

An analysis of the impact of Eocene climate and environmental changes on Pan-American marine mollusc assemblages

Priscila Morales-Ortega and Gerardo González-Barba

ABSTRACT

The phylum Mollusca experienced significant radiation and a broad redistribution of families during the Eocene epoch. However, these processes were interrupted by abrupt climatic and environmental events, including early Eocene hyperthermal events, a cooling trend followed by rapid warming in the middle Eocene, and a subsequent cooling phase in the late Eocene. Recent research has sought to correlate molluscan faunal associations to elucidate regional palaeoenvironmental changes and shifts in species distribution. In this study, we correlate four Pan-American marine provinces: Northeastern Pacific Ocean Province (NEPP), Southeastern Pacific Ocean Province (SEPP), Caribbean Province (CP), and Gulf Province (GP). The NEPP and GP exhibited closer interprovincial relationships, facilitated by the Tethys current during the Ypresian and Lutetian stages, with the Central American Seaway playing a crucial role in enabling faunal exchange among these provinces. Our results also indicate maximum marine biodiversity of molluscs coincided with hyperthermal events. In the NEPP, peak biodiversity occurred during the Ypresian (early Eocene Climatic Optimum), while in the GP it was observed during the Bartonian (middle Eocene Climatic Optimum). The Priabonian in the NEPP marked a phase of faunal redistribution, possibly driven by changes in surface current dynamics in the northwestern Pacific. By contrast, cooling intervals in the GP were associated with marked reductions in taxonomic richness. In the SEPP, affinities with Northern Hemisphere provinces during the Bartonian and Priabonian are likely attributable to the northward drift of the South American plate and the persistence of Tethyan faunal elements.

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INTRODUCTION

The Eocene was one of the most active epochs in Earth's geological history. Climatic events during this epoch are known to be associated with the movement of tectonic plates, shifting ocean currents, significant changes in atmospheric circulation, alterations in biogeochemical cycles, and even variation in orbital cycles; all of these variations resulted in a constantly changing and highly variable biosphere (Coxall and Pearson, 2007; Collins, 2011; Westerhold et al., 2012; Gebhardt et al., 2013).

The phylum Mollusca is one of the most studied groups of the epoch, as there was radiation and a wide distribution of families globally. However, this was "interrupted" by progressive and abrupt events in geological, environmental and climatic conditions during the early Eocene (hyperthermal), middle Eocene (cooling trend and sudden warming), and late Eocene (cooling) (Piccoli and Savazzi, 1983; McGowran et al., 2000; Oleinik, 2001; Squires, 2003; Lozouet, 2014; Das and Halder, 2018; Hutchinson et al., 2021). These events had repercussions on the marine biota, so in recent years, attempts have been made to correlate the faunal assemblages of molluscs from different parts of the world to understand regional palaeoenvironmental changes and shifts in the geographical redistribution of species (Coxall and Pearson, 2007; Das and Halder, 2018; Foster et al., 2020). Several authors have contributed to the correlation of molluscan faunas, including Piccoli and Savazzi (1983), who studied Late Eocene benthic molluscs from France, Italy, Somalia, Indonesia, and Japan; Saul and Squires (1997), who examined Cretaceous and Cenozoic gastropods from Pacific North America; Squires (2003), who focused on turnovers of marine gastropod faunas during the Eocene-Oligocene along the Pacific coast of North America, from Washington to the Baja California Peninsula; Oleinik (2001), who analysed Eocene gastropods from the Kamchatka Peninsula; and Das and Halder (2018), who explored Paleocene–Eocene gastropod paleobio-

geography. For this reason, the objective of this study was to establish a correlation between these marine molluscs reported in different formations of the American continent and to ascertain how climatic and environmental changes that transpired during the Eocene influenced the distribution and dispersion of the fauna in question.

Eocene Climatic and Environmental Events

The early Eocene was characterised by the highest mean annual temperatures of the entire Cenozoic Era, with relatively low pole-to-pole temperature gradients and high precipitation in an ice-free world (Zachos et al., 2001). Between ≈55 and ≈52 Ma, there was a series of short-term changes in the carbon isotope composition of the ocean; these changes occurred due to the release of carbon from the sea to the atmosphere, which caused an increase in ocean surface temperature of ≈4 to 8 °C (Galeotti et al., 2010). These short-term hyperthermal events are known as the Paleocene-Eocene Thermal Maximum (PETM or ETM1), which marks the start of the Eocene; and the Eocene Thermal Maximum 2 and 3 (ETM2 and ETM3) (Lunt et al., 2011; Thomas et al., 2018). The most recently accepted hypothesis is that orbital parameters such as eccentricity and obliquity may have triggered ETM2 and ETM3 events, especially (Galeotti et al., 2010; Lunt et al., 2011). These thermal events significantly perturbed planktonic and benthic foraminifera. However, the regional and global impact on other marine fauna remains unknown (Galeotti et al., 2010; Lunt et al., 2011; Sexton et al., 2011).

On the other hand, the middle Eocene marked the transition from a warm to a cold climate, which began ≈49 Ma ago (Bohaty et al., 2009; Westerhold et al., 2020). Carbon and oxygen isotopes indicate a shift towards global cooling. It is now recognised that the causes of the cooling have been attributed to a significant decrease in greenhouse gases (mainly CO₂), a change in ocean circulation patterns, and global heat transport, which resulted in a cold climate at the end of the Eocene

(Speelman et al., 2009; Straume et al., 2022). However, during this period of global cooling, there was a significant reversal of warming in the Bartonian. This sudden and temporary warming event is known as the Middle Eocene Climatic Optimum (MECO) (Bohaty and Zachos, 2003).

The MECO is a warming period characterised by increased atmospheric CO₂, with a maximum concentration of 4,000 ppm, the highest amount of CO₂ detected during the epoch (Bohaty and Zachos, 2003; Pearson, 2010). The increase in this gas was driven by the rate of expansion of the ocean floor, metamorphic decarbonisation reactions between Australia and Antarctica, and an increase in volcanism in the region, in addition to continental drift and the collision of India with Asia (formation of the Himalayas). However, the exact timing of atmospheric CO₂ release is still unknown (Bohaty and Zachos, 2003). Additionally, a surface temperature increase of the Tethys Sea between 32 and 36 °C has been reported (Cramwinckel et al., 2023), as well as acidification of the deep sea. This event is estimated to have lasted ≈500 ka, with a maximum warming of <100 ka (Bohaty et al., 2009; Spofforth et al., 2010).

After the MECO, oxygen isotopic records indicate a return to cooling at ≈40 Ma (Bohaty and Zachos, 2003). Undoubtedly, the climatic transition from the late Eocene to the early Oligocene is the most prominent Cenozoic (Hutchinson et al., 2021). This change was primarily marked by (1) the cooling of Antarctica due to tectonic plate reorganisation and related changes in ocean circulation controlling poleward heat transport and (2) a threshold response to decreasing atmospheric CO₂, which determined the Earth's modern glacial climate (Coxall and Pearson, 2007; Gebhardt, 2013; Hutchinson et al., 2021; Straume et al., 2022). This cooling brought significant climatic and geographical changes, while the flora and fauna registered a global shift towards species more adapted to the cold climate (Fenero et al., 2010; Hutchinson et al., 2021). However, the fossil record documents a gradual turnover pattern indicating an adjustment to food and nutrient availability changes, habitat, and climatic regime (Coxall and Pearson, 2007).

MATERIAL AND METHODS

One of the study's primary objectives was to document the species of molluscs belonging to the Bivalvia, Gastropoda, Cephalopoda, and Scaphopoda classes, as recorded in various Pan-American

lithostratigraphic formations. A review of the mollusc fauna of the United States of America (USA), the West Coast and the Gulf Coast, as well as Mexico (Baja California Sur, Chiapas, Tamaulipas, and Nuevo Leon), Central America (Jamaica), and Peru (North and Central South) was conducted. Each item recorded in the dataset was analysed and recorded under certain conditions.

Dataset Preparation

We reviewed each faunal list to obtain the most significant quantity and quality of the genera and species records (Supplementary Table 1). We compared each taxon with other faunal lists or databases to determine whether the genus or species is valid. After the review, we registered the data in our dataset. However, it is essential to mention that we exclude genera and/or species for the following reasons: genera or species with a question mark (?); species *affinis* (*aff.*), or *cofer* (*cf./cfr.*); genera or subgenera currently in doubt or not accepted (WoRMS, <https://www.marinespecies.org>); and genera or species with doubt in the age range.

It is important to note that the original record was the primary source of information for the localities (see Supplementary Tables 2, 3). However, we corroborate locality data, such as coordinates, lithostratigraphic formation and age range, using databases such as the Paleobiology Database (<https://paleobiodb.org/>), Mindat – The Hudson Institute of Mineralogy (<https://www.mindat.org>), and NGMDB-USGS – National Geologic Map Database Project (<https://ngmdb.usgs.gov/Geolex>) in collaboration with the United States Geological Survey (USGS) and the Association of American State Geologists (AASG), because these databases are constantly updated and contribute with additional information.

Once the taxa and locality data were confirmed, we recorded the taxonomic data, locality(ies), depositional environments, and stages (Ypresian, Lutetian, Bartonian, and Priabonian) of each taxa in our dataset. We used 'PaleoTax' (<http://paleotax.de>), which is a universal information system and a valuable tool for taxonomic work, facilitating the management of a large number of taxa. Each species, genus, family, or order can be correlated with locality, lithostratigraphic formation, depositional environments, provincial data, and more, depending on the quantity and quality of the information recorded in this dataset. Likewise, we categorised the species into four palaeobiogeographic provinces based on the works of Piccolli

and Savazzi (1983), Oleinik (2001), Squires (2003), and Das and Halder (2018):

- Northeastern Pacific Ocean Province (NEPP): Washington, Oregon, California, USA; and Baja California Sur, Mexico.
- Southeastern Pacific Ocean Province (SEPP): Peru.
- Caribbean Province (Caribbean or CP): Chiapas, Mexico, and Jamaica.
- Gulf Province (Gulf or GP): Texas, Louisiana, Mississippi, Alabama and Florida, USA; and Nuevo Leon and Tamaulipas, Mexico.

Furthermore, the software provides tools such as PaleoTax/Map (<https://www.paleotax.de/map>), which were utilised to generate maps of the localities (with additional detail added using CoreIDRAW 2021). In addition, the PaleoTax/Graph programme (<https://www.paleotax.de/pgraph>) was employed to create bar graphs based on the number of species (percentage) for each order, thereby facilitating the identification of orders within each class (Bivalvia, Cephalopoda, Gastropoda, and Scaphopoda). Furthermore, separate bar graphs were generated for each province and stage.

Provinces Similarity Analysis

We used 'PaleoTax' and PAST software (Hammer et al., 2001) for data analysis. The PaleoTax package incorporates 'Interpreter', a dedicated tool for data analysis and output tasks. Consequently, we were able to undertake a taxa-based correlation of provinces analysis. The correlation matrix was generated using the number of taxa (genera and species) for each of the proposed provinces (NEPP, SEPP, CP, and GP) and stages (Ypresian, Lutetian, Bartonian, and Priabonian). Following the acquisition of the matrix, the data was exported to the PAST software for the execution of cluster analysis.

In PAST, we used the Bray-Curtis dissimilarity index, which has become a key tool for quantifying differences in the composition of fossil communities across stratigraphic intervals or palaeoecological localities (Bray and Curtis, 1957; Hammer et al., 2001). This index enables the evaluation of changes in taxonomic structure associated with palaeoenvironmental events, thereby facilitating the analysis of patterns of biotic replacement or extinctions (Hammer et al., 2001; Foote, 2000). To visually interpret these relationships, the results were integrated with hierarchical clustering methods, specifically UPGMA (Unweighted Pair Group Method with Arithmetic Mean), which allowed the

identification of sample groupings with ecological or temporal affinities (Legendre and Legendre, 2012). In addition, a SIMPER (Similarity Percentages) test was performed to identify the taxa contributing most to the dissimilarities between groups (Clarke and Warwick, 2001). This multivariate approach is particularly valuable in paleobiology for paleoenvironmental reconstructions and ecological succession analyses (Hammer et al., 2001; Foote, 2000).

For the similarity analysis, we employed the number of taxa recorded per province (NEPP, SEPP, CP, and GP) and per well-defined age interval (Ypresian, Lutetian, Bartonian, and Priabonian) as the primary metric (see Table 1 and Supplementary Table 1), thereby enhancing data interpretation. This approach enabled us to infer patterns of faunal exchange and to identify potential factors influencing the isolation, connectivity, and/or proximity of the provinces. In total, 15 provinces were included in the analysis (excluding CP–Bartonian, for which no data were available), which produced

TABLE 1. Synopsis of the number of localities and species per province and stage. Provinces in bold indicate the main contributors to similarity analysis (Gulf–Lutetian, Gulf–Bartonian, NEPP–Ypresian, and NEPP–Lutetian), whereas bold and underlined entries mark intervals of maximum marine biodiversity (NEPP–Ypresian and GP–Bartonian). Provinces: NEPP – Northeastern Pacific Ocean Province; SEPP – Southeastern Pacific Ocean Province; Gulf or GP – Gulf Province; and Caribbean or CP – Caribbean Province.

Stages	Province	Number of localities	Number of species
Priabonian	Gulf	75	102
	Caribbean	9	5
	SEPP	25	96
	NEPP	166	212
Bartonian	<u>Gulf</u>	<u>366</u>	<u>390</u>
	Caribbean	–	–
	SEPP	17	97
	NEPP	77	182
Lutetian	<u>Gulf</u>	<u>112</u>	<u>281</u>
	Caribbean	2	22
	SEPP	3	7
	<u>NEPP</u>	<u>248</u>	<u>230</u>
Ypresian	Gulf	102	171
	Caribbean	1	1
	SEPP	5	8
	<u>NEPP</u>	<u>227</u>	<u>275</u>

a dendrogram from which four distinct clusters were identified.

RESULTS

A total of 73 lists were reviewed for the study region, spanning records from 1915 to 2023 (see Supplementary Table 2). The review yielded 1,479 species, 557 genera, 188 families, 35 orders, 1,625 localities, and 12,626 occurrences (see Supplementary Table 1, 3). As shown in Figure 1, the number of genera and species across all molluscan classes are presented by province (NEPP, SEPP, CP, and GP) and stage (Ypresian, Lutetian, Bartonian, and Priabonian). Table 1 provides the number of localities and species recorded for each province and stage. According to the SIMPER analysis, the Gulf-Lutetian (16.04% contribution), Gulf-Bartonian (15.92%), NEPP-Ypresian (14.7%), and NEPP-Lutetian (13.31%) provinces were identified as the primary contributors to dissimilarity (cumulative 59.96%) among province–stage–species combinations (see Table 1, highlighted in bold and underlined, and Supplementary Table 4). This pattern suggests that a relatively small set of ecologically efficient taxa disproportionately shaped the overall signal, acting as key indicators of provincialism and differential dispersal dynamics (Vörös and Escarguel, 2019).

An overview of the percentage of species by class and paleobiogeographic province was conducted (Table 2). The results indicate a predominance of gastropods, which account for more than 55% of assemblages, except SEPP-Lutetian and SEPP-Ypresian. The high preservation potential of gastropods is largely attributable to their compact and robust shells, which enhance fossilisation and confer greater resistance to diagenetic processes. By contrast, cephalopods (nautiloids) possess more fragile shells, and although bivalves are also calcareous, their shells are more susceptible to fragmentation depending on the taphonomy conditions (Frýda, 2005; Ponder and Lindberg, 2008). Based on these observations and the patterns shown in Figure 2, we were able to identify and infer the dynamics of molluscan faunal exchange during the period, as well as the influence of global and regional geological, environmental, and climatic events on taxa distribution (Morales-Ortega et al., 2015, 2016; Das and Halder, 2018). The four groups identified based on the available data are analysed below.

Cluster One: Gulf Province (GP)

Gulf Province during the Lutetian and Priabonian stages. After the hyperthermal events of the early Eocene, the beginning of the middle Eocene was marked by a “stable climate” (Zachos

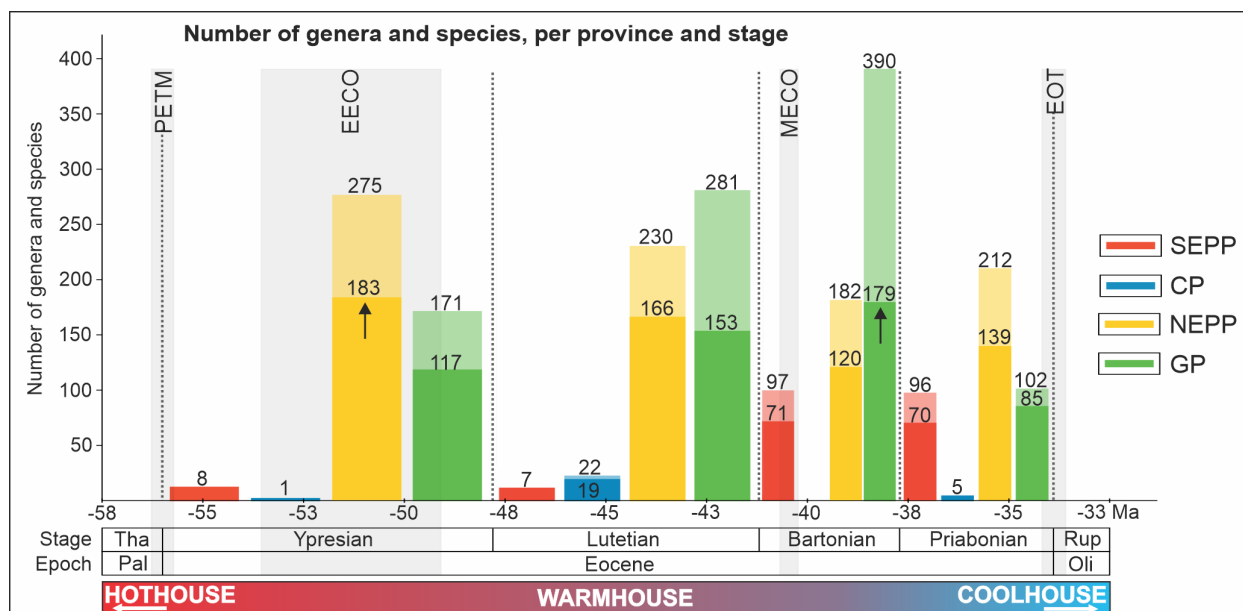


FIGURE 1. A total number of genera (sharp bars) and species (dim bars) was recorded at each stage. The four paleoclimatic events (PETM, EECO, MECO, and EOT) are observed (grey bars). Black arrows indicate the stage with the maximum marine biodiversity of molluscs (based on Huyghe et al., 2012 and Westerhold et al., 2020). Provinces: NEPP – Northeastern Pacific Ocean Province; SEPP – Southeastern Pacific Ocean Province; Gulf or GP – Gulf Province; and Caribbean or CP – Caribbean Province.

TABLE 2. Overview of the five defined clusters. Each cluster indicates the number of formations present in each province and stage. Furthermore, the percentage of species per class, province, and stage is to be included. Provinces: NEPP – Northeastern Pacific Ocean Province; SEPP – Southeastern Pacific Ocean Province; Gulf or GP – Gulf Province; and Caribbean or CP – Caribbean Province.

Cluster	Provinces	Number of Formations	% of species per class			
			Bivalvia	Cephalopoda	Gastropoda	Scaphopoda
1	Gulf-Priabonian	6	23.7	1.2	73	2.4
	Gulf-Bartonian	9	22.9	1.1	74.9	1.1
	Gulf-Lutetian	9	27.8	1.6	69.3	1.3
	Gulf-Ypresian	7	26.5	< 2	69.8	1.7
2	SEPP-Priabonian	3	30.2	2.9	67.1	–
	Caribbean-Priabonian	4	36	–	60	4
	SEPP-Bartonian	4	30.9	2.8	64.8	1.4
	Caribbean-Lutetian	2	–	–	100	–
3	NEPP-Priabonian	10	39.9	< 1	57.8	1.4
	NEPP-Bartonian	5	37.5	1.6	59.3	1.6
	NEPP-Lutetian	12	38.7	1.8	57.7	1.8
	NEPP-Ypresian	19	34.8	< 1	63.1	1.6
4	SEPP-Lutetian	3	42.9	14.3	42.9	–
	SEPP-Ypresian	2	37.5	12.5	50	–

et al., 2008); in fact, it has been pointed out as an interval of relative cooling, known as the “Lutetian cooling” (Huyghe et al., 2012). Evidence that may explain this cooling is the presence of temporary ice sheets in both hemispheres (Lear et al., 2000; Zachos et al., 2008; Payros et al., 2009; Huyghe et al., 2012). This cold stage could have influenced the average annual temperatures of the sea surface, a fact that could have caused the formation of temperate zones (or less hot) and that provided a favourable context for the increase in marine biodiversity (Huyghe et al., 2012). Similarly, a regional transgression (presence of glauconite, Figure 3) could also favour the rise in the mollusc fauna during the GP-Lutetian. Transgressions can increase the benthic zone and, therefore, favourable light, food, and oxygen conditions for the benthos (Huyghe et al., 2012; Das and Halder, 2018).

The presence of genera similar to those found in tropical, subtropical, and temperate environments suggests (bivalve: *Pitar*; gastropods: *Agaronia*, *Ancilla*, *Architectonica*, †*Ficopsis*, *Hexaplex*, *Raphitoma*, *Siphonalia*, †*Stellaxis*, †*Terebrifusus*; scaphopod: *Dentalium*) an adaptable faunal mix that could survive in changing conditions (Figure 3). This may have allowed for an increase in the GP-Lutetian genera and species (Figure 1). For example, the Paris Basin was characterised by warm summers and relatively cold winters; the “cooling” was not a negative factor in establishing

the maximum marine biodiversity of the Parisian Lutetian (Huyghe et al., 2012, p. 588).

The observed patterns indicate a connection between the Lutetian and Priabonian of the GP (Figure 2), which may be attributed to the occurrence of genera and species associated with cooler environmental conditions. However, unlike the Lutetian, where conditions were favourable for the increase in fauna, there was a significant reduction in genera and species in the Priabonian; it has been estimated that the turnover of molluscs was over 90% (Hansen, 1987; Ivany et al., 2000; Hansen et al., 2004). However, using the data obtained in this work, we estimated a 52% decrease in genera and a 74% decrease in species concerning the GP-Bartonian (Figure 1), which indicates that the environmental disturbances with a cooling tendency that occurred from the end of the middle Eocene to the Eocene-Oligocene transition (EOT) had a significant impact on mollusc assemblages (Ivany et al., 2003).

Some authors consider the late Eocene a time of regional “extinction” waves (Hansen, 1992; Ivany et al., 2000; Hansen et al., 2004). The “loss” of mollusc faunas (mainly species level) is deemed to have occurred in a prolonged and transitional manner, with warm-water taxa being more affected than cold-water taxa, including the loss of endemic taxa adapted to high temperatures (Ivany et al., 2003; Foster et al., 2020). Also, the ‘icehouse’ tran-

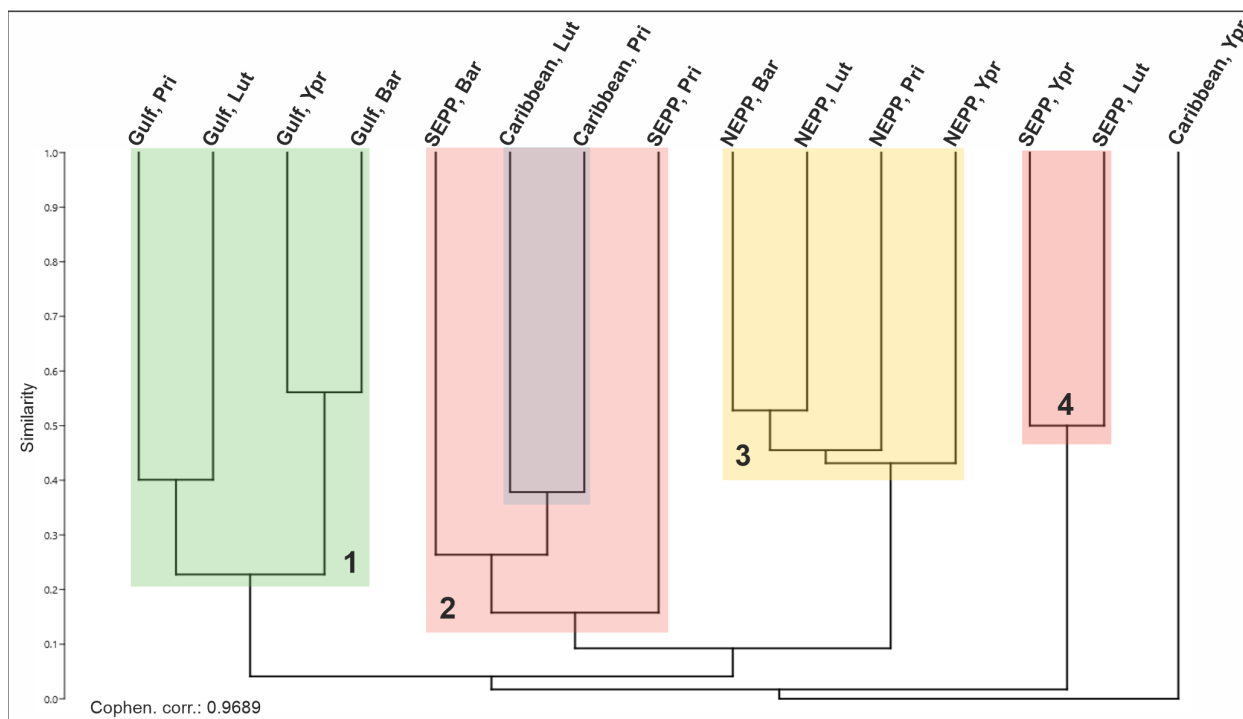


FIGURE 2. Similarity analysis showing four defined clusters (Bray-Curtis's dissimilarity). Provinces: NEPP – North-eastern Pacific Ocean Province; SEPP – Southeastern Pacific Ocean Province; GP – Gulf Province; CP – Caribbean Province; Gulf or GP – Gulf Province; Caribbean or CP – Caribbean Province. Stages: Ypr – Ypresian; Lut – Lutetian; Bar – Bartonian; Pri Priabonian. Stages: Ypr – Ypresian; Lut – Lutetian; Bar – Bartonian; Pri Priabonian.

sition may have influenced the migration of taxa, caused by the reduction of paleobiogeographic belts parallel to the Equator, which moved southwards in response to low temperatures; this may have caused warm-water species to migrate in an equatorward direction (Hansen et al., 2004; Westerhold et al., 2020). This may explain why the late Eocene to EOT is not considered a global extinction event but a 'faunal rotation event' (Dockery, 1986; Dockery and Lozouet, 2003; Hansen et al., 2004).

Similarly, a decrease in sea level can affect the diversity of habitable areas, just as circulation patterns can force a biogeographic change in taxa; both factors can justify a decrease in taxa. However, the reduction in temperature is the most notable factor in faunal change (Hansen, 1987; Ivany et al., 2000; Hansen et al., 2004; Das and Halder, 2018). The different responses of molluscs to cooling and warming events highlight the relationships between evolutionary history, ecological structure and environmental change; therefore, a significant change in environmental state ('cold or hot') will "affect" biodiversity, but the effect ('positive or negative') will depend on the initial state of the system (Ivany et al., 2003; Foster et al., 2020).

Gulf Province during the Ypresian and Bartonian stages. The Gulf Province show high inter-provincial similarity (Das and Halder, 2018). This similarity of these provinces reflects their geographic proximity, and the genera and species reported in this work are known to exhibit faunal similarities with those of the Mediterranean and Central Europe. This indicates and reinforces the idea that the transatlantic Tethys current drove the planktonic larval transport (Das and Halder, 2018). Today, major surface currents are known to transport marine fauna from the eastern Atlantic westward across the mid-Atlantic, developing some resemblance between the faunas of Western Europe and Eastern America (Silva et al., 2014; Cox, 2020).

On the other hand, the assemblages of molluscs and sedimentary sequences reported in this work are some of the consequences of changes in sea level, which allowed the dispersal of species and occupation of new niches during the Ypresian and Bartonian in the GP (Figure 3), the recorded environments are mostly shallow. The lithostratigraphic formations reported in this work contain calcareous sands, marls, silts, and clays, both lithified and non-lithified (see Supplementary Table 3).

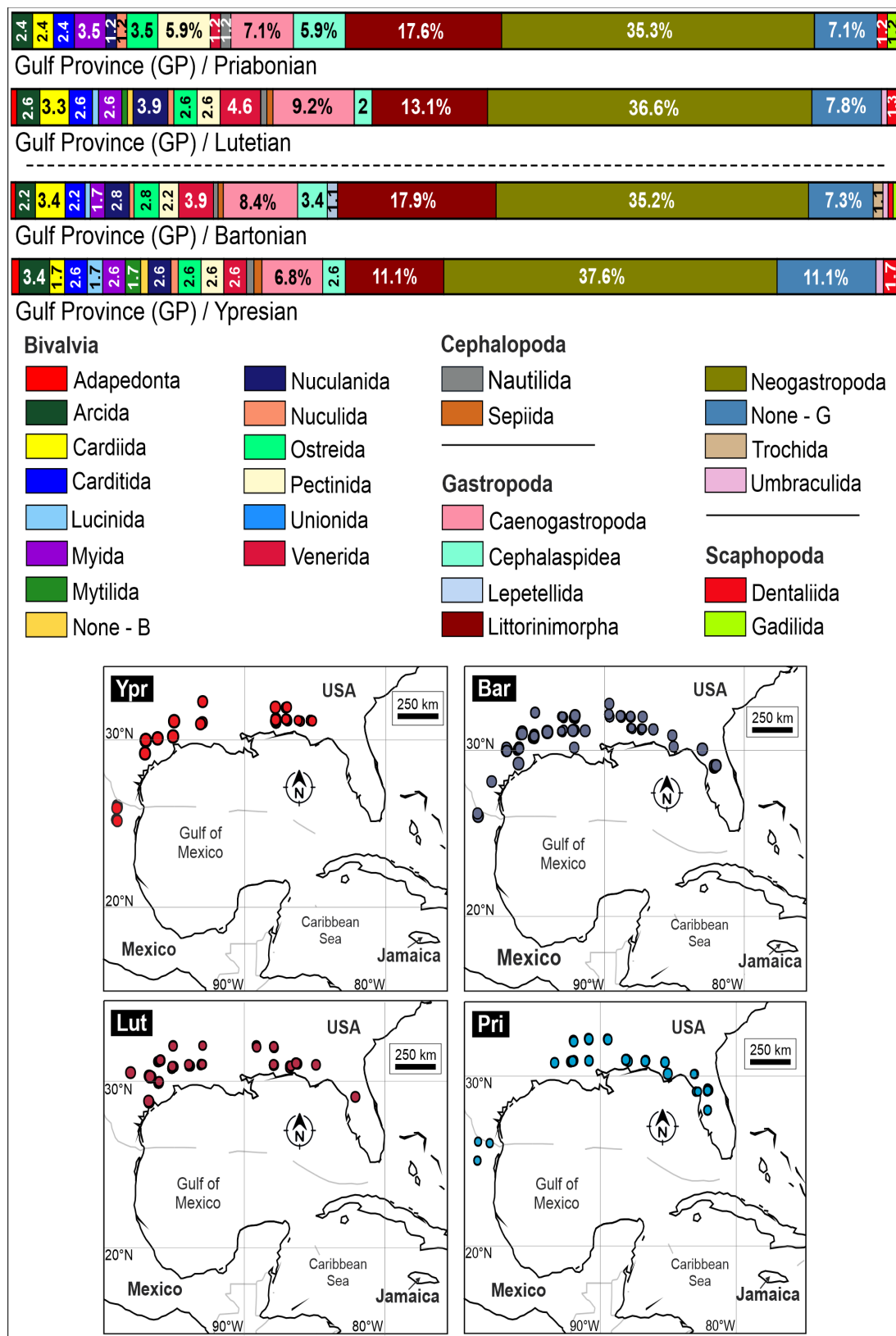


FIGURE 3. Cluster one: Gulf Province. Maps show the geographic distribution of localities by province and stratigraphic stage. Coloured bars represent the relative proportion of species assigned to each order within the corresponding provinces.

These fine-grained deposits contain phosphates and minerals such as glauconite (deposited in the shallow marine sedimentary environment), which is related to transgressions (associated with maximum flooding surfaces) (Figure 3 and Supplementary Table 3) (Garrison, 2009). Global sea-level changes estimated during the early and middle Eocene could have favoured this type of shallow environment. In addition, the GP is in a passive margin, allowing a slow sedimentary deposition (Garrison, 2009; Miller et al., 2020; Zhao et al., 2022).

However, it is interesting to mention that the fauna is related to the hyperthermal events of the early Ypresian (EECO) and the Bartonian (MECO), especially in the GP (Lunt et al., 2011; Thomas et al., 2018; Foster et al., 2020). During the Eocene, two major warming events –EECO and MECO– peaked in the late Ypresian and Bartonian. Overlaid on these trends were shorter, intense warming episodes known as hyperthermals, with the PETM and ETM2 (≈ 54 Ma) being the most extreme (Zachos et al., 2010; Foster et al., 2020). These hyperthermals are characterised by injections of carbon into the atmosphere, ocean acidification, and variable increases in sea surface temperature (Zachos et al., 2008, 2010; Lunt et al., 2011; Foster et al., 2020). Foster and collaborators (2020) have mentioned that the environmental changes associated with hyperthermal events were not harmful to shallow-water mollusc faunas despite increased temperatures, acidification, and deoxygenation. Instead, it is inferred that these hyperthermal events did produce slight changes, but these could have been reversible and short-lived.

In this work, we reported 117 genera and 171 species for the GP-Ypresian, and 179 genera and 390 species for the GP-Bartonian (Figure 1); in both stages, the highest mean annual temperatures for the entire Cenozoic Era have been recorded (Pearson and Palmer, 2000). However, the taxonomic richness was not “affected” by the hyperthermal events, especially during the Bartonian, which could be considered as the maximum marine biodiversity stage of the Gulf Coastal Plain, unlike the maximum marine biodiversity reported for the Lutetian in the Paris Basin (Huyghe et al., 2012).

Although we attribute the GP-Bartonian to be the stage of maximum marine biodiversity of molluscs, the early Eocene hyperthermal events (Ypresian) of this same province did not observe “negative effects” on the reported fauna. In contrast, the molluscs exhibited resilience to the dele-

terious conditions, predominantly those coinciding with the PETM, which allowed unoccupied areas to be recolonised once the environmental conditions improved (Foster et al., 2020). Geochemical studies have suggested that during the PETM (similar to ETM2 and ETM3 but with different intensities), there was a reduction in calcite compensation depth (CCD) and ocean surface acidification (Foster et al., 2020). In this sense, the lysocline reduction may explain the extinction of deep-sea benthic foraminifera (Molina, 2007; Speijer et al., 2012), while acidification may harm the metamorphosis, growth, and survival of planktonic mollusc larvae (Talmage and Gobler, 2009). However, the molluscs reported in this study for the GP-Ypresian mostly suggest a shallow water environment (Figure 3), so it is possible that these environments were not affected by CCD and acidification. Molluscs could cope with the acidification of the oceans, given that they regulate the pH and chemistry of the carbonates in their environment (Foster et al., 2020).

After the hyperthermal events of the early Eocene, the development of the epoch was led by a global cooling trend until the sudden warming of the Bartonian, better known as MECO (Boscolo-Galazzo et al., 2014; Savian et al., 2014). This hyperthermal event resembled its predecessor from the early Eocene, with increased atmospheric carbon dioxide (Bohaty et al., 2009). However, this hyperthermal did not impact the species richness of the GP-Bartonian; in fact, this stage is considered the maximum marine biodiversity of the province (Figure 1). In the same way that during the early Eocene, in the Bartonian, temperature rise, ocean acidification, and deoxygenation were not detrimental, persisting in the idea that shallow environments “did not undergo detrimental changes” for the fauna (Figure 3). Furthermore, during this stage, a sea level rise of ≈ 40 m (≈ 40.1 Ma) (Miller et al., 2020) has been recorded, which triggered transgressions (presence of glauconite) (Figure 3) and may have favoured the development of shallow shelves, allowing remarkable species diversification but did not lead to long-term changes in faunal diversity or composition at the genus level (Figure 1) (Huyghe et al., 2012; Das and Halder, 2018; Foster et al., 2020). It is important to mention a noticeable increase in GP-Bartonian species; this increase could be explained by species stratigraphic ranges being short, therefore exhibiting higher turnover rates across the age range, suggesting that Eocene hyperthermal events impacted benthic mollusc turnover rates at the species level,

but not at the genus level (Figure 1) (Foster et al., 2020).

The hyperthermal events during the early and middle Eocene did not have a “negative effect” on molluscan assemblages; instead, these benthic communities (genera) were warm-water tolerant and thus tolerated the high temperatures. Historically, the mollusc faunal assemblages of the Gulf Coastal Plain have been dominated by taxa that have had high-temperature tolerance since the Mesozoic greenhouse periods (Foster and Sebe, 2017; Foster et al., 2020). Furthermore, most of them are associated with warm-temperate climates and tend to have broader niches than tropical species, which explains the low impact of hyperthermal events (Foster et al., 2020).

The middle Eocene is widely regarded as the period of maximum biodiversity for molluscs, particularly within the Paris Basin (middle Lutetian) and Gulf Province (GP-Bartonian). Climate reconstructions for this age interval demonstrate a ‘stable climate’ within a long-term cooling trend. These stable conditions provided a favourable context for the increase and dispersal of marine biodiversity, while hyperthermal events allowed for high temperature tolerance and/or thermal plasticity at the species level (Huyghe et al., 2012; Foster et al., 2020).

Cluster Two: Southeastern Pacific Ocean (SEEP, Bartonian–Priabonian) and Caribbean (CP, Lutetian–Priabonian) Provinces

Most of today’s continental masses were already recognisable at the onset of the Cenozoic era. However, their relative positions and outlines continued to change until they attained their present geographical configuration (Ubilla et al., 2009). The South American plate shifted both longitudinally, allowing the expansion of the Atlantic and promoting the ‘Andean orogeny’, and latitudinally, giving rise to the Caribbean Island Arc and the opening of the Drake Passage (≈ 45 Ma) (Ramos, 2009; Ghiglione, 2016). This displacement may have permitted a ‘neighbourhood’ between the SEPP and CP provinces, thereby supporting evidence of the faunal exchange that occurred during this period because of the Tethys current, even though by the end of the Eocene this current was almost entirely closed (Morales-Ortega et al., 2015; Zhao et al., 2022).

On the other hand, the marine sedimentary sequences reported in both provinces may be a consequence of the sea level variations that occurred during the middle and late Eocene, which

are related to tectonic development. A ≈ 40 m rise in sea level under near-ice-free conditions during the MECO (≈ 40.1 Ma) and a subsequent fall in sea level of ≈ 20 m (39.5 Ma) have been recorded (Monges, 1995; Bohaty and Zachos, 2003; Miller et al., 2020). Additionally, a drop in sea level of approximately 40 m during the late Eocene was recorded, followed by a rise in sea level in almost ice-free conditions around ≈ 35 Ma (sea-level data from Ocean Drilling Program -ODP- sites 1209 - Western Pacific- and 1218 -Eastern Pacific-) (Miller et al., 2020). These conditions may have favoured the development of coastal plains, the inner and outer shelves, and deep environments (deep subtidal and submarine fans), allowing molluscs to be present (Figure 4).

Moreover, it is widely recognised the Tethys currents allowed faunal exchange between the Atlantic and Pacific oceans (Morales-Ortega et al., 2015). The northward drift of the South American plate may have further fostered biogeographic proximity with taxa documented from the Caribbean Province. The idea persists the surface circulation of the Tethys Ocean enabled faunal dispersal across the Atlantic, particularly during periods when this oceanic basin was narrower, thereby sustaining continuous biotic interchange within the equatorial region (Figure 4) (Piccoli and Savazzi, 1983; Morales-Ortega et al., 2015). Das and Halder (2018) mention that the Caribbean Northern South American Province (comprising Colombia, Peru, Venezuela, Jamaica, Trinidad and Tobago, Panama, and Haiti) displayed a notable similarity in their generic composition throughout the Eocene. In this work, we contend that SEPP and CP exhibit a comparable biogeographic relationship to that described by Das and Halder (2018), although this affinity appears to have been more pronounced during the middle and late Eocene. Furthermore, the Peruvian assemblages (SEPP-Bartonian and SEPP-Priabonian) and Caribbean assemblages (CP-Lutetian and CP-Priabonian) are associated with shallow-marine environments and warm to subtropical conditions, characteristic of the Tethyan Realm (Piccoli and Savazzi, 1983; Lozouet, 2014; Das and Halder, 2018; DeVries, 2019).

Cluster Three: Northeastern Pacific Ocean Province (NEPP)

Based on the patterns observed, the NEPP–Ypresian appears to represent the peak of marine molluscan biodiversity (Figure 1), in contrast to the Paris Basin (middle Lutetian) (Huyghe et al., 2012) and the GP–Bartonian (this study). One possible

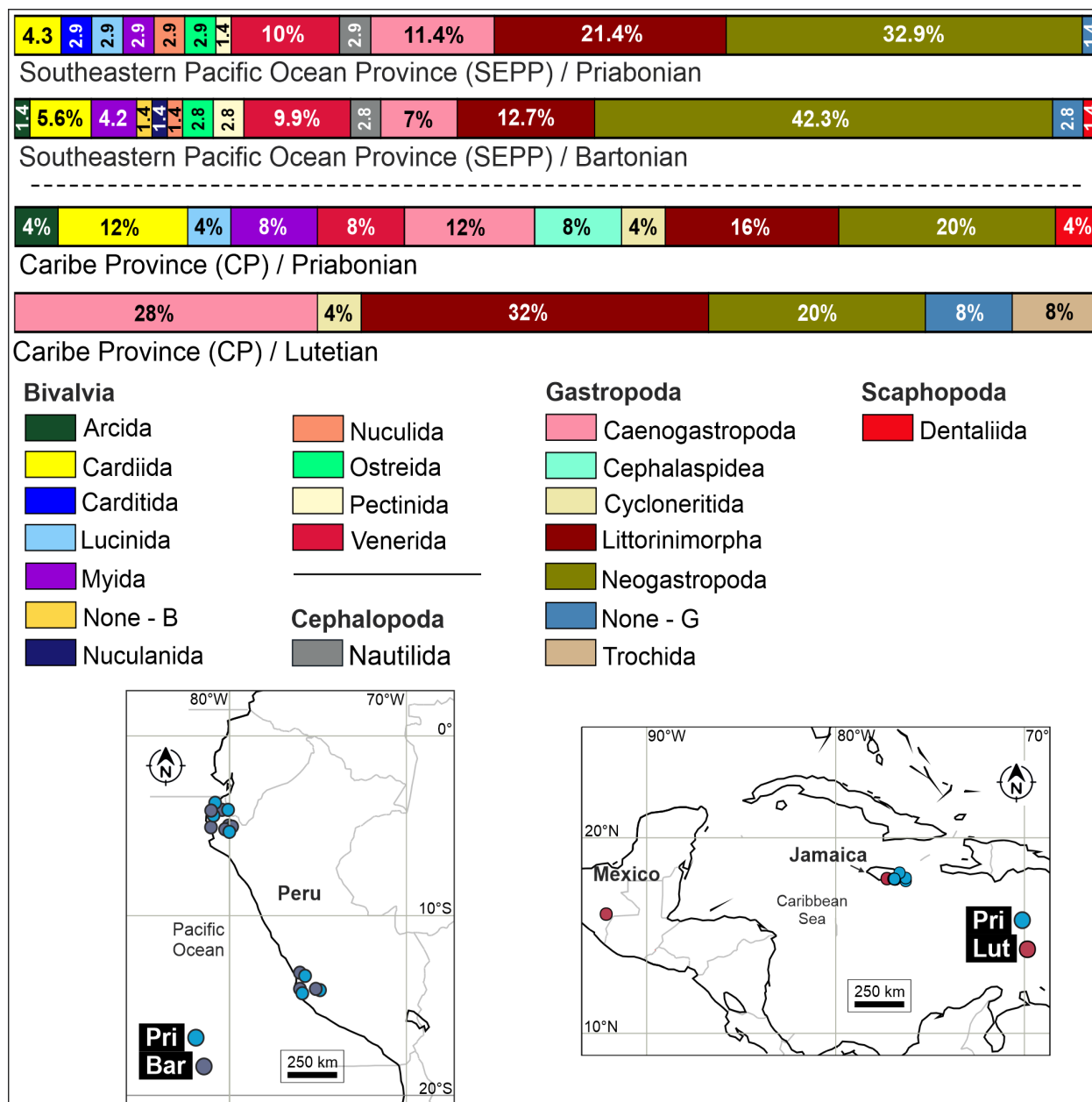


FIGURE 4. Cluster two: southeastern Pacific Ocean Province (SEPP) –Bartonian and Priabonian–, and Caribbean Province (Caribbean or CP) –Lutetian and Priabonian. Maps show the geographic distribution of localities by province and stratigraphic stage. Coloured bars represent the relative proportion of species assigned to each order within the corresponding provinces.

explanation for the higher number of recorded species (275 species; Figure 1) is the greater abundance of lithostratigraphic deposits, which in turn enhances the likelihood of specimen preservation and species identification. However, the number of genera also reaches its maximum for the entire province (183 genera; Figure 1), supporting the interpretation that the NEPP–Ypresian represents the highest level of marine biodiversity (Figure 1),

despite the hyperthermal events of the early Eocene.

The taxa reported from the Ypresian (primarily) and Lutetian of the NEPP show notable similarities to faunas documented in Western Europe and Eastern North America (Silva et al., 2014). Surface currents facilitated the migration of taxa with Tethyan affinities between the Atlantic and the Indo–West Pacific via the Central American Seaway (Oleinik, 2001; Morales-Ortega et al., 2015,

2018; Zhao et al., 2022). The occurrence of these Tethyan taxa attests to such connectivity, as reflected in bivalve genera such as *Anodontia*, *Chama*, †*Cubitostrea*, †*Gryphaeostrea*, *Plicatula*, and *Varicorbula*; gastropods including *Athleta*, *Bathytoma*, *Campanile*, †*Clavilithes*, *Conomitra*, †*Crommium*, *Cypraea*, †*Cypraedia*, †*Domenginnella*, †*Eocithara*, †*Eocypraea*, †*Eosurcula*, *Euspira*, *Galeodea*, *Gemmula*, *Harpa*, †*Keepingia*, *Latirus*, *Mesalia*, *Metula*, *Oliva*, †*Platyoptera*, †*Pleurofusua*, *Puncturella*, *Ringicula*, †*Strepsidura*, †*Surculites*, †*Trypanotoma*, *Turbonilla*, †*Velates* and *Xenophora*; and cephalopods such as †*Aturia*, †*Eutrephoceras*, and *Nautilus* (Figure 5).

The NEPP is situated on an active continental margin (Ubilla et al., 2009). Geological processes from the Mesozoic have profoundly shaped the western margin of North America to the present. The western United States and northwestern Mexico lie along a convergent margin, where the now-extinct Farallon Plate subducted beneath the North American Plate, driving abrupt changes in coastal topography (Ubilla et al., 2009; Garrison, 2009; Santiesteban-Mendivil, 2019). The resulting topographic diversity along the NEPP coast, caused by subduction and orogeny, may have facilitated the persistence of molluscan faunas (Ubilla et al., 2009). The coastline of this active margin is characterised by steep, narrow, rocky shores, which are among the most biologically productive benthic habitats of the intertidal zone, with high levels of in situ primary production (Satheesh and El-Sherbiny, 2022). The environments recorded for the NEPP during the Ypresian and Lutetian, ranging from coastal settings (rocky shores, lagoons, estuaries, bays and deltas) to deeper marine environments (deep subtidal, submarine canyons, submarine fans, bathyal, and abyssal zones), are consistent with those expected in an active margin (see Supplementary Table 3 and Figure 5).

Molluscs are abundant in the intertidal zone, and their physiological adaptations allow them to survive extreme temperature, salinity, humidity, and wave action changes (Satheesh and El-Sherbiny, 2022). Molluscs that adapted to these conditions were able to resist the increase in sea surface temperatures and deoxygenation during the epoch. Furthermore, there is a possibility that these organisms migrated both latitudinally (towards high latitudes) and vertically (downwards in depth). It has been observed that during the Eocene, the fauna prospered within the latitudinal range of 30° to 50° across both hemispheres (Dzik and Gaździcki, 2001; Das and Halder, 2018). It is

deduced that the tropical and subtropical belts were significantly broader than their modern-day counterparts. In contrast, the vertical distribution of molluscs is influenced by their physiological tolerance to abiotic (e.g., temperature, desiccation, and light) and biotic (e.g., predation and competition) factors. The ability of most molluscs to move vertically has been suggested as a factor in their ability to survive less favourable conditions, which is possible in deep environments (Camacho, 2008; Das and Halder, 2018; Satheesh and El-Sherbiny, 2022).

Another condition that allows us to infer that the early Eocene hyperthermal events did not produce significant changes in molluscs is that an increase in temperature within the system can influence the reduction in body size, promote parasitism, and/or alter the habitat preferences (Foster et al., 2020). However, body size could not have been affected since we recorded large specimens, such as the gastropods *Campanile* sp. (Morales-Ortega and González-Barba, 2018) and *Gisortia* sp. (Perrillat, 1996); the bivalves *Crassostrea contracta* (Morales-Ortega et al., 2016), *Acutostrea gaviota* (Squires, 2018), and *Phygraea stewarti* (Squires, 2018); and the cephalopod *Nautilus sudcalifornianus* (Morales-Ortega et al., 2023). The sizes of these species resemble those recorded in the Paris Basin and northern Italy with Tethyan affinity (Squires and Demetron, 1992; Squires, 1993; Morales-Ortega et al., 2016).

Furthermore, during the early Eocene, the West Coast of the USA and the Baja California peninsula in Mexico were characterised by a warm-temperate climate (Squires, 2003), and significant rises in sea levels were also observed during this period (Squires, 2018). This interplay of elevated temperatures and rising sea levels facilitated the dispersal of warm-water mollusc species from the Tethys province to the afore mentioned regions. This led to the highest point of Eocene faunal exchange among Eurasia, North Africa, and Gulf Coasts (GP) through the 'Central American seaway' (Squires, 1987; Squires and Demetron, 1992; Lozouet, 2014; Morales-Ortega et al., 2015, 2016; Das and Halder, 2018; Squires, 2018).

On the other hand, the NEPP-Bartonian exhibits the smallest number of genera (120) and species (182) compared to the GP-Bartonian (Figure 1). Three factors can explain this decrease in NEPP-Bartonian records: (1) There could be a difference in sampling effort. (2) There may be fewer sedimentary deposits within this age range. For example, in the Adelholzen section, Germany, the

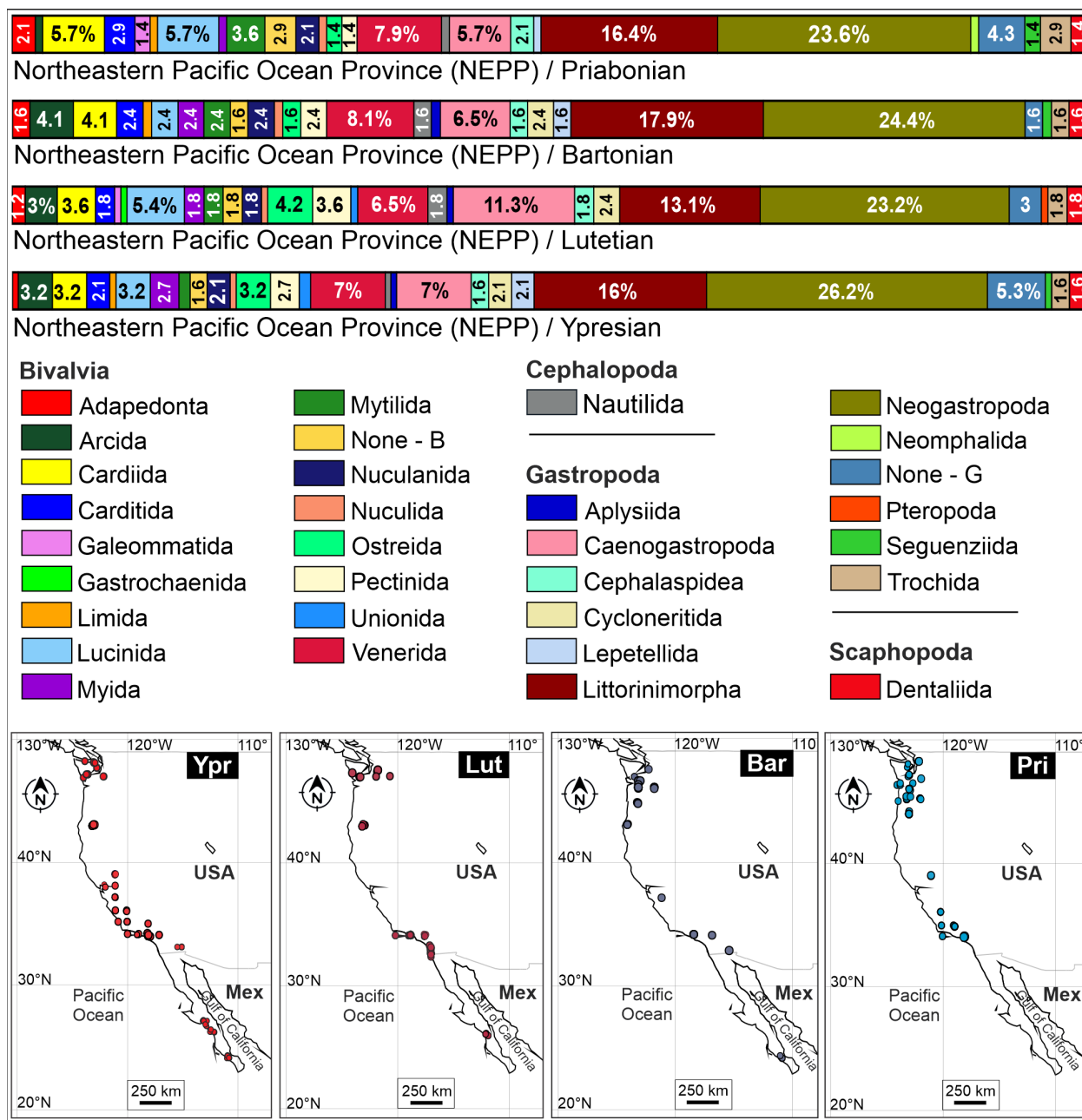


FIGURE 5. Cluster three: northeastern Pacific Ocean Province (NEPP). Maps show the geographic distribution of localities by province and stratigraphic stage. Coloured bars represent the relative proportion of species assigned to each order within the corresponding provinces.

Lutetian and Priabonian stages are widely recorded, while the Bartonian is absent (Gebhardt et al., 2013). (3) Environmental changes caused by the MECO could have affected the mollusc assemblages.

In this sense, it mentions that the effects of the MECO were not uniform worldwide (Bohaty et al., 2009). For example, low primary productivity has been reported at Site 1263 (Walvis Ridge, south-east Atlantic) due to increased surface water tem-

peratures ($\approx 4^\circ\text{C}$), which likely limited primary productivity and led to the starvation of heterotrophs (mainly planktonic foraminifera) (Boscolo-Galazzo et al., 2014). On the other hand, in Monte Cagnero (Umbria-Marche Basin), Italy, an increase in primary productivity is indicated, which was probably stimulated by an increased aeolian supply to surface waters (Savian et al., 2014); an increase in nutrients (particularly nitrogen or phosphorus)

may generate ‘dead zones’ (Dybas, 2005; Foster et al., 2020).

The development of ‘dead zones’ is a significant driver of ecological change in modern shallow-water marine ecosystems and perhaps one of the most critical drivers of benthic invertebrate loss (Dybas, 2005; Díaz and Rosenberg, 2008). Changes in water circulation patterns, wind, high temperatures, an increase in runoff, and an excess of nutrients are the main factors in whether ‘dead zones’ expand or not and, as a consequence, decrease marine biodiversity (Dybas, 2005; Díaz and Rosenberg, 2008; NOAA, 2023). Currently, ‘dead zones’ are developing in regions of the Gulf Coastal Plain, surrounding the mouth of the Mississippi River, and coastal areas of the Northwestern Pacific (Dybas, 2005; Díaz and Rosenberg, 2008; Gebhardt et al., 2013; Sluijs et al., 2014; Foster et al., 2020; NOAA, 2023). Although this work does not have data available on the factors mentioned above (winds, runoff, etc.), the ‘dead zones’ could explain the low presence of molluscs during the Bartonian of the NEPP. These zones may have been temporary, and benthic communities were able to rapidly recolonise habitats without significant renewal, which could explain the increase in genera and species during the Priabonian (Figure 1) (Foster et al., 2020). However, it is important to note that the effects of MECO are still unknown in this region (NEPP).

In a certain way, the NEPP during the Priabonian “does not record” the events that occurred during the time, mainly the cooling, compared to the GP-Priabonian, which shows a dramatic decline in genera and species (Figure 1). NEPP-Priabonian registers a slight increase in the record of genera (139) and species (212) concerning the NEPP-Bartonian (Figure 1). As mentioned, the Tethys Sea provided a migratory route. However, at the end of the Eocene, this sea became narrower and reduced lineage persistence. For example, molluscs began to diverge from the middle Eocene (Zhao et al., 2022). This is reflected by the presence of specific genera, such as the bivalves *Adula*, *Bathymodiolus*, *Calyptogena*, †*Elongatolucina* (endemic, Saul et al., 1996), *Maorithyas* (endemic, Goedert and Kaler, 1996), and *Tellidorella*; the gastropods *Desbruyeresia* (endemic, Hybertsen and Kiel, 2018), and *Thalassonerita* (endemic, Goedert and Kaler, 1996); and the scaphopod *Coccodentalium*; These genera appear from the Lutetian in the NEPP.

In the same sense, it has been mentioned that the fauna of the North American Pacific could be

differentiated into two biogeographic components. The first component could be defined by the presence of genera with Tethyan and Indo-Pacific Tethyan affinity (Tethys Realm), which can be characterised by the reported early Eocene (NEPP-Ypresian) and middle Eocene (NEPP-Lutetian) faunas (Figure 5). The second component would be represented by the fauna reported from the north-eastern Pacific during the late Eocene (NEPP-Priabonian) (Figure 5) (Oleinik, 2001; Hickman, 2015).

Climatic conditions during the late Eocene were already sufficiently different to cause differences in the composition of mollusc faunas (Piccolli and Savazzi, 1983). The North Pacific’s oceanic circulation had a pattern similar to the modern one, with a subtropical anticyclonic gyre and a subarctic cyclonic gyre as its main characteristics (Oleinick, 2001). However, the latitudinal extent, circulation intensity, and local shallow water patterns are still unknown (Oleinick, 2001). In this work, we recorded genera distributed in high and mid-latitudes, including Australasia, the northwestern and northeastern Pacific. Some genera include the bivalves, *Conchocele* (Japan, Russia), *Lucinoma* (Russia), †*Nitidavenus* (Russia), *Nuttallia* (Russia), †*Pseudocardium* (Russia), *Tivela* (Canada, Russia), and †*Vertipecten* (Canada); and the gastropods, *Argobuccinum* (Antarctica), *Bathybembix* (Tonga), *Cellana* (Antarctica), *Colus* (Japan, Russia), *Homalopoma* (Australia, Russia), †*Molopopophorus* (Russia, Canada), *Nekewis* (Japan, Russia), *Neptunea* (Antarctica, Japan, Russia), †*Parasyrinx* (Russia), and †*Turrisosyrinx* (Russia) (Piccolli and Savazzi, 1983; Oleinick, 2001; Hickman, 2015). Some of these taxa still live in the North Pacific and are potentially relevant to the biogeographic reconstruction of the Pacific Basin (Oleinik, 2001; Hickman, 2015).

During the middle to late Eocene, there were shifts in the distribution of molluscs in the north-eastern Pacific (including the CP-Priabonian). These changes showed a combination of faunas with North Pacific and Tethys affinities, evident from the presence of tropical, subtropical, and temperate taxa (Figure 5) (Oleinik, 2001; Schweitzer et al., 2006). It has been suggested that the reduction in the latitudinal range of genera with Tethys affinity was restricted to southern California during the late Eocene (Oleinik, 2001). In contrast, genera related to the North Pacific (bivalves: *Cardiomya*, †*Cryptolucina*, *Cyclinella*, †*Elongatolucina*, *Mactromeris*, *Modiolus*, *Mytilus*, *Thracia*, *Yoldia*; gastropods: †*Paraseraphs*, †*Perse*, *Rimella*) and cosmopolitan genera (bivalves: *Costacallista*, *Fimbria*, *Lucina*,

Macrocallista, *Miltha*, *Myrtea*, *Phacoides*, *Pitar*, *Tellina*, †*Venericardia*, †*Venericor*; gastropods: *Acrilla*, *Acteon*, *Bonellitia*, *Calyptraea*, *Conus*, *Crepidula*, *Exilia*, *Ficus*, *Fusinus*, *Lyria*, *Margarites*, *Odostomia*, *Olivella*, *Polynices*, *Retusa*, *Scaphander*, *Siphonalia*, *Solariella*, *Turricula*, *Turritella*) did not undergo significant changes in the latitudinal ranges. This pattern suggests that high-latitude faunas were “unaffected” by global climate changes (cooling), at least during the late Eocene. Ocean circulation patterns and climate changes limited the latitudinal migration of temperature-sensitive equatorial genera to high latitudes (Piccoli and Savazzi, 1983; Oleinik, 2001).

On the other hand, at the end of the Eocene, an increase in heteroconch bivalve fauna occurred mainly in Oregon and Washington (Figure 5; genera of the families Carditidae, Tellinidae, Cardiida, Thyasiridae, Lucinidae, Mactridae, and Veneridae) (Nesbitt, 2003; Kiel, 2006; Hickman, 2015). The heteroconchs have successfully developed morphological and physiological adaptations to extreme environments (chemosynthetic, e.g., ‘cold seep’) (Goedert and Kaler, 1996; Saul et al., 1996; Kiel, 2006). Hickman (2015) mentions that the heteroconch bivalve fauna of Oregon records the climatic transition of the late Eocene and early Oligocene, in addition to a replacement of tropical taxa by the cryophilic taxa that currently dominate the high-latitude fauna of the North Pacific.

The Priabonian in the NEPP is of great interest for the study of changes in the North Pacific region. The mixture of fauna, the ability to tolerate extreme conditions, the closure of Tethys, the change in deep and surface ocean circulation, and the diversity of marine environments caused by a tectonically active margin could favour mollusc communities within the transition to the ‘cool-house’, compared to the decrease in fauna of the GP-Priabonian (Oleinik, 2001; Schweitzer et al., 2006).

Cluster Four: Southeastern Pacific Ocean Province (SEPP), Ypresian and Lutetian

This cluster is composed of the SEPP-Ypresian and SEPP-Lutetian-Bartonian (Figure 2). In Peru (the only country included in the SEPP), the Paleogene had widely distributed but in isolated basins controlled by megaregional geological features (‘Andean magmatic arc’) and regional faults and suture zones (Monges, 1995). It is recognised that during the Peruvian Cenozoic, there were prolonged floods (transgressions) that resulted in bio-

clastic and silty sandstone deposits (DeVries, 2019).

Specifically, we report the Caballas and Negritos Formations with an age range of the Ypresian; and the Pale Greda, Paracas, and Caballas Formations for the Lutetian (see Supplementary Table 3). In addition, we reported the genera *Ostrea*, *Potamides*, *Turritella*, and *Clavilithes*, at least for the Caballas Formation, which marks a transition from fluvial and alluvial plain environments to marine paleoenvironments. In this sense, the presence of oysters and potamids is consistent with the interpretation of a brackish water environment and the deposition environments reported in this work, which are summarised in coastal habitats such as plains, estuaries, and lagoons (see Supplementary Table 3 and Figure 6) (DeVries, 2017; 2019).

However, DeVries (2019) mentions that the majority of mollusc species from the Caballas Formation exhibit a pattern of mixed affinities with faunas from the early Eocene and Late Cretaceous in northern Peru, which is why this fauna is of early Paleogene age. It is challenging to establish whether the faunal assemblages reported in this work are from the relevant time, as we did not obtain sufficient data, as only eight genera were recorded, including eight species for the SEPP-Ypresian and seven genera with seven species from the SEPP-Lutetian (Figure 1). It is also necessary to specify the age (future research). Therefore, we consider that these faunas are from the early Cenozoic era, as proposed by the author.

DISCUSSION AND CONCLUSIONS

This study aimed to examine how climate–environmental events during the Eocene (PETM, EECO, MECO, and EOT) influenced the faunal associations of Pan-American molluscs. Based on the patterns observed, we were able to distinguish the degree of similarity and shared characteristics of the taxa across provinces and age ranges, resulting in five distinct groups. However, this does not necessarily indicate substantial differences between provinces. The patterns observed also provide insight into how region-specific environmental changes and global climatic shifts during the epoch affected molluscan assemblages in each province.

The early Eocene (Ypresian) represented a period of extensive faunal exchange between the Atlantic, Pacific, and Caribbean Sea, facilitated by the Tethys Ocean and the Central American Seaway. Evidence of this exchange is observed in the NEPP and GP, which exhibited comparable spe-

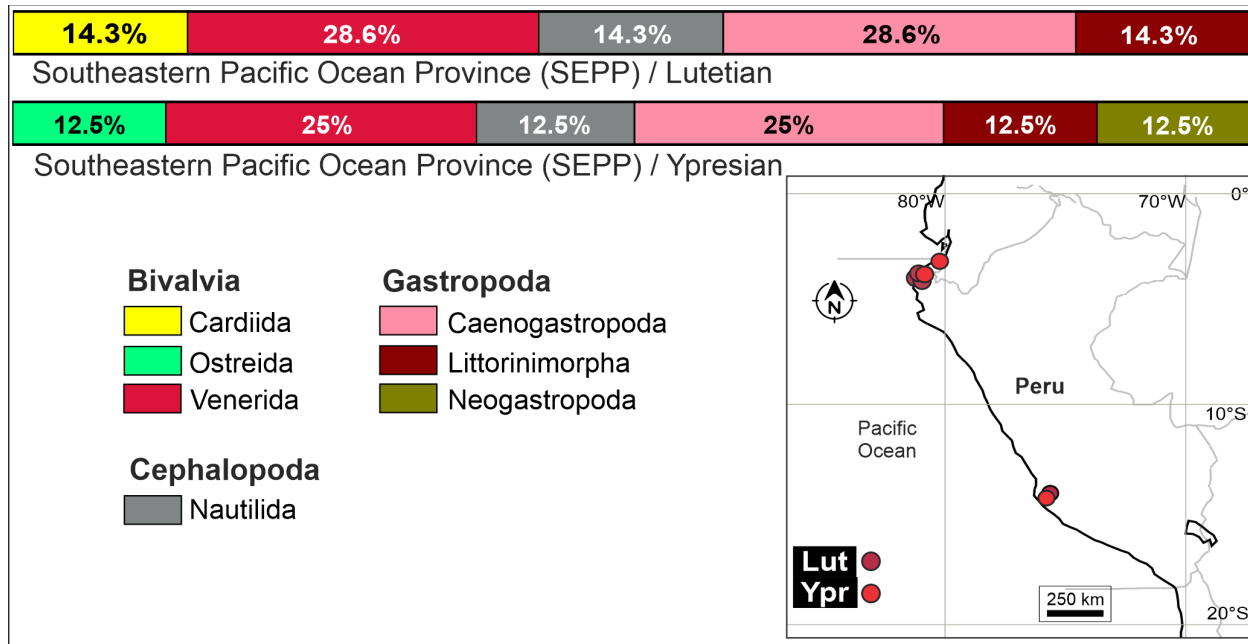


FIGURE 6. Cluster four: southeastern Pacific Ocean Province (SEPP) –Ypresian and Lutetian–. Maps show the geographic distribution of localities by province and stratigraphic stage. Coloured bars represent the relative proportion of species assigned to each order within the corresponding provinces.

cies richness despite the hyperthermal events recorded during this stage (Rolland et al., 2014; Das and Halder, 2018; Foster et al., 2020). Our results suggest that the Ypresian marked the peak of biodiversity in the NEPP, with 275 species (Figure 2; Table 1) recorded across 227 localities (Table 1). The high number of localities may account for the increased number of documented species, as sampling intensity and specimen preservation likely contributed to the extensive fossil record, introducing potential bias in data interpretation. Even so, SIMPER analysis indicates that the NEPP-Ypresian (14.7% contribution) constitutes a valuable dataset for interpreting regional palaeoclimatic and ecological change (see Supplementary Table 4). Globally, the early Eocene was characterised by perturbations in the carbon cycle, shifts in mean global temperature, and fluctuations in ocean circulation and sea level (Lunt et al., 2011; Hyland et al., 2017; Thomas et al., 2018; Miller et al., 2020). Regionally, we infer that a marine transgression occurred during this interval, promoting shell preservation, with gastropods dominating the assemblages (63%; Table 2). The hardness and compaction of gastropod shells enhanced their preservation and fossilisation (Ponder and Lindberg, 2008; Auld and Jarne, 2016). Moreover, molluscs exhibit physiological adaptations enabling them to tolerate extreme fluctuations in temperature, salinity, humidity, and wave action. Species

with such adaptations were therefore more likely to withstand elevated sea-surface temperatures and deoxygenation events during this period (Camacho, 2008; Foster et al., 2020; Sathesh and El-Sherbiny, 2022).

Similarly, we identified that GP reached its biodiversity peak during the Bartonian, with a total of 390 species (Table 1; Figure 1) and 366 localities (Table 1). As in the case of the NEPP-Ypresian, this pattern can be explained by the same context: more localities, more species. However, SIMPER analysis indicates that GP-Bartonian (15.92% contribution, Supplementary Table 4) can be considered useful for interpreting regional changes. Likewise, a regional transgression (indicated by the presence of glauconite) may have favoured the preservation of molluscan faunas, particularly gastropods, which account for just over 74% (Table 2). This transgression may also have promoted the expansion of flooded areas, providing optimal habitats for benthic communities (Huyghe et al., 2012; Das and Halder, 2018). Moreover, our data indicate that the MECO did not generate a “negative” impact on molluscan communities of this province, as Gulf Coastal Plain faunal assemblages are known to have been dominated by taxa tolerant of high temperatures (Foster et al., 2020).

As already mentioned, the NEPP-Ypresian and GP-Bartonian coincide with the warmest cli-

matic events of the Eocene, a time when tropical belts extended to high latitudes, between 30° and 50° in both hemispheres (Das and Halder, 2018). Today, the tropical region covers more than 40% of the Earth's surface and harbours around 80% of global biodiversity, including the majority of marine diversity (United Nations, 2016). Several studies support the theory that climatic stability, intense biotic interaction, and high energy availability in the tropics drive speciation (Rolland et al., 2014). It is undeniable that the tropics are the primary engine of biodiversity. According to the 'Out of the Tropics' (OTT) hypothesis proposed by Jablonski, Roy, and Valentine, many species originate in the tropics and, rather than remaining restricted, migrate towards higher latitudes, explaining latitudinal biodiversity gradients (Jablonski et al., 2006). This hypothesis has received palaeontological and phylogenetic support in marine invertebrates and could explain the richness and global distribution of molluscs during the Eocene (Jablonski et al., 2006, 2013; Rolland et al., 2014). In addition, contemporary marine seaways, the Tethys current, and possibly Pacific surface currents (although their influence remains uncertain) played a key role in the global dispersal and exchange of species.

By contrast, the late Eocene (Priabonian) represents a critical phase of species redistribution. From the late middle Eocene to the EOT, a clear cooling trend is recorded, which significantly impacted molluscan communities (Hansen, 1987; Ivany et al., 2000; Ivany et al., 2003; Hansen et al., 2004). In GP-Priabonian, the dataset reveals a marked 74% reduction in the number of species compared with GP-Bartonian. SIMPER analysis indicates that GP-Priabonian has a contribution of 4.24%, which may reinforce group separation (provincial difference) and reflects a gradual environmental and climatic transition (Supplementary Table 4). Climatic fluctuations, particularly glacial cycles, are often decisive in large-scale extinction (and potentially speciation) in temperate regions (Fischer, 1961; Dynesius and Jansson, 2000; Weir and Schluter, 2007; Rolland et al., 2014). Consequently, the "loss" of molluscan faunas in GP was a prolonged, transitional process, mainly affecting taxa adapted to warm waters, including several endemic taxa (Ivany et al., 2003; Foster et al., 2020). Temperature decline is undoubtedly the most conspicuous factor in faunal change (Hansen, 1987; Ivany et al., 2000; Hansen et al., 2004; Das and Halder, 2018). Additionally, a regional marine regression is inferred, which may have limited the record of taxa (102 species) (see Table 1,

Figure 1). Increased mechanical erosion (wind, fluvial currents) and chemical dissolution (weathering, acid rain) reduced molluscan preservation (Best and Kidwell, 2000). Similarly, bias in the fossil record may arise because, during a regression, fossil deposits are restricted to very shallow environments. This can generate the appearance of local extinctions of species typical of such habitats, even though their absence in the record reflects the lack of preservation in those environments (75 localities; see Table 1) (Jablonski, 1980).

In the same vein, the molluscan faunal composition of NEPP during the Priabonian differs from that of GP-Priabonian, evidencing a mixture of North Pacific and Tethyan faunas. The presence of taxa associated with tropical, subtropical, and temperate environments confirms this biogeographical diversity (Oleinick, 2001; Schweitzer et al., 2006). Our dataset reveals a slight increase in the number of species, reaching 212 compared with 182 in NEPP-Bartonian (Figure 1), along with an increase in the number of localities to 166 (Table 1). SIMPER analysis showed a low contribution percentage (5.4%, Supplementary Table 4), indicating community separation (Clarke, 1993). Furthermore, 100 of the localities correspond to Oregon, USA suggesting local geological and environmental changes that favoured the presence of certain molluscan groups. An increase in heteroconch bivalves was recorded in Oregon and Washington (Figure 5), a group with morphological and physiological adaptations to extreme environments such as cold seeps (Nesbitt, 2003; Kiel, 2006; Hickman, 2015). These habitats arise from seabed fissures caused by tectonic activity and represent a biome sustaining endemic species (Joseph, 2017). Geological processes in this area can be explained by the subduction of the extinct Farallon plate (Ubilla et al., 2007; Garrison, 2009; Hickman, 2015), which may have been decisive in the formation of these extreme environments, facilitating the presence of faunas adapted to such ecosystems. Likewise, the late Eocene to early Oligocene climatic transition promoted the replacement of tropical taxa by cryophilic taxa, now dominant in the North Pacific (Hickman, 2015).

In summary, although fossil marine molluscs present limitations due to their broad ecological range, morphological plasticity, and certain taphonomy biases (particularly the exclusion of key species from the record), they remain a valuable tool for reconstructing coastal and shallow marine environments, as well as for analysing biodiversity and changes in benthic communities. The Eocene rep-

resented a transitional epoch in the evolution and distribution of this fauna in the Americas, characterised by profound climatic and environmental changes that, rather than hindering diversification, stimulated ecological reorganisation and speciation processes without causing mass extinctions. Factors such as temperature variations, tectonic dynamics, marine biogeochemistry, and sea-level fluctuations shaped community structures, producing distributional patterns that still require investigation at finer spatial and temporal resolutions. In this context, it is essential to promote studies focused on specific stratigraphic intervals (Ypresian, Lutetian, Bartonian, and Priabonian) and major climatic events (PETM, EECO, MECO, and EOT), particularly in local settings with continuous and complete sedimentary sequences that may enhance environmental and climatic reconstructions. This work represents an initial contribution towards a comprehensive understanding of the influence of Eocene climatic and environmental events on the biogeographic configuration of mol-

luscs and underscores the need to incorporate data from still underrepresented regions, such as various Caribbean and South American provinces. The results obtained provide a robust foundation for future palaeoclimatic and biogeographic interpretations, with implications at local, regional, and global scales.

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APPENDIX SUPPLEMENTAL INFORMATION

SUPPLEMENTARY TABLE 1.

List of all species and localities recorded in the database, divided per stage. Due to length, the supplementary tables are available online in PDF format at <https://palaeo-electronica.org/content/2026/5808-eocene-pan-american-marine-molluscs>

SUPPLEMENTARY TABLE 2.

List of published references (1915–2023), organised per province (73 faunal lists).

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SUPPLEMENTARY TABLE 3.

List of localities per stage, including geographical location, stratigraphic formation, depositional environment, and type of sedimentary rock. Due to length, the supplementary tables are available online in PDF format at <https://palaio-electronica.org/content/2026/5808-eocene-pan-american-marine-molluscs>

Rec	Region	State or County	Location	Key Location	Stage	Formation	Depositional Environment	Facies
2	USA	Washington	Pulali Point	CSUN 1511	Ypresiano	Crescent	Submareal profundo	Conglomerado
3	USA	Washington	Pulali Point	CSUN 1512	Ypresiano	Crescent	Submareal profundo	Conglomerado
4	USA	Washington	Pulali Point	CSUN 1513	Ypresiano	Crescent	Submareal profundo	Arenisca
5	USA	Washington	Little River	CSUN 1553 (LACMIP 41553)	Ypresiano	Crescent	Marino indeterminado	Conglomerado calcáreo
6	USA	Washington	Grays Habor	CSUN 1553a (LACMIP 4153)	Ypresiano	Crescent	Marino indeterminado	Lodolita arcillosa
7	USA	Washington	Grays Habor	CSUN 1554	Ypresiano	Crescent	Marino indeterminado	Conglomerado arcilloso litificado
8	USA	Washington	Grays Habor	CSUN 1555	Ypresiano	Crescent	Marino indeterminado	Arenisca conglomerítica no litificada
9	USA	Washington	Grays Habor	CSUN 1556	Ypresiano	Crescent	Marino indeterminado	Arenisca conglomerítica no litificada
10	USA	Washington	Grays Habor	CSUN 1557	Ypresiano	Crescent	Marino indeterminado	Arenisca
11	USA	Washington	Grays Habor	CSUN 1559	Ypresiano	Crescent	Marino indeterminado	Arenisca conglomerítica no litificada
12	USA	Washington	Grays Habor	CSUN 1560	Ypresiano	Crescent	Marino indeterminado	Arenisca conglomerítica no litificada
13	USA	Washington	Larch Mountain	CSUN 1563 (LACMIP 16655)	Ypresiano	Crescent	None	Lutita limosa no litificada (glauconítica)
44	USA	Washington	None	UW 358	Ypresiano	Crescent	Marino indeterminado	Arenisca
96	USA	Oregon	Douglas	Sample #92LM9	Ypresiano	White Tail Ridge (Mb. Berry Creek)	Offshore (transgresiva)	Arenisca no litificada
97	USA	Oregon	Douglas	Sample #93LM2	Ypresiano	Bushnell Rock (Mb. Slater Creek)	Transición/shoreface	Arenisca grano fino
98	USA	Oregon	None	A-690	Ypresiano	Roseburg	Marino indeterminado	Arenisca
99	USA	Oregon	Gpo. Umpqua	UCMP A-836	Ypresiano	Roseburg	Marino indeterminado	Arenisca
100	USA	Oregon	Gpo. Umpqua	A-1151	Ypresiano	Roseburg	Marino indeterminado	Arenisca
101	USA	Oregon	None	A-1135	Ypresiano	Roseburg	Marino indeterminado	Arenisca
102	USA	Oregon	Gpo. Umpqua	UCMP A-1136	Ypresiano	Roseburg	Marino indeterminado	Arenisca
103	USA	Oregon	Gpo. Umpqua	A-1145	Ypresiano	Roseburg	Marino indeterminado	Arenisca
106	USA	Oregon	Gpo. Umpqua	A-691	Ypresiano	Roseburg	Marino indeterminado	Arenisca

Rec	Region	State or County	Location	Key Location	Stage	Formation	Depositional Environment	Facies
117	USA	Oregon	Gpo. Umpqua	UCMP A-838	Ypresiano	Roseburg	Marino indeterminado	Arenisca grano medio-grueso
118	USA	Oregon	None	A-840	Ypresiano	Roseburg	Marino indeterminado	Arenisca grano medio-grueso
119	USA	Oregon	Gpo. Umpqua	A-996	Ypresiano	Roseburg	Marino indeterminado	Arenisca grano medio-grueso
193	USA	California	Sta Susana Mountains	CSUN 371	Ypresiano	Llajas	Offshore (transgresiva)	Arenisca
196	USA	California	Sta Susana Mountains	CSUN 445	Ypresiano	Llajas	Offshore (transgresiva)	Arenisca
197	USA	California	Sta Susana Mountains	CSUN 498	Ypresiano	Llajas	Offshore (transgresiva)	Arenisca
201	USA	California	Sta Susana Mountains	CSUN 493	Ypresiano	Llajas	Offshore (transgresiva)	Arenisca
204	USA	California	Sta Susana Mountains	CSUN 373	Ypresiano	Llajas	Offshore (transgresiva)	Arenisca
212	USA	California	Devil Canyon	CSUN 500	Ypresiano	Llajas	Offshore (transgresiva)	Arenisca
220	USA	California	Devil Canyon	CSUN 499	Ypresiano	Llajas	Offshore (transgresiva)	Arenisca
226	USA	California	Riverside	CSUN 665	Ypresiano	Maniobra	Offshore (transgresiva)	Arenisca
227	USA	California	Sharps Canyon	CSUN 837	Ypresiano	Juncal (Mb. T. uva. infera)	Transición/shoreface	Arenisca
228	USA	California	Sharps Canyon	CSUN 848	Ypresiano	Juncal (Mb. T. uva. infera)	Transición/shoreface	Arenisca
229	USA	California	Sharps Canyon	CSUN 830	Ypresiano	Juncal	Transición/shoreface	Limolita
233	USA	California	Sta Susana Mountains	UCMP 7000	Ypresiano	Sta Susana	Transición/shoreface	Arenisca limosa grano fino
234	USA	California	N Mount Diablo	UCMP 3150	Ypresiano	Meganos	Costa indeterminada	Arenisca calcárea litificada con guijarros
235	USA	California	N Mount Diablo	UCMP 3151	Ypresiano	Meganos	Costa indeterminada	Arenisca calcárea litificada con guijarros
236	USA	California	Deer Valley	UCMP 3152	Ypresiano	Meganos	Costa indeterminada	Arenisca calcárea litificada con guijarros
237	USA	California	Deer Valley	UCMP 3156	Ypresiano	Meganos	Costa indeterminada	Arenisca calcárea litificada con guijarros
238	USA	California	Deer Valley	UCMP 3159	Ypresiano	Meganos (Mb. Margaret Hamilton Sand)	Costa indeterminada	Arenisca calcárea litificada con guijarros
239	USA	California	E Marsh Creek	UCMP 3578	Ypresiano	Meganos	Costa indeterminada	Arenisca calcárea litificada con guijarros
240	USA	California	Riverside	CSUN 671	Ypresiano	Maniobra	Offshore (transgresiva)	Arenisca
249	USA	Oregon	None	A-1173	Ypresiano	Roseburg	Marino indeterminado	Arenisca
258	USA	California	Chivo Canyon	CSUN 471a	Ypresiano	Llajas	Offshore (transgresiva)	Arenisca
259	USA	California	Elsmere Canyon	LACMIP 17848	Ypresiano	Juncal	Abanico submarino (aguas poco profundas)	Arenisca litificada con guijarros
260	USA	California	Elsmere Canyon	LACMIP 17849	Ypresiano	Juncal (Mb. T. uva. infera)	Abanico submarino (aguas poco profundas)	Arenisca conglomerítica litificada
261	USA	California	Urruttia Canyon	UCMP 1817	Ypresiano	Lodo (Mb. Cerros Shale)	Batial medio-superior	Lutita

Rec	Region	State or County	Location	Key Location	Stage	Formation	Depositional Environment	Facies
262	USA	California	N Canton Canyon	CSUN 359	Ypresiano	Juncal (Mb. T. uva. applinae)	Transición/shoreface	Arenisca
264	USA	California	Riverside	CSUN 673	Ypresiano	Maniobra	Abanico submarino (aguas poco profundas)	Lutita
265	USA	California	Riverside	CSUN 674 (LACMIP 16082)	Ypresiano	Maniobra	Abanico submarino (aguas poco profundas)	Lutita
266	USA	California	Riverside	CSUN 675 (LACMIP 16151)	Ypresiano	Maniobra	Abanico submarino (aguas poco profundas)	Lutita
267	USA	California	Riverside	CSUN 676 (LACMIP 16192)	Ypresiano	Maniobra	Abanico submarino (aguas poco profundas)	Lutita
268	USA	California	Riverside	CSUN 677	Ypresiano	Maniobra	Abanico submarino (aguas poco profundas)	Lutita
269	USA	California	Sta Susana Mountains	CSUN 439	Ypresiano	Llajas	Offshore (transgresiva)	Arenisca litificada
270	USA	California	Sta Susana Mountains	CSUN 440	Ypresiano	Llajas	Offshore (transgresiva)	Arenisca litificada
271	USA	California	Sta Susana Mountains	CSUN 441	Ypresiano	Llajas	Offshore (transgresiva)	Arenisca litificada
272	USA	California	Sta Susana Mountains	CSUN 442	Ypresiano	Llajas	Offshore (transgresiva)	Arenisca litificada
273	USA	California	Sta Susana Mountains	CSUN 443	Ypresiano	Llajas	Offshore (transgresiva)	Arenisca litificada
285	USA	California	Chivo Canyon	CSUN 471e	Ypresiano	Llajas	Offshore (transgresiva)	Arenisca
291	USA	California	Devil Canyon	CSUN 522	Ypresiano	Llajas	Offshore (transgresiva)	Arenisca
296	USA	California	Sta Susana Mountains	CSUN 962	Ypresiano	Sta Susana	Offshore (transgresiva)	Arenisca limosa grano fino
297	USA	California	Sta Susana Mountains	CSUN 963	Ypresiano	Sta Susana	Offshore (transgresiva)	Arenisca limosa grano fino
298	USA	California	Sta Susana Mountains	CSUN 964 (LACMIP 21551)	Ypresiano	Sta Susana	Offshore (transgresiva)	Arenisca limosa grano fino
299	USA	California	Sta Susana Mountains	CSUN 965 (LACMIP 26111)	Ypresiano	Sta Susana	Offshore (transgresiva)	Arenisca limosa grano fino
300	USA	California	Sta Susana Mountains	CSUN 966 (LACMIP 16893)	Ypresiano	Sta Susana	Offshore (transgresiva)	Arenisca limosa grano fino
301	USA	California	Sta Susana Mountains	CSUN 969 (LACMIP 16894)	Ypresiano	Sta Susana	Offshore (transgresiva)	Arenisca limosa grano fino
302	USA	California	Sta Susana Mountains	CSUN 970	Ypresiano	Sta Susana	Offshore (transgresiva)	Arenisca limosa grano fino
303	USA	California	Sta Susana Mountains	CSUN 971	Ypresiano	Sta Susana	Offshore (transgresiva)	Arenisca limosa grano fino
304	USA	California	Sta Susana Mountains	CSUN 972	Ypresiano	Sta Susana	Offshore (transgresiva)	Arenisca limosa grano fino
305	USA	California	Sta Susana Mountains	CSUN 973 (LACMIP 16895)	Ypresiano	Sta Susana	Offshore (transgresiva)	Arenisca limosa grano fino
306	USA	California	Runkle Canyon	CSUN 1347	Ypresiano	Sta Susana	Offshore (transgresiva)	Arenisca limosa grano fino
307	USA	California	Runkle Canyon	CSUN 1349	Ypresiano	Sta Susana	Offshore (transgresiva)	Arenisca limosa grano fino

Rec	Region	State or County	Location	Key Location	Stage	Formation	Depositional Environment	Facies
308	USA	Oregon	Douglas	Sample #92LM6	Ypresiano	Bushnell Rock (Mb. Slater Creek)	Offshore (transgresiva)	Arenisca grano fino
309	USA	Oregon	Douglas	Sample #9LM92	Ypresiano	White Tail Ridge (Mb. Berry Creek)	Transición/shoreface	Arenisca no litificada grano fino-medio
310	USA	Oregon	Douglas	Sample #11LM92	Ypresiano	White Tail Ridge (Mb. Berry Creek)	Transición/shoreface	Arenisca no litificada grano fino-medio
311	USA	Oregon	Douglas	Sample #12LM92	Ypresiano	White Tail Ridge (Mb. Berry Creek)	Offshore (transgresiva)	Arenisca no litificada grano fino-medio
312	USA	Oregon	Douglas	Sample #93LM12	Ypresiano	White Tail Ridge (Mb. Berry Creek)	Offshore (transgresiva)	Arenisca no litificada grano fino-medio
313	USA	Oregon	None	A-998	Ypresiano	Umpqua (Mb. Inferior)	Marino indeterminado	Arenisca
322	USA	California	Parsons Peak	UCMP 672	Ypresiano	Domengine	Marino indeterminado	Arenisca
323	USA	California	Big Tar Canyon	USGS 14482	Ypresiano	Avenal	Costa indeterminada	Arenisca
324	USA	California	Riverside	CSUN 662 (UCLA 3779)	Ypresiano	Maniobra	Offshore (transgresiva)	Lutita
331	USA	California	Sta Susana Mountains	CSUN 372	Ypresiano	Llajas	Offshore (transgresiva)	Arenisca
339	USA	California	Sta Susana Mountains	CSUN 958	Ypresiano	Sta Susana	Offshore (transgresiva)	Arenisca limosa grano fino
340	USA	California	Sta Susana Mountains	CSUN 959	Ypresiano	Sta Susana	Offshore (transgresiva)	Arenisca limosa grano fino
341	USA	California	Sta Susana Mountains	CSUN 961	Ypresiano	Sta Susana	Offshore (transgresiva)	Arenisca limosa grano fino
342	USA	California	Sta Susana Mountains	CSUN 967 (LACMIP 12648)	Ypresiano	Sta Susana	Offshore (transgresiva)	Arenisca limosa grano fino
343	USA	California	Simi Hills	CSUN 1343 (UCMP 3791)	Ypresiano	Sta Susana	Offshore (transgresiva)	Arenisca limosa grano fino
344	USA	California	Runkle Canyon	CSUN 1345	Ypresiano	Sta Susana	Offshore (transgresiva)	Arenisca limosa grano fino
345	USA	California	Runkle Canyon	CSUN 1346	Ypresiano	Sta Susana	Offshore (transgresiva)	Arenisca limosa grano fino
347	USA	Oregon	Douglas	Sample #92LM1	Ypresiano	Bushnell Rock (Mb. Slater Creek)	Offshore (transgresiva)	Arenisca no litificada grano fino
348	USA	Oregon	Douglas	Sample #92LM3	Ypresiano	Tenmile	Offshore (transgresiva)	Arenisca
349	USA	Oregon	Douglas	Sample #92LM4	Ypresiano	Camas Valley	Transición/shoreface	Lutita calcárea litificada
350	USA	Oregon	Umpqua	A-1139	Ypresiano	Roseburg	Marino indeterminado	Arenisca
351	USA	Oregon	Umpqua	A-1174	Ypresiano	Roseburg	Marino indeterminado	Arenisca
352	USA	Oregon	Umpqua	A-1175	Ypresiano	Roseburg	Marino indeterminado	Arenisca
360	USA	Oregon	Umpqua	A-1144	Ypresiano	Roseburg	Marino indeterminado	Arenisca
365	USA	California	Sta Susana Mountains	CSUN 475 (LACMIP 16337)	Ypresiano	Llajas	Offshore (transgresiva)	Arenisca
367	USA	California	Kern	USGS M4640	Ypresiano	Tejon (Mb. Liveoak Shale)	Aguas profundas	Arenisca limosa grano fino
371	USA	California	Canton Canyon	CSUN 827	Ypresiano	Juncal (Mb. T. uva. infera)	Transición/shoreface	Arenisca

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372	USA	California	Canton Canyon	CSUN 845	Ypresiano	Juncal (Mb. T. uva. infera)	Transición/shoreface	Arenisca
373	USA	California	west Canton Canyon	CSUN 358 (UCLA 7210)	Ypresiano	Juncal (Mb. T. uva. infera)	Transición/shoreface	Arenisca
418	USA	California	Chivo Canyon	CSUN 471d	Ypresiano	Llajas	Offshore (transgresiva)	Arenisca
432	USA	California	Grapevine Canyon	CAS 245	Ypresiano	Tejon	Marginal	Arenisca no litificada
433	USA	California	Grapevine Canyon	UCMP 451	Ypresiano	Tejon	Marginal	Arenisca no litificada
434	USA	California	Grapevine Canyon	UCMP 452	Ypresiano	Tejon	Marginal	Arenisca no litificada
435	USA	California	Grapevine Canyon	UCMP 459	Ypresiano	Tejon	Marginal	Arenisca no litificada
436	USA	California	Salt Creek	UCMP 462	Ypresiano	Tejon	Marginal	Arenisca no litificada
439	USA	California	Sta Susana Mountains	CSUN 960	Ypresiano	Sta Susana	Offshore (transgresiva)	Arenisca limosa grano fino
445	USA	California	Los Meganos	UCMP 3580	Ypresiano	Meganos	Costa indeterminada	Arenisca calcárea litificada con guijarros
449	USA	California	W Canton Canyon	CSUN 358a	Ypresiano	Juncal (Mb. T. uva. applinae)	Transición/shoreface	Arenisca
450	USA	California	Marysville Buttes	UCMP 1856	Ypresiano	Capay	Marino indeterminado	Arenisca
455	USA	California	Ventura	CSUN 462	Ypresiano	Llajas	Offshore	Arenisca
459	USA	California	Grapevine Canyon	UCMP 461	Ypresiano	Tejon	Marginal	Arenisca no litificada
467	USA	California	Llajas Canyon	UCMP 4052	Ypresiano	Llajas	Costa indeterminada	Conglomerado calcáreo
468	USA	California	east Canton Canyon	CSUN 807	Ypresiano	Juncal (Mb. T. uva. infera)	Transición/shoreface	Arenisca
475	USA	California	Reef Ridge	None	Ypresiano	Avenal	Marino indeterminado	Arenisca
476	USA	California	Pine Mountain	None	Ypresiano	Matilija	Marino indeterminado	Arenisca
477	USA	California	Lockwood Valley	None	Ypresiano	Juncal	Abanico submarino exterior	Arenisca
478	USA	California	Whitaker Peak	None	Ypresiano	Juncal	Abanico submarino exterior	Arenisca
479	USA	California	Orocopia Mountains	None	Ypresiano	Maniobra	Canales de abanico subm.	Arenisca
481	USA	California	Aliso Canyon	UCMP 3296	Ypresiano	Llajas	Marino indeterminado	Siliciclástico
482	USA	California	Riverside	CSUN 667	Ypresiano	Maniobra	Abanico submarino (aguas poco profundas)	Lutita
487	USA	California	Chivo Canyon	CSUN 471b	Ypresiano	Llajas	Offshore (transgresiva)	Arenisca
491	USA	California	Salt Creek	UCMP 463	Ypresiano	Tejon	Marginal	Arenisca no litificada
496	USA	Oregon	Slater Creek	Sample #93LM3	Ypresiano	Bushnell Rock (Mb. Slater Creek)	Offshore	Arenisca no litificada grano fino
499	USA	California	Riverside	CSUN 672 (LACMIP 16274)	Ypresiano	Maniobra	Abanico submarino (aguas poco profundas)	Lutita
507	USA	California	Stewartville	UCMP 3148	Ypresiano	Meganos	Costa indeterminada	Arenisca calcárea litificada con guijarros

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508	USA	California	Dry Creek	UCMP 3577	Ypresiano	Meganos (Mb. Margaret Hamilton Sand)	Costa indeterminada	Arenisca calcárea litificada con guijarros
509	USA	California	east Mount Diablo	UCMP 3579	Ypresiano	Meganos	Costa indeterminada	Arenisca calcárea litificada con guijarros
510	USA	California	east Mount Diablo	UCMP 3609	Ypresiano	Meganos	Costa indeterminada	Arenisca calcárea litificada con guijarros
512	USA	California	Kellogg Creek	UCMP 3586	Ypresiano	Meganos	Costa indeterminada	Arenisca calcárea litificada con guijarros
513	USA	California	Lake	UCMP 785	Ypresiano	Tejon	Marino indeterminado	Arenisca
525	USA	California	Marysville Buttes	UC 1853	Ypresiano	Capay	Cañon submarino	Lutita y limolita
526	USA	California	west Canton Canyon	CSUN 358b (UCLA 7210)	Ypresiano	Juncal (Mb. T. uva. applinae)	Transición/shoreface	Arenisca
527	USA	California	Riverside	CSUN 670	Ypresiano	Maniobra	Abanico submarino (aguas poco profundas)	Lutita
532	USA	Oregon	Douglas	Sample #92LM2	Ypresiano	Bushnell Rock (Mb. Slater Creek)	Transición/shoreface	Arenisca no litificada grano fino
533	USA	Oregon	Umpqua	Sample #93LM12	Ypresiano	White Tail Ridge (Mb. Berry Creek)	Transición/shoreface	Arenisca no litificada grano fino-medio
535	USA	California	Elsmere Canyon	LACMIP 17850	Ypresiano	Juncal	Abanico submarino (aguas poco profundas)	Arenisca conglomerítica litificada
537	USA	California	Simi Hills	CSUN 1344	Ypresiano	Sta Susana	Offshore (transgresiva)	Arenisca limosa grano fino
538	USA	Oregon	None	A-689	Ypresiano	Roseburg	Abanico submarino (aguas poco profundas)	Arenisca grano fino
539	USA	California	Martinez	UW 1074A	Ypresiano	Martinez (Mb. Capay Shale)	Offshore	Lutita arenosa litificada
546	USA	Oregon	Umpqua	Sample #92LM10	Ypresiano	White Tail Ridge (Mb. Berry Creek)	Transición/shoreface	Arenisca no litificada grano fino-medio
548	USA	California	east Mount Diablo	UCMP 3689	Ypresiano	Meganos	Costa indeterminada	Arenisca calcárea litificada con guijarros
549	USA	California	Ventura	CSUN 476	Ypresiano	Llajas	Offshore (regresiva)	Arenisca
552	USA	Oregon	Umpqua	Sample #24DV92	Ypresiano	White Tail Ridge (Mb. Berry Creek)	Shoreface (regresiva)	Arenisca no litificada grano fino-medio
553	USA	Oregon	Umpqua	Sample #1LM92	Ypresiano	White Tail Ridge (Mb. Berry Creek)	Transición/shoreface	Arenisca no litificada grano fino-medio
554	USA	Oregon	Douglas	Sample #10LM92	Ypresiano	White Tail Ridge (Mb. Berry Creek)	Transición/shoreface	Arenisca no litificada grano fino-medio
561	USA	California	Grapevine Canyon	CAS 246	Ypresiano	Tejon	Marginal	Arenisca
562	USA	California	Grapevine Canyon	UCMP 457	Ypresiano	Tejon	Marginal	Arenisca
581	USA	California	Chivo Canyon	CSUN 471c	Ypresiano	Llajas	Offshore (transgresiva)	Arenisca
585	USA	California	None	None	Ypresiano	Domengine	Marino indeterminado	Arenisca litificada

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586	USA	California	Deer Valley	UCMP 3158	Ypresiano	Meganos	Costa indeterminada	Arenisca calcárea litificada con guijarros
588	USA	California	Rock Creek	UCMP 2246	Ypresiano	Sn Francisquito	Submareal somero	Arenisca litificada
590	USA	California	Grapevine Canyon	UCMP 460	Ypresiano	Tejon	Marginal	Arenisca
591	USA	California	Runkle Canyon	CSUN 1348	Ypresiano	Sta Susana	Offshore (transgresiva)	Arenisca limosa grano fino
600	USA	Oregon	None	A-1176	Ypresiano	Roseburg	Abanico submarino (aguas poco profundas)	Arenisca grano fino
601	USA	California	Deer Valley	UCMP 3157	Ypresiano	Meganos	Costa indeterminada	Arenisca calcárea litificada con guijarros
602	USA	California	Marysville Buttes	UCMP 1855	Ypresiano	Capay	Cañon submarino	Lutita y limolita
608	USA	California	west Canton Canyon	CSUN 362 (LACMIP 40362)	Ypresiano	Juncal	Abanico submarino parte exterior	Arenisca
609	USA	California	Sespe Hot Springs	UCR 4667	Ypresiano	Juncal	Abanico submarino parte exterior	Arenisca
611	USA	California	Ventura	LACMIP 20586	Ypresiano	Llajas	Shoreface (regresiva)	Arenisca litificada bioturbada
615	USA	California	Tecuya Creek	UCMP 455	Ypresiano	Tejon	Marginal	Arenisca
616	USA	California	Tecuya Creek	UCMP 456	Ypresiano	Tejon	Marginal	Arenisca
617	México,	Baja California Sur	None	CSUN 1291a	Ypresiano	Bateque	Transición/ shoreface	Arenisca no litificada grano fino
618	USA	California	Agua Caliente Canyon	UCLA 6593	Ypresiano	Juncal	Abanico submarino parte exterior	Arenisca calcárea limosa
619	USA	California	Agua Caliente Canyon	UCLA 7192	Ypresiano	Juncal	Abanico submarino parte exterior	Arenisca calcárea limosa
620	USA	California	Agua Caliente Canyon	UCLA 7193	Ypresiano	Juncal	Abanico submarino parte exterior	Arenisca calcárea limosa
621	México,	Baja California Sur	None	CSUN 1220b	Ypresiano	Bateque	Transición/ shoreface	Arenisca no litificada grano fino
622	USA	California	Riverside	CSUN 669	Ypresiano	Maniobra	Abanico submarino (aguas poco profundas)	Lutita
623	USA	California	Bus Canyon	CSUN 1565	Ypresiano	Sta Susana	Offshore (transgresiva)	Arenisca limosa grano fino
627	USA	California	Grapevine Canyon	UCMP 453	Ypresiano	Tejon	Marginal	Arenisca
630	USA	California	Ventura	LACMIP 26624	Ypresiano	Llajas	Offshore (transgresiva)	Arenisca litificada bioturbada
632	USA	California	Elsmere Canyon	LACMIP 17851	Ypresiano	Juncal	Abanico submarino (aguas poco profundas)	Limolita
638	USA	California	Alcalde Hills	CAS 66747	Ypresiano	Domengine	Estuario/bahía	Arenisca
642	USA	Washington	Pulali Point	CSUN 1510	Ypresiano	Crescent	Submareal profundo	Conglomerado
643	USA	Oregon	Oak Creek Valley	Sample #93LM5	Ypresiano	Tenmile	Offshore	Arenisca
647	USA	California	Rock Creek	UCMP 2247	Ypresiano	Sn Francisquito	Submareal somero	Arenisca litificada

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648	USA	California	Rock Creek	UCMP 2248	Ypresiano	Sn Francisquito	Submareal somero	Arenisca litificada
651	México,	Baja California Sur	None	CSUN 1471	Ypresiano	Bateque	Transición/shoreface	Arenisca no litificada grano fino
652	México,	Baja California Sur	None	CSUN 1291c	Ypresiano	Bateque	Shoreface	Arenisca no litificada grano fino
653	México,	Baja California Sur	None	CSUN 1470	Ypresiano	Bateque	Transición/shoreface	Arenisca no litificada grano fino
654	México,	Baja California Sur	None	CSUN 1220a	Ypresiano	Bateque	Transición/shoreface	Arenisca no litificada
655	México,	Baja California Sur	None	CSUN 1291b	Ypresiano	Bateque	Transición/shoreface	Arenisca no litificada grano fino
656	México,	Baja California Sur	None	CSUN 1220c	Ypresiano	Bateque	Transición/shoreface	Arenisca no litificada grano fino
663	México,	Baja California Sur	El Cuarenta	CSUN 1575	Ypresiano	Bateque	Shoreface	Arenisca no litificada grano fino
665	México,	Baja California Sur	CSUN 1219 Squires and Demetron	MHN-UABCS Ba14	Ypresiano	Bateque	Transición/shoreface	Arenisca no litificada grano fino
666	México,	Baja California Sur	sur de Mesa Copalar	MHN-UABCS Ba15	Ypresiano	Bateque	Transición/shoreface	Arenisca no litificada grano fino
667	México,	Baja California Sur	Punta Osta	MHN-UABCS Ba38	Ypresiano	Bateque	Transición/shoreface	Arenisca no litificada grano fino
670	México,	Baja California Sur	Hill A North	MHN-UABCS Ba6	Ypresiano	Bateque	Transición/shoreface	Arenisca no litificada grano fino
671	México,	Baja California Sur	cerca de CSUN 1219	MHN-UABCS Ba33	Ypresiano	Bateque	Transición/shoreface	Arenisca no litificada grano fino
673	México,	Baja California Sur	Mesa Sn Ramón (La Rinconada)	MHN-UABCS Ba1	Ypresiano	Bateque	Transición/shoreface	Arenisca no litificada grano fino
674	México,	Baja California Sur	Mesa La Salina	MHN-UABCS Ba7	Ypresiano	Bateque	Transición/shoreface	Arenisca no litificada grano fino
675	México,	Baja California Sur	El Canelo	MHN-UABCS Te8	Ypresiano	Tepetate	Transición/shoreface	Arenisca no litificada grano fino
676	México,	Baja California Sur	Cañada El Llano, hacia Los Zanjones	MHN-UABCS Te42	Ypresiano	Tepetate	Transición/lower shoreface	Arenisca no litificada grano fino
677	México,	Baja California Sur	Cañada El Llano (A. Sn Hilario)	MHN-UABCS Te23	Ypresiano	Tepetate	Transición/lower shoreface	Arenisca no litificada grano fino
678	México,	Baja California Sur	base Los Zanjones	MHN-UABCS Te36a	Ypresiano	Tepetate	Transición/shoreface	Arenisca litificada grano fino
680	México,	Baja California Sur	km 103.5, Cañada Palo Alto, el Morrito Alto y El Mangle	MHN-UABCS Te3	Ypresiano	Tepetate	Transición/shoreface	Arenisca no litificada grano fino
684	México,	Baja California Sur	Localidad de la Esponjas	MHN-UABCS Te13	Ypresiano	Tepetate	Transición/shoreface	Lodolita
686	México,	Baja California Sur	Arroyo Aguajito (A. Hondo)	MHN-UABCS Te12	Ypresiano	Tepetate	Transición/shoreface	Lodolita
688	México,	Baja California Sur	Km 74.5	MHN-UABCS Te27	Ypresiano	Tepetate	Shoreface	Arenisca no litificada grano fino
689	México,	Baja California Sur	Arroyo El Conejo (a la izq)	MHN-UABCS Te9	Ypresiano	Tepetate	Plataforma interna	Arenisca grano fino
690	México,	Baja California Sur	Cañada Palo Alto sur	MHN-UABCS Te6	Ypresiano	Tepetate	Plataforma interna	Arenisca no litificada grano fino
691	México,	Baja California Sur	Cañada s/n, al N del Canelo	MHN-UABCS Te7	Ypresiano	Tepetate	Plataforma interna	Arenisca no litificada grano fino

Rec	Region	State or County	Location	Key Location	Stage	Formation	Depositional Environment	Facies
693	México,	Baja California Sur	Arroyo Sn Hilario	MHN-UABCS Te11	Ypresiano	Tepetate	Plataforma interna	Arenisca no litificada grano fino
695	México,	Baja California Sur	Cañada El Llano (WP132)	MHN-UABCS Te46	Ypresiano	Tepetate	Plataforma interna	Arenisca no litificada grano fino
698	México,	Baja California Sur	Arroyo El Conejo (a la der)	MHN-UABCS Te14	Ypresiano	Tepetate	Batial medio-superior	Lodolita
699	México,	Baja California Sur	arroyo arriba Mesa Yessenia	MHN-UABCS Te22	Ypresiano	Tepetate	Batial medio-superior	Lodolita
703	México,	Baja California Sur	Arroyo Cantil Blanco	MHN-UABCS Ba20	Ypresiano	Bateque	Plataforma interna	Arenisca no litificada grano fino
746	Perú,	None	Quebrada Mancora	CAS 850	Ypresiano	Negritos	Aguas poco profundas	Arenisca
750	Perú,	Piura	Arenisca Parinas Vichayal	None	Ypresiano	Negritos	Aguas poco profundas	Arenisca litificada
770	Perú,	Piura	Negritos	None	Ypresiano	Negritos	Costa siliciclastica	Arenisca conglomerítica no litificada
773	Perú,	None	Punto Sal Chico	CAS 334	Ypresiano	Negritos	Aguas poco profundas	Lutita arenosa con guijarros, no litificada
774	Jamaica,	None	Wait-A-Bit (o cueva Lichfield)	UF XJ018	Ypresiano	Stettin	Plataforma carbonatada	Caliza
810	México,	Nuevo León	Wilcox	USGS 13669	Ypresiano	Indio (Mb. Inferior)	Plataforma interna	Arenisca/lutita
811	México,	Nuevo León	Wilcox	USGS 13485	Ypresiano	Indio (Mb. Inferior)	Costa indeterminada	Arcilla arenosa grano fino
812	México,	Nuevo León	Wilcox	USGS 13675	Ypresiano	Indio (Mb. Inferior)	Marino indeterminado	Arenisca litificada
813	México,	Nuevo León	Wilcox	USGS 13461	Ypresiano	Indio (Mb. Inferior)	Marino indeterminado	Arenisca litificada
814	México,	Nuevo León	Wilcox	USGS 13673	Ypresiano	Indio (Mb. Inferior)	Marino indeterminado	Arenisca litificada
815	México,	Nuevo León	Wilcox	USGS 13679	Ypresiano	Indio (Mb. Inferior)	Marino indeterminado	Arenisca litificada
816	México,	Nuevo León	Wilcox	USGS 13707	Ypresiano	Indio (Mb. Inferior)	Marino indeterminado	Arenisca litificada
817	México,	Nuevo León	Wilcox	USGS 13484	Ypresiano	Indio (Mb. Inferior)	Marino indeterminado	Arenisca litificada
818	México,	Nuevo León	Claiborne	USGS 13262	Ypresiano	Bigford	Shoreface	Arenisca no litificada grano fino
864	USA	Alabama	Clarke	PRI 1593	Ypresiano	Hatchetigbee Bluff	Submareal somero	Arenisca calcárea no litificada arcillosa (glauconita)
865	USA	Alabama	Wilcox	None	Ypresiano	Hatchetigbee Bluff (Mb. Superior)	Submareal somero	Marga arenosa no litificada (glauconita)
867	USA	Alabama	Wilcox	AWa-1c	Ypresiano	Hatchetigbee Bluff (Mb. Superior)	Submareal somero	Marga arenosa no litificada (glauconita)
868	USA	Alabama	Wilcox	ACh-6	Ypresiano	Hatchetigbee Bluff (Mb. Bashi)	Submareal somero	Arenisca calcárea
878	USA	Texas	Wilcox	M260 (LGS 61)	Ypresiano	Sabinetown Bluff	Marino indeterminado	Limolita
879	USA	Alabama	Wilcox	PRI 2189	Ypresiano	Hatchetigbee Bluff (Mb. Superior)	Submareal somero	Arcilla limosa no litificada (glauconita)
880	USA	Alabama	Wilcox	Wise Rep 1	Ypresiano	Hatchetigbee Bluff (Mb. Superior)	Submareal somero	Arcilla arenosa grano fino
881	USA	Alabama	Wilcox	AlChBu Rep 2	Ypresiano	Hatchetigbee Bluff (Mb. Bashi)	Submareal somero	Arenisca calcárea no litificada (glauconita)

Rec	Region	State or County	Location	Key Location	Stage	Formation	Depositional Environment	Facies
882	USA	Alabama	Wilcox	ACof-1	Ypresiano	Hatchetigbee Bluff (Mb. Bashi Marl)	Transición/shoreface	Arenisca calcárea no litificada (glauconita)
981	USA	Louisiana	Wilcox	LGS 59	Ypresiano	Pendleton Ferry	Aguas poco profundas	Arenisca no litificada fino a muy fino
982	USA	Louisiana	Wilcox	LGS 57	Ypresiano	Pendleton Ferry	Aguas poco profundas	Arenisca no litificada fino a muy fino
983	USA	Louisiana	Wilcox	LGS 54	Ypresiano	Pendleton Ferry	Aguas poco profundas	Arenisca no litificada fino a muy fino
984	USA	Louisiana	Wilcox	LGS 53	Ypresiano	Pendleton Ferry	Aguas poco profundas	Arenisca no litificada fino a muy fino
985	USA	Louisiana	Wilcox	LGS 105	Ypresiano	Pendleton Ferry	Aguas poco profundas	Arcilla limosa no litificada (glauconita)
986	USA	Louisiana	Wilcox	LGS 45	Ypresiano	Pendleton Ferry	Aguas poco profundas	Arenisca no litificada fino a muy fino
993	USA	Alabama	Wilcox	AWa-1b	Ypresiano	Hatchetigbee Bluff (Mb. Superior)	Submareal somero	Marga arenosa no litificada (glauconita)
994	USA	Texas	Wilcox	PRI 62	Ypresiano	Sabinetown Bluff	Submareal somero	Limolita
999	USA	Alabama	Wilcox	M 664	Ypresiano	Hatchetigbee Bluff (Mb. Bashi)	Submareal somero	Arenisca calcárea no litificada arcillosa (glauconita)
1000	USA	Alabama	Wilcox	PRI 833	Ypresiano	Hatchetigbee Bluff	Marino indeterminado	Marga no litificada
1001	USA	Alabama	Wilcox	PRI 2200	Ypresiano	Hatchetigbee Bluff (Mb. Bashi)	Submareal somero	Arenisca calcárea no litificada arcillosa (glauconita)
1002	USA	Alabama	Wilcox	Toulmin 1977	Ypresiano	Hatchetigbee Bluff (Mb. Bashi)	Submareal somero	Arenisca calcárea no litificada
1003	USA	Alabama	Wilcox	PRI 753	Ypresiano	Hatchetigbee Bluff (Mb. Bashi)	Submareal somero	Arenisca calcárea no litificada arcillosa (glauconita)
1004	USA	Alabama	Wilcox	ADa-1 of Toulmin, 1977	Ypresiano	Hatchetigbee Bluff (Mb. Bashi)	Submareal somero	Arcilla arenosa no litificada
1005	USA	Alabama	Wilcox	ADa-1 of Toulmin, 1978	Ypresiano	Hatchetigbee Bluff (Mb. Bashi)	Submareal somero	Arcilla arenosa no litificada
1006	USA	Alabama	Wilcox	ADa-1 of Toulmin, 1979	Ypresiano	Hatchetigbee Bluff (Mb. Bashi)	Submareal somero	Arcilla arenosa no litificada
1007	USA	Alabama	Wilcox	Wise Rep 3	Ypresiano	Hatchetigbee Bluff (Mb. Superior)	Submareal somero	Arcilla arenosa no litificada
1008	USA	Alabama	Wilcox	Wise Rep 2	Ypresiano	Hatchetigbee Bluff (Mb. Bashi)	Submareal somero	Arcilla arenosa no litificada
1009	USA	Alabama	Wilcox	AIChBu Rep 3	Ypresiano	Hatchetigbee Bluff (Mb. Bashi)	Submareal somero	Arenisca calcárea no litificada fangosa
1010	USA	Alabama	Wilcox	AIChBu Rep 1	Ypresiano	Hatchetigbee Bluff (Mb. Bashi)	Submareal somero	Arenisca calcárea no litificada fangosa
1011	USA	Alabama	Wilcox	ACof	Ypresiano	Hatchetigbee Bluff (Mb. Bashi)	Submareal somero	Arenisca calcárea no litificada fangosa
1012	USA	Alabama	Wilcox	PRI 791	Ypresiano	Hatchetigbee Bluff (Mb. Bashi Marl)	Submareal somero	Arcilla calcárea no litificada (glauconita)

Rec	Region	State or County	Location	Key Location	Stage	Formation	Depositional Environment	Facies
1013	USA	Alabama	Spear Creek	H76-35-1 (Bulk 2)	Ypresiano	Hatchetigbee Bluff (Mb. Bashi)	Submareal somero	Arenisca no litificada
1014	USA	Alabama	Spear Creek	H76-35-1 (Bulk 1)	Ypresiano	Hatchetigbee Bluff (Mb. Bashi)	Submareal somero	Arenisca calcárea no litificada
1015	USA	Alabama	Wilcox	ADa-1	Ypresiano	Hatchetigbee Bluff (Mb. Bashi)	Submareal somero	Arenisca no litificada (glauconita)
1016	USA	Alabama	Wilcox	ACI-2	Ypresiano	Hatchetigbee Bluff (Mb. Bashi)	Submareal somero	Arcilla calcárea no litificada (glauconita)
1017	USA	Alabama	Wilcox	ACI-1	Ypresiano	Hatchetigbee Bluff (Mb. Bashi)	Submareal somero	Arcilla calcárea no litificada (glauconita)
1018	USA	Alabama	Wilcox	ACH-5	Ypresiano	Hatchetigbee Bluff (Mb. Bashi)	Submareal somero	Arcilla calcárea no litificada (glauconita)
1019	USA	Alabama	Wilcox	ACH-4	Ypresiano	Hatchetigbee Bluff (Mb. Bashi)	Submareal somero	Arcilla calcárea no litificada (glauconita)
1020	USA	Alabama	Wilcox	ACH-3	Ypresiano	Hatchetigbee Bluff (Mb. Bashi)	Submareal somero	Arcilla calcárea no litificada (glauconita)
1022	USA	Mississippi	Wilcox	MsLa21 Rep 3	Ypresiano	Hatchetigbee Bluff (Mb. Bashi)	Submareal somero	Arenisca calcárea no litificada fangosa (glauconita)
1023	USA	Mississippi	Wilcox	MsLa21 Rep 2	Ypresiano	Hatchetigbee Bluff (Mb. Bashi)	Submareal somero	Arenisca calcárea no litificada fangosa (glauconita)
1024	USA	Mississippi	Wilcox	MsLa21 Rep 1	Ypresiano	Hatchetigbee Bluff (Mb. Bashi)	Submareal somero	Arenisca calcárea no litificada fangosa (glauconita)
1025	USA	Texas	Sabinetown Bluff	NPL 4685	Ypresiano	Sabinetown Bluff	Submareal somero	Marga conglomerítica no litificada
1108	USA	Texas	Claiborne	Reklaw-locality 2	Ypresiano	Reklaw (Mb. Marquez Shale)	Submareal somero	Lutita arenosa no litificada
1125	México,	Nuevo León	None	USGS 13761	Ypresiano	Indio (Mb. Inferior)	Plataforma interna	Arenisca litificada
1133	USA	Alabama	Wilcox	AMo-7	Ypresiano	Hatchetigbee Bluff (Mb. Bashi)	Submareal somero	Marga calcárea no litificada (glauconita)
1134	USA	Mississippi	Wilcox	Gallagher Creek	Ypresiano	Hatchetigbee Bluff (Mb. Bashi)	Submareal somero	Arenisca no litificada (glauconita)
1135	USA	Mississippi	Red Hot Truck Stop	MsLa-19	Ypresiano	Hatchetigbee Bluff (Mb. Bashi)	Submareal somero	Arenisca no litificada (glauconita)
1143	USA	Alabama	Wilcox	M 9	Ypresiano	Hatchetigbee Bluff (Mb. Bashi)	Submareal somero	Arenisca no litificada arcillosa (glauconita)
1144	USA	Alabama	Wilcox	AHe-5	Ypresiano	Hatchetigbee Bluff (Mb. Bashi)	Submareal somero	Marga calcárea no litificada (glauconita)
1145	USA	Louisiana	Wilcox	M 89	Ypresiano	Pendleton Ferry	Aguas poco profundas	Arenisca no litificada fino a muy fino
1177	México,	Nuevo León	Difunta	IGM-2645	Ypresiano	Adjuntas	Bahía/estuario	Arenisca grano grueso
1231	USA	Mississippi	Wilcox	MGS 19	Ypresiano	Hatchetigbee Bluff (Mb. Bashi)	Marino indeterminado	Marga no litificada
1249	USA	Alabama	Wilcox	M 1	Ypresiano	Hatchetigbee Bluff (Mb. Bashi)	Submareal somero	Arenisca calcárea no litificada (glauconita)

Rec	Region	State or County	Location	Key Location	Stage	Formation	Depositional Environment	Facies
1250	USA	Alabama	Wilcox	AWa-1a	Ypresiano	Hatchetigbee Bluff	Submareal somero	Marga arenosa no litificada (glauconita)
1251	USA	Alabama	Wilcox	Wasatchian (bed 2)	Ypresiano	Hatchetigbee Bluff (Mb. Bashi Marl)	Marino indeterminado	Marga no litificada
1364	USA	Alabama	Wilcox	ACL-1	Ypresiano	Hatchetigbee Bluff (Mb. Bashi Marl)	Submareal somero	Arenisca calcárea no litificada (glauconita)
1368	USA	Texas	Claiborne	Reklaw-locality 3	Ypresiano	Reklaw (Mb. Marquez Shale)	Submareal somero	Arcilla arenosa no litificada
1369	USA	Texas	Joe Taylo Brach	None	Ypresiano	Reklaw (Mb. Marquez Shale)	Plataforma interna (transgresiva)	Limolita arcillosa no litificada
1375	USA	Texas	Claiborne	Reklaw-locality 6	Ypresiano	Reklaw (Mb. Marquez Shale)	Submareal somero	Arcilla arenosa no litificada
1376	USA	Texas	Claiborne	Reklaw-locality 1	Ypresiano	Reklaw (Mb. Newby Sand)	Submareal somero	Arcilla no litificada
1377	USA	Texas	Ridge Creek	None	Ypresiano	Reklaw (Mb. Marquez Shale)	Plataforma interna (transgresiva)	Limolita arcillosa no litificada
1378	USA	Alabama	Spear Creek	H76-35-2 (Bulk 1)	Ypresiano	Hatchetigbee Bluff (Mb. Bashi)	Submareal somero	Arenisca no litificada
1387	USA	Alabama	Wilcox	PRI 2755	Ypresiano	Hatchetigbee Bluff (Mb. Bashi)	Submareal somero	Arenisca calcárea no litificada arcillosa (glauconita)
1388	USA	Louisiana	Wilcox	LGS 41	Ypresiano	Pendleton Ferry	Aguas poco profundas	Arenisca no litificada (glauconita)
1389	USA	Mississippi	Wilcox	MGS 21	Ypresiano	Hatchetigbee Bluff (Mb. Bashi)	Submareal somero	Arenisca no litificada (glauconita)
1390	USA	Mississippi	Wilcox	MGS 20	Ypresiano	Hatchetigbee Bluff (Mb. Bashi)	Submareal somero	Arenisca no litificada (glauconita)
1391	USA	Alabama	Wilcox	PRI 2188	Ypresiano	Hatchetigbee Bluff (Mb. Bashi)	Submareal somero	Arenisca calcárea no litificada fangosa (glauconita)
1392	USA	California	Marysville Buttes	UCMP 1853	Ypresiano	Capay	Cañon submarino	Lutita y limolita
1403	USA	Texas	Claiborne	PRI 3237	Ypresiano	Reklaw (Mb. Marquez Shale)	Plataforma interna (transgresiva)	Limolita
1408	USA	Alabama	Wilcox	PRI 864	Ypresiano	Hatchetigbee Bluff (Mb. Bashi)	Submareal somero	Arenisca calcárea no litificada arcillosa (glauconita)
1411	USA	Alabama	Wilcox	M 424	Ypresiano	Hatchetigbee Bluff (Mb. Bashi)	Submareal somero	Arenisca calcárea no litificada (glauconita)
1430	USA	Alabama	Wilcox	M 673	Ypresiano	Hatchetigbee Bluff (Mb. Bashi)	Submareal somero	Arenisca calcárea no litificada arcillosa (glauconita)
1431	USA	Alabama	Wilcox	M 430	Ypresiano	Hatchetigbee Bluff (Mb. Bashi)	Submareal somero	Arenisca calcárea no litificada (glauconita)
1436	USA	Texas	Wilcox	M 267	Ypresiano	Sabinetown Bluff	Marino indeterminado	Arenisca no litificada (glauconita)
1437	USA	Texas	Wilcox	M 266	Ypresiano	Sabinetown Bluff	Marino indeterminado	Limolita litificada
1438	USA	Texas	Wilcox	M 259	Ypresiano	Sabinetown Bluff	Marino indeterminado	Limolita

Rec	Region	State or County	Location	Key Location	Stage	Formation	Depositional Environment	Facies
1439	USA	Alabama	Wilcox	M 2	Ypresiano	Hatchetigbee Bluff (Mb. Bashi)	Submareal somero	Arenisca calcárea no litificada arcillosa (glaucónita)
1440	USA	Texas	Claiborne	David's Bottom	Ypresiano	Reklaw	Submareal somero	Caliza no litificada (glaucónita)
1447	USA	Texas	Claiborne	Reklaw-locality 4	Ypresiano	Reklaw (Mb. Marquez Shale)	Submareal somero	Arcilla arenosa no litificada
1459	USA	Mississippi	Wilcox	M 138	Ypresiano	Hatchetigbee Bluff (Mb. Bashi)	Submareal somero	Arenisca no litificada (glaucónita)
1463	USA	Alabama	Spear Creek	H76-35-2 (Bulk 2)	Ypresiano	Hatchetigbee Bluff (Mb. Bashi)	Submareal somero	Arenisca no litificada (glaucónita)
1464	USA	Alabama	Wilcox	PRI 3146	Ypresiano	Hatchetigbee Bluff (Mb. Bashi)	Submareal somero	Arenisca calcárea no litificada arcillosa (glaucónita)
1465	USA	Alabama	Wilcox	M 12	Ypresiano	Hatchetigbee Bluff (Mb. Bashi)	Submareal somero	Arenisca calcárea no litificada (glaucónita)
1476	USA	Alabama	Wilcox	M 10	Ypresiano	Hatchetigbee Bluff (Mb. Bashi)	Submareal somero	Arenisca calcárea no litificada (glaucónita)
1478	USA	Alabama	Wilcox	M 3	Ypresiano	Hatchetigbee Bluff (Mb. Bashi)	Submareal somero	Arenisca calcárea no litificada arcillosa (glaucónita)
1479	USA	Alabama	Wilcox	M 28	Ypresiano	Hatchetigbee Bluff (Mb. Bashi)	Submareal somero	Arenisca calcárea no litificada arcillosa (glaucónita)
1480	USA	Alabama	Wilcox	M 12	Ypresiano	Hatchetigbee Bluff (Mb. Bashi)	Submareal somero	Arenisca calcárea no litificada (glaucónita)
1481	USA	Alabama	Wilcox	M 427A	Ypresiano	Hatchetigbee Bluff (Mb. Bashi)	Submareal somero	Arenisca calcárea no litificada arcillosa (glaucónita)
1529	USA	Texas	Claiborne	M 210	Ypresiano	Reklaw	Plataforma interna (transgresiva)	Limolita arcillosa no litificada
1532	USA	Texas	Claiborne	M 534	Ypresiano	Reklaw	Plataforma interna (transgresiva)	Limolita arcillosa no litificada
1533	USA	Texas	Claiborne	PRI 3238	Ypresiano	Reklaw (Mb. Marquez Shale)	Submareal somero	Lutita arenosa no litificada
1539	USA	California	NW of Vacaville	UCMP 3573	Ypresiano	Lodo (Mb. Cerros Shale)	Offshore	Lutita carbonosa no litificada
1540	Perú,	None	None	UWBM B8770	Ypresiano	Caballas	Costa indeterminada	Arenisca
1544	USA	Washington	Crescent Bay	LACMIP 30188	Ypresiano	Crescent	Costa rocosa	Lutita limosa no litificada (glaucónita)
1545	USA	Washington	Crescent Bay	LACMIP 6160	Ypresiano	Crescent	Costa rocosa	Lutita limosa no litificada (glaucónita)
1547	USA	California	Sutter	UC 692	Ypresiano	Capay	Cañon submarino	Lutita y limolita
1548	USA	Washington	Larch Mountain	CSUN 1564 (LACMIP 16848)	Ypresiano	Crescent	Costa rocosa	Lutita limosa no litificada (glaucónita)
1549	USA	Washington	None	Pulali Point	Ypresiano	Crescent	Submareal somero	Arenisca
1550	USA	Oregon	Glide	UO 142	Ypresiano	White Tail Ridge (Mb. Berry Creek)	Transición/shoreface	Arenisca no litificada grano medio-fino
1563	México,	Nuevo León	None	IGM-1973	Ypresiano	Adjuntas	Estuario/bahía	Arenisca grano grueso
1566	USA	California	Salt Creek	UCMP 464	Ypresiano	Tejon	Marginal	Arenisca

Rec	Region	State or County	Location	Key Location	Stage	Formation	Depositional Environment	Facies
1567	USA	California	Deer Valley	UCMP 3162	Ypresiano	Meganos	Costa	Arenisca calcárea litificada con guijarros
1601	USA	Oregon	Umpqua	UCMP A-997	Ypresiano	Roseburg	Abanico submarino (aguas poco profundas)	Arenisca grano fino
1604	USA	California	Big Tar Canyon	UCMP A-1282	Ypresiano	Domengine	Estuario/bahía	Arenisca
1606	USA	California	Santa Ynez River	CSUN 1566	Ypresiano	Sierra Blanca	Marino indeterminado	Caliza
1609	USA	California	Big Tar Canyon	UCMP A-9727	Ypresiano	Avenal	Bioherma	Arenisca
1614	USA	California	Contra Costa	LACMIP 22387	Ypresiano	Meganos	Abanico submarino (aguas poco profundas)	Arenisca
1624	USA	California	Contra Costa	UW 1073	Ypresiano	Martinez (Mb. Capay Shale)	Offshore	Lutita arenosa litificada grano medio-grueso (glauconita)
1625	USA	California	Contra Costa	UW 4000	Ypresiano	Martinez (Mb. Capay Shale)	Offshore	Lutita arenosa litificada grano medio-grueso (glauconita)

Lutetian localities

Rec	Region	State or County	Location	Key Location	Stage	Formation	Depositional Environment	Facies
18	USA	Washington	Grays Harbor	LACMIP 12385 (UW B-7442)	Luteciano	Humtulpils	Submareal profundo "cool seep"	Limolita
32	USA	Washington	Hobart quadrangle	USGS 645-646	Luteciano	Raging River	Marino indeterminado	Arenisca
33	USA	Washington	Hobart quadrangle	USGS 647	Luteciano	Raging River	Marino indeterminado	Arenisca limosa grano fino
34	USA	Washington	Hobart quadrangle	USGS 648	Luteciano	Raging River	Marino indeterminado	Arenisca
35	USA	Washington	Hobart quadrangle	USGS 649	Luteciano	Raging River	Marino indeterminado	Arenisca grano medio-grueso
105	USA	Oregon	Umpqua	A-661 (UO 138, CAS 125)	Luteciano	Flournoy	Marino indeterminado	Arenisca
107	USA	Oregon	Umpqua	A-844	Luteciano	Flournoy	Marino indeterminado	Arenisca
108	USA	Oregon	Umpqua	A-845	Luteciano	Flournoy	Marino indeterminado	Arenisca
109	USA	Oregon	Umpqua	A-667	Luteciano	Flournoy	Marino indeterminado	Arenisca
110	USA	Oregon	Umpqua	A-677	Luteciano	Flournoy	Marino indeterminado	Arenisca
111	USA	Oregon	None	A-686	Luteciano	Flournoy	Marino indeterminado	Arenisca
112	USA	Oregon	Umpqua	A-999	Luteciano	Flournoy	Marino indeterminado	Arenisca
113	USA	Oregon	Basket Point	A-698	Luteciano	Flournoy	Marino indeterminado	Arenisca
115	USA	Oregon	Umpqua	A-828	Luteciano	Flournoy	Marino indeterminado	Arenisca
124	USA	Oregon	Umpqua	A-662 (UO 138, CAS 125)	Luteciano	Flournoy	Marino indeterminado	Arenisca
125	USA	Oregon	Umpqua	A-687	Luteciano	Flournoy	Marino indeterminado	Arenisca
137	USA	Washington	None	UWBM B8083	Luteciano	Humtulpils	Abisal	Caliza arenosa

Rec	Region	State or County	Location	Key Location	Stage	Formation	Depositional Environment	Facies
170	USA	Oregon	Umpqua	UCMP A-834	Luteciano	Flournoy	Marino indeterminado	Arenisca
190	USA	Oregon	None	A-671	Luteciano	Flournoy	Marino indeterminado	Arenisca
191	USA	Oregon	Umpqua	A-674	Luteciano	Flournoy	Marino indeterminado	Arenisca
192	USA	Oregon	Umpqua	A-678	Luteciano	Flournoy	Marino indeterminado	Arenisca
194	USA	California	Las Lajas Canyon	CSUN 374	Luteciano	Llajas	Transición/shoreface	Arenisca
195	USA	California	Las Lajas Canyon	CSUN 444	Luteciano	Llajas	Transición/shoreface	Arenisca
198	USA	California	La Jolla	Vista Horizon 2 (UCR 4865)	Luteciano	Delmar	Perimareal	Arenisca
199	USA	California	Simi Hills	CSUN 704	Luteciano	Llajas	Submareal poco profundo (transgresiva)	Arenisca
200	USA	California	Chivo Canyon	CSUN 458	Luteciano	Llajas	Transición/shoreface	Arenisca
202	USA	California	west Sharps Canyon	CSUN 237 (LACMIP 40237)	Luteciano	Matilija Sandstone	Delta (depositos frontales)	Arenisca
203	USA	California	north Sharps Canyon	CSUN 219 (LACMIP 40219)	Luteciano	Matilija Sandstone	Delta (depositos frontales)	Arenisca
205	USA	California	Las Lajas Canyon	CSUN 447	Luteciano	Llajas	Offshore (transgresiva)	Arenisca
206	USA	California	Las Lajas Canyon	CSUN 449	Luteciano	Llajas	Offshore (transgresiva)	Arenisca
207	USA	California	Las Lajas Canyon	CSUN 451	Luteciano	Llajas	Offshore (transgresiva)	Arenisca
208	USA	California	None	CSUN 494	Luteciano	Llajas	Offshore (transgresiva)	Arenisca
213	USA	California	Sta Susana Mountains	CSUN 510	Luteciano	Llajas	Submareal poco profundo (transgresiva)	Arenisca
214	USA	California	Simi Arroyo	CSUN 548	Luteciano	Llajas	Transición/shoreface	Limolita arcillosa litificada
215	USA	California	Las Lajas Canyon	CSUN 455	Luteciano	Llajas	Offshore (transgresiva)	Arenisca
216	USA	California	Sta Susana Mountains	CSUN 466	Luteciano	Llajas	Offshore (transgresiva)	Arenisca
217	USA	California	El Toro Canyon	CSUN 467	Luteciano	Llajas	Offshore (transgresiva)	Arenisca
218	USA	California	None	CSUN 484	Luteciano	Llajas	Offshore (transgresiva)	Arenisca
219	USA	California	Las Lajas Canyon	CSUN 491	Luteciano	Llajas	Offshore (transgresiva)	Arenisca
221	USA	California	Sta Susana Mountains	CSUN 507	Luteciano	Llajas	Submareal poco profundo (transgresiva)	Arenisca
222	USA	California	Sta Susana Mountains	CSUN 508	Luteciano	Llajas	Submareal poco profundo (transgresiva)	Arenisca
223	USA	California	Las Lajas Canyon	CSUN 529b	Luteciano	Llajas	Offshore (transgresiva)	Arenisca
224	USA	California	Las Lajas Canyon	CSUN 538a	Luteciano	Llajas	Offshore (transgresiva)	Arenisca

Rec	Region	State or County	Location	Key Location	Stage	Formation	Depositional Environment	Facies
225	USA	California	Las Lajas Canyon	CSUN 539	Luteciano	Llajas	Offshore (transgresiva)	Arenisca
230	USA	California	Bus Canyon	CSUN 700	Luteciano	Llajas	Costa indeterminada	Arenisca
231	USA	California	Bus Canyon	CSUN 701	Luteciano	Llajas	Costa indeterminada	Arenisca
232	USA	California	Simi Hills	CSUN 702 (UCMP 7193)	Luteciano	Llajas	Costa indeterminada	Arenisca
241	USA	California	Las Lajas Canyon	CSUN 452 (UCMP A-994)	Luteciano	Llajas	Costa indeterminada	Arenisca
242	USA	California	Las Lajas Canyon	CSUN 454	Luteciano	Llajas	Costa indeterminada	Arenisca
243	USA	California	None	CSUN 469a	Luteciano	Llajas	Costa indeterminada	Arenisca
244	USA	California	None	CSUN 469b	Luteciano	Llajas	Costa indeterminada	Arenisca
245	USA	California	None	CSUN 469c	Luteciano	Llajas	Costa indeterminada	Arenisca
246	USA	California	Sta Susana Mountains	CSUN 501	Luteciano	Llajas	Offshore (transgresiva)	Arenisca
247	USA	California	Las Lajas Canyon	CSUN 542	Luteciano	Llajas	Costa indeterminada	Arenisca
248	USA	California	Bus Canyon	CSUN 545	Luteciano	Llajas	Costa indeterminada	Arenisca
250	USA	Oregon	None	A-665 (UO 139)	Luteciano	Flournoy	Marino indeterminado	Arenisca
252	USA	California	None	CSUN 976	Luteciano	Juncal	Transición/shoreface	Limolita arcillosa no litificada con conchas
253	USA	California	None	CSUN 978 (LACMIP 16150)	Luteciano	Juncal	Transición/shoreface	Limolita arcillosa no litificada con conchas
254	USA	California	None	CSUN 979	Luteciano	Juncal	Transición/shoreface	Limolita arcillosa no litificada con conchas
255	USA	California	None	CSUN 983	Luteciano	Juncal	Transición/shoreface	Limolita arcillosa no litificada con conchas
256	USA	California	None	CSUN 984 (LACMIP 16178)	Luteciano	Juncal	Transición/shoreface	Limolita arcillosa no litificada con conchas
257	USA	California	None	CSUN 987 (LACMID 16175)	Luteciano	Juncal	Transición/shoreface	Limolita arcillosa no litificada con conchas
274	USA	California	None	UCR 5361	Luteciano	Mount Soledad	Delta (influenciado por las mareas)	Conglomerado
275	USA	California	La Jolla	UCR 4922 (UCMP 5062)	Luteciano	Ardath	Submareal profundo	Lutita
276	USA	California	La Jolla	UCR 4923	Luteciano	Ardath	Submareal profundo	Lutita
277	USA	California	La Jolla	UCR 4926	Luteciano	Scripps	Submareal profundo	Lutita
278	USA	California	La Jolla	UCR 4927	Luteciano	Scripps	Plataforma interna	Arenisca
279	USA	California	Chivo Canyon	CSUN 453	Luteciano	Llajas	Offshore (transgresiva)	Arenisca
280	USA	California	Chivo Canyon	CSUN 457	Luteciano	Llajas	Offshore (transgresiva)	Arenisca
281	USA	California	Las Lajas Canyon	CSUN 468b	Luteciano	Llajas	Offshore (transgresiva)	Arenisca

Rec	Region	State or County	Location	Key Location	Stage	Formation	Depositional Environment	Facies
282	USA	California	None	CSUN 469d	Luteciano	Llajas	Costa indeterminada	Arenisca
283	USA	California	None	CSUN 469j	Luteciano	Llajas	Offshore (transgresiva)	Arenisca
284	USA	California	Chivo Canyon	CSUN 470c	Luteciano	Llajas	Offshore (transgresiva)	Arenisca
286	USA	California	None	CSUN 481	Luteciano	Llajas	Offshore (transgresiva)	Arenisca
287	USA	California	None	CSUN 485	Luteciano	Llajas	Offshore (transgresiva)	Arenisca
288	USA	California	None	CSUN 487	Luteciano	Llajas	Offshore (transgresiva)	Arenisca
289	USA	California	Las Llajas Canyon	CSUN 490	Luteciano	Llajas	Offshore (transgresiva)	Arenisca
290	USA	California	Las Llajas Canyon	CSUN 516	Luteciano	Llajas	Offshore (transgresiva)	Arenisca
292	USA	California	Sta Susana Mountains	CSUN 523	Luteciano	Llajas	Offshore (transgresiva)	Arenisca
293	USA	California	Sta Susana Mountains	CSUN 527a	Luteciano	Llajas	Offshore (transgresiva)	Arenisca
294	USA	California	Las Llajas Canyon	CSUN 529a	Luteciano	Llajas	Offshore (transgresiva)	Arenisca
295	USA	California	Chivo Canyon	CSUN 537	Luteciano	Llajas	Offshore (transgresiva)	Arenisca
317	USA	California	None	CSUN 974 (LACMIP 16193)	Luteciano	Juncal	Transición/shoreface	Limolita arcillosa no litificada con conchas
318	USA	California	None	CSUN 980	Luteciano	Juncal	Transición/shoreface	Limolita arcillosa no litificada con conchas
319	USA	California	La Jolla	SDSNH 3278	Luteciano	Scripps	Shoreface	Arenisca conglomerada litificada
329	USA	California	None	UCMP B6920 (LSJU 2219)	Luteciano	Matilija Sandstone	Aguas poco profundas	Arenisca grano medio
332	USA	California	None	CSUN 469e	Luteciano	Llajas	Offshore (transgresiva)	Arenisca
333	USA	California	None	CSUN 469h	Luteciano	Llajas	Offshore (transgresiva)	Arenisca
334	USA	California	Sta Susana Mountains	CSUN 486	Luteciano	Llajas	Offshore (transgresiva)	Arenisca
335	USA	California	Sta Susana Mountains	CSUN 505	Luteciano	Llajas	Offshore (transgresiva)	Arenisca
336	USA	California	Las Llajas Canyon	CSUN 514	Luteciano	Llajas	Offshore (transgresiva)	Arenisca
337	USA	California	Sta Susana Mountains	CSUN 540	Luteciano	Llajas	Offshore (transgresiva)	Arenisca
338	USA	California	Las Llajas Canyon	CSUN 705	Luteciano	Llajas	Costa indeterminada	Arenisca
355	USA	Oregon	Umpqua	A-679 (UO 139)	Luteciano	Flourney	Marino indeterminado	Arenisca
356	USA	Oregon	Umpqua	A-849	Luteciano	Flourney	Marino indeterminado	Arenisca
357	USA	Oregon	Umpqua	A-700	Luteciano	Flourney	Marino indeterminado	Arenisca
362	USA	Oregon	Umpqua	A-668	Luteciano	Flourney	Marino indeterminado	Arenisca
363	USA	Oregon	Umpqua	A-672	Luteciano	Flourney	Marino indeterminado	Arenisca

Rec	Region	State or County	Location	Key Location	Stage	Formation	Depositional Environment	Facies
378	USA	California	None	UCMP B6918	Luteciano	Matilija Sandstone	Marino indeterminado	Arenisca grano medio
379	USA	California	None	UCMP B6924	Luteciano	Cozy Dell	Cuenca oceánica	Lutita
380	USA	California	None	UCMP B6925	Luteciano	Cozy Dell	Cuenca oceánica	Lutita
381	USA	California	None	UCMP B6926	Luteciano	Cozy Dell	Cuenca oceánica	Lutita
382	USA	California	None	UCMP B6927	Luteciano	Cozy Dell	Cuenca oceánica	Lutita
383	USA	California	None	UCMP B6928	Luteciano	Cozy Dell	Cuenca oceánica	Lutita
385	USA	California	La Jolla	UCR 4847	Luteciano	Ardath	Submareal profundo	Lutita
386	USA	California	La Jolla	UCR 4856	Luteciano	Ardath	Submareal profundo	Lutita
387	USA	California	La Jolla	UCR 4860	Luteciano	Ardath	Submareal profundo	Lutita
388	USA	California	None	UCR 4921	Luteciano	Ardath	Submareal profundo	Lutita
389	USA	California	La Jolla	UCR 4937	Luteciano	Ardath	Submareal profundo	Lutita
390	USA	California	La Jolla	UCR 4938	Luteciano	Ardath	Submareal profundo	Lutita
391	USA	California	None	UCR 4853	Luteciano	Scripps	Submareal somero	Arenisca
392	USA	California	None	UCR 4935	Luteciano	Scripps	Submareal somero	Arenisca
393	USA	California	None	UCR 4936	Luteciano	Scripps (Mb. Superior)	Submareal somero	Arenisca
394	USA	California	La Jolla	UCR 4944	Luteciano	Scripps (Mb. Superior)	Submareal somero	Arenisca
395	USA	California	La Jolla	UCR 4953	Luteciano	Scripps (Mb. Superior)	Submareal somero	Arenisca
396	USA	California	None	UCR 4960	Luteciano	Scripps (Mb. Superior)	Submareal somero	Arenisca
397	USA	California	None	UCR 4965	Luteciano	Scripps (Mb. Superior)	Submareal somero	Arenisca
398	USA	California	None	UCR 4967	Luteciano	Scripps (Mb. Superior)	Submareal somero	Arenisca
399	USA	California	La Jolla	UCR 4970	Luteciano	Scripps (Mb. Superior)	Submareal somero	Arenisca
400	USA	California	La Jolla	UCR 4971	Luteciano	Scripps (Mb. Superior)	Submareal somero	Arenisca
401	USA	California	La Jolla	UCR 4972	Luteciano	Scripps (Mb. Superior)	Submareal somero	Arenisca
402	USA	California	La Jolla	UCR 4975	Luteciano	Scripps (Mb. Superior)	Submareal somero	Arenisca
403	USA	California	La Jolla	UCR 4982	Luteciano	Scripps (Mb. Superior)	Submareal somero	Arenisca
404	USA	California	La Jolla	UCR 4985	Luteciano	Scripps (Mb. Superior)	Submareal somero	Arenisca
405	USA	California	La Jolla	UCR 4987	Luteciano	Scripps (Mb. Superior)	Submareal somero	Arenisca

Rec	Region	State or County	Location	Key Location	Stage	Formation	Depositional Environment	Facies
406	USA	California	La Jolla	UCR 4988	Luteciano	Scripps (Mb. Superior)	Submareal somero	Arenisca
407	USA	California	La Jolla	UCR 4990	Luteciano	Scripps (Mb. Superior)	Submareal somero	Arenisca
409	USA	California	La Jolla	UCR 4993	Luteciano	Scripps (Mb. Superior)	Submareal somero	Arenisca
410	USA	California	Poway	UCR 4858	Luteciano	Mission Valley	Laguna	Arenisca
411	USA	California	Poway	UCR 4994	Luteciano	Mission Valley	Laguna	Arenisca
412	USA	California	Poway	UCR 4997	Luteciano	Mission Valley	Laguna	Arenisca
413	USA	California	Poway	UCR 4998	Luteciano	Mission Valley	Laguna	Arenisca
414	USA	California	Poway	UCR 4999	Luteciano	Mission Valley	Laguna	Arenisca
415	USA	California	Poway	UCR 5358	Luteciano	Mission Valley	Laguna	Arenisca
416	USA	California	La Jolla	UCR 4932	Luteciano	Ardath	Submareal profundo	Lutita
417	USA	California	None	CSUN 469i	Luteciano	Llajas	Offshore (transgresiva)	Arenisca
419	USA	California	None	CSUN 483	Luteciano	Llajas	Offshore (transgresiva)	Arenisca
420	USA	California	None	CSUN 489	Luteciano	Llajas	Offshore (transgresiva)	Arenisca
421	USA	California	None	LACMIP 23688	Luteciano	Matilija Sandstone	Marino indeterminado	Arenisca limosa grano fino
422	USA	California	None	LACMIP 24260	Luteciano	Matilija Sandstone	Marino indeterminado	Arenisca limosa grano fino
430	USA	California	Poway	SDSNH 2962	Luteciano	Mission Valley	Estuario/bahía	Arenisca arcillosa
437	USA	California	Chivo Canyon	CSUN 512b	Luteciano	Llajas	Offshore (transgresiva)	Arenisca
438	USA	California	Chivo Canyon	CSUN 512d	Luteciano	Llajas	Offshore (regresiva)	Arenisca
440	USA	California	Llajas Canyon	LACMIP 461-B	Luteciano	Llajas	Costa indeterminada	Conglomerado
442	USA	California	Simi Hills	CSUN 703	Luteciano	Llajas	Offshore (transgresiva)	Arenisca
443	USA	California	Sta Susana Mountains	CSUN 517	Luteciano	Llajas	Offshore	Arenisca
451	USA	California	La Jolla	UCR 4876	Luteciano	Delmar	Submareal somero	Arenisca
452	USA	California	La Jolla	UCR 4879	Luteciano	Delmar	Submareal somero	Arenisca
453	USA	California	La Jolla	UCR 4880	Luteciano	Delmar	Submareal somero	Arenisca
454	USA	California	La Jolla	UCR 4918	Luteciano	Delmar	Submareal somero	Arenisca
460	USA	California	La Jolla	UCR 4920	Luteciano	Ardath	Submareal profundo	Arenisca grano fino
461	USA	California	Chivo Canyon	CSUN 472	Luteciano	Llajas	Offshore (transgresiva)	Arenisca
462	USA	California	Chivo Canyon	CSUN 477	Luteciano	Llajas	Offshore (transgresiva)	Arenisca
463	USA	California	None	CSUN 479	Luteciano	Llajas	Offshore (transgresiva)	Arenisca

Rec	Region	State or County	Location	Key Location	Stage	Formation	Depositional Environment	Facies
466	USA	California	None	CSUN 475 (LACMIP 16201)	Luteciano	Juncal	Transición/shoreface	Limolita arcillosa no litificada con conchas
471	USA	California	None	CSUN 460	Luteciano	Llajas	Offshore	Arenisca
472	USA	California	None	CSUN 482	Luteciano	Llajas	Offshore (transgresiva)	Arenisca
473	USA	California	Sta Susana Mountains	CSUN 518	Luteciano	Llajas	Offshore	Arenisca
480	USA	California	Llajas Canyon	LACMIP 461-A	Luteciano	Llajas	Costa indeterminada	Siliciclastica
483	USA	California	Las Llajas Canyon	CSUN 450	Luteciano	Llajas	Offshore	Arenisca
484	USA	California	Sta Susana Mountains	CSUN 465	Luteciano	Llajas	Offshore	Arenisca
485	USA	California	None	CSUN 469g	Luteciano	Llajas	Offshore (transgresiva)	Arenisca
486	USA	California	Chivo Canyon	CSUN 470b	Luteciano	Llajas	Offshore (transgresiva)	Arenisca
488	USA	California	None	CSUN 480	Luteciano	Llajas	Offshore (transgresiva)	Arenisca
489	USA	California	None	CSUN 488	Luteciano	Llajas	Offshore (transgresiva)	Arenisca
490	USA	California	Sta Susana Mountains	CSUN 497	Luteciano	Llajas	Offshore (transgresiva)	Arenisca
492	USA	California	Sta Susana Mountains	CSUN 509	Luteciano	Llajas	Submareal poco profundo (transgresiva)	Arenisca
493	USA	California	Las Llajas Canyon	CSUN 538	Luteciano	Llajas	Offshore (transgresiva)	Arenisca
495	USA	California	La Jolla	UCR 4941	Luteciano	Ardath	Submareal profundo	Lutita
497	USA	California	Sta Ana Mountains	F104 (USGS 18996)	Luteciano	Santiago	Costa indeterminada	Arenisca litificada con guijarros
498	USA	California	Simi Valley	UCMP 7004	Luteciano	Llajas	Transición/shoreface	Arenisca litificada grano fino
500	USA	California	None	B6921 (LSJU 2220)	Luteciano	Matilija Sandstone	Marino indeterminado	Arenisca grano medio
501	USA	California	None	CSUN 492	Luteciano	Llajas	Offshore (transgresiva)	Arenisca
503	USA	California	Sta Susana Mountains	CSUN 506	Luteciano	Llajas	Submareal poco profundo (transgresiva)	Arenisca
504	USA	California	Las Llajas Canyon	CSUN 513	Luteciano	Llajas	Offshore (transgresiva)	Arenisca
505	USA	California	Sta Susana Mountains	CSUN 528	Luteciano	Llajas	Offshore (transgresiva)	Arenisca
506	USA	California	Chivo Canyon	CSUN 541	Luteciano	Llajas	Offshore	Arenisca
511	USA	Oregon	Umpqua	A-666 (UO 139)	Luteciano	Flournoy	Marino indeterminado	Arenisca
514	USA	California	Matilija Hot Springs	CSUN 1444 (LACMIP 16961)	Luteciano	Matilija Sandstone	Marino indeterminado	Lutita limosa no litificada (glauconita)
515	USA	California	Matilija Hot Springs	CSUN 1450 (LACMIP 16963)	Luteciano	Matilija Sandstone	Costa indeterminada	Arenisca
516	USA	California	Matilija Hot Springs	CSUN 1451 (LACMIP 16964)	Luteciano	Matilija Sandstone	Costa indeterminada	Arenisca
517	USA	California	La Jolla	UCR 4968	Luteciano	Friars	Laguna	Limolita

Rec	Region	State or County	Location	Key Location	Stage	Formation	Depositional Environment	Facies
518	USA	Oregon	Umpqua	A-699	Luteciano	Flournoy	Marino indeterminado	Arenisca
522	USA	California	Poway	UCR 4996	Luteciano	Mission Valley	Laguna	Arenisca
528	USA	California	Simi Hills	CSUN 543	Luteciano	Llajas	Offshore (transgresiva)	Arenisca
531	USA	California	Grapevine Canyon	CAS 711	Luteciano	Tejon	Marino indeterminado	Arenisca litificada grano fino-medio
534	USA	Oregon	Umpqua	A-1138	Luteciano	Flournoy	Marino indeterminado	Arenisca
536	USA	California	None	CSUN 469f	Luteciano	Llajas	Offshore (transgresiva)	Arenisca
540	USA	California	Sta Ana Mountains	F108 (USGS #18999)	Luteciano	Santiago	Costa indeterminada	Arenisca litificada con guijarros
541	USA	Washington	Hobart quadrangle	USGS 644	Luteciano	Raging River	Marino indeterminado	Limolita
550	USA	California	Chivo Canyon	CSUN 512a	Luteciano	Llajas	Offshore (regresiva)	Arenisca
551	USA	California	Sta susana Mountains	CSUN 520	Luteciano	Llajas	Offshore (transgresiva)	Arenisca
555	USA	California	Sta Susana Mountains	UCMP B6919	Luteciano	Matilija Sandstone	Marino indeterminado	Arenisca grano medio
557	USA	California	Chivo Canyon	CSUN 473	Luteciano	Llajas	Aguas profundas	Limolita arcillosa no litificada con conchas
560	USA	California	Las Llajas Canyon	CSUN 438 (UCLA 2275)	Luteciano	Llajas	Offshore	Arenisca litificada
563	USA	California	Las Llajas Canyon	CSUN 525	Luteciano	Llajas	Offshore (transgresiva)	Arenisca
564	USA	California	La Jolla	UCR 4852	Luteciano	Delmar	Submareal somero	Arenisca
571	USA	California	La Jolla	UCR 4919	Luteciano	Delmar	Submareal somero	Arenisca
572	USA	California	None	SU 1150	Luteciano	Stadium	Delta (influenciado por las mareas)	Conglomerado
573	USA	California	Las Llajas Canyon	CSUN 468a	Luteciano	Llajas	Offshore	Arenisca
574	USA	California	None	CSUN 478	Luteciano	Llajas	Offshore (transgresiva)	Arenisca
575	USA	California	Matilija Hot Springs	CSUN 1446	Luteciano	Matilija Sandstone	Costa indeterminada	Lutita limosa no litificada (glauconita)
576	USA	California	Matilija Hot Springs	CSUN 1445	Luteciano	Matilija Sandstone	Costa indeterminada	Lutita limosa no litificada (glauconita)
577	USA	California	Matilija Hot Springs	CSUN 1453	Luteciano	Matilija Sandstone	Costa indeterminada	Lutita limosa no litificada (glauconita)
578	USA	California	Matilija Hot Springs	CSUN 1452	Luteciano	Matilija Sandstone	Costa indeterminada	Lutita limosa no litificada (glauconita)
579	USA	California	Chivo Canyon	CSUN 706	Luteciano	Llajas	Costa indeterminada	Arenisca
580	USA	California	Poway	Murray Ridge	Luteciano	Mission Valley	Marino indeterminado	Arenisca
582	USA	California	Sta Ana Mountains	F106 (1642A)	Luteciano	Santiago	Costa indeterminada	Arenisca litificada con guijarros
583	USA	California	Sta Barbara	UCMP B6922	Luteciano	Matilija Sandstone	Marino indeterminado	Arenisca grano medio

Rec	Region	State or County	Location	Key Location	Stage	Formation	Depositional Environment	Facies
584	USA	Oregon	Umpqua	A-697	Luteciano	Flournoy	Marino indeterminado	Arenisca
587	USA	California	La Jolla	UCMP 3989	Luteciano	Ardath	Abanico submarino	Lutita
589	USA	California	Simi Hills	CSUN 544	Luteciano	Llajas	Offshore (transgresiva)	Arenisca
592	USA	California	Simi Valley	UCMP 7003	Luteciano	Llajas	Transición/shoreface	Arenisca litificada grano fino
593	USA	California	Las Llajas Canyon	CIT 206	Luteciano	Llajas	Transición/shoreface	Arenisca litificada grano fino
594	USA	California	Las Llajas Canyon	CIT 428	Luteciano	Llajas	Transición/shoreface	Arenisca litificada grano fino
595	USA	California	Sn Clemente Canyon	None	Luteciano	None	Marino indeterminado	Siliciclastica
596	USA	Oregon	Umpqua	A-850	Luteciano	Flournoy	Marino indeterminado	Arenisca
597	USA	California	La Jolla	Vista Horizon 4 (UCR 4865)	Luteciano	Delmar	Perimareal	Arenisca
598	USA	California	La Jolla	UCR 4917	Luteciano	Delmar	Submareal somero	Arenisca
603	USA	California	None	LACMIP 7418	Luteciano	Llajas	Costa (transgresiva)	Arenisca litificada bioturbada
605	USA	California	Las Llajas Canyon	UCLA 2312	Luteciano	Llajas	Offshore	Arenisca limosa litificada (glauconita)
606	USA	California	None	LACMIP 7434	Luteciano	Llajas	Offshore (regresiva)	Arenisca limosa litificada (bioturbada)
607	USA	California	None	LACMIP 7445	Luteciano	Llajas	Offshore (regresiva)	Arenisca limosa litificada (bioturbada)
613	USA	California	Poway	UCR 5357	Luteciano	Stadium	Delta (influenciado por las mareas)	Conglomerado
624	USA	Oregon	Umpqua	A-670	Luteciano	Flournoy	Marino indeterminado	Arenisca
626	USA	California	Beartrap Creek	LACMIP 7226	Luteciano	Matilija Sandstone	Costa indeterminada	Lutita limosa no litificada (glauconita)
628	USA	Oregon	None	A-673	Luteciano	Flournoy	Marino indeterminado	Arenisca
629	USA	California	Sta Ana Mountains	UCMP 2233	Luteciano	Santiago	Marino indeterminado	Lutita y limolita
631	USA	California	None	LACMIP 7430	Luteciano	Llajas	Offshore (transgresiva)	Arenisca litificada (bioturbada)
633	USA	California	La Jolla	UCR 5362	Luteciano	Mount Soledad	Delta (influenciado por las mareas)	Conglomerado
636	USA	California	Blue Point Campground	CSUN 28	Luteciano	Matilija Sandstone	Marino indeterminado	Arenisca
637	USA	California	None	CSUN 485 (LACMIP 40485)	Luteciano	Llajas	Offshore (transgresiva)	Arenisca
661	México,	Baja California Sur	None	CSUN 1293a	Luteciano	Bateque	Offshore	Lutita no litificada
662	México,	Baja California Sur	None	Lado S del A. Mezquital (CSUN 1293b)	Luteciano	Bateque	Offshore	Lutita no litificada
664	México,	Baja California Sur	None	San Jose de Gracia (CSUN 1552)	Luteciano	Bateque	Shoreface	Arenisca no litificada grano fino

Rec	Region	State or County	Location	Key Location	Stage	Formation	Depositional Environment	Facies
683	México,	Baja California Sur	None	este San Juanico (CSUN 1292)	Luteciano	Bateque	Transición/shoreface	Arenisca no litificada grano fino
704	México,	Chiapas	Veinte de Noviembre	IHN 1005	Luteciano	Sn Juan	Submareal somero	Caliza litificada
738	USA	Washington	Hobart quadrangle	H-312	Luteciano	Raging River	Abanico submarino	Arenisca litificada grano fino
760	Perú	Piura	Negritos	None	Luteciano	Salina	Costa siliciclastica	Arenisca conglomerada no litificada
767	Perú	Piura	Restin	None	Luteciano	Pale Greda	Costa siliciclastica	Lutita no litificada
772	Perú	Piura	Cabo Blanco	CP10-CP12A	Luteciano	Pale Greda	Costa indeterminada	Arenisca
779	Jamaica,	St. James	Seven River	None	Luteciano	Chapelton (Mb. Yellow Limestone)	Estuario/bahía	Arenisca calcárea limosa
845	USA	Texas	Smithville	None	Luteciano	Weches	Marginal	Arena verde
885	USA	Alabama	Claiborne	AMo-4	Luteciano	Lisbon (Mb. Superior)	Submareal somero	Arenisca calcárea no litificada (glauconita)
886	USA	Alabama	Claiborne	ACon-4	Luteciano	Lisbon (Mb. Superior)	Submareal somero	Arenisca calcárea no litificada (glauconita)
887	USA	Alabama	Claiborne	ACI-4	Luteciano	Lisbon (Mb. Superior)	Submareal somero	Arenisca calcárea no litificada (glauconita)
888	USA	Alabama	Claiborne	ACI-3	Luteciano	Lisbon (Mb. Superior)	Submareal somero	Arenisca calcárea no litificada (glauconita)
889	USA	Alabama	Choctaw	ACH-8	Luteciano	Lisbon (Mb. Superior)	Submareal somero	Arenisca calcárea no litificada (glauconita)
900	USA	Alabama	Conecuh River	H76-52	Luteciano	Cook Mountain	Offshore	Limolita arenosa no litificada
901	USA	Alabama	Conecuh River	H76-49	Luteciano	Cook Mountain	Offshore	Limolita arenosa no litificada
902	USA	Alabama	Little Stave Creek	H76-34-10	Luteciano	Lisbon (Mb. Superior)	Offshore	Limolita no litificada (glauconita)
903	USA	Alabama	Little Stave Creek	H76-34	Luteciano	Lisbon	Offshore	Arenisca limosa
904	USA	Alabama	Route 23	H76-31-3	Luteciano	Lisbon (Mb. Superior)	Offshore	Limolita arenosa no litificada
905	USA	Alabama	Route 24	H76-31-1	Luteciano	Lisbon (Mb. Superior)	Offshore	Limolita arenosa no litificada
906	USA	Alabama	Alabama River	H76-27-1	Luteciano	Lisbon (Mb. Superior)	Offshore	Limolita
907	USA	Alabama	Little Stave Creek	LSC-L	Luteciano	Lisbon (Mb. Superior)	Plataforma carbonatada	Arena verde
909	USA	Alabama	Alabama River	CB-L	Luteciano	Lisbon (Mb. Superior)	Submareal somero	Arenisca no litificada grano fino
910	USA	Alabama	Souwilper Creek	BARYT	Luteciano	Lisbon (Mb. Superior)	Submareal somero	Arenisca calcárea no litificada
918	USA	Louisiana	Saline Bayou	H76-76-3	Luteciano	Cook Mountain (Mb. Saline Bayou)	Offshore	Arcilla limosa no litificada (glauconita)
919	USA	Mississippi	Claiborne	MGS 26b (PRI 3664)	Luteciano	Kosciusko	Llanura costera	Arenisca grano grueso
927	USA	Mississippi	Doby's Bluff	MCI-6-a (bag #2)	Luteciano	Kosciusko (Doby's Bluff)	Bahía interna	Arenisca arcillosa no litificada

Rec	Region	State or County	Location	Key Location	Stage	Formation	Depositional Environment	Facies
934	USA	Texas	Chireno Road	None	Luteciano	Weches	Shoreface (transgresiva)	Arenisca fangosa no litificada (glauconita)
937	USA	Texas	Stone City Bluff	PRI 2749	Luteciano	Crockett (Mb. Stone City)	Transición/shoreface	Arenisca arcillosa no litificada
940	USA	Louisiana	Claiborne	M 709	Luteciano	Cane River	Transición/shoreface	Marga arenosa no litificada (glauconita)
941	USA	Texas	Bald Mount	M 395	Luteciano	Weches (Mb. Typus)	Transición/shoreface	Marga arenosa no litificada (glauconita)
951	USA	Alabama	Claiborne	ACov-5	Luteciano	Lisbon	Submareal somero	Arenisca calcárea no litificada (glauconita)
958	USA	Alabama	Little Stave Creek	H76-34-13	Luteciano	Lisbon (Mb. Superior)	Offshore	Marga calcárea no litificada (glauconita)
959	USA	Louisiana	Claiborne	None	Luteciano	Cane River (Mb. Middle Glauconitic Clay)	Marginal	Limolita
960	USA	Texas	Smithville,	SMITH	Luteciano	Weches	Marginal	Arena verde
962	USA	Texas	Claiborne	NAC-2	Luteciano	Weches	Marginal	Arena verde
966	USA	Texas	Claiborne	CHIRENO	Luteciano	Weches	Marginal	Arena verde
972	USA	Alabama	Claiborne	ACov-4	Luteciano	Lisbon (Mb. Superior)	Submareal somero	Arenisca calcárea no litificada (glauconita)
973	USA	Alabama	Claiborne	ACov-7	Luteciano	Lisbon (Mb. Superior)	Submareal somero	Arenisca calcárea no litificada (glauconita)
974	USA	Alabama	Claiborne	ACov-1	Luteciano	Lisbon (Mb. Superior)	Submareal somero	Arenisca no litificada
978	USA	Alabama	Claiborne	ACH-14	Luteciano	Lisbon (Mb. Superior)	Submareal somero	Arenisca calcárea no litificada (glauconita)
979	USA	Alabama	Route 23	H76-31-4	Luteciano	Lisbon	Offshore	Limolita arcillosa no litificada
980	USA	Alabama	Route 24	H76-31-2	Luteciano	Lisbon	Offshore	Limolita arenosa no litificada
989	USA	Florida	Avon Park	L-76 (FGS)	Luteciano	Avon Park	Perimareal	Caliza litificada
992	USA	Florida	Geological Survey	L-92 (FGS)	Luteciano	Avon Park	Perimareal	Caliza litificada
995	USA	Texas	Claiborne	WECH-T	Luteciano	Weches	Marginal	Arena verde
996	USA	Texas	McBrides Place	MCB	Luteciano	Weches (Mb. Viesca)	Marginal	Arena verde
997	USA	Texas	Brazos River	BB	Luteciano	Weches (Mb. Viesca)	Submareal somero	Marga no litificada
998	USA	Texas	Claiborne	PRI 733	Luteciano	Weches	Marginal	Arena verde
1082	USA	Mississippi	None	M 755	Luteciano	Weches (Mb. Viesca)	Marginal	Arena verde
1083	USA	Texas	Trinity River	KICK	Luteciano	Weches	Marginal	Arena verde
1084	USA	Texas	Navosota River	DONH	Luteciano	Weches	Marginal	Arena verde
1086	USA	Texas	Robertson	M 876	Luteciano	Weches (Mb. Viesca)	Marginal	Arena verde
1087	USA	Texas	Robertson	M 832	Luteciano	Weches (Mb. Viesca)	Marginal	Arena verde
1088	USA	Texas	Nacogdoches	M 597	Luteciano	Weches	Marginal	Arena verde
1089	USA	Texas	Gonzales	M 560	Luteciano	Weches	Marginal	Arena verde
1090	USA	Texas	Cherokee	M 548	Luteciano	Weches (Mb. Viesca)	Marginal	Arena verde

Rec	Region	State or County	Location	Key Location	Stage	Formation	Depositional Environment	Facies
1091	USA	Texas	Cherokee	M 547	Luteciano	Weches (Mb. Viesca)	Marginal	Arena verde
1092	USA	Texas	Burleson	M 803	Luteciano	Weches (Mb. Viesca)	Marginal	Arena verde
1093	USA	Texas	Cherokee	M 384	Luteciano	Weches (Mb. Viesca)	Marginal	Arena verde
1094	USA	Texas	Bastrop	M 196	Luteciano	Weches (Mb. Viesca)	Marginal	Arena verde
1095	USA	Texas	Burleson	PRI 2835	Luteciano	Weches	Marginal	Arena verde
1102	USA	Texas	Robbins,	ROB	Luteciano	Weches (Mb. Viesca)	Marginal	Arena verde
1156	USA	Alabama	Choctaw	ACH-7	Luteciano	Lisbon (Mb. Superior)	Submareal somero	Arenisca calcárea no litificada (glauconita)
1158	USA	Louisiana	Saline Bayou	H76-76-1	Luteciano	Cook Mountain (Mb. Saline Bayou)	Offshore	Arcilla limosa no litificada (glauconita)
1160	USA	Mississippi	Doby's Bluff	MCI-6-b	Luteciano	Kosciusko	Bahía interna	Arenisca arcillosa no litificada
1168	USA	Texas	Bastrop	PRI 776	Luteciano	Queen City	Delta (influenciado por las mareas)	Arenisca
1169	USA	Texas	Trinity River	H76-73-8	Luteciano	Cook Mountain (Whellock Marl)	Offshore	Arcilla limosa no litificada
1170	USA	Texas	Trinity River	H76-73-7	Luteciano	Cook Mountain (Whellock Marl)	Offshore	Arcilla limosa no litificada
1186	USA	Alabama	Geneva	AGe-2	Luteciano	Lisbon (Mb. Superior)	Submareal somero	Arenisca calcárea no litificada (glauconita)
1187	USA	Alabama	Coffee	ACof-2	Luteciano	Lisbon (Mb. Superior)	Submareal somero	Arenisca calcárea no litificada (glauconita)
1189	USA	Alabama	Washington	AWa-2	Luteciano	Lisbon (Mb. Superior)	Submareal somero	Arenisca calcárea no litificada (glauconita)
1190	USA	Alabama	Monroe	AMo-6	Luteciano	Lisbon (Mb. Superior)	Submareal somero	Arenisca calcárea no litificada (glauconita)
1195	USA	Texas	Cedar Creek	CCR	Luteciano	Weches	Submareal somero	Arcilla no litificada
1196	USA	Texas	Nacogdoches	ATAS	Luteciano	Weches	Submareal somero	Marga no litificada
1197	USA	Alabama	Monroe	PRI 1930	Luteciano	Lisbon (Mb. Superior)	Submareal somero	Arenisca calcárea no litificada (glauconita)
1202	USA	Mississippi	Clarke	MGS 23	Luteciano	Winona	Plataforma interna	Arenisca no litificada (glauconita)
1203	USA	Mississippi	Clarke	MGS 22	Luteciano	Winona	Plataforma interna	Arenisca no litificada (glauconita)
1239	USA	Texas	Robertson	M 402	Luteciano	Weches	Marginal	Arena verde
1253	USA	Alabama	Covington	ACov-6	Luteciano	Lisbon (Mb. Medio)	Submareal somero	Arenisca carbonosa no litificada
1254	USA	Alabama	Choctaw	ACH-13	Luteciano	Lisbon (Mb. Inferior)	Submareal somero	Arenisca calcárea no litificada (glauconita)
1255	USA	Louisiana	Sabine	M 721	Luteciano	Weches	Marginal	Arena verde
1310	USA	Texas	Leon	WALL	Luteciano	Weches	Marginal	Arena verde
1311	USA	Texas	Nacogdoches	NAC	Luteciano	Weches	Marginal	Arena verde

Rec	Region	State or County	Location	Key Location	Stage	Formation	Depositional Environment	Facies
1313	USA	Texas	Burleson	TX	Luteciano	Weches	Offshore	Arenisca arcillosa no litificada
1318	USA	Texas	Trinity River	KIK	Luteciano	Weches (Mb. Typus)	Marino indeterminado	Arena verde
1319	USA	Texas	Brazos River	BR-W	Luteciano	Weches	Submareal somero	Arcilla no litificada
1320	USA	Texas	Bastrop	Gazley Creek	Luteciano	Cook Mountain	Costa indeterminada	Marga arenosa no litificada (glauconita)
1325	USA	Louisiana	Natchitoches	LNa-1b (bag 2)	Luteciano	Weches	Offshore	Marga no litificada
1333	USA	Texas	Little Brazos River	None	Luteciano	Cook Mountain (Whellock Marl)	Offshore	Lutita no litificada
1349	USA	Texas	Cherokee	PRI 758	Luteciano	Weches	Marginal	Arena verde
1333	USA	Texas	Little Brazos River	H76-69-2	Luteciano	Cook Mountain (Whellock Marl)	Offshore	Lutita no litificada
1366	USA	Texas	Taylor Branch	TB	Luteciano	Reklaw (Mb. Marquez Shale)	Plataforma interna	Limolita
1367	USA	Texas	Colorado River	GAZ	Luteciano	Queen City	Delta (influenciado por las mareas)	Arenisca
1371	USA	Texas	Bastrop	RC-RED	Luteciano	Reklaw	Plataforma interna (transgresiva)	Limolita
1372	USA	Texas	Bastrop	None	Luteciano	Reklaw (Mb. Marquez Shale)	Plataforma interna (transgresiva)	Limolita
1373	USA	Texas	Angelina	ANGL	Luteciano	Reklaw	Submareal somero	Marga no litificada
1374	USA	Texas	Bastrop	11-T-72	Luteciano	Reklaw (Mb. Marquez Shale)	Submareal somero	Arcilla no litificada
1384	USA	Texas	Leon	LEEW	Luteciano	Weches (Mb. Viesca)	Marino indeterminado	Arena verde
1397	USA	Louisiana	Natchitoches	LNa-1a	Luteciano	Weches	Offshore	Marga no litificada
1404	USA	Texas	Little Brazos River	H76-69-1	Luteciano	Cook Mountain (Whellock Marl)	Offshore	Lutita no litificada
1426	USA	Texas	Caldwell	M 212	Luteciano	Weches	Marginal	Arena verde
1428	USA	Texas	Bastrop	M 197	Luteciano	Weches	Marginal	Arena verde
1429	USA	Texas	Burleson	PRI 723	Luteciano	Crockett (Mb. Stone City)	Marino indeterminado	Arcilla calcárea no litificada (glauconita)
1466	USA	Alabama	Covington	ACov-12	Luteciano	Lisbon (Mb. Superior)	Submareal somero	Arenisca calcárea no litificada (glauconita)
1468	USA	Texas	Cherokee	M 810	Luteciano	Weches	Marginal	Arena verde
1470	USA	Texas	Bastrop	M 535	Luteciano	Weches	Marginal	Arena verde
1477	USA	Texas	Leon	WALL-C	Luteciano	Weches	Marginal	Arena verde
1491	USA	Texas	Bastrop	M 198	Luteciano	Weches (Mb. Viesca)	Marino indeterminado	Arena verde
1492	USA	Texas	Anderson	M 181	Luteciano	Weches (Mb. Viesca)	Marino indeterminado	Arena verde
1508	USA	Texas	Smithville,	TU 243	Luteciano	Weches	Marginal	Arena verde
1510	USA	Texas	Brazos	M 144	Luteciano	Weches	Marginal	Arena verde
1528	USA	Texas	Robertson	M 256	Luteciano	Weches	Marginal	Arena verde

Rec	Region	State or County	Location	Key Location	Stage	Formation	Depositional Environment	Facies
1534	USA	Texas	Leon	CENT-9	Luteciano	Weches	Marginal	Arena verde
1535	USA	Texas	Bastrop	M 791	Luteciano	Weches	Marginal	Arena verde
1541	USA	California	Tecolote Creek	UCMP 5091	Luteciano	La Jolla (Mb. Rose Canyon)	Marino indeterminado	Lutita
1543	USA	Oregon	Basket Point	A-696	Luteciano	Flournoy	Marino indeterminado	Arenisca
1546	USA	California	Poway	UCR 4995	Luteciano	Mission Valley	Laguna	Arenisca
1577	USA	Oregon	None	A-829	Luteciano	Flournoy	Marino indeterminado	Arenisca
1578	USA	Washington	None	CSUN 1582	Luteciano	Humptulips	Aguas profundas	Limolita
1579	USA	Washington	Humptulips River	CSUN 1583	Luteciano	Humptulips	Aguas profundas	Limolita
1584	USA	Washington	Satsop Weatherwax	UWBM B8951	Luteciano	Humptulips	Cold-seep	Caliza
1600	USA	California	La Jolla	Bed local 1	Luteciano	Delmar	Perimareal	Arenisca
1607	USA	California	La Jolla	UCR 4952	Luteciano	Ardath	Submareal profundo	Lutita
1608	USA	California	La Jolla	Rose Canyon	Luteciano	Ardath	Abanico submarino	Lutita

Bartonian localities

Rec	Region	State or County	Location	Key Location	Stage	Formation	Depositional Environment	Facies
1	USA	Washington	Cowlitz River	CAS 183 (LACMIP 22536)	Bartoniano	Cowlitz	Llanura costera	Lodolita arenosa
14	USA	Washington	Garrard Creek	CSUN 1567	Bartoniano	Crescent/McIntosh	Plataforma externa	Lutita no litificada con guijarros
15	USA	Washington	Garrard Creek	CSUN 1569	Bartoniano	Crescent/McIntosh	Plataforma externa	Lutita no litificada con guijarros
16	USA	Washington	Garrard Creek	CSUN 1570	Bartoniano	Crescent/McIntosh	Plataforma externa	Lutita no litificada con guijarros
21	USA	Washington	Nuculana assemblage	Big Bend, bed R	Bartoniano	Cowlitz	Batial	Arcilla limolita carbonatada (glauconita)
22	USA	Washington	Pitar assemblage	Big Bend, bed C	Bartoniano	Cowlitz	Offshore (transgresiva)	Limolita arcillosa no litificada con conchas
23	USA	Washington	Puget	Tukwila Checklist	Bartoniano	Tukwila	Delta (influenciado por mareas)	Arenisca/lutita
24	USA	Washington	Turritella-Solena assemblage	None	Bartoniano	Cowlitz	Transición/shoreface	Arenisca litificada grano medio
25	USA	Washington	Turritella-Tivela assemblage	Big Bend, bed A	Bartoniano	Cowlitz	Offshore (transgresiva)	Arenisca no litificada
36	USA	Washington	None	UW 1a	Bartoniano	Cowlitz	Marino indeterminado	Arenisca
38	USA	Washington	None	UW 319	Bartoniano	Cowlitz	Marino indeterminado	Arenisca
39	USA	Washington	None	UW 326	Bartoniano	Cowlitz	Marino indeterminado	Arenisca
40	USA	Washington	None	UW 329	Bartoniano	Cowlitz	Marino indeterminado	Arenisca
41	USA	Washington	None	UW 337	Bartoniano	Cowlitz	Marino indeterminado	Arenisca

Rec	Region	State or County	Location	Key Location	Stage	Formation	Depositional Environment	Facies
42	USA	Washington	None	UW 342	Bartoniano	Cowlitz	Marino indeterminado	Arenisca
43	USA	Washington	None	UW 347	Bartoniano	Cowlitz	Marino indeterminado	Arenisca
104	USA	Oregon	None	A-716	Bartoniano	Coaledo (Mb. Inferior)	Marino indeterminado	Arenisca
120	USA	Oregon	None	A-718	Bartoniano	Coaledo (Mb. Inferior)	Marino indeterminado	Arenisca
121	USA	Oregon	None	A-717	Bartoniano	Coaledo (Mb. Inferior)	Marino indeterminado	Arenisca
122	USA	Oregon	None	A-714	Bartoniano	Coaledo (Mb. Inferior)	Marino indeterminado	Arenisca
123	USA	Oregon	None	A-715	Bartoniano	Coaledo (Mb. Inferior)	Marino indeterminado	Arenisca limosa grano fino
126	USA	Oregon	None	A-858	Bartoniano	Coaledo (Mb. Inferior)	Marino indeterminado	Arenisca
127	USA	Oregon	None	A-861	Bartoniano	Coaledo (Mb. Inferior)	Marino indeterminado	Arenisca
156	USA	Oregon	None	USGS 15255	Bartoniano	Cowlitz	Marino indeterminado	Arenisca
167	USA	Washington	Cowlitz River	UCMP 7162	Bartoniano	Cowlitz	Marino indeterminado	Arenisca
168	USA	Oregon	None	USGS 15296	Bartoniano	Cowlitz	Marino indeterminado	Arenisca
169	USA	Oregon	None	USGS 15533	Bartoniano	Cowlitz	Marino indeterminado	Arenisca
173	USA	Oregon	None	A-712	Bartoniano	Coaledo (Mb. Inferior)	Marino indeterminado	Arenisca
185	USA	Oregon	None	A-722	Bartoniano	Coaledo (Mb. Inferior)	Marino indeterminado	Arenisca
320	USA	California	Edmonston Pumping Plant	USGS M4634	Bartoniano	Tejon	Costa indeterminada	Arenisca litificada
353	USA	Oregon	None	A-711	Bartoniano	Coaledo (Mb. Inferior)	Marino indeterminado	Arenisca
354	USA	Oregon	None	A-713	Bartoniano	Coaledo (Mb. Inferior)	Marino indeterminado	Arenisca
358	USA	Oregon	None	A-707	Bartoniano	Coaledo (Mb. Inferior)	Marino indeterminado	Arenisca
361	USA	Oregon	None	A-708	Bartoniano	Coaledo (Mb. Inferior)	Marino indeterminado	Arenisca
364	USA	Oregon	None	A-719	Bartoniano	Coaledo (Mb. Inferior)	Marino indeterminado	Arenisca
370	USA	California	Grapevine Creek	UC 458	Bartoniano	Tejon	Marino indeterminado	Arenisca no litificada
444	USA	California	Edmonston Pumping Plant	CSUN 1201 (USGS M4631)	Bartoniano	Tejon	Shoreface	Arenisca conglomerada litificada
465	USA	Oregon	Pantano Haynes	Coos Bay	Bartoniano	Coaledo (Mb. Inferior)	Costa indeterminada	Arenisca no litificada grano fino a grueso
521	USA	California	Mount Diablo	UCMP 476	Bartoniano	Tejon	Costa indeterminada	Arenisca
523	USA	California	None	USGS #M4639	Bartoniano	Tejon	Costa indeterminada	Arenisca litificada con conchas/esqueletos
529	USA	Washington	None	UW 321	Bartoniano	Cowlitz	Llanura costera	Arenisca
530	USA	California	None	USGS #M4632	Bartoniano	Tejon	Marino indeterminado	Arenisca
558	USA	California	Edmonston Pumping Plant	#M4630	Bartoniano	Tejon	Costa indeterminada	Arenisca litificada

Rec	Region	State or County	Location	Key Location	Stage	Formation	Depositional Environment	Facies
559*	USA	California	None	M4633	Bartoniano	Tejon	Transición/shoreface	Arenisca limosa carbonosa litificada
565	USA	Washington	Acutostrea assemblage	Willapa Hills	Bartoniano	Cowlitz	Estuario/bahía	Lutita carbonada no litificada
566	USA	Washington	None	UW 320	Bartoniano	Cowlitz	Llanura costera	Arenisca
567	USA	Washington	None	UW 324	Bartoniano	Cowlitz	Llanura costera	Arenisca
568	USA	Washington	None	UW 340	Bartoniano	Cowlitz	Llanura costera	Arenisca
569	USA	Washington	None	UW 341	Bartoniano	Cowlitz	Llanura costera	Arenisca
644	USA	Oregon	None	A-98	Bartoniano	Coaledo (Mb. Inferior)	Marino indeterminado	Lutita
649	USA	California	Edmonston Pumping Plant	CSUN 1203	Bartoniano	Tejon	Shoreface (transgresiva)	Arenisca conglomerada bioturbada
650	USA	California	Edmonston Pumping Plant	CSUN 1202	Bartoniano	Tejon	Offshore (transgresiva)	Arenisca conglomerada bioturbada
660	México,	Baja California Sur	Pta. Colnett	Loc. 13	Bartoniano	Tepetate	Llanura costera	Arenisca no litificada grano fino
679	México,	Baja California Sur	Cerros Atravesados	MHN-UABCS Te1	Bartoniano	Tepetate	Transición/shoreface	Arenisca no litificada grano fino
681	México,	Baja California Sur	km 71, al sur	MHN-UABCS Te4	Bartoniano	Tepetate	Transición/shoreface	Arenisca no litificada grano fino
682	México,	Baja California Sur	El Hornito-El Aguajito	MHN-UABCS Te10	Bartoniano	Tepetate	Plataforma interna	Caliza arenosa
685	México,	Baja California Sur	A. Aguajito	MHN-UABCS Te24	Bartoniano	Tepetate	Transición/shoreface	Lodolita
692	México,	Baja California Sur	Los Zanjones	MHN-UABCS Te36b	Bartoniano	Tepetate	Plataforma interna	Arenisca no litificada grano fino
709	Perú	Piura	Conglomerado Lomitos	Secc. Local	Bartoniano	Talara (esquisto)	Costa indeterminada	Arenisca no litificada
717	Perú	Piura	Conglomerado Lomitos	Área Salina	Bartoniano	Talara (Mb. Lutita Talara)	Costa indeterminada	Arenisca no litificada
718	Perú	Piura	Casa Saman	None	Bartoniano	Verdun (Mb. Arenisca lagunitas)	Abanico submarino	Arenisca no litificada grano grueso a muy grueso
747	Perú	Piura	Conglomerado Lomitos	Caleto Sal	Bartoniano	Talara (Mb. Lutita Talara)	Costa indeterminada	Arenisca no litificada grano fino
751	Perú	None	Cerro Orgános	None	Bartoniano	Terebratula	Transición/shoreface	Lutita limosa no litificada (glauconita)
755	Perú	Piura	Campo de golf Talara	None	Bartoniano	Talara (Mb. Esquisto Talara)	Costa indeterminada	Arenisca no litificada grano fino
757	Perú	Piura	Lobitos (Punta Nautilus)	None	Bartoniano	Terebratula	Transición/shoreface	Lutita no litificada
758	Perú	Piura	Jabonillal	None	Bartoniano	Restin	Costa indeterminada	Lutita no litificada
759	Perú	Piura	Quebrada Salada	None	Bartoniano	Restin	Costa indeterminada	Lutita no litificada
761	Perú	Piura	Rio Pozo	None	Bartoniano	Restin	Costa indeterminada	Lutita no litificada
762	Perú	Piura	Restin	None	Bartoniano	Restin	Costa indeterminada	Lutita no litificada
763	Perú	Piura	Keswick Hills	Hills	Bartoniano	Parinas	Costa indeterminada	Arenisca no litificada grano grueso a muy grueso
764	Perú	Piura	Punta Balcones	Balcones	Bartoniano	Parinas	Costa indeterminada	Arenisca no litificada grano grueso a muy grueso

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765	Perú	Piura	Punta Parinas	Parinas	Bartoniano	Parinas	Costa indeterminada	Arenisca no litificada grano grueso a muy grueso
768	Perú	Piura	Lagunitas (conglomerado lomitos)	None	Bartoniano	Talara (Mb. Conglomerado lomitos)	Costa indeterminada	Lutita arenosa no litificada con guijarros
769	Perú	Piura	N de Gran Falla	None	Bartoniano	Talara (Mb. Esquisto Talara)	Costa indeterminada	Lutita arenosa no litificada con guijarros
771	Perú	Piura	Quebrada Barracas	None	Bartoniano	Talara (Mb. Lutita Talara)	Offshore	Lutita
823	México,	Tamaulipas	None	M 291	Bartoniano	Cook Mountain	Marino indeterminado	Arcilla grano fino
846	USA	Texas	Claiborne	None	Bartoniano	Crockett	Submareal somero	Arenisca arcillosa no litificada
847	USA	Texas	Stone City Bluff	Bed S (MGB)	Bartoniano	Stone City	Aguas poco profundas	Arenisca limosa grano fino
848	USA	Texas	Nelson 3	None	Bartoniano	Stone City	Offshore	Arenisca arcillosa no litificada
849	USA	Texas	Nelson 2	None	Bartoniano	Stone City	Offshore	Arenisca arcillosa no litificada
850	USA	Texas	Nelson 1	None	Bartoniano	Stone City	Offshore	Arenisca arcillosa no litificada
851	USA	Mississippi	Quitman City	Unit 3 (CI-5-c2)	Bartoniano	Cook Mountain (Mb. Potterchitto)	Marino indeterminado	Arenisca calcárea arcillosa no litificada (glauconita)
852	USA	Mississippi	Quitman City	Unit 2 (MCI-5-c1)	Bartoniano	Cook Mountain (Mb. Potterchitto)	Marino indeterminado	Arenisca calcárea arcillosa no litificada (glauconita)
853	USA	Mississippi	Newton City	Bag #2 (MNe-3-b)	Bartoniano	Cook Mountain (Mb. Archusa Marl)	Offshore	Marga arenosa no litificada (glauconita)
854	USA	Alabama	Claiborne	PRI 1423 (MGS 28)	Bartoniano	Gosport Sand	Submareal somero	Arenisca calcárea no litificada (glauconita)
855	USA	Alabama	Little Stave Creek	ACI-4-a2	Bartoniano	Lisbon	Offshore	Arenisca calcárea arcillosa no litificada (glauconita)
856	USA	Alabama	Barrytown	ACH-8-c2 (bag #2)	Bartoniano	Lisbon	Offshore	Marga arenosa no litificada (glauconita)
857	USA	Alabama	Barrytown	ACH-8-b2 (bag #2)	Bartoniano	Lisbon	Offshore	Marga arenosa no litificada (glauconita)
858	USA	Alabama	Barrytown	ACH-8-b1 (bag #1)	Bartoniano	Lisbon	Offshore	Marga arenosa no litificada (glauconita)
859	USA	Alabama	Barrytown	ACH-8-a (bag #1)	Bartoniano	Lisbon	Offshore	Marga arenosa no litificada (glauconita)
860	USA	Alabama	Coffeeville Landing	ACI-3-b	Bartoniano	Lisbon (Mb. Superior)	Offshore	Marga arenosa no litificada (glauconita)
861	USA	Alabama	Coffeeville Landing	ACI-3-a	Bartoniano	Lisbon (Mb. Superior)	Offshore	Arenisca calcárea no litificada (glauconita)
862	USA	Alabama	Claiborne	PRI 2161	Bartoniano	Lisbon (Mb. Superior)	Aguas poco profundas	Arena verda
863	USA	Texas	Stone City Bluff	Bed F	Bartoniano	Stone City	Offshore	Lutita carbonoda no litificada
866	USA	Alabama	Jackson	PRI 1040	Bartoniano	Moodys Branch	Submareal poco profunda (transgresiva)	Marga arenosa no litificada (glauconita)
869	USA	Louisiana	Red River	MONT	Bartoniano	Moodys Branch	Submareal poco profunda (transgresiva)	Marga arenosa no litificada (glauconita)
870	USA	Louisiana	Jackson	PRI 2224	Bartoniano	Moodys Branch	Offshore	Limolita calcárea no litificada

Rec	Region	State or County	Location	Key Location	Stage	Formation	Depositional Environment	Facies
871	USA	Louisiana	Jackson	PRI 1	Bartoniano	Moody's Branch	Offshore	Limolita arcillosa calcárea no litificada
872	USA	Louisiana	Jackson	Moo Bran	Bartoniano	Moody's Branch	Submareal poco profunda (transgresiva)	Marga arenosa no litificada (glaucónita)
873	USA	Mississippi	Jackson	TECH	Bartoniano	Moody's Branch	Submareal poco profunda (transgresiva)	Marga arenosa no litificada (glaucónita)
874	USA	Mississippi	Jackson	MGS 7	Bartoniano	Moody's Branch	Transición/shoreface	Siliciclástico
875	USA	Mississippi	Town Creek	MGS 1	Bartoniano	Moody's Branch	Transición/shoreface	Arcilla limosa no litificada (glaucónita)
876	USA	Mississippi	Jackson	PRI 699	Bartoniano	Moody's Branch	Marino indeterminado	Caliza no litificada (glaucónita)
877	USA	Mississippi	Jackson	MHI-2	Bartoniano	Moody's Branch	Submareal poco profunda (transgresiva)	Marga arenosa no litificada (glaucónita)
884	USA	Alabama	Claiborne	ACI-4	Bartoniano	Gosport Sand	Submareal somero	Arenisca no litificada (glaucónita)
890	USA	Alabama	Barrytown	Unit C (ACh-8-a2)	Bartoniano	Lisbon (Mb. Superior)	Aguas poco profundas	Marga arenosa no litificada (glaucónita)
891	USA	Alabama	Claiborne	None	Bartoniano	Gosport Sand	Plataforma interna	Arenisca calcárea no litificada (glaucónita)
892	USA	Alabama	Little Stave Creek	None	Bartoniano	Gosport Sand	Plataforma interna (transgresiva)	Arenisca calcárea no litificada (glaucónita)
893	USA	Alabama	Little Stave Creek	None	Bartoniano	Gosport Sand	Plataforma interna (transgresiva)	Arenisca calcárea no litificada (glaucónita)
894	USA	Alabama	Little Stave Creek	ACI-4-a1	Bartoniano	Lisbon (Mb. Superior)	Offshore	Arenisca calcárea arcillosa no litificada (glaucónita)
895	USA	Alabama	Coffeeville	ACI-3-d (Bag #1)	Bartoniano	Lisbon (Mb. Superior)	Offshore	Arenisca no litificada (glaucónita)
896	USA	Alabama	Coffeeville	ACI-3-c2 (bad #2)	Bartoniano	Lisbon (Mb. Superior)	Offshore	Arenisca no litificada (glaucónita)
897	USA	Alabama	Coffeeville	ACI-3-c1	Bartoniano	Lisbon (Mb. Superior)	Offshore	Arenisca no litificada (glaucónita)
898	USA	Alabama	Barrytown	ACh-8-d	Bartoniano	Lisbon (Mb. Superior)	Offshore	Arenisca calcárea arcillosa no litificada (glaucónita)
899	USA	Alabama	Barrytown	ACh-8-c1 (bag #1)	Bartoniano	Lisbon (Mb. Superior)	Offshore	Marga arenosa no litificada (glaucónita)
908	USA	Alabama	Claiborne	LSC-G	Bartoniano	Gosport Sand	Plataforma interna (transgresiva)	Arenisca calcárea no litificada (glaucónita)
912	USA	Alabama	Claiborne	PRI 734	Bartoniano	Lisbon (Mb. Superior)	Aguas poco profundas	Arena verde
914	USA	Louisiana	Claiborne	PRI 34	Bartoniano	Cook Mountain	Marino indeterminado	Arcilla arenosa
915	USA	Louisiana	Claiborne	PRI 2227	Bartoniano	Cook Mountain	Marino indeterminado	Arcilla arenosa
916	USA	Louisiana	Claiborne	M 86	Bartoniano	Cook Mountain	Marino indeterminado	Arcilla arenosa
917	USA	Louisiana	Claiborne	M 68	Bartoniano	Cook Mountain	Marino indeterminado	Arcilla arenosa
920	USA	Mississippi	Claiborne	PRI 731	Bartoniano	Cook Mountain (Mb. Archusa Marl)	Offshore	Marga arenosa no litificada (glaucónita)

Rec	Region	State or County	Location	Key Location	Stage	Formation	Depositional Environment	Facies
921	USA	Mississippi	Claiborne	PRI 2254	Bartoniano	Cook Mountain	Offshore	Marga arenosa no litificada (glauconita)
922	USA	Mississippi	Quitman,	MCI-5-c2	Bartoniano	Cook Mountain (Mb. Potterchitto)	Offshore	Arenisca calcárea arcillosa no litificada (glauconita)
923	USA	Mississippi	Quitman,	MCI-5-c1	Bartoniano	Cook Mountain (Mb. Potterchitto)	Offshore	Arenisca calcárea arcillosa no litificada (glauconita)
924	USA	Mississippi	Quitman,	MCI-5-b	Bartoniano	Cook Mountain (Mb. Potterchitto)	Offshore	Arenisca calcárea arcillosa no litificada (glauconita)
925	USA	Mississippi	Quitman,	MCI-5-a	Bartoniano	Cook Mountain (Mb. Potterchitto)	Offshore	Arenisca calcárea arcillosa no litificada (glauconita)
926	USA	Mississippi	Hickory	MNe-1a	Bartoniano	Cook Mountain (Mb. Archusa Marl)	Offshore	Marga arenosa no litificada (glauconita)
928	USA	Texas	Pinoak Creek	PIN	Bartoniano	Cook Mountain	Marino indeterminado	Arcilla grano fino
930	USA	Texas	Two Mile Creek	2MC-S	Bartoniano	Cook Mountain (Mb. Landrum)	Submareal somero	Arenisca no litificada grano fino
931	USA	Texas	Claiborne	M 262	Bartoniano	Cook Mountain	Marino indeterminado	Arcilla grano fino
932	USA	Texas	Claiborne	M 223	Bartoniano	Cook Mountain	Marino indeterminado	Arcilla grano fino
933	USA	Texas	Stone City	MGB (Stone-a)	Bartoniano	Crockett	Offshore	Arenisca arcillosa no litificada
935	USA	Texas	Stone City Bluff	Bed B	Bartoniano	Stone City	Marino indeterminado	Arenisca no litificada fina a muy fina
936	USA	Texas	Stone City Bluff	Bed A	Bartoniano	Stone City	Marino indeterminado	Marga arenosa no litificada (glauconita)
938	USA	Texas	Stone City Bluff	Bed D	Bartoniano	Stone City	Marino indeterminado	Arenisca no litificada fina a muy fina
939	USA	Louisiana	St. Maurice	PRI 1039	Bartoniano	Cook Mountain (Mb. Saline Bayou)	Offshore	Arcillolita
942	USA	Texas	Brazos River	H76-75-11	Bartoniano	Yazoo Clay	Marino indeterminado	Arcilla arenosa
943	USA	Texas	Claiborne	M 869	Bartoniano	Cook Mountain	Marino indeterminado	Arcilla arenosa
945	USA	Alabama	Alabama River	CB	Bartoniano	Gosport Sand	Submareal somero	Arenisca no litificada (glauconita)
946	USA	Alabama	Acree Mill Creek	None	Bartoniano	Gosport Sand	Plataforma interna (transgresiva)	Arenisca fóstática (glauconita)
947	USA	Alabama	Little Stave Creek	Ostracoda	Bartoniano	Gosport Sand	Marino indeterminado	Arenisca grano grueso ferruginosa
948	USA	Alabama	Claiborne	AWa-2	Bartoniano	Moody's Branch	Submareal somero	Arenisca no litificada (glauconita)
949	USA	Alabama	Claiborne	AMo-4	Bartoniano	Gosport Sand	Submareal somero	Arenisca no litificada (glauconita)
950	USA	Alabama	Claiborne	ACI-8	Bartoniano	Gosport Sand	Submareal somero	Arenisca no litificada (glauconita)

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952	USA	Alabama	Claiborne	Claiborne Bluff 7	Bartoniano	Gosport Sand	Plataforma interna (transgresiva)	Arenisca calcárea no litificada (glauconita)
953	USA	Alabama	Claiborne	Claiborne Bluff 5	Bartoniano	Gosport Sand	Plataforma interna (transgresiva)	Arenisca calcárea no litificada (glauconita)
954	USA	Alabama	Claiborne	Claiborne Bluff 4	Bartoniano	Gosport Sand	Plataforma interna (transgresiva)	Arenisca calcárea no litificada (glauconita)
955	USA	Alabama	Claiborne	Claiborne Bluff 3	Bartoniano	Gosport Sand	Plataforma interna (transgresiva)	Arenisca calcárea no litificada (glauconita)
956	USA	Alabama	Claiborne	Claiborne Bluff 2	Bartoniano	Gosport Sand	Plataforma interna (transgresiva)	Arenisca calcárea no litificada (glauconita)
957	USA	Alabama	Little Stave Creek	None	Bartoniano	Gosport Sand	Plataforma interna (transgresiva)	Arenisca calcárea no litificada (glauconita)
961	USA	Texas	Shipps Ford	SF	Bartoniano	Cook Mountain	Marino indeterminado	Arcilla arenosa grano fino
963	USA	Texas	Claiborne	LB-LL	Bartoniano	Cook Mountain (Mb. Wheelock)	Plataforma interna interior a media	Lutita
964	USA	Texas	Claiborne	LB	Bartoniano	Cook Mountain (Mb. Wheelock)	Plataforma interna interior a media	Lutita
965	USA	Texas	Elm Creek	ELMC-P	Bartoniano	Yegua	Shoreline/barra de arena	Arenisca mixta
967	USA	Texas	Claiborne	BR-LL	Bartoniano	Cook Mountain	Submareal somero	Arenisca no litificada grano fino
968	USA	Texas	Borden Creek	None	Bartoniano	Cook Mountain	Submareal somero	Arenisca no litificada grano fino
969	USA	Texas	Claiborne	BCR	Bartoniano	Cook Mountain (Mb. Stone City)	Submareal somero	Marga no litificada
970	USA	Alabama	St. Stephens Quarry	None	Bartoniano	Gosport Sand	Plataforma interna (transgresiva)	Arenisca calcárea no litificada (glauconita)
987	USA	Mississippi	Jackson	MISSLITE	Bartoniano	Yazoo Clay	Plataforma carbonatada	Arcilla arenosa grano fino
988	USA	Florida	Claiborne	M 47	Bartoniano	Avon Park Limestone	Perimareal	Caliza
1026	USA	Alabama	Claiborne	Claiborne Bluff 6	Bartoniano	Gosport Sand	Plataforma interna (transgresiva)	Arenisca calcárea no litificada (glauconita)
1027	USA	Alabama	Claiborne	Little Stave Creek 3	Bartoniano	Moody's Branch	Plataforma interna (transgresiva)	Arenisca calcárea no litificada (glauconita)
1030	USA	Alabama	Choctaw	ACH-10	Bartoniano	Moody's Branch	Submareal poco profunda (transgresiva)	Arenisca calcárea arcillosa no litificada (glauconita)
1032	USA	Florida	Jackson	M 43	Bartoniano	Moody's Branch	Submareal poco profunda (transgresiva)	Marga arenosa no litificada (glauconita)
1035	USA	Louisiana	Jackson	PRI 2763	Bartoniano	Moody's Branch	Offshore	Limolita calcárea arcillosa no litificada
1040	USA	Louisiana	Montgomery Landing	H-76-75-9	Bartoniano	Yazoo Clay	Offshore	Lutita calcárea no litificada
1041	USA	Louisiana	Montgomery Landing	H-76-75-4	Bartoniano	Moody's Branch	Offshore	Lutita calcárea no litificada

Rec	Region	State or County	Location	Key Location	Stage	Formation	Depositional Environment	Facies
1042	USA	Louisiana	Montgomery Landing	H-76-75-3	Bartoniano	Moody's Branch	Offshore	Lutita calcárea no litificada
1043	USA	Louisiana	Montgomery Landing	H-76-75-2	Bartoniano	Moody's Branch	Offshore	Lutita calcárea no litificada
1045	USA	Mississippi	Jackson	MGS 10	Bartoniano	Moody's Branch	Submareal poco profunda (transgresiva)	Marga arenosa no litificada (glauconita)
1046	USA	Mississippi	Jackson	MGS 9	Bartoniano	Moody's Branch	Submareal poco profunda (transgresiva)	Marga arenosa no litificada (glauconita)
1047	USA	Mississippi	Jackson	PRI 1050	Bartoniano	Moody's Branch	Submareal poco profunda (transgresiva)	Marga arenosa no litificada (glauconita)
1048	USA	Mississippi	Jackson	PRI 3662 (MGS 16)	Bartoniano	Moody's Branch	Submareal poco profunda (transgresiva)	Marga arenosa no litificada (glauconita)
1049	USA	Mississippi	Jackson	PRI 1098	Bartoniano	Moody's Branch	Offshore	Limolita calcárea arcillosa no litificada
1051	USA	Mississippi	None	MHi-1	Bartoniano	Moody's Branch	Submareal poco profunda (transgresiva)	Marga arenosa no litificada (glauconita)
1058	USA	Mississippi	Riverside Park	H-79-11-14	Bartoniano	Yazoo Clay	Offshore	Lutita calcárea no litificada
1075	USA	Mississippi	Jackson	RVP	Bartoniano	Moody's Branch	Submareal poco profunda (transgresiva)	Marga arenosa no litificada (glauconita)
1076	USA	Mississippi	Riverside Park	MGS 2	Bartoniano	Moody's Branch	Transición/shoreface	Siliciclástico
1080	USA	Alabama	Barrytown	ACh-8-b2	Bartoniano	Lisbon (Mb. Superior)	Offshore	Marga arenosa no litificada (glauconita)
1081	USA	Alabama	Barrytown	ACh-8-a2	Bartoniano	Lisbon (Mb. Superior)	Offshore	Marga arenosa no litificada (glauconita)
1085	USA	Texas	Brazos River	BR	Bartoniano	Cook Mountain (Mb. Stone City)	Submareal somero	Marga arenosa no litificada (glauconita)
1096	USA	Texas	Stone City Bluff	Stone City, bed X	Bartoniano	Stone City	Marino indeterminado	Arenisca calcárea no litificada (glauconita)
1097	USA	Texas	Stone City Bluff	Stone City, bed W	Bartoniano	Stone City	Marino indeterminado	Marga limosa no litificada (glauconita)
1098	USA	Texas	Stone City Bluff	Stone City, bed U	Bartoniano	Stone City	Marino indeterminado	Arenisca limosa grano fino
1099	USA	Texas	Stone City Bluff	Stone City, bed P	Bartoniano	Stone City	Marino indeterminado	Arenisca limosa litificada (glauconita)
1100	USA	Texas	Stone City Bluff	Stone City, bed C	Bartoniano	Stone City	Marino indeterminado	Lutita calcárea no litificada
1101	USA	Texas	Stone City	MGB (Stone-b)	Bartoniano	Crockett	Offshore	Arenisca arcillosa no litificada
1103	USA	Texas	Little Brazos River	LB-U	Bartoniano	Cook Mountain (Mb. Wheelock)	Plataforma interna a media (regresiva)	Lutita
1104	USA	Texas	Trinity River	AF-ST-U	Bartoniano	Cook Mountain (Mb. Stone City)	Submareal somero	Arcilla arenosa no litificada
1105	USA	Texas	Trinity River	AF-ST-L	Bartoniano	Cook Mountain (Mb. Stone City)	Submareal somero	Arenisca no litificada grano grueso a muy grueso
1106	USA	Texas	Claiborne	M 383	Bartoniano	Cook Mountain	Marino indeterminado	Arcilla arenosa grano fino

Rec	Region	State or County	Location	Key Location	Stage	Formation	Depositional Environment	Facies
1107	USA	Texas	Claiborne	PRI 766	Bartoniano	Cook Mountain	Marino indeterminado	Arcilla arenosa grano fino
1109	USA	Louisiana	Jackson	PRI 2234	Bartoniano	White Bluff	Marino indeterminado	Arenisca arcillosa no litificada
1110	USA	Louisiana	Jackson	PRI 2745	Bartoniano	Moody's Branch	Submareal poco profunda (transgresiva)	Marga arenosa no litificada (glauconita)
1112	USA	Louisiana	Jackson	PRI 7	Bartoniano	Moody's Branch	Offshore	Limolita calcárea arcillosa no litificada
1113	USA	Mississippi	Jackson	MGS 11	Bartoniano	Moody's Branch	Submareal poco profunda (transgresiva)	Marga arenosa no litificada (glauconita)
1116	USA	Alabama	Claiborne	M 303	Bartoniano	Cook Mountain	Marino indeterminado	Arcilla arenosa grano fino
1117	USA	Mississippi	Claiborne	M 494	Bartoniano	Cook Mountain	Marino indeterminado	Arcilla arenosa grano fino
1118	USA	Mississippi	Claiborne	M 352	Bartoniano	Cook Mountain	Marino indeterminado	Arcilla arenosa grano fino
1120	USA	Louisiana	Claiborne	Harvey Site-F	Bartoniano	Cook Mountain	Plataforma interna	Arcilla arenosa no litificada
1121	USA	Louisiana	Claiborne	Harvey Site-E	Bartoniano	Cook Mountain	Transición/shoreface	Arcilla arenosa no litificada
1122	USA	Louisiana	Claiborne	Harvey Site-D	Bartoniano	Cook Mountain	Marginal (transgresiva)	Arcilla arenosa no litificada
1123	USA	Louisiana	Claiborne	Harvey Site-B	Bartoniano	Cook Mountain	Marginal (transgresiva)	Arcilla arenosa no litificada
1124	USA	Louisiana	Claiborne	Harvey Site-A	Bartoniano	Cook Mountain	Marginal (transgresiva)	Arcilla arenosa no litificada
1126	USA	Louisiana	Claiborne	PRI 1553	Bartoniano	Cook Mountain	Marino indeterminado	Arcilla arenosa grano fino
1127	USA	Texas	Claiborne	LB-BR	Bartoniano	Yegua	Shoreline/barra de arena	Arenisca mixta
1128	USA	Mississippi	Claiborne	MGS 65	Bartoniano	Cook Mountain	Marino indeterminado	Arcilla arenosa grano fino
1129	USA	Mississippi	Claiborne	M 351	Bartoniano	Cook Mountain	Marino indeterminado	Arcilla arenosa grano fino
1130	USA	Mississippi	Claiborne	PRI 728	Bartoniano	Cook Mountain	Offshore	Arcilla arenosa grano fino
1131	USA	Mississippi	Jackson	PRI 2257	Bartoniano	Moody's Branch	Submareal poco profunda (transgresiva)	Marga arenosa no litificada (glauconita)
1136	USA	Alabama	Claiborne	M 7	Bartoniano	Cook Mountain	Marginal (transgresiva)	Arcilla arenosa grano fino
1137	USA	Louisiana	Claiborne	PRI 2229	Bartoniano	Cook Mountain	Marino indeterminado	Arcilla arenosa grano fino
1138	USA	Louisiana	Claiborne	M 706	Bartoniano	Cook Mountain	Marino indeterminado	Arcilla arenosa grano fino
1139	USA	Louisiana	Claiborne	M 73	Bartoniano	Cook Mountain	Marino indeterminado	Arcilla arenosa grano fino
1140	USA	Mississippi	Claiborne	M 349	Bartoniano	Cook Mountain	Marino indeterminado	Arcilla arenosa grano fino
1141	USA	Texas	Claiborne	M 251	Bartoniano	Cook Mountain	Marino indeterminado	Arcilla arenosa grano fino
1142	USA	Texas	Claiborne	M 250	Bartoniano	Cook Mountain	Marino indeterminado	Arcilla arenosa grano fino
1153	USA	Mississippi	Jackson	USGS Station 64	Bartoniano	Moody's Branch	Transición/shoreface	Siliciclástico
1155	USA	Mississippi	Bravo Oil	R.489	Bartoniano	Moody's Branch	Transición/shoreface	Siliciclástico

Rec	Region	State or County	Location	Key Location	Stage	Formation	Depositional Environment	Facies
1157	USA	Louisiana	Claiborne	Harvey Site-C	Bartoniano	Cook Mountain	Plataforma interna (transgresiva)	Caliza
1159	USA	Mississippi	Claiborne	NEWM	Bartoniano	Cook Mountain	Offshore (transgresiva)	Marga arenosa no litificada (glauconita)
1161	USA	Texas	Claiborne	LB-2	Bartoniano	Cook Mountain (Mb. Wheelock)	Plataforma interna a media (regresiva)	Lutita
1162	USA	Texas	Claiborne	ELMC-O	Bartoniano	Yegua	Shoreline/barra de arena	Arenisca mxta
1163	USA	Texas	Copper Creek	BCR-H	Bartoniano	Cook Mountain	Submareal somero	Marga no litificada
1164	USA	Texas	Two Mile Creek	2MC-C	Bartoniano	Cook Mountain	Plataforma carbonatada	Arcilla no litificada
1165	USA	Texas	Two Mile Creek	2MC	Bartoniano	Cook Mountain	Submareal somero	Arcilla no litificada
1166	USA	Texas	Claiborne	M 820	Bartoniano	Cook Mountain	Marino indeterminado	Arcilla arenosa grano fino
1167	USA	Texas	Claiborne	M 226	Bartoniano	Cook Mountain	Marino indeterminado	Arcilla arenosa grano fino
1171	USA	Alabama	Claiborne	CLAIB	Bartoniano	Gosport Sand	Plataforma interna (transgresiva)	Arenisca calcárea no litificada (glauconita)
1172	USA	Alabama	Claiborne	LSC	Bartoniano	Gosport Sand	Plataforma interna (transgresiva)	Arenisca calcárea no litificada (glauconita)
1173	USA	Alabama	Moody's Branch	AMo-4	Bartoniano	Moody's Branch	Submareal poco profunda (transgresiva)	Marga arenosa no litificada (glauconita)
1175	USA	Mississippi	Moody's Branch	MCI-1	Bartoniano	Moody's Branch	Submareal poco profunda (transgresiva)	Marga arenosa no litificada (glauconita)
1176	USA	Texas	Jackson	M 420	Bartoniano	Jackson	Cañon submarino	Arenisca limosa
1188	USA	Alabama	Claiborne	M 426	Bartoniano	Cook Mountain	Marino indeterminado	Arcilla arenosa grano fino
1191	USA	Mississippi	Clarke	MGS 62	Bartoniano	Cook Mountain (Mb. Archusa Marl)	Offshore (transgresiva)	Marga arenosa no litificada (glauconita)
1192	USA	Mississippi	Clarke	MGS 61	Bartoniano	Cook Mountain (Mb. Archusa Marl)	Offshore (transgresiva)	Marga arenosa no litificada (glauconita)
1193	USA	Mississippi	Clarke	MGS 50	Bartoniano	Cook Mountain (Mb. Archusa Marl)	Offshore (transgresiva)	Marga arenosa no litificada (glauconita)
1194	USA	Mississippi	Clarke	MGS 26a	Bartoniano	Cook Mountain (Mb. Archusa Marl)	Offshore (transgresiva)	Marga arenosa no litificada (glauconita)
1198	USA	Alabama	Monroe	PRI 2163	Bartoniano	Lisbon (Mb. Superior)	Aguas poco profundas	Marga no litificada
1199	USA	Louisiana	Winn	PRI 759	Bartoniano	Cook Mountain	Submareal somero	Arcilla arenosa grano fino
1200	USA	Louisiana	Natchitoches	PRI 2223	Bartoniano	Cook Mountain	Aguas poco profundas	Arcilla arenosa grano fino
1201	USA	Louisiana	Natchitoches	PRI 2221	Bartoniano	Cook Mountain	Aguas poco profundas	Arcilla arenosa grano fino

Rec	Region	State or County	Location	Key Location	Stage	Formation	Depositional Environment	Facies
1209	USA	Alabama	Clarke	ACI-7	Bartoniano	Moody's Branch	Submareal poco profunda (transgresiva)	Marga arenosa no litificada (glauconita)
1210	USA	Alabama	Choctaw	ACH-18	Bartoniano	Moody's Branch	Submareal poco profunda (transgresiva)	Marga arenosa no litificada (glauconita)
1216	USA	Alabama	Covington	ACov-3	Bartoniano	Moody's Branch	Submareal poco profunda (transgresiva)	Arenisca calcárea
1217	USA	Alabama	Covington	ACov-2	Bartoniano	Moody's Branch	Submareal poco profunda (transgresiva)	Arenisca calcárea
1218	USA	Texas	Two Mile Creek	2MC-O	Bartoniano	Cook Mountain (Mb. Landrum)	Submareal somero	Arcilla no litificada
1219	USA	Texas	Houston	M 568	Bartoniano	Cook Mountain	Marino indeterminado	Arcilla arenosa grano fino
1220	USA	Texas	Houston	M 567	Bartoniano	Cook Mountain	Marino indeterminado	Arcilla arenosa grano fino
1221	USA	Mississippi	Clarke	PRI 2253	Bartoniano	Cook Mountain	Marino indeterminado	Arcilla arenosa grano fino
1222	USA	Florida	Suwannee	M 54	Bartoniano	Ocala Limestone	Plataforma carbonatada	Grainstones y packstone
1225	USA	Alabama	Washington	PRI 1056	Bartoniano	Moody's Branch	Submareal poco profunda (transgresiva)	Marga arenosa no litificada (glauconita)
1227	USA	Mississippi	Hinds	HiMS-2.1	Bartoniano	Moody's Branch	Offshore	Limolita calcárea arcillosa no litificada
1232	USA	Alabama	Washington	AWa-2	Bartoniano	Gosport Sand	Submareal somero	Arenisca no litificada (glauconita)
1233	USA	Alabama	Geneva	AGe-3	Bartoniano	Moody's Branch	Submareal poco profunda (transgresiva)	Marga arenosa no litificada (glauconita)
1234	USA	Alabama	Geneva	AGe-1	Bartoniano	Moody's Branch	Submareal poco profunda (transgresiva)	Marga arenosa no litificada (glauconita)
1235	USA	Alabama	Covington	ACov-4	Bartoniano	Moody's Branch	Submareal poco profunda (transgresiva)	Marga arenosa no litificada (glauconita)
1236	USA	Louisiana	Lincoln	PRI 66	Bartoniano	Cook Mountain	Marino indeterminado	Arcilla arenosa grano fino
1237	USA	Texas	Bastrop	M 792	Bartoniano	Cook Mountain	Marino indeterminado	Arcilla arenosa grano fino
1238	USA	Texas	Bastrop	PRI 767	Bartoniano	Cook Mountain	Marino indeterminado	Arcilla arenosa grano fino
1240	USA	Texas	Stone City Bluff	Stone City, bed R	Bartoniano	Stone City	Marino indeterminado	Lutita calcárea no litificada
1241	USA	Texas	Stone City Bluff	Stone City, bed J	Bartoniano	Stone City	Marino indeterminado	Lutita calcárea no litificada
1242	USA	Texas	Stone City Bluff	Stone City, bed H	Bartoniano	Stone City	Marino indeterminado	Lutita calcárea no litificada
1243	USA	Mississippi	Yazoo	MGs 13	Bartoniano	Moody's Branch	Submareal poco profunda (transgresiva)	Marga arenosa no litificada (glauconita)
1244	USA	Mississippi	Hinds	MGs 3	Bartoniano	Moody's Branch	Submareal poco profunda (transgresiva)	Marga arenosa no litificada (glauconita)
1245	USA	Mississippi	Hinds	M 760	Bartoniano	Moody's Branch	Submareal poco profunda (transgresiva)	Marga arenosa no litificada (glauconita)

Rec	Region	State or County	Location	Key Location	Stage	Formation	Depositional Environment	Facies
1246	USA	Mississippi	Hinds	M 497	Bartoniano	Moodys Branch	Submareal poco profunda (transgresiva)	Marga arenosa no litificada (glauconita)
1247	USA	Mississippi	Clarke	M 750	Bartoniano	Moodys Branch	Submareal poco profunda (transgresiva)	Marga arenosa no litificada (glauconita)
1248	USA	Alabama	Clarke	M 431	Bartoniano	Gosport Sand	Plataforma interna (transgresiva)	Arenisca calcárea no litificada (glauconita)
1252	USA	Alabama	Monroe	M 305	Bartoniano	Cook Mountain	Marino indeterminado	Arcilla arenosa grano fino
1256	USA	Mississippi	Newton	MGS 64	Bartoniano	Cook Mountain	Marino indeterminado	Arcilla arenosa grano fino
1257	USA	Mississippi	None	M 357	Bartoniano	Cook Mountain	Marino indeterminado	Arcilla arenosa grano fino
1259	USA	Texas	Houston	M 814	Bartoniano	Cook Mountain	Marino indeterminado	Arcilla arenosa grano fino
1260	USA	Texas	Bastrop	M 539	Bartoniano	Crockett	Marino indeterminado	Arcilla calcárea no litificada
1261	USA	Louisiana	Natchitoches	PRI 2240	Bartoniano	Cook Mountain	Marino indeterminado	Arcilla arenosa grano fino
1262	USA	Texas	Robertson	M 602	Bartoniano	Crockett	Marino indeterminado	Arcilla calcárea no litificada (glauconita)
1263	USA	Texas	Houston	M 873	Bartoniano	Crockett	Marino indeterminado	Arcilla calcárea no litificada (glauconita)
1265	USA	Mississippi	Hinds	M 355	Bartoniano	Moodys Branch	Submareal poco profunda (transgresiva)	Marga arenosa no litificada (glauconita)
1266	USA	Mississippi	Newton	MNe-3-b	Bartoniano	Cook Mountain (Mb. Archusa Marl)	Offshore	Marga no litificada
1267	USA	Louisiana	Bienville	PRI 730	Bartoniano	Cook Mountain	Marino indeterminado	Arcilla arenosa grano fino
1268	USA	Mississippi	Newton	MGS 66	Bartoniano	Cook Mountain	Marino indeterminado	Arcilla arenosa grano fino
1269	USA	Mississippi	Hinds	PRI 785	Bartoniano	Moodys Branch	Submareal poco profunda (transgresiva)	Marga arenosa no litificada (glauconita)
1271	USA	Louisiana	Grant	PRI 2249	Bartoniano	Moodys Branch	Submareal poco profunda (transgresiva)	Marga arenosa no litificada (glauconita)
1273	USA	Mississippi	Jasper	MGS 63	Bartoniano	Cook Mountain	Marino indeterminado	Arcilla arenosa grano fino
1275	USA	Mississippi	Clarke	MGS 17	Bartoniano	Moodys Branch	Submareal poco profunda (transgresiva)	Marga arenosa no litificada (glauconita)
1276	USA	Alabama	Choctaw	M 297	Bartoniano	Moodys Branch	Submareal poco profunda (transgresiva)	Marga arenosa no litificada (glauconita)
1277	USA	Mississippi	Clarke	PRI 794	Bartoniano	Moodys Branch	Submareal poco profunda (transgresiva)	Marga arenosa no litificada (glauconita)
1278	USA	Texas	Brazos River	BR-SPARTA	Bartoniano	Cook Mountain	Submareal somero	Arcilla arenosa grano fino
1279	USA	Louisiana	Grant	PRI 1054	Bartoniano	Moodys Branch	Submareal poco profunda (transgresiva)	Marga arenosa no litificada (glauconita)
1281	USA	Louisiana	Winn	M 726	Bartoniano	Moodys Branch	Submareal poco profunda (transgresiva)	Marga arenosa no litificada (glauconita)

Rec	Region	State or County	Location	Key Location	Stage	Formation	Depositional Environment	Facies
1282	USA	Louisiana	Grant	PRI 15	Bartoniano	Moody's Branch	Submareal poco profunda (transgresiva)	Marga arenosa no litificada (glauconita)
1285	USA	Mississippi	Clarke	M 495	Bartoniano	Moody's Branch	Submareal poco profunda (transgresiva)	Marga arenosa no litificada (glauconita)
1286	USA	Texas	Sabine	M 410	Bartoniano	Moody's Branch	Submareal poco profunda (transgresiva)	Marga arenosa no litificada (glauconita)
1287	USA	Texas	Sabine	PRI 1121	Bartoniano	Moody's Branch	Submareal poco profunda (transgresiva)	Marga arenosa no litificada (glauconita)
1288	USA	Texas	Sabine	PRI 922	Bartoniano	Moody's Branch	Submareal poco profunda (transgresiva)	Marga arenosa no litificada (glauconita)
1291	USA	Louisiana	Catahoula	PRI 886	Bartoniano	Moody's Branch	Submareal poco profunda (transgresiva)	Marga arenosa no litificada (glauconita)
1293	USA	Louisiana	Caldwell	PRI 16	Bartoniano	Moody's Branch	Offshore	Limolita calcárea arcillosa no litificada
1295	USA	Louisiana	Montgomery	M 467	Bartoniano	Moody's Branch	Submareal poco profunda (transgresiva)	Marga arenosa no litificada (glauconita)
1296	USA	Louisiana	Caldwell	M 465	Bartoniano	Moody's Branch	Offshore	Limolita calcárea arcillosa no litificada
1297	USA	Louisiana	Caldwell	PRI 913	Bartoniano	Moody's Branch	Submareal poco profunda (transgresiva)	Marga arenosa no litificada (glauconita)
1298	USA	Louisiana	Caldwell	PRI 912	Bartoniano	Moody's Branch	Submareal poco profunda (transgresiva)	Marga arenosa no litificada (glauconita)
1299	USA	Louisiana	Caldwell	PRI 1118	Bartoniano	Moody's Branch	Offshore	Limolita calcárea arcillosa no litificada
1300	USA	Mississippi	Hinds	MGS 5	Bartoniano	Moody's Branch	Submareal poco profunda (transgresiva)	Marga arenosa no litificada (glauconita)
1301	USA	Alabama	Covington	ACov-16	Bartoniano	Moody's Branch	Marino indeterminado	Arenisca calcárea
1302	USA	Alabama	Monroe	PRI 104	Bartoniano	Gosport Sand	Plataforma interna (transgresiva)	Arenisca calcárea no litificada (glauconita)
1303	USA	Mississippi	Newton	PRI 803	Bartoniano	Cook Mountain	Marino indeterminado	Arcilla arenosa grano fino
1304	USA	Mississippi	Clarke	PRI 729	Bartoniano	Cook Mountain	Marino indeterminado	Arcilla arenosa grano fino
1305	USA	Mississippi	Newton	PRI 726 (MGS 67)	Bartoniano	Lisbon (Mb. Superior)	Aguas poco profundas	Arena verde
1306	USA	Mississippi	Newton	MNe-3-a2	Bartoniano	Cook Mountain (Mb. Archusa Marl)	Offshore	Marga arenosa no litificada (glauconita)
1307	USA	Mississippi	Newton	MNe-3-a1	Bartoniano	Cook Mountain (Mb. Archusa Marl)	Offshore	Marga arenosa no litificada (glauconita)
1308	USA	Mississippi	Clarke	RR (MCI-3)	Bartoniano	Cook Mountain (Mb. Archusa Marl)	Offshore	Marga arenosa no litificada (glauconita)
1309	USA	Mississippi	Clarke	PRI 1107	Bartoniano	Moody's Branch	Offshore	Arcillolita

Rec	Region	State or County	Location	Key Location	Stage	Formation	Depositional Environment	Facies
1312	USA	Texas	Sabine	PRI 725	Bartoniano	Crockett	Offshore	Arcilla calcárea no litificada (glauconita)
1314	USA	Louisiana	Vernon	M 91	Bartoniano	Moodys Branch	Submareal poco profunda (transgresiva)	Marga arenosa no litificada (glauconita)
1315	USA	Louisiana	Caldwell	M 331	Bartoniano	Moodys Branch	Offshore	Limolita calcárea arcillosa no litificada
1316	USA	Louisiana	Ouachita	PRI 741	Bartoniano	Cook Mountain	Marino indeterminado	Arcilla arenosa grano fino
1321	USA	Texas	Copper Creek	BCR-U	Bartoniano	Cook Mountain (Mb. Wheelock)	Submareal somero	Marga no litificada
1322	USA	Texas	Brazos	PRI 727	Bartoniano	Cook Mountain	Offshore	Arenisca no litificada grano fino
1323	USA	Louisiana	Sabine	PRI 2744	Bartoniano	Cook Mountain	Marino indeterminado	Arcilla arenosa grano fino
1324	USA	Louisiana	Sabine	PRI 2275	Bartoniano	Cook Mountain	Marino indeterminado	Arcilla arenosa grano fino
1326	USA	Mississippi	Newton	MGs 68	Bartoniano	Cook Mountain	Marino indeterminado	Arcilla arenosa grano fino
1327	USA	Mississippi	Hinds	PRI 914	Bartoniano	Moodys Branch	Submareal poco profunda (transgresiva)	Marga arenosa no litificada (glauconita)
1328	USA	Texas	Houston	CROCK	Bartoniano	Cook Mountain	Marino indeterminado	Arcilla arenosa grano fino
1329	USA	Texas	Robertson	M 425	Bartoniano	Crockett	Marino indeterminado	Arcilla calcárea no litificada (glauconita)
1330	USA	Texas	Sabine	PRI 2276	Bartoniano	Crockett	Marino indeterminado	Arcilla calcárea no litificada (glauconita)
1331	USA	Texas	Sabine	PRI 2273	Bartoniano	Crockett	Submareal somero	Arenisca arcillosa no litificada
1332	USA	Texas	Little Brazos River	TX	Bartoniano	Crockett (Mb. Wheelock)	Offshore	Lutita limosa no litificada (glauconita)
1334	USA	Texas	Houston	CROCK-1	Bartoniano	Cook Mountain	Marino indeterminado	Arcilla arenosa grano fino
1336	USA	Mississippi	Clarke	MGs 18	Bartoniano	Moodys Branch	Submareal poco profunda (transgresiva)	Marga arenosa no litificada (glauconita)
1337	USA	Mississippi	Clarke	PRI 1111	Bartoniano	Moodys Branch	Marino indeterminado	Limolita calcárea arcillosa no litificada
1338	USA	Louisiana	Grant	M 334	Bartoniano	Moodys Branch	Submareal somero	Arenisca carbonosa no litificada
1339	USA	Mississippi	Hinds	PRI 879	Bartoniano	Moodys Branch	Submareal poco profunda (transgresiva)	Marga arenosa no litificada (glauconita)
1340	USA	Louisiana	Rapides	M 336	Bartoniano	Moodys Branch	Submareal poco profunda (transgresiva)	Marga arenosa no litificada (glauconita)
1341	USA	Mississippi	Clarke	M 131	Bartoniano	Moodys Branch	Offshore	Limolita calcárea no litificada
1342	USA	Mississippi	Clarke	PRI 1099	Bartoniano	Moodys Branch	Offshore	Limolita calcárea no litificada
1343	USA	Alabama	Clarke	PRI 1072	Bartoniano	Moodys Branch	Submareal poco profunda (transgresiva)	Marga arenosa no litificada (glauconita)
1344	USA	Texas	Hurricane Bayou	HB	Bartoniano	Cook Mountain (Mb. Landrum)	Offshore	Marga no litificada

Rec	Region	State or County	Location	Key Location	Stage	Formation	Depositional Environment	Facies
1345	USA	Mississippi	Hinds	M 132	Bartoniano	Moodys Branch	Submareal poco profunda (transgresiva)	Marga arenosa no litificada (glauconita)
1346	USA	Louisiana	Montgomery Landing	TU 99	Bartoniano	Moodys Branch	Costa indeterminada	Marga no litificada
1347	USA	Texas	Atascosa	M 427	Bartoniano	Moodys Branch	Submareal poco profunda (transgresiva)	Marga arenosa no litificada (glauconita)
1348	USA	Mississippi	Newton	MGS 69	Bartoniano	Cook Mountain	Marino indeterminado	Arcilla arenosa grano fino
1350	USA	Texas	Leon	PRI 732	Bartoniano	Cook Mountain	Marino indeterminado	Arcilla arenosa grano fino
1351	USA	Texas	Angelina	PRI 761	Bartoniano	Cook Mountain	Marino indeterminado	Arcilla arenosa grano fino
1352	USA	Louisiana	Winn	PRI 2754	Bartoniano	Cook Mountain	Submareal somero	Arcilla arenosa grano fino
1353	USA	Louisiana	Ouachita	PRI 756	Bartoniano	Cook Mountain	Offshore	Arcilla arenosa grano fino
1354	USA	Louisiana	Sabine	PRI 2750	Bartoniano	Cook Mountain	Marino indeterminado	Arcilla arenosa grano fino
1355	USA	Texas	Bastrop	M 540	Bartoniano	Stone City	Aguas poco profundas	Arcilla arenosa grano fino
1357	USA	Texas	Two Mile Creek	2MC-B	Bartoniano	Cook Mountain	Submareal somero	Arcilla no litificada
1359	USA	Alabama	Claiborne Bluff	TU 78	Bartoniano	Gosport Sand	Costa indeterminada	Arenisca no litificada
1370	USA	Texas	Sabine	M 408	Bartoniano	Cook Mountain (Mb. Landrum)	Offshore	Marga no litificada
1379	USA	Louisiana	Caldwell	PRI 923	Bartoniano	Moodys Branch	Offshore	Limolita calcárea arcillosa no litificada
1380	USA	Louisiana	Sabine	PRI 743	Bartoniano	Cook Mountain	Marino indeterminado	Arcilla arenosa grano fino
1381	USA	Texas	Colorado	M 603	Bartoniano	Cook Mountain (Mb. Wheelock)	Plataforma interna a media (regresiva)	Lutita
1382	USA	Texas	Robertson	M 600	Bartoniano	Cook Mountain (Mb. Wheelock)	Plataforma interna a media (regresiva)	Lutita
1383	USA	Texas	Angelina	PRI 745	Bartoniano	Cook Mountain	Marino indeterminado	Arcilla arenosa grano fino
1394	USA	Texas	Bear Branch	BEAR	Bartoniano	Cook Mountain (Mb. Wheelock)	Submareal somero	Marga no litificada
1395	USA	Texas	Sabine	PRI 765	Bartoniano	Cook Mountain	Marino indeterminado	Arcilla arenosa grano fino
1396	USA	Texas	Lee	LEE-1	Bartoniano	Yegua	Shoreline/barra de arena	Arenisca mixta
1398	USA	Texas	Lee	M 225	Bartoniano	Cook Mountain (Mb. Landrum)	Offshore	Marga no litificada
1399	USA	Texas	Houston	M 390	Bartoniano	Cook Mountain (Mb. Landrum)	Offshore	Marga no litificada

Rec	Region	State or County	Location	Key Location	Stage	Formation	Depositional Environment	Facies
1400	USA	Texas	Houston	M 388	Bartoniano	Cook Mountain (Mb. Wheelock)	Plataforma interna a media (regresiva)	Lutita
1401	USA	Texas	Cherokee	M 385	Bartoniano	Cook Mountain	Marino indeterminado	Arcilla grano fino
1402	USA	Texas	Brazos	M 379	Bartoniano	Cook Mountain	Marino indeterminado	Arcilla arenosa grano fino
1405	USA	Mississippi	Hinds	MGS 6	Bartoniano	Moody's Branch	Submareal poco profunda (transgresiva)	Marga arenosa no litificada (glauconita)
1406	USA	Louisiana	Winn	PRI 2748	Bartoniano	Cook Mountain	Submareal somero	Arcilla arenosa grano fino
1407	USA	Texas	Robertson	M 404	Bartoniano	Cook Mountain (Mb. Wheelock)	Plataforma interna a media (regresiva)	Lutita
1409	USA	Alabama	Clarke	PRI 1062	Bartoniano	Gosport Sand	Marino indeterminado	Arenisca calcárea no litificada (glauconita)
1410	USA	Texas	Sabine	PRI-Columbus	Bartoniano	Cook Mountain	Marino indeterminado	Arcilla arenosa grano fino
1412	USA	Texas	Houston	PRI 2285	Bartoniano	Cook Mountain (Mb. Landrum)	Offshore	Marga no litificada
1413	USA	Texas	Brazos	M 202	Bartoniano	Cook Mountain	Marino indeterminado	Arcilla grano fino
1414	USA	Louisiana	Ouachita	M 66	Bartoniano	Moody's Branch	Submareal poco profunda (transgresiva)	Marga arenosa no litificada (glauconita)
1415	USA	Mississippi	Hinds	M 134	Bartoniano	Moody's Branch	Submareal poco profunda (transgresiva)	Marga arenosa no litificada (glauconita)
1416	USA	Louisiana	Sabine	PRI 724	Bartoniano	Cook Mountain	Marino indeterminado	Arcilla grano fino
1417	USA	Texas	Robertson	M 601	Bartoniano	Cook Mountain	Marino indeterminado	Arcilla grano fino
1418	USA	Texas	Brazos	M 203	Bartoniano	Cook Mountain	Marino indeterminado	Arcilla grano fino
1419	USA	Texas	Lee	M 875	Bartoniano	Yegua	Shoreline/barra de arena	Arenisca mixta
1420	USA	Texas	Lee	M 394	Bartoniano	Yegua	Shoreline/barra de arena	Arenisca mixta
1421	USA	Texas	Robertson	PRI 746	Bartoniano	Cook Mountain	Marino indeterminado	Arcilla grano fino
1423	USA	Mississippi	Hinds	PRI 880	Bartoniano	Moody's Branch	Marino indeterminado	Caliza no litificada (glauconita)
1424	USA	Mississippi	Clarke	MGS 25	Bartoniano	Cook Mountain (Mb. Archusa Marl)	Offshore	Marga arenosa no litificada (glauconita)
1425	USA	Texas	Burleson	FM1362	Bartoniano	Cook Mountain	Marino indeterminado	Arcilla grano fino
1427	USA	Texas	Bastrop	M 377	Bartoniano	Cook Mountain	Marino indeterminado	Arcilla arenosa grano fino
1432	USA	Alabama	Choctaw	MGS 73	Bartoniano	Gosport Sand	Plataforma interna (transgresiva)	Arenisca calcárea no litificada (glauconita)
1433	USA	Alabama	Washington	M 307	Bartoniano	Gosport Sand	Plataforma interna (transgresiva)	Arenisca calcárea no litificada (glauconita)

Rec	Region	State or County	Location	Key Location	Stage	Formation	Depositional Environment	Facies
1434	USA	Alabama	Choctaw	PRI 1096	Bartoniano	Moody's Branch	Submareal poco profunda (transgresiva)	Marga arenosa no litificada (glauconita)
1435	USA	Texas	Anderson	M 182	Bartoniano	Moody's Branch	Submareal poco profunda (transgresiva)	Marga arenosa no litificada (glauconita)
1441	USA	Louisiana	Ouachita	HAR 4	Bartoniano	Cook Mountain	Marino indeterminado	Arcilla arenosa grano fino
1442	USA	Louisiana	Winn	M 724	Bartoniano	Cook Mountain	Submareal somero	Arcilla grano fino
1443	USA	Louisiana	Winn	PRI 3	Bartoniano	Cook Mountain	Submareal somero	Arcilla arenosa grano fino
1444	USA	Texas	Lee	M 228	Bartoniano	Cook Mountain	Marino indeterminado	Arcilla arenosa grano fino
1445	USA	Texas	Stone City Bluff	Stone City, bed T	Bartoniano	Stone City	Aguas poco profundas	Lutita no litificada
1446	USA	Texas	Robertson	LB-B	Bartoniano	Cook Mountain (Mb. Wheelock)	Plataforma interna a media (regresiva)	Lutita
1448	USA	Alabama	Monroe	M 438	Bartoniano	Gosport Sand	Plataforma interna (transgresiva)	Arenisca calcárea no litificada (glauconita)
1449	USA	Louisiana	Sabine	PRI 4	Bartoniano	Moody's Branch	Submareal poco profunda (transgresiva)	Marga arenosa no litificada (glauconita)
1450	USA	Texas	Houston	M 387	Bartoniano	Cook Mountain	Marino indeterminado	Arcilla grano fino
1453	USA	Florida	Marion	PRI 1176	Bartoniano	Ocala Limestone	Plataforma carbonatada	Caliza
1454	USA	Florida	Marion	PRI 1170	Bartoniano	Ocala Limestone	Plataforma carbonatada	Grainstone y packstone
1456	USA	Florida	Jackson	Chipola River	Bartoniano	Mariana	Plataforma carbonatada	Caliza
1460	USA	Alabama	Monroe	M 18	Bartoniano	Cook Mountain	Marino indeterminado	Arcilla arenosa grano fino
1467	USA	Mississippi	Clarke	MGS 27	Bartoniano	Cook Mountain (Mb. Archusa Marl)	Offshore (transgresiva)	
1469	USA	Texas	Fayette	M 556	Bartoniano	Cook Mountain (Mb. Landrum)	Offshore	
1472	USA	Alabama	Monroe	AMo-6	Bartoniano	Gosport Sand	Submareal somero	Arenisca no litificada (glauconita)
1473	USA	Texas	Brazos	M 537	Bartoniano	Cook Mountain (Mb. Wheelock)	Plataforma interna a media (regresiva)	Lutita
1474	USA	Mississippi	Clarke	M 129	Bartoniano	Cook Mountain	Marino indeterminado	Arcilla arenosa grano fino
1475	USA	Alabama	Clarke	M 649	Bartoniano	Gosport Sand	Plataforma interna (transgresiva)	Arenisca calcárea no litificada (glauconita)
1482	USA	Alabama	Monroe	M 306	Bartoniano	Cook Mountain	Marino indeterminado	Arcilla arenosa grano fino
1483	USA	Louisiana	Winn	PRI 2235	Bartoniano	Cook Mountain	Marino indeterminado	Arcilla arenosa grano fino
1484	USA	Texas	Brazos	M 200	Bartoniano	Cook Mountain (Mb. Wheelock)	Plataforma interna a media (regresiva)	Lutita

Rec	Region	State or County	Location	Key Location	Stage	Formation	Depositional Environment	Facies
1485	USA	Louisiana	Claiborne	M 74	Bartoniano	Cook Mountain	Marino indeterminado	Arcilla arenosa grano fino
1486	USA	Louisiana	Bienville	M 71	Bartoniano	Cook Mountain	Marino indeterminado	Arcilla arenosa grano fino
1487	USA	Louisiana	Bienville	M 70	Bartoniano	Cook Mountain	Marino indeterminado	Arcilla arenosa grano fino
1488	USA	Alabama	Choctaw	M 4	Bartoniano	Cook Mountain	Marino indeterminado	Arcilla arenosa grano fino
1489	USA	Louisiana	Webster	M 92	Bartoniano	Cook Mountain	Marino indeterminado	Arcilla arenosa grano fino
1490	USA	Texas	Brazos	M 201	Bartoniano	Cook Mountain (Mb. Wheelock)	Plataforma interna a media (regresiva)	Lutita
1494	USA	California	Grapevine Creek	UCMP 458	Bartoniano	Tejon	Marino indeterminado	Arenisca
1495	USA	California	Edmonston Pumping Plant	USGS M4639	Bartoniano	Tejon	Costa transgresiva	Arenisca litificada
1496	USA	California	Edmonston Pumping Plant	USGS M4630	Bartoniano	Tejon	Costa transgresiva	Arenisca litificada
1497	USA	Alabama	Stone City Bluff	PRI 139	Bartoniano	Crockett	Offshore	Arenisca calcárea no litificada (glauconita)
1498	USA	Mississippi	Newton	PRI 773	Bartoniano	Cook Mountain (Mb. Archusa Marl)	Offshore (transgresiva)	Marga arenosa no litificada (glauconita)
1499	USA	Mississippi	Newton	PRI 748	Bartoniano	Cook Mountain (Mb. Archusa Marl)	Offshore (transgresiva)	Marga arenosa no litificada (glauconita)
1500	USA	Texas	Bastrop	PRI 755	Bartoniano	Cook Mountain	Offshore (transgresiva)	Marga arenosa no litificada (glauconita)
1502	USA	Mississippi	Newton	PRI 774	Bartoniano	Cook Mountain (Mb. Archusa Marl)	Offshore (transgresiva)	Marga arenosa no litificada (glauconita)
1503	USA	Texas	Robertson	M 252a	Bartoniano	Cook Mountain	Marino indeterminado	Arcilla arenosa grano fino
1504	USA	Texas	Lee	M 227	Bartoniano	Cook Mountain	Marino indeterminado	Arcilla arenosa grano fino
1506	USA	Louisiana	Grant	EX-SMO	Bartoniano	Moody's Branch	Submareal poco profunda (transgresiva)	Marga arenosa no litificada (glauconita)
1507	USA	Mississippi	Clarke	M 423	Bartoniano	Cook Mountain	Marino indeterminado	Arcilla arenosa grano fino
1509	USA	Texas	Houston	M 218	Bartoniano	Cook Mountain (Mb. Landrum)	Offshore	Marga no litificada
1511	USA	Texas	Houston	M 216	Bartoniano	Cook Mountain	Marino indeterminado	Arcilla arenosa grano fino
1512	USA	Mississippi	Yazoo	MGS 12	Bartoniano	Moody's Branch	Submareal poco profunda (transgresiva)	Marga arenosa no litificada (glauconita)
1513	USA	Texas	Houston	M 389	Bartoniano	Cook Mountain	Marino indeterminado	Arcilla arenosa grano fino
1514	USA	Texas	Lee	M 224	Bartoniano	Crockett	Marino indeterminado	Arenisca calcárea no litificada (glauconita)
1515	USA	Texas	Brazos	M 544	Bartoniano	Cook Mountain	Marino indeterminado	Arcilla arenosa grano fino

Rec	Region	State or County	Location	Key Location	Stage	Formation	Depositional Environment	Facies
1516	USA	Texas	Madison	M 396	Bartoniano	Cook Mountain	Marino indeterminado	Arcilla arenosa grano fino
1517	USA	Texas	Brazos	M 382	Bartoniano	Cook Mountain	Marino indeterminado	Arcilla arenosa grano fino
1524	USA	Alabama	None	Pine Barren	Bartoniano	Cook Mountain (Mb. Landrum)	Offshore	Marga no litificada
1525	USA	Texas	Houston	AF-2	Bartoniano	Cook Mountain	Submareal somero	Arcilla no litificada
1526	USA	Texas	Sabine	M 405	Bartoniano	Cook Mountain	Marino indeterminado	Arcilla grano fino
1527	USA	Texas	Robertson	M 255	Bartoniano	Cook Mountain	Marino indeterminado	Arcilla grano fino
1536	USA	Texas	Brazos	M 543	Bartoniano	Stone City	Aguas poco profundas	Arcilla grano fino
1537	USA	Texas	Houston	M 813	Bartoniano	Crockett	Marino indeterminado	Arcilla calcárea no litificada (glauconita)
1551	USA	Washington	None	UW 342	Bartoniano	Cowlitz	Llanura costera o delta	Arenisca
1552	USA	Washington	Cowlitz River	UCMP 7162	Bartoniano	Cowlitz	Llanura costera o delta	Arenisca
1553	USA	California	Live Oak Canyon	None	Bartoniano	Tejon	Costa transgresiva	Arenisca litificada
1554	USA	Washington	None	UW 325	Bartoniano	Cowlitz	Llanura costera o delta	Arenisca
1555	USA	Washington	None	UW 323	Bartoniano	Cowlitz	Llanura costera o delta	Arenisca
1556	USA	Washington	Lewis	UW 316	Bartoniano	Cowlitz	Llanura costera o delta	Arenisca
1557	USA	Washington	Lewis	UW 315	Bartoniano	Cowlitz	Llanura costera o delta	Arenisca
1564	USA	California	Riggs Canyon	UCMP 714	Bartoniano	Tejon (Mb. Superior)	Costa indeterminada	Arenisca
1565	USA	Washington	Cowlitz River	east of Vader	Bartoniano	Cowlitz	Offshore	Lodolita litificada (glauconita)
1568	USA	Washington	Cowlitz River	UCMP IP12603	Bartoniano	Cowlitz	Offshore	Lodolita litificada (glauconita)
1569	USA	Washington	Cowlitz River	UCMP D-8040	Bartoniano	Cowlitz	Aguas poco profundas	Limolita carbonosa no litificada (glauconita)
1570	USA	Washington	Lewis	Corbicula assemblage	Bartoniano	Cowlitz	Estuario/bahía	Limolita arcillosa no litificada con conchas
1572	USA	Oregon	None	A-706	Bartoniano	Coaledo (Mb. Inferior)	Marino indeterminado	Lutita
1585	USA	Oregon	None	A-860	Bartoniano	Coaledo (Mb. Inferior)	Marino indeterminado	Lutita
1602	USA	Oregon	None	A-859	Bartoniano	Coaledo (Mb. Inferior)	Marino indeterminado	Lutita
1603	USA	Oregon	None	A-856	Bartoniano	Coaledo (Mb. Inferior)	Marino indeterminado	Lutita

Priabonian localities

Rec	Region	State or County	Location	Key Location	Stage	Formation	Depositional Environment	Facies
17	USA	Washington	Bear Creek	LACMIP 5802	Priaboniano	Lincoln Creek (Mb. Gries Ranch)	Cuenca profunda cercana a la costa	Caliza

Rec	Region	State or County	Location	Key Location	Stage	Formation	Depositional Environment	Facies
19	USA	Washington	Wahkiakum	M-1 (M2562)	Priaboniano	Unit B	Marino indeterminado	Arenisca
20	USA	Washington	Wahkiakum	M-2 (M2785)	Priaboniano	Unit B	Marino indeterminado	Arenisca
26	USA	Washington	Woodmans Wharf	UCMP A-1802	Priaboniano	Quimper	Marino indeterminado	Conglomerado litificado
27	USA	Washington	Mats-Mats	UCMP A-1808	Priaboniano	Quimper	Marino indeterminado	Conglomerado litificado
28	USA	Washington	Woodmans Wharf	UCMP A-3711	Priaboniano	Quimper	Marino indeterminado	Conglomerado litificado
29	USA	Washington	Old Gries Ranch	UCMP 3607 (UW 239)	Priaboniano	Lincoln Creek (Mb. Gries Ranch)	Marino indeterminado	Arenisca tobacea grano fino
31	USA	Washington	Needles-Grey Wolf	USGS M1928	Priaboniano	None	Marino indeterminado	Siliciclástica
37	USA	Washington	Lewis	UW 1b	Priaboniano	Lincoln Creek (Mb. Gries Ranch)	Marino indeterminado	Arenisca
45	USA	Oregon	Columbia	USGS 15265	Priaboniano	Keasey (Mb. Inferior)	Aguas profundas	Limolita
46	USA	Oregon	Columbia	USGS 15267 (SU H-36)	Priaboniano	Keasey (Mb. Medio)	Aguas profundas	Limolita calcárea no litificada
47	USA	Oregon	Columbia	USGS 15266	Priaboniano	Keasey (Mb. Inferior)	Aguas profundas	Limolita
48	USA	Oregon	Columbia	USGS 25031 (UCMP IP1984)	Priaboniano	Keasey (Mb. Medio)	Aguas profundas	Limolita calcárea no litificada
49	USA	Oregon	Columbia	USGS 25918	Priaboniano	Keasey (Mb. Medio)	Aguas profundas	Limolita
50	USA	Oregon	Eugene East	UO 2538	Priaboniano	Eugene	Costa indeterminada	Arenisca litificada
51	USA	Oregon	Eugene East	UC A-980	Priaboniano	Eugene	Costa indeterminada	Arenisca litificada
52	USA	Oregon	Eugene East	UO 2552	Priaboniano	Eugene	Costa indeterminada	Arenisca litificada
53	USA	Oregon	Eugene	UO 80	Priaboniano	Eugene	Transición/shoreface	Arenisca litificada
54	USA	Oregon	Eugene East	UO 2553	Priaboniano	Eugene	Costa indeterminada	Arenisca litificada
55	USA	Oregon	Eugene East	CAS 238	Priaboniano	Eugene	Costa indeterminada	Arenisca litificada
56	USA	Oregon	Eugene East	CAS 239	Priaboniano	Eugene	Costa indeterminada	Arenisca litificada
57	USA	Oregon	Eugene East	NP 93	Priaboniano	Eugene	Costa indeterminada	Arenisca litificada
58	USA	Oregon	Eugene East	UO 37, 38	Priaboniano	Eugene	Costa indeterminada	Arenisca litificada
59	USA	Oregon	Eugene East	UO 2556	Priaboniano	Eugene	Costa indeterminada	Arenisca litificada
60	USA	Oregon	Columbia	USGS 15268	Priaboniano	Keasey (Mb. Medio)	Aguas profundas	Limolita calcárea no litificada
61	USA	Oregon	Columbia	USGS 15274	Priaboniano	Keasey (Mb. Medio)	Aguas profundas	Limolita calcárea no litificada
62	USA	Oregon	Columbia	USGS 15282	Priaboniano	Keasey (Mb. Medio)	Aguas profundas	Limolita calcárea no litificada
63	USA	Oregon	Columbia	USGS 15510	Priaboniano	Keasey (Mb. Medio)	Aguas profundas	Limolita calcárea no litificada
64	USA	Oregon	Columbia	USGS 15280	Priaboniano	Keasey (Mb. Medio)	Aguas profundas	Limolita calcárea no litificada

Rec	Region	State or County	Location	Key Location	Stage	Formation	Depositional Environment	Facies
65	USA	Oregon	Columbia	USGS 15263	Priaboniano	Keasey (Mb. Inferior)	Aguas profundas	Limolita
66	USA	Oregon	Columbia	USGS 15284	Priaboniano	Keasey (Mb. Inferior)	Aguas profundas	Limolita
67	USA	Oregon	Columbia	SU H36	Priaboniano	Keasey (Mb. Medio)	Aguas profundas	Limolita
68	USA	Oregon	Columbia	SU H26	Priaboniano	Keasey (Mb. Inferior)	Aguas profundas	Limolita
69	USA	Oregon	Columbia	USGS 15281	Priaboniano	Keasey (Mb. Medio)	Aguas profundas	Limolita calcárea no litificada
70	USA	Oregon	Columbia	USGS 15517	Priaboniano	Keasey (Mb. Medio)	Aguas profundas	Limolita calcárea no litificada
71	USA	Oregon	Columbia	USGS 15602	Priaboniano	Keasey (Mb. Medio)	Aguas profundas	Limolita calcárea no litificada
72	USA	Oregon	Columbia	USGS 25033	Priaboniano	Keasey (Mb. Medio)	Aguas profundas	Limolita calcárea no litificada
73	USA	Oregon	Columbia	USGS 25036	Priaboniano	Keasey (Mb. Medio)	Aguas profundas	Limolita calcárea no litificada
74	USA	Oregon	Columbia	USGS 25032	Priaboniano	Keasey (Mb. Superior)	Aguas profundas	Limolita calcárea no litificada
75	USA	Oregon	Columbia	USGS 2717	Priaboniano	Keasey (Mb. Inferior)	Aguas profundas	Limolita
76	USA	Oregon	Tillamook	UCMP IP6496	Priaboniano	Nestucca	Aguas profundas	Limolita
77	USA	Oregon	Columbia	USGS 15307	Priaboniano	Keasey (Mb. Inferior)	Aguas profundas	Limolita
78	USA	Oregon	Columbia	USGS 15308	Priaboniano	Keasey (Mb. Inferior)	Aguas profundas	Limolita
79	USA	Oregon	Columbia	USGS 15309	Priaboniano	Keasey (Mb. Inferior)	Aguas profundas	Limolita
80	USA	Oregon	Columbia	USGS 25025	Priaboniano	Keasey (Mb. Inferior)	Aguas profundas	Limolita
81	USA	Oregon	Columbia	USGS 25026	Priaboniano	Keasey (Mb. Inferior)	Aguas profundas	Limolita
82	USA	Oregon	Columbia	USGS 25028	Priaboniano	Keasey (Mb. Inferior)	Aguas profundas	Limolita
83	USA	Oregon	Columbia	USGS 25270	Priaboniano	Keasey (Mb. Inferior)	Aguas profundas	Limolita
84	USA	Oregon	Columbia	DOGAMI PF 187	Priaboniano	Keasey (Mb. Inferior)	Aguas profundas	Limolita
85	USA	Oregon	Holman	SU H43	Priaboniano	Keasey (Mb. Inferior)	Aguas profundas	Limolita
86	USA	Oregon	Holman	SU H68	Priaboniano	Keasey (Mb. Inferior)	Aguas profundas	Limolita
87	USA	Oregon	North Pacific	SU NP 3	Priaboniano	Keasey (Mb. Inferior)	Aguas profundas	Limolita
88	USA	Oregon	Columbia	USGS 15601	Priaboniano	Keasey (Mb. Superior)	Aguas profundas	Limolita calcárea no litificada
89	USA	Oregon	Columbia	USGS 15525	Priaboniano	Keasey (Mb. Medio)	Aguas profundas	Limolita calcárea no litificada
90	USA	Oregon	Burn Road Bridge	USGS 15318	Priaboniano	Keasey (Mb. Medio)	Cuenca profunda cercana a la costa	Lutita tobacea
91	USA	Oregon	Columbia	USGS 15279	Priaboniano	Keasey (Mb. Medio)	Aguas profundas	Limolita calcárea no litificada
92	USA	Oregon	Columbia	USGS 25030	Priaboniano	Keasey (Mb. Medio)	Aguas profundas	Limolita calcárea no litificada
93	USA	Oregon	Eugene East	UO 2541	Priaboniano	Eugene	Costa indeterminada	Arenisca litificada

Rec	Region	State or County	Location	Key Location	Stage	Formation	Depositional Environment	Facies
94	USA	Oregon	Eugene East	UO 2542	Priaboniano	Eugene	Costa indeterminada	Arenisca litificada
95	USA	Oregon	Eugene East	UO 2545	Priaboniano	Eugene	Costa indeterminada	Arenisca litificada
116	USA	Oregon	Columbia	USGS 25034	Priaboniano	Keasey (Mb. Medio)	Aguas profundas	Limolita calcárea no litificada
128	USA	Oregon	Lane	USGS 17019 (UO 2534)	Priaboniano	Eugene	Costa indeterminada	Arenisca litificada
129	USA	Oregon	Eugene East	UO 2551	Priaboniano	Eugene	Costa indeterminada	Arenisca litificada
130	USA	Oregon	Eugene East	UO 2554	Priaboniano	Eugene	Costa indeterminada	Arenisca litificada
131	USA	Oregon	Eugene West	USGS 17038	Priaboniano	Eugene	Costa indeterminada	Arenisca litificada
132	USA	Oregon	Sidney	UO 2557	Priaboniano	Eugene	Costa indeterminada	Arenisca litificada
133	USA	Oregon	Rickreall	UO 148	Priaboniano	Eugene	Costa indeterminada	Arenisca litificada
134	USA	Washington	Middle Fork of Statsop River	USGS 26905	Priaboniano	Lincoln Creek (Mb. Gries Ranch)	Abisal	Limolita
135	USA	Washington	Whiskey Creek	UWBM B6753	Priaboniano	Pysht	Aguas profundas	Limolita
136	USA	Washington	Canyon River	USGS 26901	Priaboniano	Lincoln Creek (Mb. Gries Ranch)	Cold-seep	Limolita
138	USA	Oregon	Eugene East	UO 2531	Priaboniano	Eugene	Costa indeterminada	Arenisca litificada
139	USA	Oregon	Eugene East	UO 2530	Priaboniano	Eugene	Costa indeterminada	Arenisca litificada
140	USA	Oregon	Eugene East	UO 2537	Priaboniano	Eugene	Costa indeterminada	Arenisca litificada
141	USA	Oregon	Eugene East	UO 2536	Priaboniano	Eugene	Costa indeterminada	Arenisca litificada
142	USA	Oregon	Eugene East	UO 2535	Priaboniano	Eugene	Costa indeterminada	Arenisca litificada
143	USA	Oregon	Eugene East	UO 2539	Priaboniano	Eugene	Costa indeterminada	Arenisca litificada
144	USA	Oregon	Eugene East	UO 2543	Priaboniano	Eugene	Costa indeterminada	Arenisca litificada
145	USA	Oregon	Eugene East	UO 2544	Priaboniano	Eugene	Costa indeterminada	Arenisca litificada
146	USA	Oregon	Eugene East	UO 2549	Priaboniano	Eugene	Costa indeterminada	Arenisca litificada
147	USA	Oregon	Eugene East	UO 2550	Priaboniano	Eugene	Costa indeterminada	Arenisca litificada
148	USA	Oregon	Eugene East	UO 10	Priaboniano	Eugene	Costa indeterminada	Arenisca litificada
149	USA	Oregon	Eugene East	USGS 17025 (UO 170)	Priaboniano	Eugene	Costa indeterminada	Arenisca litificada
150	USA	Oregon	Salem West	UO 2558	Priaboniano	Eugene	Costa indeterminada	Arenisca litificada
151	USA	Oregon	Columbia	USGS 25029	Priaboniano	Keasey (Mb. Inferior)	Aguas profundas	Limolita
152	USA	Oregon	Columbia	USGS 15508	Priaboniano	Keasey (Mb. Medio)	Aguas profundas	Limolita tobacea
153	USA	Oregon	Empire Literock Quarry	USGS 25037	Priaboniano	Keasey (Mb. Medio)	Marino indeterminado	Arenisca

Rec	Region	State or County	Location	Key Location	Stage	Formation	Depositional Environment	Facies
154	USA	Oregon	None	USGS 15276	Priaboniano	Keasey (Mb. Medio)	Marino indeterminado	Arenisca
155	USA	Oregon	None	USGS 25039	Priaboniano	Keasey (Mb. Medio)	Marino indeterminado	Arenisca
157	USA	Oregon	None	USGS M3862	Priaboniano	Keasey (Mb. Medio)	Marino indeterminado	Arenisca
158	USA	Oregon	None	UCMP A5020	Priaboniano	Keasey (Mb. Medio)	Marino indeterminado	Arenisca
159	USA	Washington	east of Port Hadlock	UCMP A3702	Priaboniano	Quimper	Marino indeterminado	Arenisca
160	USA	Oregon	None	USGS 25027	Priaboniano	Keasey (Mb. Superior)	Marino indeterminado	Arenisca
161	USA	Oregon	Eugene East	UO 2540	Priaboniano	Eugene	Costa indeterminada	Arenisca litificada
162	USA	Oregon	Columbia	USGS 15283	Priaboniano	Keasey (Mb. Medio)	Aguas profundas	Limolita calcárea no litificada
163	USA	Oregon	None	USGS M3863	Priaboniano	Keasey (Mb. Medio)	Marino indeterminado	Arenisca
164	USA	Oregon	Salem West	UO 2559	Priaboniano	Eugene	Costa indeterminada	Arenisca litificada
165	USA	Oregon	Burn Road Bridge	UCMP V6730	Priaboniano	Keasey (Mb. Medio)	Marino indeterminado	Arenisca
166	USA	Washington	Pacific	USGS M2285	Priaboniano	Keasey (Mb. Inferior)	Aguas profundas	Limolita
171	USA	Oregon	College Hill	USGS 5425	Priaboniano	Eugene	Transición/shoreface	Arenisca litificada
172	USA	Washington	Mason	LCF Woof Fall	Priaboniano	Lincoln Creek (Mb. Gries Ranch)	Aguas profundas	Lutita
174	USA	Oregon	McMahn Branch	UO 2561	Priaboniano	Eugene	Transición/shoreface	Arenisca litificada
175	USA	Oregon	McMinnville	UO 2564	Priaboniano	Eugene	Costa indeterminada	Arenisca litificada
176	USA	Oregon	U. of Oregon	U. of Oregon (excavations)	Priaboniano	Eugene	Transición/shoreface	Arenisca no litificada grano grino a grueso
177	USA	Oregon	Eugene West	USGS 17044	Priaboniano	Eugene	Costa indeterminada	Arenisca litificada
178	USA	Oregon	Eugene East	UO 2533	Priaboniano	Eugene (Skinner Butte Park)	Costa indeterminada	Arenisca litificada
179	USA	Oregon	Eugene East	US 5422	Priaboniano	Eugene	Costa indeterminada	Arenisca litificada
180	USA	Oregon	McMinnville	UO 2565	Priaboniano	Eugene	Costa indeterminada	Arenisca litificada
181	USA	Oregon	Eugene East	UO 19	Priaboniano	Eugene	Costa indeterminada	Arenisca litificada
182	USA	Oregon	Rickreall	UO 2563	Priaboniano	Eugene	Costa indeterminada	Arenisca litificada
183	USA	Oregon	Rickreall	UO 39	Priaboniano	Eugene	Costa indeterminada	Arenisca litificada
184	USA	Oregon	Rickreall	UO 2562	Priaboniano	Eugene	Costa indeterminada	Arenisca litificada
186	USA	Oregon	McMinnville	UO 2566	Priaboniano	Eugene	Costa indeterminada	Arenisca litificada
187	USA	Oregon	Eugene East	UO 2532	Priaboniano	Eugene	Costa indeterminada	Arenisca litificada
188	USA	Washington	mouth of Whiskey Creek	None	Priaboniano	Lincoln Creek (Mb. Gries Ranch)	Marino indeterminado	Caliza

Rec	Region	State or County	Location	Key Location	Stage	Formation	Depositional Environment	Facies
189	USA	Oregon	Rock Creek	UCMP IP16004	Priaboniano	Keasey (Mb. Medio)	Abisal	Lutita
263	USA	California	McCray Wells	Locality 8 (Waring, 1917)	Priaboniano	Llajas	Marino indeterminado	Arenisca
446	USA	California	Kern	Ucal 3174	Priaboniano	Emigdio	Costa indeterminada	Lutita arenosa no litificada
447	USA	California	Kern	Ucal 3186	Priaboniano	Emigdio	Costa indeterminada	Lutita arenosa no litificada
448	USA	California	Kern	Ucal 3190	Priaboniano	Emigdio	Costa indeterminada	Lutita arenosa no litificada
474	USA	California	Sn Emigdio Creek	None	Priaboniano	Emigdio	Plataforma interna	Arenisca
542	USA	Washington	Needles-Gray Wolf	USGS M1534	Priaboniano	None	Marino indeterminado	Siliciclástica
543	USA	Washington	Needles-Gray Wolf	USGS M1535	Priaboniano	None	Marino indeterminado	Siliciclástica
544	USA	Washington	Needles-Gray Wolf	USGS M1536	Priaboniano	None	Marino indeterminado	Siliciclástica
545	USA	Washington	Needles-Gray Wolf	CSUN 1598	Priaboniano	None	Marino indeterminado	Siliciclástica
556	USA	California	east McCray Wells	1.5 miles	Priaboniano	Llajas	Plataforma externa	Arenisca grano fino
604	USA	California	Kern	Ucal 3212	Priaboniano	Emigdio	Costa indeterminada	Lutita arenosa no litificada
612	USA	California	Tejon north	Locality 6 (Waring, 1917)	Priaboniano	Llajas	Plataforma externa	Arenisca
634	USA	California	Cuarta Canyon	LACMIP 7289	Priaboniano	Gaviota	Shoreface	Arenisca
635	USA	California	Wheatland	UCMP A1889	Priaboniano	Wheatland	Costa indeterminada	Conglomerado con guijarros
641	USA	Washington	Hobart quadrangle	USGS 650	Priaboniano	Renton	Marginal	Arcillolita
707	Perú,	Piura	near Quercotilla	None	Priaboniano	Chira	Marino indeterminado	Lutita carbonosa no litificada
708	Perú,	Ica	Bajada del Diablo	None	Priaboniano	Otuma	Llanura costera	Arenisca
710	Perú,	Ica	SE de Playa Yumaque	None	Priaboniano	Otuma	Shoreface	Arenisca litificada grano fino a medio
711	Perú,	Piura	N de Casa Saman	None	Priaboniano	Chira	Marino indeterminado	Lutita carbonosa no litificada
714	Perú,	Piura	Lagunitas	None	Priaboniano	Cone Hill	Offshore	Lutita
715	Perú,	Piura	Punta Bravo	None	Priaboniano	Mancora	Marginal	Arenisca no litificada
716	Perú,	Piura	Negritos	None	Priaboniano	Saman (conglomerado)	Costa indeterminada	Conglomerado no litificado
719	Perú,	Piura	Casa Saman	None	Priaboniano	Saman	Costa indeterminada	Arenisca arcillosa no litificada
720	Perú,	Moquegua Pampa	Las Salinas	None	Priaboniano	Otuma	Llanura costera	Arenisca
721	Perú,	Ica	Paracas-Otuma Road	95DV 825	Priaboniano	Otuma	Llanura costera	Arenisca
728	Perú,	Ica	None	DV 631-8	Priaboniano	Paracas	Costa indeterminada	Arenisca litificada grano fino a medio
729	Perú,	None	None	DV 1174-1	Priaboniano	Paracas	Costa indeterminada	Arenisca litificada grano fino a medio
732	Perú,	None	None	DV 637-7	Priaboniano	Paracas	Costa indeterminada	Arenisca no litificada grano fino
733	Perú,	None	None	DV 585-1	Priaboniano	Paracas	Costa indeterminada	Siliciclastica

Rec	Region	State or County	Location	Key Location	Stage	Formation	Depositional Environment	Facies
734	Perú,	None	None	DV 501-2	Priaboniano	Paracas	Costa indeterminada	Siliciclastica
735	Perú,	None	None	DV 394-2	Priaboniano	Paracas	Costa indeterminada	Siliciclastica
737	Perú,	None	None	DV 634-1	Priaboniano	Paracas	Costa indeterminada	Arenisca no litificada grano fino
739	Perú,	None	None	DV 1123-1	Priaboniano	Otuma	Costa indeterminada	Arenisca litificada grano fino
748	Perú,	None	Conglomerado Mirador	None	Priaboniano	Mirador	Aguas poco profundas	Arenisca grano grueso
749	Perú,	Piura	Belen y Pajaro Bobo	None	Priaboniano	Cone Hill	Submareal poco profundo ("coldseep")	Caliza litificada
752	Perú,	Piura	Caleta Sal	None	Priaboniano	Saman	Costa indeterminada	Arenisca arcillosa no litificada
753	Perú,	Piura	Talara	None	Priaboniano	Saman	Costa indeterminada	Arenisca arcillosa no litificada
754	Perú,	Piura	Mancora	None	Priaboniano	Mancora	Marginal	Arenisca no litificada
766	Perú,	Piura	Lagunitas	None	Priaboniano	Saman (conglomerado)	Costa indeterminada	Conglomerado no litificado
775	Jamaica,	None	Crab Hiill Point	None	Priaboniano	Troy Limestone	Aguas poco profundas	Caliza recristalizada y dolomitizada
776	Jamaica,	None	Claremont	None	Priaboniano	Troy Limestone	Plataforma carbonatada	Caliza recristalizada y dolomitizada
777	Jamaica,	St. Andrew Stone Hill	None	None	Priaboniano	Troy Limestone	Plataforma carbonatada	Caliza recristalizada y dolomitizada
778	Jamaica,	St. Ann/St. Catherine	None	None	Priaboniano	Somerset	Laguna	Grainstone y packstone
780	Jamaica,	St. Ann Valle	None	None	Priaboniano	Gibraltar Limestone	Submareal somero	Caliza litificada
781	Jamaica,	None	Somerset	None	Priaboniano	Somerset	Laguna	Grainstone y packstone
782	Jamaica,	St. Ann	White Limestone	None	Priaboniano	Somerset	Laguna	Grainstone y packstone
783	Jamaica,	None	Los Hidalgos	TU 1424	Priaboniano	Los Hidalgos	Perimareal	Caliza arenosa
784	Jamaica,	None	Claremont	TU 1006	Priaboniano	Troy Limestone	Aguas poco profundas	Caliza recristalizada y dolomitizada
785	México,	Tamaulipas	None	USGS 13504	Priaboniano	Jackson	Costa indeterminada	Arenisca calcárea grano fino
789	México,	Tamaulipas	La Mission	USGS 13508	Priaboniano	Jackson (Mb. Medio)	Costa indeterminada	Arenisca calcárea grano fino
790	México,	Tamaulipas	None	USGS 13506	Priaboniano	Jackson (Mb. Medio)	Costa indeterminada	Arenisca calcárea grano fino
791	México,	Nuevo Leon	Presa El Mezcal	USGS 13598	Priaboniano	Jackson (Mb. Superior)	Costa indeterminada	Arenisca concrecionada
792	México,	Nuevo Leon	carretera Monterrey-Reynosa	USGS 14009	Priaboniano	Jackson (Mb. Superior)	Costa indeterminada	Arenisca calcárea
793	México,	Tamaulipas	None	USGS 13503	Priaboniano	Jackson (Mb. Medio)	Costa indeterminada	Arenisca calcárea grano fino
794	México,	Nuevo Leon	Rio Panorama	USGS 13513	Priaboniano	Jackson (Mb. Superior)	Costa indeterminada	Arenisca grano fino
798	México,	Tamaulipas	Loma de azucar	USGS 13754	Priaboniano	Jackson (Mb. Arenisca Roma)	Costa indeterminada	Arenisca no litificada
944	USA	Florida	Gulf Hammock	PRI 3201	Priaboniano	Inglis Limestone	Marino indeterminado	Caliza litificada

Rec	Region	State or County	Location	Key Location	Stage	Formation	Depositional Environment	Facies
990	USA	Florida	Unspecified loc.	None	Priaboniano	Inglis Limestone	Submareal somero	Caliza no litificada grano grueso
991	USA	Florida	Gulf Hammock	FGS L-93	Priaboniano	Inglis Limestone	Marino indeterminado	Caliza litificada
1028	USA	Alabama	N Creek Clay	ACH-19	Priaboniano	Yazoo Clay (Mb. North Twistwood)	Marino indeterminado	Arcilla arenosa grano fino
1029	USA	Alabama	N Creek Clay	ACH-17	Priaboniano	Yazoo Clay (Mb. North Twistwood)	Marino indeterminado	Arcilla arenosa grano fino
1031	USA	Florida	None	M 42	Priaboniano	Inglis Limestone	Marino indeterminado	Caliza litificada
1033	USA	Florida	Gulf Hammock	FGS VL-187	Priaboniano	Inglis Limestone	Marino indeterminado	Caliza litificada
1034	USA	Florida	Withlacoochee River	FGS L-135	Priaboniano	Inglis Limestone	Marino indeterminado	Caliza no litificada
1050	USA	Mississippi	None	Ready-Mix Concrete Company	Priaboniano	Yazoo Clay	Offshore	Arcilla no litificada
1074	USA	Mississippi	Jackson	Jackson	Priaboniano	Jackson (Mb. Superior)	Cañon submarino	Arenisca limosa grano fino
1111	USA	Louisiana	Caldwell	PRI 2	Priaboniano	Danville Landing	Transición/shoreface	Lodolita calcárea litificada
1132	USA	Alabama	Clarke	ACI-11	Priaboniano		Marino indeterminado	Arcilla calcárea no litificada
1146	México,	Tamaulipas	El Azucal	Colletion 5145, Station 277	Priaboniano	Fayette	Costa indeterminada	Arenisca calcárea grano fino
1147	USA	Alabama	Choctaw	W of Silas (L.B.)	Priaboniano	Yazoo (Mb. Pachuta Marl)	Marino indeterminado	Marga calcárea no litificada
1148	USA	Alabama	Choctaw	USGS 7219	Priaboniano	Yazoo (Mb. Pachuta Marl)	Marino indeterminado	Marga calcárea no litificada
1149	USA	Alabama	Choctaw	USGS 2892	Priaboniano	Yazoo (Mb. Pachuta Marl)	Marino indeterminado	Marga calcárea no litificada
1150	USA	Alabama	Choctaw	USGS 2637	Priaboniano	Yazoo (Mb. Pachuta Marl)	Marino indeterminado	Marga calcárea no litificada
1151	USA	Florida	Jackson	Marianna Lime Products Co.	Priaboniano	Ocala Limestone	Submareal somero	Caliza litificada
1152	USA	Florida	Citrus	FCi-1	Priaboniano	Ocala Limestone	Laguna	Packstone
1154	USA	Mississippi	Clarke	USGS 12559	Priaboniano	Yazoo (Mb. Pachuta Marl)	Marino indeterminado	Marga calcárea no litificada (glauconita)
1174	USA	Louisiana	Grant	Montgomery Landing	Priaboniano	Yazoo (Mb. Tullos)	Offshore	Arcilla limosa no litificada (glauconita)
1178	USA	Florida	Citrus	Crystal River Rock, bed 4	Priaboniano	Crystal River	Plataforma carbonatada	Caliza no litificada
1179	USA	Florida	Citrus	Crystal River Rock, bed 2	Priaboniano	Crystal River	Plataforma carbonatada	Caliza no litificada
1180	USA	Florida	Taylor	FTa-3	Priaboniano	Crystal River	Plataforma carbonatada	Caliza
1181	USA	Florida	Taylor	FTa-2	Priaboniano	Crystal River	Plataforma carbonatada	Caliza
1182	USA	Florida	Taylor	FTa-1	Priaboniano	Crystal River	Plataforma carbonatada	Caliza
1183	USA	Florida	Lafayette	FLa-2	Priaboniano	Crystal River	Plataforma carbonatada	Caliza
1184	USA	Florida	Lafayette	FLa-1	Priaboniano	Crystal River	Plataforma carbonatada	Caliza

Rec	Region	State or County	Location	Key Location	Stage	Formation	Depositional Environment	Facies
1185	USA	Florida	Dixie	FDI-1	Priaboniano	Crystal River	Plataforma carbonatada	Caliza
1204	USA	Alabama	Escambria	AEs-4	Priaboniano	Crystal River	Plataforma carbonatada	Caliza
1205	USA	Alabama	Clarke	ACI-6	Priaboniano	Yazoo Clay (Mb. Shubuta)	Aguas poco profundas	Arcilla calcárea no litificada
1206	USA	Alabama	Escambria	AEs-3	Priaboniano	Yazoo (Mb. Pachuta Marl)	Aguas poco profundas	Marga calcárea no litificada
1207	USA	Alabama	Clarke	ACI-11(a)	Priaboniano	Yazoo Clay (Mb. Cocoa Sand)	Plataforma interna (transgresiva)	Arenisca calcárea
1208	USA	Alabama	Clarke	ACI-6	Priaboniano	Yazoo Clay (Mb. Cocoa Sand)	Plataforma interna (transgresiva)	Arenisca calcárea
1211	USA	Florida	Crystal River	FLe-1	Priaboniano	Crystal River	Plataforma carbonatada	Caliza
1212	USA	Mississippi	Scott	Highway 35	Priaboniano	Yazoo (Mb. Pachuta Marl)	Foreshore	Arcillolita
1213	USA	Alabama	St. Stephens Quarry	None	Priaboniano	Yazoo Clay (Mb. Shubuta)	Costa indeterminada	Marga
1214	USA	Alabama	Clarke	ACI-10	Priaboniano	Yazoo Clay (Mb. Shubuta)	Aguas poco profundas	Arcilla calcárea no litificada
1215	USA	Alabama	Clarke	ACI-4	Priaboniano	Yazoo Clay (Mb. Shubuta)	Marino indeterminado	Lutita calcárea no litificada
1223	USA	Florida	Alachua	PRI 25	Priaboniano	Ocala Limestone	Plataforma carbonatada	Grainstone y packstone
1224	USA	Florida	Marion	M 51	Priaboniano	Ocala Limestone	Plataforma carbonatada	Grainstone y packstone
1228	USA	Mississippi	Clarke	M 353a	Priaboniano	Yazoo Clay (Mb. Shubuta)	Aguas poco profundas	Arcilla calcárea no litificada
1229	USA	Mississippi	Clarke	M 130	Priaboniano	Yazoo Clay (Mb. Shubuta)	Marino indeterminado	Limolita calcárea no litificada
1230	USA	Florida	Jackson	M 41	Priaboniano	Bumpnose	Plataforma carbonatada	Caliza
1258	USA	Mississippi	Scott	Pinkston Hill	Priaboniano	Yazoo (Mb. Pachuta Marl)	Playa	Arcillolita
1264	USA	Louisiana	Grant	PRI 10	Priaboniano	Yazoo (Mb. Tullos)	Marino indeterminado	Arcilla no litificada
1270	USA	Louisiana	Catahoula	M 2745	Priaboniano	Danville Landing	Transición/shoreface	Lodolita calcárea litificada
1272	USA	Mississippi	Clarke	MGS 31	Priaboniano	Yazoo Clay (Mb. Cocoa Sand)	Plataforma interna (transgresiva)	Arenisca calcárea
1274	USA	Mississippi	Clarke	MGS 33	Priaboniano	Yazoo (Mb. Pachuta Marl)	Marino indeterminado	Marga calcárea no litificada (glauconita)
1280	USA	Louisiana	La Salle	PRI 12	Priaboniano	Yazoo (Mb. Tullos)	Marino indeterminado	Arcilla no litificada
1283	USA	Louisiana	Montgomery	PRI 11	Priaboniano	Yazoo (Mb. Tullos)	Marino indeterminado	Arcilla no litificada
1284	USA	Louisiana	Caldwell	PRI 8	Priaboniano	Yazoo (Mb. Tullos)	Marino indeterminado	Arcilla no litificada
1289	USA	Louisiana	Catahoula	PRI 6	Priaboniano	Yazoo Clay (Mb. N Twistwood Creek)	Marino indeterminado	Arcilla limosa no litificada (glauconita)
1290	USA	Louisiana	Vernon	PRI 14	Priaboniano	Danville Landing	Marino indeterminado	Arenisca

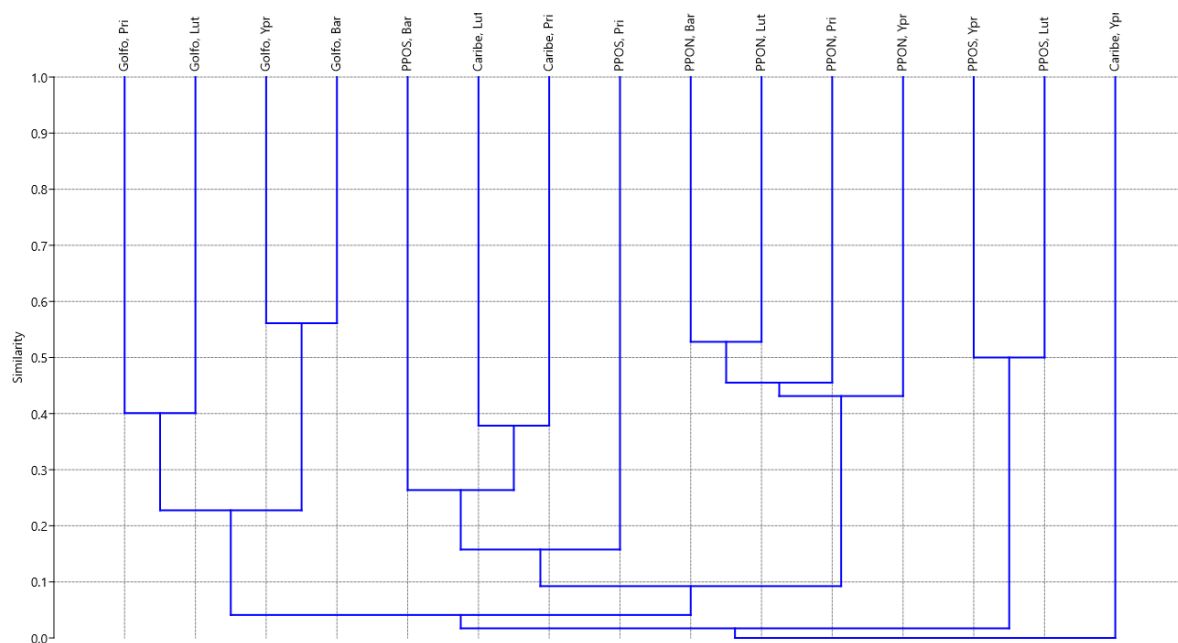
Rec	Region	State or County	Location	Key Location	Stage	Formation	Depositional Environment	Facies
1292	USA	Louisiana	Caldwell	PRI 1119	Priaboniano	Yazoo (Mb. Tullos)	Marino indeterminado	Arcilla no litificada
1294	USA	Mississippi	Hinds	MGs 15	Priaboniano	Yazoo Clay (Mb. N Twistwood Creek)	Marino indeterminado	Arcilla limosa no litificada (glauconita)
1317	USA	Louisiana	Catahoula	PRI 20	Priaboniano	Danville Landing	Transición/shoreface	Lodolita calcárea litificada
1335	USA	Louisiana	Catahoula	PRI 18	Priaboniano	Danville Landing	Transición/shoreface	Lodolita calcárea litificada
1393	USA	Louisiana	Winn	M 96	Priaboniano	Danville Landing	Transición/shoreface	Arenisca
1422	USA	Alabama	Clarke	ACI-4	Priaboniano	Yazoo Clay (Mb. Cocoa Sand)	Plataforma interna (transgresiva)	Arenisca calcárea
1451	USA	Alabama	Escambria	AEs-1	Priaboniano	Crystal River	Plataforma carbonatada	Caliza
1452	USA	Alabama	Conecuh	ACon-1	Priaboniano	Crystal River	Plataforma carbonatada	Caliza
1455	USA	Florida	Marion	None	Priaboniano	Crystal River	Plataforma carbonatada	Caliza litificada
1457	USA	Florida	Marion	FMa-1	Priaboniano	Crystal River	Plataforma carbonatada	Caliza
1458	USA	Florida	Jackson	FJa-1	Priaboniano	Crystal River	Plataforma carbonatada	Caliza
1518	USA	California	Fresno	SU 2367	Priaboniano	Tumey	Offshore	Arenisca litificada
1519	USA	California	Fresno	SU 2362	Priaboniano	Tumey	Offshore	Arenisca litificada
1523	USA	California	Kern	USGS M4595	Priaboniano	San Emigdio	Transición/shoreface	Arenisca litificada
1530	USA	Florida	Citrus	M 39 (Phosphate Minig)	Priaboniano	Inglis Limestone	Marino indeterminado	Caliza litificada
1531	USA	Florida	Citrus	FGS C-11 (Phosphate Minig)	Priaboniano	Inglis Limestone	Marino indeterminado	Caliza litificada
1538	Perú,	None	Near Quercotilla	None	Priaboniano	Chira	Marino indeterminado	Lutita calcárea no litificada
1560	USA	California	Kern	Ucal 3196	Priaboniano	San Emigdio	Costa indeterminada	Lutita arenosa litificada
1561	USA	California	Kern	Ucal 3191	Priaboniano	San Emigdio	Costa indeterminada	Lutita arenosa litificada
1562	USA	California	Kern	Ucal 3189	Priaboniano	San Emigdio	Costa indeterminada	Lutita arenosa litificada
1573	USA	California	Yuba	UCMP A1889	Priaboniano	Wheatland	Costa indeterminada	Conglomerado con guijarros
1574	USA	California	Kern	Ucal 3183	Priaboniano	San Emigdio	Costa indeterminada	Lutita arenosa litificada
1575	USA	California	Kern	Ucal 3182	Priaboniano	San Emigdio	Costa indeterminada	Lutita arenosa litificada
1576	USA	California	Kern	Ucal 3177	Priaboniano	San Emigdio	Costa indeterminada	Lutita arenosa litificada
1580	USA	Washington	None	S of Bear River	Priaboniano	Siltstone Cliff Point	Marino indeterminado	Limolita
1581	USA	Washington	Pacific	LACM IP12326	Priaboniano	Lincoln Creek (Mb. Gries Ranch)	Cuenca profunda cercana a la costa	Limolita
1582	USA	California	Kern	Ucal 3195	Priaboniano	San Emigdio	Offshore	Lutita calcárea litificada
1583	USA	Washington	Knappton	UWBM B-7446	Priaboniano	Lincoln Creek (Mb. Gries Ranch)	Cuenca oceánica	Limolita

Rec	Region	State or County	Location	Key Location	Stage	Formation	Depositional Environment	Facies
1586	USA	California	Kern	USGS M4638	Priaboniano	San Emigdio	Transición/shoreface	Arenisca litificada
1587	USA	Washington	Classens Wharf	NP 125	Priaboniano	Quimper	Marino indeterminado	Arenisca litificada grano fino a medio
1589	USA	California	Kern	USGS M4597	Priaboniano	San Emigdio	Transición/shoreface	Arenisca litificada
1590	USA	California	Fresno	SU 2511	Priaboniano	Tumey	Offshore	Arenisca litificada grano fino a medio
1591	USA	California	Fresno	SU 2471	Priaboniano	Tumey	Offshore	Arenisca litificada grano fino a medio
1592	USA	California	Kern	CSUN 1581	Priaboniano	Wagonwheel	Abanico submarino	Arenisca calcárea litificada (glauconita)
1593	USA	California	Kern	CSUN 1580	Priaboniano	Wagonwheel	Abanico submarino	Arenisca calcárea litificada (glauconita)
1594	USA	Oregon	Washington	UCMP D8945	Priaboniano	Keasey (Mb. Medio)	Marino indeterminado	Limolita
1595	USA	California	Kern	UCal 3193	Priaboniano	San Emigdio	Costa indeterminada	Lutita arenosa litificada
1596	USA	California	Kern	Ucal 3185	Priaboniano	San Emigdio	Costa indeterminada	Lutita arenosa litificada
1597	USA	California	Kern	Ucal 3175	Priaboniano	San Emigdio	Costa indeterminada	Lutita arenosa litificada
1598	USA	California	Kern	Ucal 3184	Priaboniano	San Emigdio	Costa indeterminada	Lutita arenosa litificada
1599	USA	California	Kern	Ucal 3194	Priaboniano	San Emigdio	Costa indeterminada	Lutita arenosa litificada
1615	USA	California	Kern	Ucal 3232	Priaboniano	San Emigdio	Costa indeterminada	Lutita arenosa litificada
1616	USA	California	Kern	Ucal 2431	Priaboniano	San Emigdio	Offshore	Lutita calcárea litificada
1617	USA	California	Kern	Ucal 3176	Priaboniano	San Emigdio	Costa indeterminada	Lutita arenosa litificada
1618	USA	California	Kern	Ucal 3187	Priaboniano	San Emigdio	Costa indeterminada	Lutita arenosa litificada
1619	USA	California	Kern	Ucal 3231	Priaboniano	San Emigdio	Costa indeterminada	Lutita arenosa litificada
1620	USA	California	Kern	Ucal 3213	Priaboniano	San Emigdio	Costa indeterminada	Lutita arenosa litificada
1621	USA	California	Kern	USGS M4596	Priaboniano	San Emigdio	Shoreface (transgresiva)	Arenisca litificada
1622	USA	California	Kern	Ucal 3188	Priaboniano	San Emigdio	Costa indeterminada	Lutita arenosa litificada
1623	USA	California	Kern	Ucal 3180	Priaboniano	San Emigdio	Costa indeterminada	Lutita arenosa litificada

SUPPLEMENTARY TABLE 4.

Correlation matrix derived from Paleotax and processed in Past software, accompanied by the corresponding simpler analysis. contribution percentages are emphasised in bold.

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	SIMPER Contribution %
1	NEEP, Ypr	0	78	4	34	144	2	1	0	0	0	6	0	1	2	0	14.7
2	NEPP, Bar	78	0	3	39	66	1	1	0	0	0	2	0	1	2	0	9.913
3	SEPP, Bar	4	3	0	1	2	0	32	2	0	0	0	1	0	1	0	5.194
4	NEPP, Pri	34	39	1	0	32	1	1	0	0	0	2	0	1	1	0	5.409
5	NEPP, Lut	144	66	2	32	0	3	0	0	0	0	4	0	1	2	0	13.31
6	Caribbean, Lut	2	1	0	1	3	0	0	0	0	0	4	1	3	2	2	1.319
7	SEPP, Pri	1	1	32	1	0	0	0	1	1	0	0	1	1	2	0	5.55
8	SEPP, Ypr	0	0	2	0	0	0	1	0	0	0	0	0	0	0	0	0.3312
9	SEPP, Lut	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0.1154
10	Caribbean, Ypr	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11	Caribbean, Pri	6	2	0	2	4	4	0	0	0	0	0	0	0	0	0	1.389
12	Gulf, Pri	0	0	1	0	0	1	1	0	0	0	0	0	3	82	21	4.24
13	Gulf, Ypr	1	1	0	1	1	3	1	0	0	0	0	3	0	36	123	6.581
14	Gulf, Bar	2	2	1	1	2	2	2	0	0	0	0	82	36	0	174	15.92
15	Gulf, Lut	0	0	0	0	0	2	0	0	0	0	0	21	123	174	0	16.04



 SIMPER

Taxon

Av. dissim

Contrib. %

Cumulative %

Mean 1

Mean 2

Mean 3

Mean 4

15

14

1

5

2

13

7

4

3

12

11

6

8

9

10

15.3

15.18

14.02

12.69

9.455

6.277

5.293

5.159

4.953

4.044

1.325

1.258

0.3158

0.1101

0

16.04

15.92

14.7

13.31

9.913

6.581

5.55

5.409

5.194

4.24

1.389

1.319

0.3312

0.1154

0

16.04

31.96

46.65

59.96

69.87

76.45

82

87.41

92.61

96.85

98.23

99.55

99.88

100

100

0

1.75

64

60.5

45.8

1

0.75

26.3

2.5

0

3.5

1.75

0

0

0

0

0.75

1.25

0.5

1

0.25

8.5

0.5

8.5

0.5

0

0

0.75

0.25

0

0.667

0.667

2.67

2.33

1

1

0

1

0

0.333

1.33

1.33

0

0

0

79.5

73

0.75

0.75

0.75

40.5

1

0.5

0.5

26.5

0

2

0

0

0

Group 1

1

Group 2

2

☒ Or pool all groups

Distance/similarity measure

Bray-Curtis

Recompute

Overall average dissimilarity:

95.37

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