Deep-Sea Research II 99 (2014) 1–5

Contents lists available at ScienceDirect

Deep-Sea Research II

journal homepage: www.elsevier.com/locate/dsr2

Introduction

Proceedings ISDSC5

1. Introduction

This issue contains the Proceedings of the 5th International Symposium on Deep-Sea Corals (ISDSC5), held in Amsterdam, the Netherlands, 1–6 April 2012. This symposium attracted some 200 scientists and students devoted to studying a wide range of aspects and topics related to cold-water corals. The ISDSC has become the major forum to present and discuss all aspects of cold-water coral research, thereby crossing the boundaries between management and science, and between disciplines like geology, biology, chemistry and physics. A total of 87 oral presentations were given, while in addition 98 posters were presented. This Special issue of Deep-Sea Research presents selected results of this symposium.

In the last decades the global presence of (deep-sea) cold-water corals has been established, and knowledge on their distribution is still expanding. Cold-water corals appear to settle and grow in a wide variety of settings ranging from open slopes, to canyons, seamounts and mud-volcanoes. Similar wide variation is observed in their formation, which varies from isolated thickets on topographic highs to extensive reef structures and giant carbonate mounds. A common feature of all these physical forms is the enhanced biodiversity comprising a range of organisms including microbes, invertebrates and fishes. Besides their role as biological hotspots and diversity reservoirs, cold-water coral skeletons contain a detailed chemical archive of ambient ocean water conditions over periods of rapid global climate change.

The continuously growing number of scientific papers on cold-water corals, especially in the last two decades, has led to a general recognition of their ecological, scientific and economic value, and consequently to numerous initiatives around the world to conserve and manage these ecosystems. Despite these initiatives and measures taken, cold-water coral ecosystems in many parts of the ocean are seriously threatened by the effects of climate change and human activities.

At the 4 previous conferences, notably the 3rd and 4th ISDSC (George and Cairns, 2007; Miller et al., 2009), conservation issues formed an important topic driven by urgency to convince management and politics to prevent further deterioration and loss of cold-water coral ecosystems. Catastrophes like the Deepwater Horizon oil spill in the Gulf of Mexico demonstrate that hazards to cold-water coral ecosystems are still imminent especially with oil-exploration progressing to deeper water and the recent development of plans for deep-sea mining in vulnerable areas.

In concert with increased awareness of the value and importance of cold-water corals and their incorporation in ocean management (e.g. Campbell and Simms, 2009; National Oceanic and Atmospheric Administration, Coral Reef Conservation Program, 2010), there is growing demand for basic information on aspects such as tolerance of corals to environmental stressors (e.g., temperature, pH, turbidity), physiology (growth), taxonomy and connectivity of populations. Furthermore, for the translation of chemical records taken from coral skeletons into actual in-situ conditions, long- and short-term experimental studies on coral growth are needed. This broad palette of topics needed to support science and management is reflected in these Proceedings of the ISDSC5. The highlights of the studies presented in this volume have been grouped according to topic in the following sections.

2. Environmental constraints

Knowledge of environmental factors that are relevant to or even determine the presence–absence of cold-water coral ecosystems is crucial for making predictions where to expect these vulnerable systems. Because of the sheer size of the ocean basins and adjacent slopes, actual sampling is and will remain localised and, moreover, is often biased. As an alternative, predictive species distribution models are rapidly developing and becoming a major and important tool for ocean management. Predictive models use actual observations and measurements in spite of the fact that this has drawbacks for the quality of the model outcome. Inherent limitations of using localised and biased datasets in current presence–absence models for the Deep-Sea are discussed by Vierod et al. (2014). They show that many of these issues can be overcome in part by careful consideration of the data and realisation of its limitations and, when appropriate, through the implementation of novel methodologies. They further plea for making datasets collected by industry and fisheries available to the scientific community to improve reliability of models.

Progress in resolving how the composition of the bottom water affects cold-water coral occurrence is presented by Flögel et al. (2014). These authors compiled physical and hydrochemical parameters of the ambient water masses of cold-water coral sites with *Lophelia pertusa* in the NE Atlantic and the Mediterranean. Their study extends existing datasets regarding a potential density envelope and reports on a distinct tipping point forced by dissolved inorganic carbon (DIC). High DIC values likely cannot be regulated by metabolic and calcification processes of the corals. Next step is to find a causal relationship between nutrients in the water column and density envelopes.

3. Experimental metabolic studies

Experimental studies on effects of stressors on cold-water corals are crucial to evaluate the consequences of climate change as well as of human induced disturbances. Metabolic responses

0967-0645/$ - see front matter
http://dx.doi.org/10.1016/j.dsr2.2013.10.003

of *L. pertusa* to acidification were studied in a 21 days duration experiment with increased CO_2 levels by Hennige et al. (2014). The respiration rates of *L. pertusa* were shown to be significantly lower, but there was no change in calcification rate. This suggests an energetic imbalance, which is likely related to the utilisation of lipid reserves.

The effect of a decrease of the natural temperature on the metabolism of *L. pertusa* and *Madrepora oculata* from the relatively warm Mediterranean were studied by Naumann et al. (2014). These coral species responded differently to a 3–6 °C decrease in ambient temperature. While *L. pertusa* shows thermal acclimation in respiration and calcification, this is absent in *M. oculata*. These differential responses imply repercussions for the distribution of the two species.

Responses to a changing environment may also involve adaptation in feeding behaviour. Several cold-water coral species from the Mediterranean appear to actively absorb dissolved free amino acids (Gori et al. 2014). Because the measured uptake equals a significant portion of their carbon demand and nitrogen excretion of the corals, this mechanism can be important when particulate food is scarce.

4. Field growth and reproductive studies

Growth, reproduction and recruitment of cold-water corals have long been enigmatic, probably because this involves long-term sampling. Continued efforts have led to growing insight into these important facets. Consecutive sampling of 4 principal reef building cold-water corals from Brazil by Pires et al. (2014) shows that some species are continuous and others periodic spawners. The first category comprises *Enallopsammia rostrata* and *M. oculata*. The latter category includes *L. pertusa,* which has a different spawning period off Brazil than that has been found for this species in the NE Atlantic and Gulf of Mexico.

Budding and new polyp growth rates of *L. pertusa* and *M. oculata* were studied in aquaria and in-situ in a Mediterranean canyon by Lartaud et al. (2014). The authors found differences in seasonal growth and budding patterns between the two species, which are attributed to a higher sensitivity of *M. oculata* to the variability of food supply in the Lacaze-Duthiers canyon resulting from periodic cascading events.

A long-term study on distribution and population dynamics of *Paramuricea* species in the Gulf of Mexico by Doughty et al. (2014) shows that mortality rates decreased with size (age), and that recruitment rates were highly variable at the different sites and times. Because *Paramuricea* species in the Gulf of Mexico are growing slow, with low recruitment rates, these species are highly susceptible to anthropogenic changes such as induced by the Deepwater Horizon oil spill.

5. Genetics and taxonomy

Advances in sequencing and construction of databases with genetic codes are the driving forces for growing insight in the taxonomy and phylogeny of cold-water corals. A study of the mitochondrial genome in representatives of two octocoral families, Coralliidae and Paragorgiidae, led Figueroa and Baco (2014) to conclude that Coralliidae are a monophyletic branch of the Paragorgiidae. Within the six Coralliidae species that the authors investigated, three genera could be distinguished but more are to be expected as many reported species have not been sequenced yet and many specimens remain unidentified in collections.

Species diversity among Octocorallia from 250–2500 m depth in the Gulf of Mexico was assessed by Quattrini et al. (2014) by sequencing mitochondrial barcoding regions. The diversity pattern they found, with high values in shallow and deep parts, is opposite to what is normally found in the deep-sea. Moreover species distributions showed a depth zonation and a distinct biogeographical barrier between the West Florida slope and other parts of the study area. Octocorals also appear widespread and diverse off Brazil as shown by Arantes and Loiola (2014), who report new records for Brazil of five primnoid genera: *Calyptrophora, Candidella, Dasystenella*, *Narella* and *Thouarella*. For several species of these genera, the new records are a significant extension of their known distributions.

De Matos et al. (2014) provide the first in situ description based on video surveys of an *Anthipatella subpinnata* garden in the Azores Archipelago, considerably extending the western-most boundary of distribution of the species in the NE Atlantic. The species exhibit a maximum density of 2.64 colonies m^{-2}, yielding a local population estimate of 50,500 colonies. Nuclear DNA analyses suggest that *A. subpinnata* from the Azores and the Mediterranean belongs to the same species.

6. Fish, fishery and cold-water corals

Assemblages dominated by cold-water corals for a long time were assumed to support high fish density and diversity, also because they have been the target of commercial trawling on, for instance, redfish but also by long-lining. New studies have attempted to quantify fish stocks and biomass, and relate these to cold-water coral cover. Standardized long-line fishing was used by Kutti et al. (2014) to compare catch rates of three principal fish species in and around areas with scattered cold-water coral reefs. They found a positive relation between catch rates of the fish and the presence of cold-water coral reefs. Also on smaller spatial scales, fish seem to be more abundant near cold-water corals and their variability increased as well. Despite these positive relations, the authors consider the importance of cold-water corals for Norwegian fisheries as a whole as marginal.

In a series of video-surveys across oceanic cold-water coral mounds off Ireland, Biber et al. (2014) found no significant relationship between overall fish abundance and estimates of coral cover. However, for individual species and sites positive relationships exist. A similar result was found when fish abundance and lengths were correlated with terrain variables which only explained small part of the variation. On local scale and with individual species more significant relationships were found. Scale is a crucial factor in resolving the fish/cold-water coral associations. Fishery still represents one of the major threats to cold-water corals. The potential of long-line fisheries to catch and destroy cold-water corals is demonstrated by Mytilineou et al. (2014). They analysed cold-water coral species collected with long-line fishing in the East Ionian Sea. Cold-water corals occurred in 72% of the long-line catches and consisted of 8 taxa, 4 of which were new records for the area. Small hooks in particular collected entire live colonies of black corals.

7. Habitats

Fauna inventories for impact or other purpose studies are time-consuming and costly. Alternative approaches consist of trying to relate fauna with habitats, substrate or terrain type and use this relationship to make more extensive predictions of fauna distribution. In search of factors explaining the local distribution of cold-water corals and associated mega-fauna on a seamount near Hawaii, Long and Baco (2014) used a set of terrain variables to establish the link with the faunal assemblages. Despite the relatively narrow depth range of the observations, six distinct assemblages were found with the factor depth having the strongest explanatory power for their distribution. Relief, rugosity and slope were also significant.

By using a combination of multibeam and ROV observations of a submarine bank in British Columbia to map substrates and gorgonian-coral and sponge-dominated biotopes, Neves et al. (2014) were able to show a strong correspondence between the two types of maps. This result allows substrate types to function as a surrogate for helping to map biotope distributions, providing a rapid and extensive coverage of the area.

8. Proxies

Deep-sea corals offer a promising archive of past oceanic environments given their global distribution. Robinson et al. (2014) provide a review of a range of successful and promising approaches and highlights areas where future research most likely will provide new insights into important aspects such as biomineralisation, paleo-oceanography and distribution of past coral populations. Dating of historic coral populations in the Atlantic, the Southern Ocean and the Pacific identifies climate and environmental changes as the most dominant controls on coral populations over millennial and orbital scales.

The way in which samples are preserved can have a major influence on their geochemistry as shown by Strzepek et al. (2014). A Bamboo coral was preserved in ethanol and seawater to mimic the first stages of fossilisation and dry preserved samples were used as control. Main differences were observed in the Ba/Ca ratios, which appear to be significantly different after storage in ethanol. This can be linked to decomposition or contamination with organics.

Komugabe et al. (2014) present a new method to reconstruct long-term high-resolution sea surface reservoir ages based on the analyses of the organic skeleton of deep-sea black corals from the Norfolk Ridge (North Tasman Sea). Their results show that these corals grow extremely slow. The reservoir age obtained from corals from this region from the period between 1790 and 1900 AD was 330 years, followed by a steep decrease of about 70 years to 1950 AD, indicating an increase in surface water ventilation of water masses in this region. Primnoid coral skeletal microgeochemistry probably records temporal changes in both temperature and primary productivity. Enhanced primary productivity off the coast of northern British Columbia and Washington State was deduced from growth rates, which were more than 4 times higher than growth rates measured in the NW Atlantic (Aranha et al. 2014). Seasonal and interannual variability in primary productivity may affect skeletal growth rates, as is expressed by Mg/Ca and Sr/Ca ratios, which are related to seasonal changes in precipitation efficiency, which is in turn related to variations in primary productivity.

9. The geological record

Cold-water coral ecosystems can occur in wide variety of forms, from single colonies and patches to mature reef and mound structures. In general cold-water coral reefs and mounds have been observed in areas where strong bottom currents prevail. In current-swept (mainly erosional) areas, high production of skeletal debris by cold-water corals and sediment baffling by the cold-water coral framework results in local accumulation of carbonate sediment. Therefore cores from cold-water coral reefs and mounds may contain high-resolution records of climate change and deep ocean circulation at depths where in general no sedimentation occurs.

Raddatz et al. (2014) studied cores from IODP expedition 307, which made it for the first time possible to investigate the entire body of a cold-water coral mound. Paleo-oceanographic reconstructions reveal that cold-water coral growth in the Porcupine Seabight is mainly related to specific oceanographic conditions. Three mound growth phases were recognised. A steady mound growth between 3 and 2.1 Ma is related to enhanced sea-surface productivity and the stratification between ENAW and MOW waters that caused enhanced nutrient supply at intermediate water levels. Due to reduced export productivity the food supply decreased between 1.7 and 1 Ma. When the Pleistocene mound growth was restricted to interglacial periods, glacial mound growth was limited likely due to the fact that the boundary between MOW and ENAW was below the mound summits. The growth history of 5 solitary cold-water coral species was reconstructed by Margolin et al. (2014) to define the tolerances to varying environmental conditions of these corals with a particular focus on potential impact(s) of changing climate. Their study examined the spatial and temporal distribution of the different species, to reconstruct their growth history across a range of environmental regimes. More than 850 individual corals were dated. *Desmophyllum dianthus* populations show a clear variability in their occurrence over time depending on the latitudinal position within the Drake passage. Shifts across frontal zones in populations were likely linked to changes in surface productivity, subsurface oxygen concentrations and carbonate saturation states. Furthermore, differences in age and depth distributions of populations provided evidence that each coral genus has unique environmental requirements to sustain its population.

Post-glacial reef growth was observed in pistoncores from the Lopphavet reef, northern Norway (Stalder et al. 2014). The base of the cores was dated at around 10,600 years, revealing the transition from a proximal glacier environment to a cold-water coral ecosystem. Benthic foraminiferal assemblages in the cores were studied to characterise sedimentary facies. The diversity of benthic foraminifera increases in intervals with a high abundance of cold-water coral framework. Five clusters of Foraminifera were identified, which relate to different ecological settings like fluctuations of sea-ice cover, influence of different water masses and nutrient rich and high current settings. This is the first study indicating that ostracod assemblages might also be used as a tool to characterise sedimentary facies in cold-water coral reefs. Smeulders et al. (2014) also identified different mound substrates, like off-mound settings, hardgrounds, coral debris and substrates characterised by a variable density of living framework, using benthic foraminiferal assemblages from surface sediment samples. The benthic foraminifera along a transect from an off mound setting to on mound setting with high coral density appear to represent a gradient of decreasing current intensity and availability of suspended food particles and increasing availability of organic matter associated with the finer grained material trapped between the coral framework.

Douarin et al. (2014) present a model of cold-water coral reef build-up from the Mingulay reef (Outer Hebrides), which includes shifts in biodiversity, environmental processes and the sedimentary regime. The model is based on the study of two vibrocores, which show alternations of distinct reef facies. These facies occurred in a systematic order within the cores, suggesting cyclic depositional environments that drive a rapid cycle of reef growth, disturbance and recovery. Van der Land et al. (2014) reveal that the influx and types of material transported to cold-water coral mounds may have a direct impact on the carbonate mound accumulation rate and on post-depositional processes. Mound development rates and sediment composition of mounds at the SW Rockall Trough margin and the Galway mound in the Porcupine Seabight were investigated and compared. Mound accumulation rates on the Galway mound are likely higher due to a higher influx of hemi-pelagic non-carbonate sediments. In both mound areas mound growth was continuous for the last 11,000 years, before this period several hiatuses and unconformities are present. The most recent unconformity can be correlated across multiple mounds and mound areas at the Irish margin. On the SW Rockall Trough margin unconformities are linked to post-depositional aragonite dissolution and lithification, while at Galway mound these processes are absent.

The relation between coral framework growth and its infilling by hemipelagic sediment was studied by Eisele et al. (2014), using 14C datings of planktonic Foraminifera and U-series dates obtained from *L. pertusa* from the same core depth intervals. The coral ages display no depositional trend, while the 14C dates of the matrix provide an even narrower time window, which is interpreted as a deposit of a mass-wasting event. This event has resulted in an averaging of the foraminifera ages and gives randomly distributed coral ages. For the first time mass wasting is proposed to be a substantial process of mound propagation, transporting material from the top of the mounds to the flanks.

Lo Iacono et al. (2014) recognised up to 103 buried cold-water coral mounds between 299 and 590 m water depth in the West Mellila mound field in the Mediterranean Sea. Seismic data suggest that these mounds grew throughout the early Pleistocene – Holocene, and that settling started on erosive unconformities and mass movement deposits. Likely, these mounds suffered a drastic change at the last glacial–interglacial transition, whereby the mounds were progressively buried due to increasing depositional rates.

10. Outlook

As shown above by these highlights, considerable progress has been made in many aspects related to cold-water coral biology, geology and geochemistry in between the 4th and 5th ISDSC. Work in many of the fields outlined above is progressing after ISDSC 5, holding promises for a successful 6th symposium. We expect to see that rapid developments in molecular techniques will provide new insights into the taxonomy and phylogeny of corals and organisms associated with cold-water corals (e.g. Galkiewicz et al., 2012; Kellogg et al., 2012; Schottner et al., 2012), as well as in the connectivity of populations (Dahl et al., 2012; Coykendall and Morrison, 2013). Impacts of ocean acidification on cold-water coral communities will also be subject of further evaluations given the results presented at the ISCDS 5 and published by Maier et al. (2013a,b). Continued expansion of hydrocarbon exploration to deeper waters in addition to plans for extraction of mineral ores in the Deep-Sea require more insight into effects of, for instance, suspended solids on corals and cold-water coral communities. Progress in this field was recently published by Allers et al. (2013) and Larsson et al. (2013). Hand in hand with seafloor mapping for commercial exploration and other purposes new occurrences of cold-water coral communities are being reported e.g. (Cairns and Polonio, 2013), giving new fuel for improved predictive distribution models (Ross and Howell, 2013). Although such models become more advanced, and key factors for large-scale cold-water coral distribution become more transparent, there is still an incomplete understanding of the mechanisms determining the exact occurrence and prevalence of cold-water corals. One of the most important environmental factors influencing cold-water coral growth apparently is the availability of food. A study on cores taken from a cold-water coral mound in the Mediterranean Sea shows that prolific coral growth was related to periods of enhanced surface productivity (Fink et al., 2013). Similar findings were reported by Thierens et al. (2013) from the Porcupine Seabight. However, so far a proxy to determine primary productivity from paleo-records has not yet been established.

For better understanding and further development of generalised concepts, more information is required on processes such as coral recruitment and biotic interactions within cold-water coral communities, and the interplay between local hydrography and food supply. To tackle these important questions, which involve aspects of biology, physics, and chemistry, integrated studies are required with close multi-and inter-disciplinary collaboration, and we here would like to plea for (inter)national funding of such initiatives.

ISDSC 5 was supported by many sponsors, but here we wish to express our special gratitude to the Netherlands Science Organisation (NWO) and the Royal Netherlands Institute for Sea Research (NIOZ) for their generous support. The guest editors also express their sincere gratitude to all reviewers for their sometimes painstaking efforts, and to the Editor in Chief of Deep-Sea Research John Milliman for his input and efforts to help us in maintaining as fast handling of the manuscripts as possible. Furthermore, we thank all authors who have contributed to this volume.

References

Allers, E., Abed, R.M.M., Wehrmann, L.M., Wang, T., Larsson, A.I., Purser, A., de Beer, D., 2013. Resistance of Lophelia pertusa to coverage by sediment and petroleum drill cuttings. Marine Pollution Bulletin 74, 132–140.

Aranha, R., Edinger, E., Layne, G., Piercey, G., 2014. Growth rate variation and potential paleoceanographic proxies in Primnoa pacifica: Insights from high-resolution trace element microanalysis. Deep Sea Research Part II: Topical Studies in Oceanography 99, 213–226.

Arantes, R.C.M., Loiola, L.L., 2014. New records of Primnoidae (Cnidaria: Octocorallia) in Brazilian deep waters. Deep Sea Research Part II: Topical Studies in Oceanography 99, 103–112.

Biber, M.F., Duineveld, G.C.A., Lavaleye, M.S.S., Davies, A.J., Bergman, M.J.N., van den Beld, I.M.J., 2014. Investigating the association of fish abundance and biomass with cold-water corals in the deep Northeast Atlantic Ocean using a generalised linear modelling approach. Deep Sea Research Part II: Topical Studies in Oceanography 99, 134–145.

Cairns, S.D., Polonio, V., 2013. New records of deep-water Scleractinia off Argentina and the Falkland Islands. Zootaxa 3691, 58–86.

Campbell, J.S., Simms, J.M., 2009. Status report on coral and sponge conservation in Canada. Fisheries and Oceans Canada: vii+, 87.

Coykendall, D.K., Morrison, C.L., 2013. Polymorphic microsatellite markers developed from 454 pyro-sequencing in the cold water coral-associated squat lobster species, Eumunida picta (Chirostylidae: Eumunididae). Conservation Genetics Resources 5, 495–498.

Dahl, M.P., Pereyra, R.T., Lundalv, T., Andre, C., 2012. Fine-scale spatial genetic structure and clonal distribution of the cold-water coral *Lophelia pertusa*. Coral Reefs 31, 1135–1148.

de Matos, V., Gomes-Pereira, J.N., Tempera, F., Ribeiro, P.A., Braga-Henriques, A., Porteiro, F., 2014. First record of Antipathella subpinnata (Anthozoa, Antipatharia) in the Azores (NE Atlantic), with description of the first monotypic garden for this species. Deep Sea Research Part II: Topical Studies in Oceanography 99, 113–121.

Doughty, C.L., Quattrini, A.M., Cordes, E.E., 2014. Insights into the population dynamics of the deep-sea coral genus Paramuricea in the Gulf of Mexico. Deep Sea Research Part II: Topical Studies in Oceanography 99, 71–82.

Douarin, M., Sinclair, D.J., Elliot, M., Henry, L.-A., Long, D., Mitchison, F., Roberts, J. M., 2014. Changes in fossil assemblage in sediment cores from Mingulay Reef Complex (NE Atlantic): Implications for coral reef build-up. Deep Sea Research Part II: Topical Studies in Oceanography 99, 286–296.

Eisele, M., Frank, N., Wienberg, C., Titschack, J., Mienis, F., Beuck, L., Tisnerat-Laborde, N., Hebbeln, D., 2014. Sedimentation patterns on a cold-water coral mound off Mauritania. Deep Sea Research Part II: Topical Studies in Oceanography 99, 307–315.

Figueroa, D.F., Baco, A.R., 2014. Complete mitochondrial genomes elucidate phylogenetic relationships of the deep-sea octocoral families Coralliidae and Paragorgiidae. Deep Sea Research Part II: Topical Studies in Oceanography 99, 83–91.

Fink, H.G., Wienberg, C., De Pol-Holz, R., Wintersteller, P., Hebbeln, D., 2013. Cold-water coral growth in the Alboran Sea related to high productivity during the Late Pleistocene and Holocene. Marine Geology 339, 71–82.

Flögel, S., Dullo, W.C., Pfannkuche, O., Kiriakoulakis, K., Rüggeberg, A., 2014. Geochemical and physical constraints for the occurrence of living cold-water corals. Deep Sea Research Part II: Topical Studies in Oceanography 99, 19–26.

Galkiewicz, J.P., Stellick, S.H., Gray, M.A., Kellogg, C.A., 2012. Cultured fungal associates from the Deep-Sea coral *Lophelia pertusa*. Deep-Sea Research Part I – Oceanographic Research Papers 67, 12–20.

George, R.Y., Cairns, S.D., 2007. Introduction. Bulletin of Marine Science 81, 309–310.

Gori, A., Grover, R., Orejas, C., Sikorski, S., Ferrier-Pagès, C., 2014. Uptake of dissolved free amino acids by four cold-water coral species from the Mediterranean Sea. Deep Sea Research Part II: Topical Studies in Oceanography 99, 42–50.

Hennige, S.J., Wicks, L.C., Kamenos, N.A., Bakker, D.C.E., Findlay, H.S., Dumousseaud, C., Roberts, J.M., 2014. Short-term metabolic and growth responses of the cold-water coral Lophelia pertusa to ocean acidification. Deep Sea Research Part II: Topical Studies in Oceanography 99, 27–35.

Kellogg, C.A., Piceno, Y.M., Tom, L.M., DeSantis, T.Z., Zawada, D.G., Andersen, G.L., 2012. PhyloChip (TM) microarray comparison of sampling methods used for coral microbial ecology. Journal of Microbiological Methods 88, 103–109.

Komugabe, A.F., Fallon, S.J., Thresher, R.E., Eggins, S.M., 2014. Modern Tasman Sea surface reservoir ages from deep-sea black corals. Deep Sea Research Part II: Topical Studies in Oceanography 99, 207–212.

Kutti, T., Bergstad, O.A., Fosså, J.H., Helle, K., 2014. Cold-water coral mounds and sponge-beds as habitats for demersal fish on the Norwegian shelf. Deep Sea Research Part II: Topical Studies in Oceanography 99, 122–133.

Larsson, A.I., van Oevelen, D., Purser, A., Thomsen, L., 2013. Tolerance to long-term exposure of suspended benthic sediments and drill cuttings in the cold-water coral *Lophelia pertusa*. Marine Pollution Bulletin 70, 176–188.

Lartaud, F., Pareige, S., de Rafelis, M., Feuillassier, L., Bideau, M., Peru, E., De la Vega, E., Nedoncelle, K., Romans, P., Le Bris, N., 2014. Temporal changes in the growth of two Mediterranean cold-water coral species, in situ and in aquaria. Deep Sea Research Part II: Topical Studies in Oceanography 99, 64–70.

Lo Iacono, C., Gràcia, E., Ranero, C.R., Emelianov, M., Huvenne, V.A.I., Bartolomé, R., Booth-Rea, G., Prades, J., 2014. The West Melilla cold water coral mounds, Eastern Alboran Sea: Morphological characterization and environmental context. Deep Sea Research Part II: Topical Studies in Oceanography 99, 316–326.

Long, D.J., Baco, A.R., 2014. Rapid change with depth in megabenthic structure-forming communities of the Makapu'u deep-sea coral bed. Deep Sea Research Part II: Topical Studies in Oceanography 99, 158–168.

Maier, C., Bils, F., Weinbauer, M.G., Watremez, P., Peck, M.A., Gattuso, J.P., 2013a. Respiration of Mediterranean cold-water corals is not affected by ocean acidification as projected for the end of the century. Biogeosciences 10, 5671–5680.

Maier, C., Schubert, A., Sanchez, M.M.B., Weinbauer, M.G., Watremez, P., Gattuso, J.P., 2013b. End of the century pCO(2) levels do not impact calcification in Mediterranean cold-water corals. PLoS One 8.

Margolin, A.R., Robinson, L.F., Burke, A., Waller, R.G., Scanlon, K.M., Roberts, M.L., Auro, M.E., vandeFlierdt, T., 2014. Temporal and spatial distributions of cold-water corals in the Drake Passage: Insights from the last 35,000 years. Deep Sea Research Part II: Topical Studies in Oceanography 99, 237–248.

Miller, K., Neil, H., Tracey, D., 2009. Recent advances in Deep-Sea coral science and emerging links to conservation and management of Deep-Sea ecosystems. Marine Ecology Progress Series 397, 1–5.

Mytilineou, C., Smith, C.J., Anastasopoulou, A., Papadopoulou, K.N., Christidis, G., Bekas, P., Kavadas, S., Dokos, J., 2014. New cold-water coral occurrences in the Eastern Ionian Sea: results from experimental long line fishing. Deep Sea Research Part II: Topical Studies in Oceanography 99, 146–157.

Naumann, M.S., Orejas, C., Ferrier-Pagès, C., 2014. Species-specific physiological response by the cold-water corals Lophelia pertusa and Madrepora oculata to variations within their natural temperature range. Deep Sea Research Part II: Topical Studies in Oceanography 99, 36–41.

National Oceanic and Atmospheric Administration, Coral Reef Conservation Program, 2010. NOAA Strategic Plan for Deep-Sea Coral and Sponge Ecosystems: Research, Management, and International Cooperation. Silver Spring, MD: NOAA Coral Reef Conservation Program. NOAA Technical Memorandum CRCP 11. 67 pp.

Neves, B.M., Du Preez, C., Edinger, E., 2014. Mapping coral and sponge habitats on a shelf-depth environment using multibeam sonar and ROV video observations: Learmonth Bank, northern British Columbia, Canada. Deep Sea Research Part II: Topical Studies in Oceanography 99, 169–183.

Pires, D.O., Silva, J.C., Bastos, N.D., 2014. Reproduction of deep-sea reef-building corals from the southwestern Atlantic. Deep Sea Research Part II: Topical Studies in Oceanography 99, 51–63.

Quattrini, A.M., Etnoyer, P.J., Doughty, C., English, L., Falco, R., Remon, N., Rittinghouse, M., Cordes, E.E., 2014. A phylogenetic approach to octocoral community structure in the deep Gulf of Mexico. Deep Sea Research Part II: Topical Studies in Oceanography 99, 92–102.

Raddatz, J., Rüggeberg, A., Liebetrau, V., Foubert, A., Hathorne, E.C., Fietzke, J., Eisenhauer, A., Dullo, W.-C., 2014. Environmental boundary conditions of cold-water coral mound growth over the last 3 million years in the Porcupine Seabight, Northeast Atlantic. Deep Sea Research Part II: Topical Studies in Oceanography 99, 227–236.

Robinson, L.F., Adkins, J.F., Frank, N., Gagnon, A.C., Prouty, N.G., Roark, B.E., Van de Flierdt, T., 2014. The geochemistry of deep-sea coral skeletons: A review of vital effects and applications for palaeoceanography. Deep Sea Research Part II: Topical Studies in Oceanography 99, 184–198.

Smeulders, G.G.B., Koho, K.A., de Stigter, H.C., Mienis, F., de Haas, H., van Weering, T. C.E., 2014. Cold-water coral habitats of Rockall and Porcupine Bank, NE Atlantic Ocean: Sedimentary facies and benthic foraminiferal assemblages. Deep Sea Research Part II: Topical Studies in Oceanography 99, 270–285.

Stalder, C., Spezzaferri, S., Rüggeberg, A., Pirkenseer, C., Gennari, G., 2014. Late Weichselian deglaciation and early Holocene development of a cold-water coral reef along the Lopphavet shelf (Northern Norway) recorded by benthic foraminifera and ostracoda. Deep Sea Research Part II: Topical Studies in Oceanography 99, 249–269.

Strzepek, K.M., Thresher, R.E., Revill, A.T., Smith, C.I., Komugabe, A.F., Fallon, S.F., 2014. Preservation effects on the isotopic and elemental composition of skeletal structures in the deep-sea bamboo coral Lepidisis spp. (Isididae). Deep Sea Research Part II: Topical Studies in Oceanography 99, 199–206.

Ross, R.E., Howell, K.L., 2013. Use of predictive habitat modelling to assess the distribution and extent of the current protection of 'listed' deep-sea habitats. Diversity and Distributions 19, 433–445.

Schottner, S., Wild, C., Hoffmann, F., Boetius, A., Ramette, A., 2012. Spatial scales of bacterial diversity in cold-water coral reef ecosystems. PLoS One 7.

Thierens, M., Browning, E., Pirlet, H., Loutre, M.F., Dorschel, B., Huvenne, V.A.I., Titschack, J., Colin, C., Foubert, A., Wheeler, A.J., 2013. Cold-water coral carbonate mounds as unique palaeo-archives: the Plio-Pleistocene Challenger Mound record (NE Atlantic). Quaternary Science Reviews 73, 14–30.

van der Land, C., Eisele, M., Mienis, F., de Haas, H., Hebbeln, D., Reijmer, J.J.G., van Weering, T.C.E., 2014. Carbonate mound development in contrasting settings on the Irish margin. Deep Sea Research Part II: Topical Studies in Oceanography 99, 297–306.

Vierod, A.D.T., Guinotte, J.M., Davies, A.J., 2014. Predicting the distribution of vulnerable marine ecosystems in the deep sea using presence-background models. Deep Sea Research Part II: Topical Studies in Oceanography 99, 6–18.

Guest Editors
Furu Mienis*, Gerard C.A. Duineveld, Marc S.S. Lavaleye,
Tjeerd C.E. van Weering
Royal Netherlands Institute for Sea Research, P.O. Box 59,
1790 AB Den Burg, The Netherlands
E-mail address: Furu.Mienis@nioz.nl (F. Mienis)

---

* Corresponding author. Tel.: +31 222369393; fax: +31 222319674.