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High spatial resolution Sea Surface Temperature data for the study of Marine Heat Waves in the souther North Sea

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Marine Heat Waves (MHWs) are defined as discrete periods of anomalously warm water temperature at a given location. MHWs can have a huge impact on marine ecosystems, already under stress because of the effects of a warming ocean under climate change and high anthropogenic pressure. This work will assess the spatio-temporal evolution of MHWs in the southern North Sea, with an emphasis on the 2022 events. Studying the impact of MHWs on coastal marine ecosystems is currently hampered by the resolution mismatch between traditional satellite data (typically 1 km spatial resolution for SST and CHL) and species habitat/substrate. In the southern North Sea, a multitude of shallow sandbanks, sand, mud and coarser sediment substrats are for instance present, offering a multitude of habitats to different species. With ocean dynamics, and hence water mass and temperature distribution being impacted by the presence of these sandbanks, fine spatial resolution data are required for accurate analysis of the consequences of MHWs and cold spells on the ecosystem. The Thermal InfraRed Sensor (TIRS) sensor onboard the Landsat constellation provides SST at a spatial resolution of 30 m with an accuracy of 0.1 to 0.2K, and can allow the study of the evolution of small-scale dynamics in coastal regions, including the development of MHWs. However, Landsat data have a very low revisit time (7-9 days), not optimal to study specific MHW events, which can evolve on a daily basis. This work will assess the synergy between Landsat data and daily, low-spatial resolution SST data to analyse the evolution of MHWs at coastal regions. DINEOF (Data Interpolating Empirical Orthogonal Functions) will be used to merge these tow data sources and provide high spatial and temporal resolution SST data. This work is a first attempt at linking MHW variability and their consequences on marine ecosystems at very fine spatio-temporal scales, and is part of the North-Heat project. We aim at providing key insights for our comprehension of MHWs in the southern North Sea, a region where marine ecosystems are already under high anthropogenic pressure.