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Environmental conditions controlling Cold-water corals occurrence in western Melilla (western Mediterranean) since the last deglaciation

M. Selvaggi[1,2], M. de la Fuente[1], C. Lo Iacono[3], N. Haghipour[4,5], A. Català[1], J. N. Pérez-Asensio[6], I. Cacho[1]

[1] GRC Geociències Marines, Departament de Dinàmica de la Terra i de l'Oceà, Universitat de Barcelona, Barcelona, SPAIN.
[2] Dipartimento di Scienze della Terra, Università di Roma la Sapienza, Roma, ITALY.
[3] Institut de Ciències del Mar (ICM-CSIC), Barcelona, SPAIN.
[4] Geological Institute, ETH Zürich, Zürich, SWITZERLAND.
[5] Laboratory for Ion Beam Physics, ETH Zürich, Zürich, SWITZERLAND.
[6] Departamento de Estratigrafía y Paleontología, Universidad de Granada, SPAIN.

Cold-water corals (CWCs) are widely scattered in the southern Alboran Sea (westernmost Mediterranean), specifically in the so-called East and West Melilla CWC mound provinces (EMCP, WMCP). In this study, we present hydrographical changes in West Melilla from the sediment core MD13-3451 (370 m water depth) across the last ~14.2 kyr BP, followed by an integrated assessment of the WMCP complex evolution. The detected temporal mound occurrence allowed the identification of CWCs development' patterns since the last deglaciation, and relate them to distinct palaeoceanographic changes that potentially influenced the local environment framework. The performed analyses include both sedimentary characteristics (i.e., grain-size records), and geochemical measurements in benthic foraminifera calcite, i.e., stable isotopes and trace elements, such Mg/Ca as a proxy for deep-water temperatures (DWTs). Furthermore, seawater $\delta^{18}O$ ($\delta^{18}O_{sw}$) and seawater $\delta^{18}O$ corrected for the ice volume signal ($\delta^{18}O_{w\text{-}ivc}$) have been estimated via paired analyses of Mg/Ca and $\delta^{18}O_{carbonate}$. The generated data suggest: i) CWCs develop well with relatively warm DWTs and high currents intensities, although these factors are here not considered to be determinant in their formation. This also account for the oxygen content, where major changes does not seem to affect CWCs development. ii) Major changes concerning the hydrographical conditions occurred during the Early Holocene, where a rapid freshening of the waters is detected. The presented results, when combined with available records from neighbor sites, permitted to observe that CWCs proliferation or decline is closely coupled to the reorganization of the whole Alboran Sea' water column structure. For instance, the Holocene decrease of CWCs growth occur simultaneously when intermediate water properties above ~400 m water depth became very distinctive from those below, suggesting a higher influence of isotopically lighter water masses. This point to the important role of Mediterranean Circulation in driving the development of coral mounds. Overall, our data provide a high-resolution record of the most recent hydrographic changes in the southern Alboran Sea, and also reflect the importance of integrating a wide range of environmental variables to better understand the complex interplay that controls CWCs development.