Geophysical Research Abstracts
Vol. 21, EGU2019-4982, 2019
EGU General Assembly 2019

Hydrographic properties of living cold-water coral reefs in the northern East Atlantic and the Gulf of Mexico

Wolf-Christian Dullo (1), Silke Glogowski (2), and Sascha Flögel ()

(1) GEOMAR, Paleooceanology, Wischhofstr. 1-3, 24148 Kiel, Germany (cdullo@geomar.de), (2) JADE Hochschule Oldenburg, Ofener Straße 16/19 D-26121 Oldenburg (silke.glogowski@jade-hs.de), (3) GEOMAR, Paleooceanology, Wischhofstr. 1-3, 24148 Kiel, Germany (sfloegel@geomar.de)

The hydrographic properties of bottom waters influencing living cold-water coral (CWC) reefs in the North Atlantic are discussed. Cold-water corals (CWCs) are sessile filter feeders and depend on hydrographic properties providing suspended, and ideally enriching nutrients as well as on the removal of resuspended sediments. Furthermore, living CWC reefs occur in a distinct density ($\sigma\Theta$) window as a result of ambient temperature and salinity properties. The development of a steep density gradient above living CWC reefs seems to be necessary to advect and accumulate nutrients. The density gradient is derived by calculating the difference in water mass density between 10 m intervals resulting in the term of $\Delta\sigma\Theta$10m. This density gradient seems to be indicative for living CWC reefs as soon as its value is >0.02 kg/m3. This parameter does not depend on the health status or size of the CWC structure and is valid for large CWC reef structures or just thin living CWC covers.

The investigated CWC structures on the southern North Atlantic margin such as Morocco and Mauretania, as well as those in the semi-closed basin of the Gulf of Mexico are composed of living CWC veneers or isolated smaller patches. There, the gradients are mainly driven by changes in temperature. In contrast, the living CWC reefs on the northern North Atlantic margin off Norway which form reef buildups, as well as in the Porcupine Seabight which form large scale biogenic frameworks, while those in the Bay of Biscay (St. Nazaire canyon) just exhibit patchy growth forms. At these sites, the density gradient is mainly driven by changes in salinity.

The calculated maximum density gradients of $\Delta\sigma\Theta$10m differ in their bathymetrical thickness right above the living CWC reefs. Healthy and pristine reef systems on the Norwegian margin exhibit a range of ~15 m maximum $\Delta\sigma\Theta$10m thickness, whereas, the poorly developed structures of Mauretania, Morocco and in the Gulf of Mexico show a thickness of ~50 m.

The development of density gradients favour nutrient accumulations. Thick, but less pronounced layers of maximum of $\Delta\sigma\Theta$10m release nutrients obviously more rapidly, while in thin, but pronounced layers of maximum of $\Delta\sigma\Theta$10m nutrients are more retained.