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OXYGENATION CHANGES IN THE MEXICAN PACIFIC BASED ON THE SEDIMENTARY RECORD OF BENTHIC FORAMINIFERA

Oxygen minimum zones (OMZ) are located below upwelling systems and are characterized by a dissolved oxygen (DO) concentration <0.5 ml L^{-1} [1, 2]. Dissolved oxygen in seawater is crucial in many biogeochemical processes. The formation of the modern OMZ in the Eastern North Pacific (ENP) is primarily due to a combination of two factors: (1) the high rate of dissolved oxygen consumption by remineralization of exported organic matter and (2) limited ventilation due to a slow ocean circulation [2-5].

Over the past decades, the scientific community has put considerable effort into understanding the past dynamics of the OMZ. The importance of reconstructing OMZ reoxygenation and deoxygenation events and mechanistically explaining their climatic causes is essential in light of the ocean's current and potential future responses to modern global warming [6].

Benthic foraminifera (BF) are considered sensitive biological tracers of temporal and spatial variations in OMZ intensity [7-15], since DO and the flux of organic matter are usually the main limiting factors of the assemblages of foraminifera in these areas [17]. From the adaptation of benthic foraminiferal assemblages (BFA), the levels of qualitative dissolved oxygen concentrations have been proposed as oxic (>1.5ml L^{-1}), suboxic (0.5 to <1.5ml L^{-1}) and dysoxic (<0.5 ml L^{-1}) [10-18].

The study of the BFA in the Southwestern margin of Baja California Sur (SW-BCS) is extremely scarce, so it is necessary to carry out a paleoecological analysis of the community of BF. With the aim of analyzing the relative abundances of BF, estimating the concentration of DO in the OMZ and comparing the trends of OD estimation with denitrification tracers obtained by [22] of the (SW-BCS). The sediment core MAGD-MC02, collected at 680 m depth, is 1200 years old.

The study area is located in the transition zone of the ENP where the equatorial, subarctic, tropical subsurface [19] and intermediate water masses of the North Pacific converge [20]. The current system in this transitional zone is characterized by the California Current that flows towards the equatorial zone, the North Equatorial Current with a west-northwest direction and the California Countercurrent that flows towards the North Pole. The California Current transports cold, less saline, oxygenated and nutrient-rich water from the subarctic water mass, while the California Countercurrent, which transports properties of the equatorial subsurface mass, is characterized by being warm, more saline and poor in oxygen (Fig. 1).

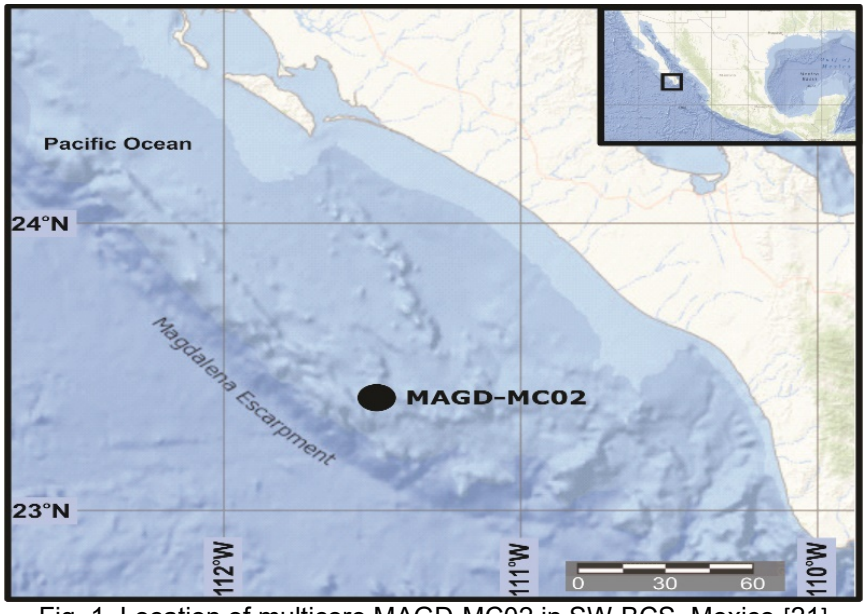

Fig. 1. Location of multicore MAGD-MC02 in SW-BCS, Mexico [21]

The correspondence analysis showed that the abundances of foraminifera are divided into two main groups (dysoxic [*B. subadvena*, *B. seminuda*, *B. exilis*] and suboxic [*B. argentea*, *U. peregrina, C. carinata, T. delicata*, *E. pseudobeyrichi*]). The concentration of DO was estimated by quantifying the percentages of

dysoxic, suboxic and oxic foraminifera. In the last 1200 years CE, the OMZ has maintained dysoxic. The $\delta^{15}N$ values of the organic matter (denoted a trend opposite to what was observed for the estimation of dissolved oxygen inferred from the abundance of the group of dysoxic species. The $\delta^{15}N$ values of the organic matter suggested that the water column showed a trend towards a decrease in denitrification i.e. increased oxygenation [23] of the water column, which contrasted with the opposite trend of the estimation of dissolved oxygen during the MWP. The $\delta^{15}N$ of the sedimentary record reflects a lower use of nitrates. While, the $\delta^{15}N$ values of the organic matter had a tendency of increasing from the LIA to the recent, consistent with the dysoxic conditions inferred from the BF. This suggests that the OMZ has maintained dysoxic conditions over the past 1200 years.

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