

Marine and lacustrine proxy calibration: preliminary results from CALIBRE project (Western Mediterranean Sea)

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Jimenez-Espejo Francisco J.[1]; Martin-Puertas Celia[2]; Valero-Garces Blas[3]; Martinez-Ruiz Francisca[4]; 坂本 竜彦 [5]; Mata Pilar[2]; Nieto Moreno Vanesa[4]; 飯島 耕一 [6]

Francisco J. Jimenez-Espejo[1]; Celia Martin-Puertas[2]; Blas Valero-Garces[3]; Francisca Martinez-Ruiz[4]; Tatsuhiko Sakamoto[5]; Pilar Mata[2]; Vanesa Nieto Moreno[4]; Koichi Iijima[6]

[1] 海洋研究開発機構 IFREE; [2] UCA; [3] IPE, CSIC; [4] IACT, CSIC-UGR; [5] IFREE, JAMSTEC; [6] 海洋研究開発機構、IFREE

[1] IFREE, JAMSTEC; [2] UCA; [3] IPE, CSIC; [4] IACT, CSIC-UGR; [5] IFREE, JAMSTEC; [6] IFREE, JAMSTEC

Present climatic models can hardly use geochemical and sedimentological proxy data because of the existing limited calibration. Quantitative information about climate parameters from geochemical data remains a major scientific challenge. In this regards, calibration of homogeneous long-term climate variability series, lake and marine sedimentary records from the Western Mediterranean is being developed by the CALIBRE project. Within the frame of this project, this work focuses on correlation between lake and marine sediments which would potentially help to calibrate proxies in both environments.

The major difficulties found when comparing marine and lake records are related to time constrain, sample resolution, age models, proxy interpretation and environment sensibility. In order to characterize present climatic change and to avoid variations related to tectonic/eustatic changes, this study has been constrained for the last 4.0 kyr cal BP. The lacustrine record (Zonar Lake, South Iberia) is composed of laminated sediments allowing, a sampling resolution lower than centennial scale. The marine record it is located in the Westernmost Mediterranean Sea (Core TTR-300G), with a sample resolution around 0.3 Ky. Respective sample resolutions make both exceptional records for paleoclimate reconstruction. A high resolution multiproxy approach has been developed in both records. Age models are based in ^{14}C , and ^{137}Cs dating and varve counting (lake sediments).

The different depositional conditions preclude the use of a single common proxy, which complicates comparisons. Furthermore, the different sensibility of each proxy and the delay in climate responses may add further difficulties to such comparisons. In order to solve these problems, detailed mineralogical/geochemical profiles, and also data from sediments traps, have been established aiming to relate geochemical ratios to different sources. Thus, in the marine realm, Zr/Al ratio has been related with heavy minerals content and aeolian input from North Africa and Mg/Al ratio appears to be related with chlorite content and in turn to fluvial/detrital input. In the lake sediments, the presence of laminations informs about seasonal changes. On the other hand, the presence of gypsum and the Si/Al ratio have been related with evaporitic processes and detrital/runoff input variations, respectively. These and other proxies have been analysed statistically in a semi-random approach where geochemical data are converted in adimensional environmental and climate signals and compared in wave to wave trends.