



Late Neogene marine osmium isotopic records of the Mediterranean and Atlantic sediments

Junichiro Kuroda (1,2), Francisco J. Jimenez-Espejo (2), Tatsuo Nozaki (2), Rocco Gennari (3,4), Stefano Lugli (5), Vinicio Manzi (3), Marco Roveri (3), Rachel Flecker (6), Francisco J. Sierro (7), Toshihiro Yoshimura (1,2), Katsuhiko Suzuki (2), and Naohiko Ohkouchi (2)

(1) University of Tokyo, Atmosphere and Ocean Research Institute, Kashiwa, Japan (kuroda@aori.u-tokyo.ac.jp), (2) Japan Agency for Marine-Earth Science and Technology, Yokosuka, Japan, (3) University of Parma, Parma, Italy, (4) University of Turin, Turin, Italy, (5) University of Modena and Reggio Emilia, (6) University of Bristol, Bristol, UK, (7) University of Salamanca, Salamanca, Spain

The Mediterranean Sea experienced a salinity crisis at Messinian, the end of Miocene (5.97 to 5.33 Ma) that resulted in the precipitation of thick evaporites (i.e., Mediterranean salt giant) in deep and marginal basins [1]. We report osmium isotopic records ($^{187}\text{Os}/^{188}\text{Os}$) of sediments from DSDP and ODP sites in the Mediterranean Sea: the Balearic Sea (Site 372), the Tyrrhenian Sea (Site 654), the Ionian Basin (Site 374) and the Florence Rise (Sites 375-376), as well as the Gulf of Cadiz, North Atlantic (IODP Site U1387) [2]. Pliocene-Pleistocene sediments from all sites show isotopic values close to that of the coeval ocean water, indicating that the Mediterranean was connected to the North Atlantic. Messinian evaporitic sediments deposited during the salinity crisis, however, have values significantly lower than the coeval ocean water value. This offset is attributed to a limited inflow from the North Atlantic during the salinity crisis. The unradiogenic osmium is likely to be supplied by weathering of ultramafic rocks (ophiolites) cropping out in the Mediterranean drainage area. A box model shows that the Atlantic-Mediterranean exchange rate dropped to about one twentieth. Osmium isotopic ratios of the pre-evaporite sediments in the western Mediterranean are nearly identical to that of the coeval ocean water. In contrast, equivalent sediments from the Florence Rise have significantly lower isotopic values. This offset could be attributed either to limited water exchange between eastern and western Mediterranean, or to a local effect such as exhumation of the Troodos ophiolite in Cyprus.

[1] Roveri et al. (2014) *Marine Geology* 352, 25–58.

[2] Kuroda et al. (2016) *Paleoceanography* 31, 148-166.