Miocene to Pleistocene osmium isotopic records of the Mediterranean and Atlantic sediments

J. KURODA[1]*, F.J. JIMÉNEZ-ESPEJO[1], T. NOZAKI[1], R. GENNARI[2], S. LUGLI[3], V. MANZI[2], M. ROVERI[2], R. FLECKER[4], F.J. SIERRO[5], T. YOSHIMURA[1,6], K. SUZUKI[1], N. OHKOUCHI[1]

[1] Japan Agency for Marine-Earth Science and Technology (JAMSTEC), 2-15 Natsushima-cho, Yokosuka 237-0061, Japan (*correspondence: kurodaj@jamstec.go.jp)
[2] Università di Parma, Parma, Italy
[3] Università degli Studi di Modena e Reggio Emilia, Modena, Italy
[4] University of Bristol, Bristol, UK
[5] University of Salamanca, Salamanca, Spain
[6] University of Tokyo, Kashiwa, Japan

In the late Messinian (5.97 to 5.33 Ma) the Mediterranean Sea experienced a salinity crisis and thick sequences of evaporites precipitated across the deep and marginal basins [1]. In this study we report Os isotopic records from DSDP and ODP cores in the Mediterranean: 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 IODP Site U1387 in Gulf of Cadiz, North Atlantic [2]. Pliocene-Pleistocene sediments at all sites show $^{187}Os/^{188}Os$ values close to that of the coeval ocean water, indicating that the Mediterranean was connected to the North Atlantic. Evaporitic sediments deposited during the late Miocene however, have $^{187}Os/^{188}Os$ values significantly lower than the coeval ocean water. The offset of the Mediterranean evaporite $^{187}Os/^{188}Os$ is attributed to limited exchange with the North Atlantic during the Messinian salinity crisis. The source of unradiogenic Os is likely to be weathering of ultramafic rocks (ophiolites) cropping out in the Mediterranean's drainage basins. Based on a box model we estimated the amount of unradiogenic Os and the Atlantic-Mediterranean exchange rate to explain this offset. Os isotopic ratios of the pre-evaporite sediments in the western Mediterranean are almost identical to that of the coeval ocean water. In contrast, equivalent sediments from the Florence Rise have significantly lower $^{187}Os/^{188}Os$ values. The offset in the Os isotopic ratio on the Florence Rise is attributed either to limited water exchange between eastern and western Mediterranean, or to local effects associated with exhumation of the Troodos ophiolites (Cyprus).

[1] Roveri *et al*. (2014) *Marine Geology* **352**, 25–58.
[2] Kuroda *et al*. (2016) *Paleoceanography* **31**, 148-166.