Authigenic 10Be/9Be Isotope Ratios as a tracer of Sediment Transport Processes: A Case Study from The Strait of Sicily

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Abstract

Cosmogenic meteoric 10Be has been used as a tracer, yet its behaviour in deep marine sedimentary settings, particularly where various depositional processes occur, remains poorly understood. The authigenic 10Be/9Be ratio, which reflects the relative contributions of atmospherically derived 10Be and 9Be produced by rock weathering, potentially promising for resolving sediment provenance and transport dynamics in a complex depositional environment. This study presents new authigenic 10Be/9Be data from the the MS-75 sediment core, an 842.5 cm piston core, was retrieved from the Gela Basin upper slope on the Strait of Sicily, a critical Mediterranean gateway where Modified Atlantic Water and Levantine Intermediate Water are topographically confined. This site records a post-Last Glacial Maximum succession of contourite and turbidite deposits, characterized by Gauchery et al. (2021). This existing framework comprises grain size analysis, seismic stratigraphy, and XRF element profiles, provide robust independent constraints against which the 10Be/9Be signal will be evaluated. In addition, ^{13}Nd/^{1}Nd isotope ratios are used as an independent water mass and provenance tracer to cross-validate the ^{1}Be/Be data. In conclusion, these paired 143Nd/144Nd and 10Be/9Be data from MS-75 will allow us to identify the effect of changing water masses and provenance on the authigenic Be signal, and to test whether the 10Be/9Be ratio can differentiate contourite from turbidite layers in this mixed depositional system. The study was supported by the Scientific Grant Agency of the Ministry of Education, Science, Research and Sport of the Slovak Republic and the Slovak Academy of Sciences (VEGA) under the contract No.1/0215/26.

Keywords: Beryllium isotopes, cosmogenic nuclides, turbidite, Mediterranean paleoceanography, contourite

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