The $^{10}Be/^{9}Be$ ratio in Neogene marine sediments: a proxy of the Earth's magnetic field or a history of climate, sedimentation and ocean circulation?

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Prominent concentration peaks of cosmogenic ^{10}Be in sediments are usually interpreted as the geochemical signature of major geomagnetic reversals and events.
The approach is commonly employed in the case of ice cores, which do not preserve an inherent paleomagnetic signal, and sedimentary successions with poor magnetic properties. However, even in the case of glaciers and loess deposits, where the ^{10}Be signal generates from the instantaneous "freezing" of the atmospheric signal, the ^{10}Be flux and its preservation potential are known to respond to climatic and environmental factors, such as the turbidity and composition of the atmosphere and the local precipitation rates. When dealing with marine terrigenous successions, one must add further levels of uncertainty in order to account for a much more complex sedimentary system, which may hamper both the creation and preservation of a genuine ^{10}Be record. In this scenario, the effects of climate, sea level, sedimentary yield and ocean circulation patterns may affect, or even overshadow, the primary ^{10}Be signal. This entanglement can only be solved by framing the local ^{10}Be record within a sound chronostratigraphic background and comparing it to a number of independent proxies of sea level and climate such as physical stratigraphy, $\delta^{18}O$ and pollen.

We aim at providing a statistical validation to the information recently reconstructed across the Matuyama-Brunhes magnetic reversal (~780 ka) in the Crotone Basin (Calabria, Southern Italy) that, by comparison to the local $\delta^{18}O$ and pollen records, points to a sharp climatic and sedimentary control on ^{10}Be concentrations. In particular, the ^{10}Be concentration curve tracks the major changes in both sediment size and accumulation rates (which also depend on the climate conditions on mainland) and sea level, implying that the local ^{10}Be record may be the response to a complex interplay between the atmosphere and ocean systems. If validated, this scenario would demote the potential of ^{10}Be as a proxy of geomagnetic reversals.

This study will mainly involve field and lab work and geochemical analyses to be performed at the AMS facility, IEECAS, of Xi'an (China).

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