Geophysical Research Abstracts
Vol. 20, EGU2018-6688-1, 2018
EGU General Assembly 2018

Combined geochemical and isotopic analyses refine the tephrostratigraphic correlations on marker tephra layers from southern Italy lacustrine and marine sequences.

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Trace element abundance and isotopic composition determinations of distal tephra levels is not currently a routine analysis, so the main objective of this work was to obtain full geochemical and isotopic data on well-known regional markers, aiming at enriching the comparison data-base for future tephrostratigraphic investigations. We chose to work on distal tephra embedded in the San Gregorio Magno (SGM) lacustrine sequence (Campania, Southern Italy) because its high sedimentation rates, should make it easier to avoid the problems linked to the mixing of volcanic fragments related to different explosive events occurred very close in time. Where necessary, due to the lack of data on comparison tephra from literature, marine distal equivalent were also fully characterized. The main tephra layers extracted from both sequences, already characterized as to major element composition (Munno and Petrosino, 2007; Morabito et al.,2014; Petrosino et al., 2016), were analyzed through LA-ICP-MS to evaluate the abundance of trace elements. The isotopic composition has been measured on a hand-picked glass amounts and when possible on minerals. The results of these analyses made it possible to refine some correlations previously hypothesized, as that of sample SGM16, which definitely results the distal counterpart of Monte Epomeo eruption of Ischia Island, aged ca. 55 ka, and well repeats the composition of the widespread tephra marker Y-7. The bimodal composition of layer SGM11 is confirmed by the trace element abundance, and only one of the two compositions (Na2O/K2O ca. 0.45) fully corresponds to that of marker X-5 (ca. 105 ka), here firstly fully characterized in a marine sequence from a Tyrrhenian sea core. The glass fragments displaying a different chemical composition (Na2O/K2O ca. 0.9) are probably the product of the reworking of the slightly older tephra SGM10, the distal counterpart of marker X-6 (ca. 109 ka). Few tephra layers are deeply altered, as evidenced by the high amount of clay minerals found by XRD analyses and for such a reason the results of 87Sr/86Sr and 143Nd/144Nd isotopic analysis on their glasses were not reliable. To bypass the problems linked to secondary alteration, where possible, we analyzed feldspar crystals, less prone than glass to chemical alteration, and obtained better results. In conclusion, the data produced in this work highlight that the full geochemical characterization of tephra levels, integrated by isotopic data, makes it possible to identify their source and, in most cases, to correlate them to a specific well known eruptive event.

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