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Refining and augmenting Central Mediterranean Tephrochronologies using visible and non-visible distal ash layers from the Upper Pleistocene

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The development of long and well dated regional records of environmental change is essential if we are to understand the long term working of the environmental system. The application of volcanic ash layers as time-parallel markers is developing as a tool to link archaeological and geological sequences.

This presentation will make a key contribution to the PROMESS 1 European Project – PROfiles across Mediterranean Sedimentary System (http://promess1.pangaea.de/). The project aims to understand the sediment systems of Continental Margins by investigating changes in sea level, oceanographic regime and sediment flux. The precise and robust chronological control that is required to address these issues is frequently unavailable using traditional chronological techniques. Tephrochronology offers the potential of isochronous marker horizons that can provide independent age estimates and be used to correlate terrestrial and marine sequences over several glacial-interglacial cycles.

Here we will summarise new tephrochronological results for the PROMESS-1 marine core PRAD 1-2, obtained from a water depth of 184m in the central Adriatic. The recovered sediment sequence is 71m long, spans at least 3 glacial-interglacial cycles and analysis of foraminiferal assemblages suggests the sequence extends back to Marine Isotope Stage 10.

Current Central Mediterranean tephrochronology schemes are largely or entirely based on analysis of visible tephra layers. Density separation extraction techniques have been developed (Turney 1998; Blockley et al, 2005) which demonstrate that many more non-visible tephra layers exist than have previously been recognised in Mediterranean sequences, greatly enhancing the potential of tephrochronology as an independent dating method.

A detailed Adriatic tephrochronology for the last 100kyr will be presented which indicates a more complicated eruptive history than visible tephra layers have previously suggested. 24 discrete and undisturbed non-visible ash layers are recognised in this time period and a number of these can already be correlated to equivalent proximal volcanic layers that have be dated by high-precision 40Ar/39Ar dating. For example the Campanian Ignimbrite eruption which has undergone an extensive re-dating and has an unusually precise age of 39,280 $\pm$110 cal B.P (de Vivo et al, 2001). Work to produce an independent age-model for the whole sequence using 40Ar/39Ar dates from visible tephra layers in the core will also be presented.

The challenges of undertaking tephrochronology in marine environments where there are multiple eruptions from the same volcanic source will be highlighted and finally the potential of this long continuous sequence to become a regional tephra stratotype will be demonstrated.

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