Pleistocene tephrostratigraphy and palaeoclimatology in the central Mediterranean region: ongoing research in Fucino Basin (central Apennines, Italy)

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Résumé

Palaeoclimatic records spanning beyond the radiocarbon range generally derive their chronologies from orbital tuning strategies. These chronologies can introduce a priori assumptions that are difficult to test and, possibly, circular arguments in palaeoclimatic reconstructions.
We elaborate two high-resolution, multi-proxy and tephrochronologically-constrained records (F1-F3 and F4-F5) of past environmental and climatic changes in the central Mediterranean region. We perform geochemical (X-ray fluorescence scanning, carbon, nitrogen and sulphur elemental analysis through combustion), isotopic (C and O stable isotope mass spectrometry on bulk carbonates and organic matter), mineralogical (X-ray powder diffraction) and grain-size analyses on lacustrine marls recovered from palaeolake Fucino (Abruzzo, central Italy). Lacustrine sediments were acquired during two scientific drilling campaigns (F1-F3 and F4-F5) interesting the first ca. 85 m of the 1 km-thick and 2 Ma-old Fucino sedimentary succession. We make use of detailed tephrostratigraphic and tephrochronological frameworks to produce robust and independent chronologies based on new and published 40Ar/39Ar and 14C dating of tephra layers. On the basis of our chronologies, the F1-F3 and F4-F5 records continuously span over the last two glacial-interglacial cycles and over the last five glacial-interglacial cycles, respectively.

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We combine our geological data into proxies for catchment- and regional-scale environmental processes. Our proxy time-series depict prominent orbital and sub-orbital environmental changes that can be tracked in other lacustrine, marine and speleothem records across the Mediterranean and North Atlantic regions. Thanks to tephrostratigraphic correlations and chronological matching, we produce spatially coherent palaeoclimatic reconstructions recognising a complex interplay between regional environmental processes and broad-scale climatic events. We highlight strong orbital forcing for past climate changes.

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