
A new 33 000 years long record at the Lago Grande di Monticchio (Basilicate, Italy): Overview of new tephrochronology, cores scan XRF and CT-scan analyses.

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Résumé

In 2023, a new coring was carried out in paleoenvironmental well-known archive of the Lago Grande di Monticchio (Basilicata, Italy). This archive is famous for containing dozens of tephra layers originated from the Campanian volcanic province. Two sister cores (MONTI23-II) were extracted at a lake depth of 6m, side by side and staggered in depth, using the U-NID-90-PO corer and the Uvitech Platform of the DT-INSU (France). A continuous composite core of 17.6 m covering the last 33 000 years was constructed, constituting a high potential archive for studying the paleoenvironmental changes occurred during this period covering the last deglaciation and the entire Holocene.

In this contribution we present millimeter resolution XRF and CTScan measurements provided all along the core that enabled the creation of a digital twin of each section, allowing a sub-millimetric match between them. We also discuss the chemical and lithological variations observed along the core. Regarding palaeoclimatic issues, the last deglaciation is here well expressed (3m) characterized by an increase of the carbon content in the sediment, that jumps between about 5 % during last glacial maximum (LGM) to about 30% at the beginning the Holocene. One other interested discovery is the drastic change in the chemistry of the sediments, lasting 300 years (40 cm), during the Middle Ages linked to the building of Sant'ippolito abbey and following other human activities around the lake.

The combined XRF and CT scan images also bring significant information regarding the tephra layers preservations, deformation and potential reworking along the core. We also performed major elements analyses on 57 volcanic horizons on glass shards. We also obtained trace elements for 24 of them.

Finally, thanks to the geochemical identification of these tephra and direct ^{14}C (on seed and macro plants remains) and $^{40}\text{Ar}/^{39}\text{Ar}$ (on single grains K-feldspars) dating, we created a Bayesian model for the core enabling us to construct the most accurate chronology for this environmental archive done so far.

All these new data will be compared with previous works published for this lake Monticchio, especially with pollen data already available (Allen et al., 2009).

Mots-Clés: $^{40}\text{Ar}/^{39}\text{Ar}$, Monticchio lake, XRF, CTscan, tephra, sediment