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The TephroMed project: Precise synchronising of two key palaeoclimatic ICDP records of the eastern Mediterranean using tephra

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The eastern Mediterranean region is located at divergent climatic zones and contrasting precipitation regimes of the humid Mediterranean climate and hyper-arid Saharo-Arabian desert belt. Important sedimentary archives from lakes allow past hydroclimatic variability to be reconstructed using multiple proxies. This can provide useful insight into potential future water budget scenarios. However, problems associated with chronological uncertainty can prevent insight into regional climatic (a)synchronies. The use of isochronous chronological markers of tephra (volcanic ash) can be a powerful tool in correlating palaeoclimatic records, particularly over vast distances with the development of cryptotephra analyses (non-visible volcanic glass shards).

The TephroMed project aims to precisely synchronise two key ICDP palaeoclimatic records from eastern Mediterranean through the use of tephrostratigraphic investigations: to the north, in the Anatolian region, Lake Van (PALEOVAN, Litt et al., 2014) and to the south, in the Levant, the Dead Sea (DSDDP, Stein et al., 2011). Both records have undergone lake level reconstructions, indicating contrasting past regional responses to large-scale climatic events (e.g. Finne et al., 2019; Neugebauer et al., 2015). Though both records are dated through absolute and relative methods (radiocarbon, U-Th, varve counting, wiggle-matching), inherited large chronological uncertainties do not allow detailed insight into the potential climatic time-transgressive nature between the two sites. Yet, both records have tephra deposits within their lacustrine sediments, highlighting the potential to facilitate the alignment of both records using tephra (Neugebauer et al., 2021).

Here, we present new major and minor element volcanic glass chemical data from several tephra layers from both Lake Van and the Dead Sea ICDP cores. New geochemical data from selected visible tephra layers in Lake Van are given. The cryptotephra results from the Dead Sea show particular significant findings with volcanic glass derived from potentially several volcanic regions within the Mediterranean (e.g. Anatolia, Italy). This new data can help to facilitate a chronological alignment between the Dead Sea, Lake Van and other important climatic archives in the Mediterranean. In addition, it highlights the importance of distal records in understanding past volcanic eruptions. As a result of these findings, we can now start to answer questions associated with regional expression of past climatic events and their temporal transgression.

References

Finné, M., Woodbridge, J., Labuhn, I., Roberts, C.N., 2019. Holocene hydro-climatic variability in the Mediterranean: A synthetic multi-proxy reconstruction. Holocene 29(5), 847–863

Litt, T., Anselmetti, F.S., 2014. Lake Van deep drilling project PALEOVAN. Quat. Sci. Rev. 104, 1-7.

Neugebauer, I., Brauer, A., Schwab, M.J., Dulski, P., Frank, U., Hadzhiivanova, E., Kitagawa, H., Litt, T., Schiebel, V., Taha, N., Waldmann, N.D., DSDDP Scientific Party, 2015. Evidences for centennial dry periods at ~3300 and ~2800 cal. yr BP from micro-facies analyses of the Dead Sea sediments. Holocene 25, 1358-1371.

Neugebauer, I., Müller, D., Schwab, M.J., Blockley, S., Lane, C.S., Wulf, S., Appelt, O., Brauer, A., 2021. Cryptotephras in the Lateglacial ICDP Dead Sea sediment record and their implications for chronology. Boreas 50 (3), 844-861.

Stein, M., Ben-Avraham, Z., Goldstein, S.L., 2011. Dead Sea deep cores: A window into past climate and seismicity. Eos, Transactions American Geophysical Union 92, 453-454