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Challenges and opportunities extending the INTIMATE tephra event stratigraphy into the Levant and Arabia.

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The nature and expression of climate change in the Eastern Mediterranean, the Levant and further into Arabia is of considerable interest across a range of communities. This is in part due to the need to understand the potential for future climate forcing on environments given the complex range of climatic forcing factors that play out in the region. These include the role of prevailing winds across the Mediterranean, Northerly winds pushing down into the region during cold glacial conditions, and the influence of the Afro-Arabian Monsoon. The last glacial to interglacial period is a critical window to examine such processes, as a range of climatic signals are recorded, many of which have been proposed as correlatives of events seen in the North Atlantic. Dating issues are as ever an issue when trying to precisely compare different climate archives. To address such, the INTIMATE event stratigraphy has been developed for the North Atlantic region, with recent extensions into parts of the Mediterranean. This couples the stratigraphic framework of the Greenland Ice core records as a regional stratotype, with a number of tephra horizons in the North Atlantic and Europe, aiding the process of correlation. The last INTIMATE event stratigraphy coupled the extended GICC05 timescale for Greenland back to 128 b2k (Blockley et al., 2014). This paper reports on attempts to test the potential for tephrochronology to be extended into the Levant and potentially Arabia, through the identification of tephra layers in sediment focussing archives, such as archaeological cave sequences. We have examined tephra presence in archaeological sites, principally in Israel, that record sediment deposition from ~30ka BP through to >100ka BP. Analyses of these records show that tephra is present in almost all of the studied sites (e.g., Kebara, Tabun, Amud, Shovakh). Moreover, tephra in these sequences can be chemically correlated to known volcanic systems, demonstrating the potential going forward to analyse long lake and marine records around the region for cryptotephra. At the same time clear challenges are emerging. Firstly, there is a range of chemistry in many of the layers and careful analyses is needed to pick apart the geochemical signal and to identify reworking, as opposed to chemically heterogeneous ash layers from a single volcano. This process is complicated by the relatively limited range of published geochemical data from some volcanic centres. This presentation will outline the current state of knowledge of key volcanic centres, particularly in the Aegean and Turkey, alongside the new Levantine data, to consider the steps needed to establish a secure extension of the INTIMATE approach into this region.

Blockley, S., et al., 2014. Quaternary Science Reviews. 106, 88-100. doi:10.1016/j.quascirev.2014.11.002.