Monogenetic basaltic volcanoes represent extraction rather than melting events

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Magmas from very small basaltic systems (volumes <0.1 km3) leak from the mantle on time scales of 10^4- 10^6 years to form fields of small volcanoes each resulting from a single short-lived eruption sequence. Because magma volumes are small and rise quickly they do not fractionate within the crust or assimilate components from it. Hence, their chemical compositions and variability reflect the interplay of processes deep in the system. The range of chemical compositions displayed by individual eruptions shows the diversity of these processes. Do these small magma batches represent discrete melting events or instead extraction episodes tapping long-lived (10^4 year) zones of partial melting? In the Auckland Volcanic Field N.Z. paleo-magnetic measurements [1] correlated with the ~ 31 ka Mono Lake magnetic excursion identify five eruptions of alkali basalt magmas from depths of ~80km within a time interval of a few hundred years. The chemical composition erupted in each event cannot be related to the others by fractionation processes. Heat flux constraints suggest that these discrete magma batches cannot represent distinct melting events. Rather they represent separate extraction events from a continuous but heterogeneous melt zone. Their near simultaneous eruption along with the overall pattern of volcanic activity at Auckland indicates that such extraction events may be driven by plate boundary related tectonic processes occurring over 600 km away.

[1] Cassata *et al.* (2008) *EPSL* **268**, 76–88.

Australasian sea surface temperatures over the past millennium

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The 'hockey-stick' temperature increase of the 20^{th} century has instigated concern for a global warming trend. In order to investigate this temperature increase, it is necessary to derive high-resolution temperature records that span the last millennium. Currently, data from this period is sourced almost exclusively from the Northern Hemisphere, predominantly from terrestrial records. There is a considerable lack of temperature records for the Southern Hemisphere, making analysis of hemispheric and global trends in temperature changes difficult.

Marine sediments can often represent a continous geological record of climate through the gradual deposition of organic matter on the sea floor over time. Biomarkers are organic compounds produced by living organisms that have extraordinary preservation potential in sediments. The most useful biomarkers are resistant to diagenesis and can be readily linked to a characteristic group of producing organisms [1]. The lipids of some haptophyte marine algae (alkenones) and marine Crenarchaeota (glycerol dialkyl glycerol tetraethers) in the sedimentary record are biomarkers that may be converted to sea-surface temperature via the $U^{K'}_{37}$ [2] and TEX_{86} [3] proxies, respectively.

Here, we present a record of sea-surface temperature using multicores sourced from near the Australian east coast (at ~1, 000 m depth) utilising the combined capacities of these biomarker proxies. This is the first temperature record to span the past millennium in the Southern Hemisphere and provides an important means of palaeoenvironmental inference for hemispheric and global climatic trends during this period.

[1] Brocks & Pearson (2005) *Molecular Geomicrobiology* **59**, 233–258. [2] Brassell *et al.* (1986) *Nature* **320**, 129–133. [3] Schouten *et al.* (2002) *Earth & Planetary Science Letters*, **204**, 265–274.