Duration of hydrothermal activity at the Mid-Atlantic Ridge, 26°N

A.M. DUTRIEUX[1], A. LICHTSCHLAG[2], S. MORETON[3], AND B.M. MURTON[2].

[1]University of Southampton, UK (A.Dutrieux@soton.ac.uk)
[2]UKRI, National Oceanography Centre, Southampton, UK
[3]NERC Radiocarbon Laboratory, SUERC, East Kilbride, UK

Hydrothermal activity at mid-oceanic ridges (MORs) plays a significant role in the composition of seawater, cooling of the interior of the Earth, and the formation of mineral deposits that might help to meet the globally growing demand. Knowing the duration of hydrothermal activity at individual sites is essential for calculating the energy flux of the underlying system controling the hydrothermal circulation and therefore understanding the nature of that heat source. Th-U dating on primary sulphides at the Mid-Atlantic Ridge suggests that the hydrothermal activity forming these minerals is episodic [1]. Yet dating primary sulphides is subject to open-system alteration and might be biased as the absence of dated sulphides does not necessarily mean a period of inactivity. The temporal development of vent fields is usually recorded in proximal and distal sediments that contain distinct, metal-rich layers reflecting hydrothermal activity, interspersed with pelagic carbonate. Our aim is to cross correlate the hydrothermal events recorded in a particular hydrothermal system with external events, such as changes in sea level, axial faulting or episodes of volcanism.

Therefore, we present an age model, based on oxygen isotopes, radiocarbon and paleomagnetic dating of metalliferous sediments from the TAG Hydrothermal Field (Mid-Atlantic Ridge, 26°N). Sediment cores were collected close to or on top of extinct hydrothermal deposits [2] and contain layers dominated by material derived from hydrothermal plume fall-out and mass-wasted sulphides. Those layers are discriminated by their geochemical composition rich in Fe and showing a positive Eu anomaly. The resulting age-depth model at the inactive hydrothermal sites indicates that the hydrothermal activity spans from 20 ka, during the last glaciation, to 73 ka with several temporary reductions of intensity. Finally, we consider the role of external drivers such as magma chamber processes and, as recently suggested, the effects of glacial–interglacial cycles to justify the episodic nature of the hydrothermal activity and the variation of metallic flux intensity within the sediments.

[1] Cherkashov *et al.* (2017) *Ore Geol Rev* **87**, 147-154.
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