Enhanced hydrothermal sedimentation along the East Pacific Rise from 25 to 5 kyr BP

D. C. LUND[1]*, P. D. ASIMOW[2], E. W. JACKSON[3] AND Z. M. DURHAM[3]

[1]University of Connecticut, Marine Sciences, Groton, CT, USA, david.lund@uconn.edu (*presenting author)
[2]California Institute of Technology, Pasadena, CA
[3]University of Michigan, Earth Sciences, Ann Arbor, MI

Glacial-interglacial changes in continental ice volume likely modulate sub-aerial volcanism in Iceland [1-3] and other high latitude locations [4]. A similar effect may occur in the oceans, with sea level lowering due to ice sheet growth promoting magma production beneath mid-ocean ridges [4-6]. Enhanced magmatism following sea level low stands should yield greater heat flux and hydrothermal activity at ridge axes. Here we evaluate the sea level hypothesis using seven records of hydrothermal sedimentation from 1ºN, 6ºS, and 11ºS along the East Pacific Rise (EPR). At each location, the carbonate-free concentration of Fe, Mn, and Zn increased beginning at ~25 kyr BP, reached maximum values by 15 kyr BP, and then decreased into the Holocene. The similar pattern on both sides of the ridge axis and spanning more than 1300 km of the EPR points to a common driver. Lateral sediment focusing is an unlikely explanation given the similar signal in all seven cores. Alternatively, variations in deep water oxygen concentration could focus redox-sensitive elements in the 25 to 5 kyr BP interval of each record [7]. Down-core Fe/Mn and Fe/Zn ratios are inconsistent with diagenetic overprinting, however, and instead support a hydrothermal origin [8-9]. Spatially coherent variations in hydrothermal activity on glacial-interglacial timescales are consistent with the sea level hypothesis. Confirmation of our initial results will require additional records from the EPR and other sites along the global mid-ocean ridge system.

[1] Jull and McKenzie (1996) *J. Geophys. Res.* **101**, 21815-21828. [2] Maclennan et al (2002) G-cubed 3, 1062. [3] Licciardi, Kurz, and Curtice (2007) *Quaternary Science Reviews* **26**, 1529-1546. [4] Huybers and Langmuir (2009) *Earth and Planetary Science Letters* **286**, 479-491. [5] Lund and Asimow (2008) AGU Fall Meeting, Abstract #PP11D-08. [6] Lund and Asimow (2011) G-cubed 12, Q12009. [7] Mills et al (2010) *Paleoceanography* **25**, PA4226. [8] Dymond (1981) *Geo. Soc. Amer. Mem.* **154**, 133-172. [9] Dunk and Mills (2006) *Marine Geology* **229**, 133-157.