CONTROL ID: 1493140 **TITLE:** Compositional variation of lavas from a young volcanic field on the Southern Mid-Atlantic Ridge, 8°48'S **AUTHORS (FIRST NAME, LAST NAME):** Karsten Haase[1], Philipp A. Brandl[1], Bernd Melchert[2, 5], Folkmar Hauff[2], C-Dieter Garbe-Schoenberg[3], Holger Paulick[4, 6], Thomas Find Kokfelt[2, 7], Colin W Devey[2]
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ABSTRACT BODY: Volcanic eruptions along the mid-oceanic ridge system are the most abundant signs of volcanic activity on Earth but little is known about the timescales and nature of these processes. The main parameter determining eruption frequency as well as magma composition appears to be the spreading rate of the mid-oceanic ridge. However, few observations on the scale of single lava flows exist from the slow-spreading Mid-Atlantic Ridge so far. Here we present geological observations and geochemical data for the youngest volcanic features of the so-called A2 segment (Bruguier et al., 2003, Hoernle et al., 2011) of the slow-spreading (33 mm/yr) southern Mid-Atlantic Ridge at 8°48'S. This segment has a thickened crust of about 9 km indicating increased melt production in the mantle. Side-scan sonar mapping revealed a young volcanic field with high reflectivity that was probably erupted from two volcanic fissures each of about 3 km length. Small-scale sampling of the young lava field at 8°48'S by ROV and wax corer and geochemical analyses of the volcanic glasses reveal three different compositional lava units along this about 11 km long portion of the ridge. Based on the incompatible element compositions of volcanic glasses (e.g. K/Ti, Ce/Yb) we can distinguish two lava units forming the northern and the larger southern part of the lava field covering areas of about 5 and 9 square kilometres, respectively. Basalts surrounding the lava field and from an apparently old pillow mound within the young flows are more depleted in incompatible elements than glasses from the young volcanic field. Radium disequilibria suggest that most lavas from this volcanic field have ages of 3000 to 5000 yrs whereas the older lavas surrounding the lava field are older than 8000 yrs. Faults and a thin sediment cover on many lavas support the ages and indicate that this part of the Mid-Atlantic Ridge is in a tectonic rather than in a magmatic stage. Lavas from the northern and southern ends of the southern lava unit have lower MgO but higher Cl/K than those from the centre of the unit indicating more extensive cooling and assimilation of hydrothermally altered material during ascent, most likely at the tips of the feeder dike. The compositional heterogeneity on a scale of 3 km suggests small magma batches that rise vertically from the mantle to the surface without significant lateral flow and mixing. Thus, the observations on the 8°48'S lava field are in agreement with low frequency eruptions from single ascending magma batches beneath slow-spreading ridges.

Bruguier, N.J., Minshull, T.A., Brozena, J.M., 2003. Morphology and tectonics of the Mid-Atlantic Ridge, 7°-12°S. Journal of Geophysical Research, 108: DOI: 10.1029/2001JB001172.
Hoernle, K., Hauff, F., Kokfelt, T.F., Haase, K., Garbe-Schönberg, D., and Werner, R., 2011, On- and off-axis chemical heterogeneities along the South Atlantic Mid-Ocean-Ridge (5-11°S): Shallow or deep recycling of ocean crust and/or intraplate volcanism?: Earth and Planetary Science Letters, v. 306, p. 86-97.

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