Evolution of the Jan Mayen Ridge – New data from the Jan Mayen Fracture Zone

J. SLAMA[1,3] R.B. PEDERSEN[1,2] AND J. KOSLER[1,2]

[1]Department of Earth Science, University of Bergen, Norway (jiri.slama@geo.uib.no)
[2]Centre for Geobiology, University of Bergen (Rolf.Pedersen@geo.uib.no, jan.kosler@geo.uib.no)
[3]Department Institute of Geology, Academy of Sciences of the Czech Republic, v.v.i., Prague, Czech Republic

Geochronologic and geochemical data derived from seafloor samples dredged from the Jan Mayen Fracture Zone (JMFZ) provide new information about the tectonomagmatic evolution of the Jan Mayen Ridge (JMR). Based on geophysical data, the JMR is believed to represent an off-rifted fragment of East Greenland continental lithosphere that since early Miocene has drifted 400 km into the North Atlantic as a result of seafloor spreading along the Kolbeinsey Ridge.

A suite of volcanic rocks, as well as sandstones and conglomerates that predominantly are made up of volcaniclastic material were recovered from the southern escarpment of JMFZ east of Jan Mayen. The conglomerates contain shell fragments that yielded $^{87}Sr/^{86}Sr$ age of ca. 32 Ma, which probably reflects the time of deposition of these volcano-sedimentary rock. U-Pb ages of detrital zircon from the samples show age distribution consistent with an East Greenland source region. A population of angular zircons provides ages around 30 Ma – consistent with the Sr-age data. These young zircons are likely derived from the local volcanic material and do accordingly date the volcanic activity.

Analyses of individual volcanic clasts in the conglomerates show that they belong to the trachytic suite, and predominantly are hawaiites and trachyandesites. They are geochemically very similar to the recent volcanic rocks of the Jan Mayen Island.

The new data suggest that the alkaline volcanism in the Jan Mayen area may be traced 30 my back in time. It is yet unknown if the region has more or less been continuously volcanic active for this long period of time, or if there have been long inactive periods.

Geophysical data suggest that spreading along the Kolbeinsey Ridge was initiated at 25 Ma. The ca. 30 Ma magmatic event recorded in the dredged samples seems to reflect an episode of alkaline break-up magmatism associated with the off-rifting of the Jan Mayen micro-continent.

Tracing metals and pathways in the Equatorial Pacific

L.O. SLEMONS[1]*, J.W. MURRAY[1], J. RESING[2] AND B. PAUL[1]

[1]School of Oceanography, Univ. of Washington, Seattle, WA 98195, USA
(*correspondence: ossianla@u.washington.edu)
(jmurray@u.washington.edu, bpaul@ocean.washington.edu)
[2]Pacific Marine Environmental Laboratory, NOAA, Seattle, WA 98115 (joseph.resing@noaa.gov)

Dissolved and total acid soluble iron, manganese, and aluminum samples were collected along a series of short meridional sections in the equatorial Pacific from 140°W to 145°E to 1000 m with highest resolution through the depth range of the Equatorial Undercurrent (EUC). Vertical profiles in southern EUC source waters were measured in both the New Guinea and New Ireland Coastal Undercurrents. All three trace elements exhibited a subsurface maximum near the velocity core of the EUC, although the Fe maximum was deeper than those of Al and Mn, which both showed surface enrichment, as shown in the example profile at 165°E below.

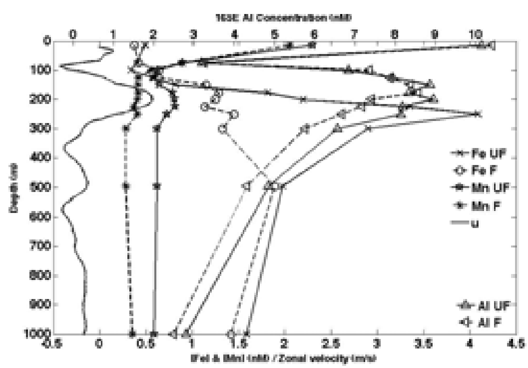

Figure 1: Trace metal profiles at 165°E. Upper axis: Al concentrations, lower axis: [Fe], [Mn] and zonal velocity.

Total acid soluble Al in the EUC decreased from 10.7 nM at 145°E to 6.04 nM at 140°W. Total acid soluble Mn decreased from 0.92 nM to 0.45 nM from 145°E to 155°W, east of which no subsurface Mn maximum was observed. The Fe subsurface maxima appeared primarily in the particulate fraction, decreasing from 6.57 nM total acid soluble Fe at 145°E to 1.18 nM at 140°W, although the gradient was less smooth than that of Al and Mn. Metal concentrations were greatest offshore of New Guinea, with strongest enrichment downstream of the Sepik River. The zoanl gradients and high shelf concentrations imply that continental sources of metals should be considered when modeling the oceanic Fe supply.