The Mesoproterozoic continental margin of the Baltic Shield: Geochemical evidence for a Cordillera-type setting

T. ANDERSEN[1] AND W.L. GRIFFIN[2]

[1]Department of Geology, University of Oslo, PO Box 1047 Blindern, N-0316 Oslo, Norway (tom.andersen@broadpark.no)

[2]GEMOC Key Centre, Earth and Planetary Sciences, Macquarie University, NSW 2109, Australia

The evolution of the mid-Proterozoic, soutwestern continental margin of the Baltic Shield has been much debated recently. A central issue is whether the Precambrian crust of SW Sweden and S Norway evolved as part of a single continental margin, or if the westernmost part of the area (i.e. parts of present-day S Norway) is an exotic microcontinent with a separate history, accreted onto the Baltic Shield between 1.6 and 1.5 Ga (e.g. Åhäll et al. 2000, Andersen et al. 2001). Mesoproterozoic, subduction-related metaigneous rocks are widespread in the area, and provide an important test of the age and character of the subduction zone(s) involved. If such rocks on either side of potential sutures show the same timing, tectonic setting and source material, it is strong evidence against tectonic models which claim the presence of rocks of non-Baltic Shield origin in the area.

The U-Pb and Lu-Hf systematics of zircons from Proterozoic metaintrusive calcalkaline gneiss complexes across south Norway have been studied by laser-ablation microprobe ICPMS. U-Pb data from populations of single zircons suggest that most intrusions were emplaced between 1.61 and 1.55 Ga, and some intrusions are distinctly younger (down to 1.51 Ga). There is no systematic distribution of ages with respect to potential suture zones, suggesting the presence of a single, long-lived (100-160 Ma) subduction zone system in the area. Initial Hf isotopic ratios change gradually from juvenile values in the westernmost (most distal) complexes (ε_{Hf} =+13) to ε_{Hf}=+6 in the eastern areas, where the presence of a 1.6-1.7 Ga basement is demonstrated by inherited zircons. The calcalkaline intrusions in S Norway show the major and trace element characteristics of intrusive rocks formed in a moderately evolved magmatic arc at a continental margin, and represent a more evolved stage of an arc evolution that may have started with eruption of low-K mafic volcanic rocks of the Stora-Le Marstrand belt in SW Sweden and their possible equvialents in S Norway. The data from south Norway contradict the hypothesis of an exotic microcontinent in S. Norway and of a 1.5-1.6 Ga continental collision event at the SW margin of the Baltic Shield. The NW American Cordillera may be a useful analogue for the tectonomagmatic evolution of the mid-Proterozoic Baltic margin.

References

Åhäll, K.-I., Connelly, J. and Brewer, T.S. (2000), *Geology* **28,** 823-826.

Andersen, T. Andresen, A. and Sylvester A.G (2001): *J. Geol. Soc. Lond.* **158,** 253-267.

Glacial-Interglacial Variability in the Accumulation of Lithogenic material in Central Equatorial Pacific Sediments

R. F. ANDERSON AND M. Q. FLEISHER

Lamont-Doherty Earth Observatory, Columbia University, Palisades, NY, USA 10964 (boba@ldeo.columbia.edu)

Records from ice cores, and from marine sediment cores in many regions, have led to the view that the world was "dustier" during glacial periods than during interglacials. Recent modeling efforts support this view. Reconstructions from sediments in the eastern and central equatorial Pacific Ocean depart from this pattern, however. Previous investigators have concluded either that maximum dust deposition occurred during interglacials, or that there is no systematic relationship between climate state and dust flux to the region. Either the climate-related variability in supply of eolian material to this region has not been in phase with the rest of the world, or unrecognized factors have influenced the evaluation of eolian fluxes to equatorial Pacific sediments.

Here we report accumulation rates of lithogenic material from a transect of cores crossing the equator at 140°W, evaluated by normalizing to ^{230}Th to correct for sediment focusing and to overcome biases associated with subtle errors in chronology. Titanium and ^{232}Th are used as proxies for lithogenic material, each providing unique information; e.g., ^{232}Th is enriched in continental crust but depleted in ocean basalts. These records show a coherent pattern of ^{232}Th accumulation among the cores, including: 1) a positive correlation between ^{232}Th accumulation and ice volume, as inferred from benthic foraminiferal ^{18}O; 2) a maximum amplitude of about a factor of two in the climate-related variability in ^{232}Th accumulation; and 3) average ^{232}Th accumulation rates that decrease systematically from north to south across the equator. In contrast to ^{232}Th, accumulation of Ti shows no detectable climate-related variability in the two records with greatest temporal resolution (Eq. and 2°S), reflecting the different sources of Th- and Ti-bearing lithic material. To the extent that ^{232}Th accumulation traces primarily the supply of old continental crustal material, these results indicate a pattern of dust supply to the central equatorial Pacific Ocean similar to that observed in most other regions.