

## Red Sea detritus provenance during MIS 6/5 and MIS 2/1 transitions

D. PALCHAN<sup>1,2</sup>, M. STEIN<sup>2</sup>, A. ALMOGI-LABIN<sup>2</sup>,  
Y. EREL<sup>1</sup> AND S.L. GOLDSTEIN<sup>3</sup>

<sup>1</sup>Institute of Earth Science, The Hebrew University, Jerusalem, Israel (Pdanielos@gmail.com, yerel@vms.huji.ac.il)

<sup>2</sup>The Geological survey of Israel, 30 Malkhe Israel St, Jerusalem, Israel (motistein@gsi.gov.il, almogi@gsi.gov.il)

<sup>3</sup>Lamont-Doherty Earth Observatory and Columbia University, 10964 Palisade, NY, USA (steveg@ldeo.columbia.edu)

The Red Sea (RS), located in the midst of the Arabian-Sahara desert belt, comprises a sedimentary trap for fine-grain detritus that is transported from its neighbouring continental terrains. Interpreting the fine detritus as desert dust we explored the mineralogy, grain-size, major and trace elements chemistry and Sr-Nd-Hf isotope composition of silicate material (insoluble in acetic acid) recovered from the sedimentary core KL-23, which was drilled in the northern RS (25°44' 88N 35°03' 28E). Core chronology is based on the SPECMAP  $\delta^{18}\text{O}$  age model indicating that the core spans over 370 ka. We focused on two glacial interglacial transitions: MIS 6 to 5 and MIS 2 to 1 (~160-110 kyr BP and ~20-8 kyr BP, respectively) and analyzed the <63 $\mu\text{m}$  fraction of the insoluble material. The Nd-Sr-Hf isotopic ratios indicate contribution from two main lithological sources: 'granitic' material, which is common over the Arabian and Sahara crustal terrains and a 'basaltic' material, which possibly originated from the Cenozoic basaltic terrains at the southern margins of the RS. The 'granitic' source was more dominant during glacials while the 'basaltic' source contributes fine detritus immediately after glacial terminations and transitions to interglacials. Major elements reveal different effects of diagenetic-alteration processes reflecting possibly enhanced alteration during wetter periods in the basaltic source regions during interglacials.

## Ti-in-quartz thermometry of siliciclastic metasedimentary rocks of the Otago Schist, New Zealand

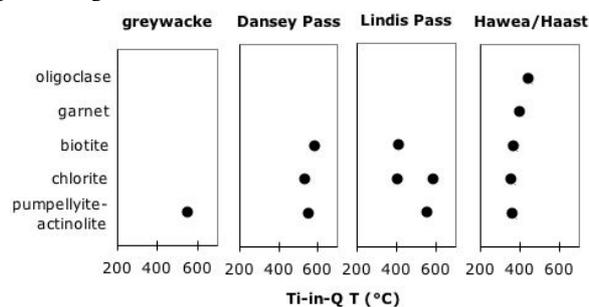
J.M. PALIN\*, C.L. KING, A. WILSON AND C.E. MARTIN

Department of Geology, University of Otago, P.O. Box 56, Dunedin 9054 New Zealand

(\*correspondence: michael.palin@otago.ac.nz)

We have used exposures of siliciclastic metasedimentary rocks of increasing grade from the margins to the core of the Otago Schist belt of New Zealand to examine changes in quartz Ti concentration due to re-equilibration and new crystallization at increasing P-T [1, 2]. Samples were taken across three well-documented metamorphic field gradients: Dansey Pass [3], Lindis Pass [4], and Lake Hawea/Haast River [5]. Quartz in thin sections and mineral separates was analyzed using LA-ICP-MS. Raw intensity data were normalized via the NIST 610 standard to obtain trace element concentrations.

There are systematic changes in the concentrations of Ti in quartz: (a) variability is greatest at low grade where re-equilibration of primary igneous signatures of detrital quartz is incomplete; and (b) quartz Ti concentrations increase systematically from moderate to high metamorphic grade. The latter provide metamorphic P-T constraints that agree with previous geothermometry for the rocks [6] for a reduced  $a(\text{TiO}_2)$  appropriate for textural equilibrium of quartz with titanite at low metamorphic grade and ilmenite at higher grades (Fig. 1).



**Figure 1:** Ti-in-quartz temperatures calculated for  $P = 5 \text{ kb}$  and  $a(\text{TiO}_2)$  of  $0.8 \pm 0.2$ .

[1] Wark & Watson (2006) *Contrib. Min. Petrol.* **152**, 743–754. [2] Thomas *et al.* (2010) *Contrib. Min. Petrol.* **160**, 743–759. [3] Bishop (1972) *Bull. GSA* **83**, 3177–3198. [4] Stallard *et al.* (2005) *J. Meta. Geol.* **23**, 443–459 [5] Cox (1993) unpubl. PhD thesis. [6] Mortimer (2001) *Int. J. Earth Sci.* **89**, 295–306.