The effects of paleoclimatic change on sediment fluxes in the vicinity of the Gao-Ping submarine canyon, Taiwan

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This multi-proxy study aims to look at the effects of late Holocene paleoclimatic variations in monsoonal intensity (humid vs. dry periods), on sediment mass transfer between the Gao-ping shelf and the open ocean regime of the South China Sea (SCS) in order to identify significant climate-coupled terrigenous sediment export and depositional events.

For this, two pelagic, undisturbed, long cores (ORI 799-G24 and ORI 732-8G) and short box-cores (ORI 811-K8, 811-K31) are analysed. Results show that the sediments consist of homogenous olive grey silty clay with little bioturbation and low carbonate concentrations (<5%) indicating a predominantly terrestrial origin of the sediment constituents. Initial chemical analyses, using XRF-spectrometry, of terrigenous elements from core ORI 732-8G display significant variations over the sedimentary sequence studied. The Rb/Sr ratios, which are used as an indicator of chemical weathering, reveal distinct trends which may be associated to short-term changes in chemical weathering conditions due to periods of strengthened or weaker summer monsoonal intensity. AMS-^{14}C dating from planktonic foraminifera constrain the ages of the sediments. Stable oxygen isotope, mineralogical, micropaleontological, Mg/Ca and alkenone analyses form future work in progress.

Thermochronology of the Bushveld Complex: Rapid cooling confirmed

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The thermal history of the Bushveld Igneous Complex (BIC) of South Africa, the world's largest known mafic intrusion, has received little attention. Thermal modelling suggests emplacement of the mafic portion of the BIC in a strikingly brief interval of <75 ka [1], consistent with the BIC being the intrusive component of a continental flood basalt province. Replicate ^{40}Ar/^{39}Ar plateau ages have been obtained for single crystals or crystal fragments of hornblende (*hb*), biotite (*bi*) and plagioclase (*pl*) from 8 rock units of the Rustenburg Layered Suite (RLS) and associated veins, and a granite from the Lebowa Granite Suite (LGS). *Hb* and *bi* plateau ages from the RLS are indistinguishable, and U/Pb-consistent constants [2] yield ages indistinguishable from a Pb/Pb age of 2059 Ma determined for titanite from a xenolith [3], implying a cooling rate >1000°C/Ma over the range ~650-300 °C. Multiple crystal fragments of one RLS *pl* sample yields variably discordant age spectra with plateaux ranging from ~2060 Ma to <2000 Ma, consistent with partial degassing by the nearby ~1.3 Ga Pilanesberg Complex. Closure temperatures ca. 305-340 °C [4] were determined using the approach pioneered by Berger and York [5], and we infer that the range in plateau ages reflects variable subsampling of larger scale ^{40}Ar/K gradients imposed by the partial degasssing event. Limited ^{40}Ar/^{39}Ar data from RLS veins suggests possibly slightly lower cooling rates. A U/Pb zircon Concordia age of 2057 ±3 Ma from an LGS granite establishes the LGS as an integral component of the BIC which must be accounted for in mass balance calculations of "missing" (i.e., inferred to have erupted) magma [e.g. 1]. In comparison with the U/Pb zircon age, a weighted mean (2055 ±1 Ma) of 8 ^{40}Ar/^{39}Ar *hb* plateau ages suggests much slower cooling (~100 °C/Ma) for the LGS than the RLS, probably indicative of elevated ambient temperatures over the time span of BIC intrusion.

[1] Cawthorne & Walraven (1998) *J. Petrol.* **39**, 1669-1687. [2] Mundil *et al.* (2006) *Eos Abstr. AGU* **57**, V21A-0543 [3] Buick *et al.* (2001) *J. Geol. Soc. Lond.* **158**, 3-6. [4] Cassata *et al.* (2008) GCA, this volume [5] Berger & York (1981) *GCA* **45**, 795-811.