Effects of chemical weathering on the chemical and isotopic signatures of ancient zircons from Jack Hills and Mt Narryer, Western Australia

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Sandstones and conglomerates from Jack Hills and Mt Narryer in Western Australia are unique in containing detrital zircons with ages in excess of 4 billion years. Extensive studies have been made of the ages of the ancient zircon using SIMS U-Pb analyses and the zircons have been subjected to oxygen, Hf and Li isotopic analyses and Ti and REE concentration determinations aimed at throwing light on the early history of the Earth. Numerous geochronological studies have shown that zircons from both locations are unusually highly discordant. This is explained by the effect of recent weathering. Jack Hills and Mt Narryer have experienced extreme chemical weathering, possibly since the Permian. It is well established by observation and experiment that radiation damaged zircon can be very susceptible to low temperature fluid interaction. Radiation damaged zircons from the sandstones and conglomerates show significant loss of radiogenic Pb and a corresponding increase in common Pb. The discordant zircons also show significant increases in trace elements and have oxygen isotope effects that we attribute to sustained interaction with solutions in the weathering environment.

[1] Geisler, T., Pidgeon, R.T., van Bronswijk, W & Kurtz, R. (2002) *Chem. Geol.* **191**, 141-154. [2] Pidgeon, R.T., O'Neil, J.R. & Silver, L.T. (1973) *Fortchr. Mineral.* **50,** 118.

Ar-Ar ages of glacially transported hornblende, Wilkes Land, Antarctica

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Ar-Ar ages of ice rafted hornblende grains from marine coretop sediments around the Antarctic perimeter [1] reproduce the geological story from field observations of very limited outcrops. Most East Antarctic perimeter cores are characterized by predominant ~500 Myr Ar-Ar ages but Ar-Ar ages along the Wilkes Land margin include significant populations of Mesoproterozoic and Paleoproterozoic ages, and even some Archean ages. A downcore study of ice rafted detritus peak layers at ODP Site 1165 off Prydz Bay has revealed two different populations of Proterozoic Ar-Ar ages (1100-1300 Ma and 1500-1600 Ma) suggesting transport of icebergs from the Wilkes Land and Adélie Coast/George V Land coasts, respectively, to Site 1165. This interpretation is based on the match of limited data from the initial core top survey [1], with the downcore data, and outcrop data from Wilkes Land and the Adélie Coast/George V Land coasts.

The Wilkes Land sector comprises the boundary between crustal terranes of different Proterozoic ages, the exact location of which remains poorly defined. More analyses from proximal cores and the application of other mineral grains and isotope systems for geochronological studies to better elucidate the thermochronological history within this sector is desirable. Furthermore, most of the ice sheet in the Wilkes Land sector is grounded below sea level making the sedimentary record offshore particularly sensitive to ice sheet dynamics, and therefore an ideal place to study Antarctic glaciation throughouth the Cenozoic[3].

NBP01-01 JPC11 recovered 1-meter of LGM diamict. Samples from 2305 and 2370 cm in this core are dominated by Paleoproterozoic hornblende ages (1500-1800 Ma). The JPC11 dominant age peak is consistent with the ages of [1] at a core just to the west, and with on land ages [4].

[1] Roy *et al.* (2007) *Chem. Geol*. **244**, 507-519. [2] Williams *et al.* (in revision) *Geology*. [3] Escutia *et al.* (2005) *Global & Planetary Change* **45**, 51-81. [4] Vicenzo *et al.* (2007) *Precambrian Research.*