Geophysical Research Abstracts, Vol. 8, 00929, 2006
SRef-ID: 1607-7962/gra/EGU06-A-00929

Condensed authigenic mineral cemented surfaces from the western margin of South Africa in relation to late Oligocene/early Miocene sea-level fluctuations.

R.A. Wigley and J.S. Compton

Department of Geological Sciences, University of Cape Town, Private Bag, Rondebosch, 7700, South Africa (rwigley@geology.uct.ac.za / +27 21 650 3783

The geological evolution of passive margins is largely governed by changes in relative sea level, recording both changes in global sea level and the local effects such as tectonic movement, subsidence and sediment supply. The geological evolution of the passive western margin of southern Africa is still poorly constrained, largely due to an absence of a well-preserved sedimentary record within the very condensed margin Tertiary succession. The Oligocene to Miocene period is of global importance because of the major growth and decay of the Antarctic ice sheets. The late Oligocene (from $\sim$26 Ma) is linked to global warming with increased water temperature and a major drop in the δ^{18}O of benthic foraminifera associated with an overall decrease in size of the East Antarctic ice-sheet and glaciation that lasted until $\sim$ 14 Ma. However, a number of cycles of ice sheet growth and cooling are identified within the late Oligocene to Miocene period, with considerable ice-sheet expansion and global cooling occurring around 23.7 Ma.

The upper Oligocene-lower Miocene succession from the western margin of southern Africa includes evidence of a significant phosphogenesis event, which occurred around 23.6-26.1 Ma (Compton *et al.*, 2004). These phosphatised hardground horizons are preserved within younger sediments as a reworked gravel component. Many of the carbonate fluorapatite (CFA)-rich gravels show evidence for multiple phosphogenesis events, with well defined erosional surfaces present, with these surfaces often goethite-rich.

Layered phosphorite pebbles from the Head of the Cape Canyon area include distinct sediment layers, with varying relative abundances of phosphorite, glauconite,

and quartz in the cemented sand fraction preserved below erosional surfaces. These cemented erosional surfaces are interpreted to represent maximum flooding surfaces and to indicate overall low sedimentation rates and possibly increased bottom water activity. The variations in sediment composition and the intimate relationship between CFA and glauconite and the additional presence of quartz sand imply considerable changes in the depositional environment, sediment supply and oceanographic conditions along the western margin of southern Africa during the Tertiary. The available stratigraphic data for the Upper Oligocene/Lower Miocene sediment record along the western margin of South Africa include at least four distinct facies representing a complex, discontinuous and condensed depositional history between 27.2 and 18.3 Ma. A complex depositional history is supported by the highly condensed layered CFA-rich gravels, which record further complexities in the environment. Condensed sections dated by Sr isotope stratrigraphy provide important evidence in interpreting the evolution of depositional environments on the western margin of South Africa.