Geophysical Research Abstracts, Vol. 9, 05644, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-05644

500,000 years of coherent dust flux variations in the tropical Pacific Ocean and Antarctica

G. Winckler (1), R.F. Anderson (1,2), N. Mahowald (3), M.Q. Fleisher (1), D. McGee (1)

(1) Lamont-Doherty Earth Observatory, Columbia University, USA

(2) Department of Earth and Environmental Sciences, Columbia University, USA

(3) National Center for Atmospheric Research, Boulder, USA

Dust is thought to have significant effects on the Earth's climate system, both by influencing the radiative balance of the atmosphere as well as by influencing biogeochemical cycles of carbon and nutrients. Records extracted from Antarctic ice cores tell us that dust deposition from the atmosphere to the ice sheet was 2-20 times greater during glacial periods than during interglacials, which raises the possibility that dust may be a key player in climate change on glacial-interglacial timescales.

Dust is considered such an important factor in climate change that considerable effort is now devoted to including dust-generating processes in climate models to simulate he impact of dust deposition on marine biota, nutrient cycles and atmospheric CO_2, and, in turn, dust-related feedbacks affecting climate change and biogeochemical cycles. While climate-related changes in dust fluxes are well constrained at high latitudes by ice core records, questions remain about dust fluxes at lower latitudes, where the iron supply by dust is a potential key parameter of the ocean's carbon cycle.

We present eolian dust fluxes to the tropical equatorial Pacific along a zonal transect across the Pacific Ocean along the equator, from the eastern (ODP 849, 110W), to the central (TT013-PC72, 140W) and western (ODP 806, 160E) equatorial Pacific Ocean. Common Thorium (Thorium-232) and terrigenous Helium-4 were used as dust tracers, fluxes were determined by normalizing the proxy concentrations to excess Thorium-230.

The highly consistent reconstruction of the dust flux throughout the tropical Pacific

bears remarkable similarity with global ice volume and with the non sea salt calcium-based dust flux record, reconstructed from EPICA-Dome C [Wolff et al., 2006]. The excellent correlation between the records reflecting changes in dust supply from vastly different regions suggests that a global driver controlled ‘dustiness’ on earth during the last five glacial cycles. The dust flux record provides valuable benchmarks for developing and testing of earth system climate models that include dust representation and feedback.

Reference: E.W. Wolff et al., Nature, Vol. 440, 491-496, 2006