Dust transport pathways and bioavailability of dust emissions from southern Africa

K. KANGUEEHI [1], S. FIETZ [1], A. N. ROYCHOUDHURY[1], F. D. ECKARDT [2], J. VON HOLDT [2]

[1] *Department of Earth Sciences, University of Stellenbosch, South Africa*

[2] *Department of Environmental and Geographical Science, University of Cape Town, South Africa*

Dust deposition to the open oceans can provide bioactive trace metals which, will increase primary productivity and ultimately sequestration of carbon dioxide from the atmosphere thus reducing global warming. This study is one of few to simulate observed dust emissions to determine their long-range pathways from southern African regions. The trace elemental characteristics of the dust from the major emitting sources in southern Africa were determined by focussing on the bulk chemistry, mineralogy and solubility. A continuous flow leaching method and grain size analysis were used to determine the solubility. HYSPLIT modeling was used to determine air mass pathways for major dust emission events observed between 2005 and 2008 (Figure 1). Among the investigated dust sources, Etosha Pan has the finest grain sizes and highest solubility, although bulk trace elemental concentrations is much lower in comparison to the other sources such the Kuiseb River. Iron solubility ranged from 0.01 to 26% for the various dust emitters. Phytoplankton incubation experiments indicated large variability in southern African dust fertilising potential and showed that some of the dust is toxic, possibly due to high concentrations of leached out Cu potentially altering the biogeochemistry of open oceans. Most emissions occur during winter seasons when there low light available for photosynthesis, hence probably not directly stimulating primary productivity. Our findings highlight the need for further research to confirm the deposition and quality of dust in the areas mapped in the present study.

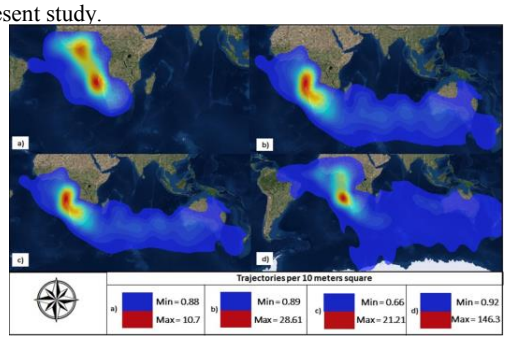

Figure 1: All modelled trajectories for the (a) Autumn, (b) Spring (c) Summer and (d) Winter detected as dust emissions for the period between January 2005 to December 2008

This abstract is too long to be accepted for publication. Please revise it so that it fits into the column on one page.