An aeolian sediment reconstruction of regional wind intensity and links to larger scale climate variability since the last deglaciation from the east coast of southern Africa

M.S. Humphries, C.R. Benitez-Nelson, M. Bizimis, J.M. Finch

PII: S0921-8181(17)30079-6
DOI: doi: 10.1016/j.gloplacha.2017.08.002
Reference: GLOBAL 2618

To appear in: *Global and Planetary Change*

Received date: 17 February 2017
Revised date: 18 July 2017
Accepted date: 1 August 2017

Please cite this article as: M.S. Humphries, C.R. Benitez-Nelson, M. Bizimis, J.M. Finch , An aeolian sediment reconstruction of regional wind intensity and links to larger scale climate variability since the last deglaciation from the east coast of southern Africa, *Global and Planetary Change* (2017), doi: 10.1016/j.gloplacha.2017.08.002

An aeolian sediment reconstruction of regional wind intensity and links to larger scale climate variability since the last deglaciation from the east coast of southern Africa

M.S. Humphries[1], C.R. Benitez-Nelson[2,3], M. Bizimis[2,3], J.M. Finch[4],

[1] *Molecular Sciences Institute, School of Chemistry, University of the Witwatersrand, South Africa*

[2] *Marine Science Program, University of South Carolina, USA*

[3] *Department of Earth and Ocean Sciences, University of South Carolina, USA*

[4] *School of Agricultural, Earth and Environmental Sciences, University of KwaZulu-Natal, South Africa*

[1] *Corresponding author: marchump@gmail.com*

Abstract

Few long-term environmental records are available for southern Africa where shifts in atmospheric circulation and changes in sea surface temperatures interact to influence regional climate dynamics. We present downcore grain size and inorganic geochemistry data covering the last ~23,000 years from a peatland on the east coast of South Africa and examine links between shifts in regional wind activity and palaeoclimatic variability. Our record documents substantial variations in aeolian flux associated with changes in regional climate and wind patterns that reflect larger scale atmospheric circulation patterns. Substantially higher fluxes observed during the Last Glacial Maximum (LGM) are linked to widespread aridification and an expansion in local source areas brought about by a clear shift to dry and cool conditions. Variations in grain size distribution reveal that the aeolian record from Mfabeni comprises two dominant end-members; locally-derived coarse-grained material and a more fine-grained dust component. Marked changes in composition and modal grain size suggest that hydrological shifts in the region during the LGM were accompanied by an increase in storm frequency and wind strength that we link to a northward displacement in the westerly wind belt and a strengthening in wind intensity.