# Processes and Quaternary history of dust dynamics: low-latitude records and global implications

## 2nd meeting of the PAGES ADOM Working Group, Bremen, Germany, 31 October-3 November 2011

Jan-Berend Stuut[1,2], U. Merkel[2] and D.-D. Rousseau[3]

[1]NIOZ - Netherlands Institute for Sea Research, Den Burg, The Netherlands; jbstuut@nioz.nl
[2]MARUM - Center for Marine Environmental Sciences, University of Bremen, Germany; [3]Ecole Normale Supérieure, Laboratoire de Météorologie Dynamique & CERES-ERTI, Paris, France

Understanding the role of mineral dust in the climate system and its radiative impact is expected to reduce existing uncertainties about global climate change. In this context, the PAGES "Atmospheric Dust during the last glacial cycle: Observations and Modeling (ADOM)" working group intends to combine the evidence from aeolian records from continents, oceans, and ice sheets with model simulations of the past atmospheric circulation and modern process understanding.

Following up on the first ADOM workshop (Hyères-les-Palmiers, France, 2009; Rousseau et al. 2009), and the results of the DUSTSPEC meeting (Lamont, USA, 2010; Winckler et al. 2010), it was recognized that there is a specific need for an integration of datasets of dust deposition on land and in the ocean. Furthermore, it has been acknowledged that there are still large gaps in our knowledge on dust processes and dynamics. Open questions exist about emission-related processes at the various sources of dust, dispersion at different altitudes in the atmosphere, deposition on both terrestrial and marine environments and the effects of mineral dust after deposition.

To address these questions, the second ADOM workshop focused on strategies to derive quantitative and physically consistent synoptic reconstructions by integration of dust records, climate observations, and model simulations.

The workshop was organized according to the following themes: (1) Present-day dust, meteorology and remote sensing; (2) Ice, marine, and terrestrial dust archives; (3) Modern and (paleo-) dust modeling; (4) Open discussion on future activities and strategies.

The open discussion raised different questions of importance: Which are the relevant (paleo) sources of dust (a key point for climate model setups)? Are the differences between atmospheric measurements and observations of paleo-dust particle size distributions significant? Which size range should be used in climate models given the fact that present-day observations of particle-size variations cannot be explained in terms of basic physics? How reliable is the reconstruction of wind-strength variations from dust/loess grain-size data given that grain size is also determined and constrained by other factors such as transport-distance and altitude or mixing? Which parameters influence the atmospheric processing of dust, including dry and wet deposition?

Several recommendations resulted from the final discussion. These include a strategic remapping of global soil distributions and the collection of more meteorological and mineral-dust data closer to the dust sources. Methods on dating and the measurement of particle grain size and shape should be standardized, and the definitions of isotope ratios for the characterization of different source regions refined. $^{222}$Rn should be monitored in polar regions to constrain atmospheric transport times. Furthermore, new marine sediment proxies should be developed to constrain the provenance of dust in Antarctica. Seasonal to millennial timescales should be taken into account when studying dust processes and mechanisms. In the context of abrupt climate change, selected Dansgaard/Oeschger events deserve more focus where detailed evidence from ice cores exists. Finally, there is a need for a coordinated exchange of data between the paleo and modeling communities, which should flank ongoing database initiatives such as DUSTSPEC, PASH2 or DIRTMAP.

Almost 50 participants from 10 countries made this workshop a very successful and fruitful one. It was organized by Jan-Berend Stuut, Ute Merkel, and Denis-Didier Rousseau, with sponsorship from MARUM, NIOZ and PAGES. A PAGES newsletter dedicated to the dust topic is planned.

More information:
www.marum.de/dust-workshop2011.html
and
www.pages-igbp.org/workinggroups/adom

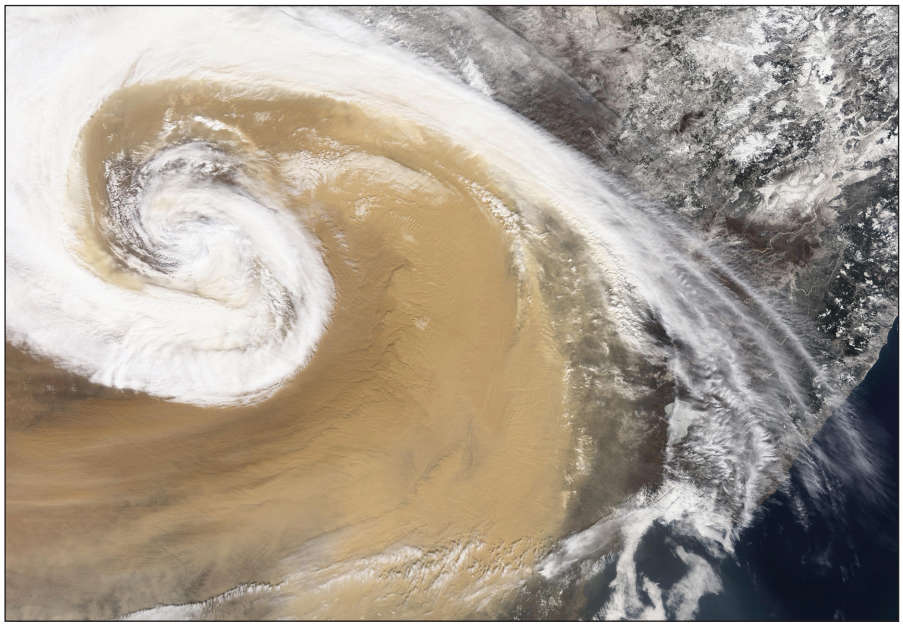

*Figure 1: Dust storm over China in April 2001. Dust from this event crossed the Pacific Ocean and was deposited as far as the Great Lakes region in the USA. Image credit: NASA.*

## References

Rousseau DD, Hatte C , Tegen I (2009) *PAGES news* 17(2): 75
Winckler G, Mahowald N, Maher B (2010) *Eos* 91(40): 360