Geophysical Research Abstracts
Vol. 13, EGU2011-1487, 2011
EGU General Assembly 2011

Data synthesis and modeling of Holocene dust

Samuel Albani (1,2), Natalie Mahowald (2), Gisela Winckler (3,4), Michelle Goman (2), Bette Otto-Bliesner (5), Barbara Delmonte (1), Valter Maggi (1), and David McGee (3)

(1) Department of Environmental Sciences, University of Milano-Bicocca, Milano, Italy , (2) Department of Earth and Atmospheric Sciences, Cornell Univeristy, Ithaca NY, USA , (3) Lamont-Doherty Earth Observatory, Columbia University, Palisades NY, USA, (4) Department of Earth and Environmental Sciences, Columbia University, New York NY, USA, (5) National Center for Atmospheric Research, Boulder CO, USA

Paleodust records provide estimates of dustiness for the pre-observational era, and can be used as paleoclimate proxies for the physical mechanisms related to its cycle, including the environmental conditions in the source areas, the hydrological cycle and atmospheric circulation. In addition mineral dust is an active component of the climate system, with impacts on the optical and chemical properties of the atmosphere as well as on clouds and biogeochemistry. For this reason paleodust records also represent a test for dust-including climate models under climate change scenarios. On the other hand, climate models are physically self-consistent tools to help the understanding of paleodust records.
While dust deposition in the Last Glacial Maximum is extensively studied, much less attention was dedicated to shorter time scales, such as the Holocene, despite the fact that some records show important variations during this period.
Here we present our approach for a database compilation and the preliminary results of our data synthesis.
First, we are collecting a global observational dust database from different paleoarchives, including ice cores, marine sediments, and terrestrial deposits whose temporal coverage and time resolution enclose at least the period around 6 ka BP. We are particularly interested in data of dust deposition fluxes together with grain size range and distributions. This information, together with critical interpretation of paleodust records, allows quantitative estimates of spatial variability in dust deposition, and provides clues for atmospheric transport and deposition mechanisms.
Second, we want to compare the observational dataset with climate model simulations including dust (1) for the Mid-Holocene, which has never been done, and analyze model results to interpret how the dust cycle responds to the peculiar climate conditions of this period and (2) for a sub-period of the Holocene, using a transient simulation to investigate “abrupt” changes in dustiness.
Third, the climatic effect of dust will be studied.