Geophysical Research Abstracts
Vol. 14, EGU2012-6586, 2012
EGU General Assembly 2012

Potential source regions of dust accumulated in northern Africa

S. Wąsowska (1) and B. Woronko (2)

(1) Geography and Regional Studies Department, The University of Warsaw, Warsaw, Poland (s.wasowska@uw.edu.pl), (2) Geography and Regional Studies Department, The University of Warsaw, Warsaw, Poland (bworonko@uw.edu.pl)

Sahara is the largest source of the dust in the world. The material sampled from dust storms in Tunisia (Nefta Oasis, El Kantoui Harbor), north Egypt (Alexandria) and Morocco (Mhamid Oasis) (March 2001, March and April 2009) was taken to identify the potential sources of dust accumulation and transport paths in North Africa. The samples were analyzed on grain size, micromorphology of silt grain surfaces in Scanning Electron Microscope (SEM), elemental composition of grains and their surface crusts, loss on ignition, mineralogical composition of samples and carbonate content. Additionally the meteorological situation was analyzed during the dust storm occurrences and preceding periods.
The results of grain size analyses show that all studied sediments belong to the small dust type, and dust accumulated in Mhamid is the clay mineral agglomerated (CMA) dust. The source of the CMA are the old dry lake beds. Dust particles are mobilized as aggregates of clay minerals, what is controlled by structure (particle packing) of the original lake sediment, and accumulation is dry and wet as well. The results of the analysis of the quartz grain surface micromorphology, the elemental composition and loss on ignition indicate that dust accumulated in Morocco originated from a relatively homogenous sediment source and, on the other hand, dust found in Alexandria comes from a diversified source. Dust sampled in Tunisia is characterized by the highest content of carbonates and organic matter which suggests the intensive dispelling acting on the weathered material from carbonate rocks and local Mediterranean soil covers rich in $CaCO_3$. The analyses of meteorological conditions during the dust storms and the analyses of the textural characteristics of deposits show that it is highly probable that analysed aeolian dust was transported both for shorter and longer distances. Hypothetic source areas of dust accumulated in Mhamid could be the old ergs, some located 300-500 km away like Iguidi and Chech-Adrar, although the most probable source area is Erg Occidental. Tunisian dusts come from vast expanses of Erg Oriental and Chott-el-Jerid. The potential source of the dusts accumulated in Alexandria could be Libyan Desert. This does not preclude also much more distant sources of sediment, as for instance ergs from North Sudan. From the other hand the presence of shell parts of diatoms of the Actinoptychus genus may indicate the dispelling of the Nile alluvium.

Key words: source region, aeolian accumulation, north Africa, textural features of grains, aeolian dust, meteorological situation, Sahara, SEM analysis