Geophysical Research Abstracts, Vol. 9, 00598, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-00598

Determination of the transport direction of dust in the accumulation period of Bag Tephra

B. Bradák and E. Horváth

Institute of Geography and Earth Sciences, Eötvös University, Budapest

Since the beginning of XX century one of the most important fields of study for numerous Hungarian scientists has been the reconstruction of Quaternary environment: that is the direction of the paleowind, the transporting medium of parent material of loess.

One possible approach is the application of anisotropy of magnetic susceptibility (AMS) measurement. The geophysical method to be presented in this paper has been applied since 1960 in the sedimentological investigations to solve the problem of the direction of transportation.

To test AMS on loess-paleosoil sequences, 67 samples were taken from seven loess-paleosoil outcrops. The samples were collected from the loess overlaying the Bag Tephra, which is a characteristic marker horizon in the Hungarian loess deposited in the Middle-Pleistocene ($\sim$350 ka, MIS 10).

Oriented samples were taken from the above mentioned horizon of loess profile, and in the laboratory from these samples $2\times2\times2$ cm "loess cubes" was formed.

KLY-1 Kappabridge instrument had been used to determine the anisotropy of magnetic susceptibility of cubes. The principal susceptibilities (κ_{max}, κ_{int}, κ_{min}) were defined from the results of measurements by computer analysis. The foliation (F), lineation (L) and degree of anisotropy (P) were determined based on the value of principal susceptibilities.

The results were plotted on Jelinek-diagram in order to determine the shape of susceptibility ellipsoid. The direction of principal susceptibilities was illustrated in geographical coordinate system on stereographical projection. The separation of wind blown and reworked loess were based on the statistical methods.

After the AMS measurements a pilot sample was picked out to determine the magnetic mineralogy character by IRM studies from all group of samples.

The lineation was dominant in all of sample group except the samples originated from Basaharc. All of the samples figured in the oblate ellipsoid province of the Jelinek-diagram except five samples from Basaharc, Hévízgyörk and Sióagárd outcrops. The oblate form may be the results of the compaction of the material after the accumulation (Basaharc, Galgahévíz, Hévízgyörk, Isaszeg and Sióagárd) or the reworking (Bag).

The wind blown (Basaharc, Galgahévíz, Hévízgyörk and Isaszeg) and redeposited material were well divided by the statistical analysis. The wind blown material accumulated on a flat (plain) surface. The directions of minimum susceptibilities were not diverged from the 90˚ higher than 10˚ except the Isaszeg samples (see bellow). It means the elongated magnetic minerals “lay down” to the flat palaeosurface. The N-NE/S-SW axis of transport is revealed by the representation of the direction of maximum susceptibilities of wind blown material in geographical coordinate system on stereographical projection. The character of wind blown material and the effect of palaeogeomorphology was indicated in the magnetic fabric of the samples from Isaszeg. May be the wind-channel effect of the Danube valley determine the direction of the transportation of dust, accumulated and sampled in Basaharc and Sióagárd section. This effect was reflected in the dominant N/S axis directionality of the maximum susceptibilities.

The question was, if we can determine the wind direction based on the application of anisotropy of magnetic susceptibility measurements in the accumulation period of Bag Tephra? The possible direction of accumulation and transport was in the N-NE / S-SW axis, but a possible period in MIS 10 is not excluded, when the deflation (wind erosion) could be stronger. This period(s) could appear for example as a hiatus(es) in the loess sequences and can’t be identified by the AMS method.