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Magnetic investigations of Pleistocene sediments from Tuzla section (Taman Peninsula, Russia)

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With the purpose to obtain the new continuous high-resolution record of the relative paleointensity and to determine the possible connection between the geomagnetic field and climatic changes detailed paleomagnetic investigations of the Pleistocene Tuzla section were made. The Tuzla Cliff (Southern Russia) is located on the northern part of the Taman peninsula (45,5 N, 37.9 E). It is made up of the alternation of loess and paleosol layers through the upper ˜4 m. This interval represents approximately the last 50 Ka up to Holocene and corresponds to marine oxygen isotope stages 2-3. The low part is made up of the marine deposits and spanning the time interval from 130 to 70 Ka. This work is devoted to the upper part of the Tuzla section. Rock magnetic properties of the upper part of the Tuzla section show the uniformity in terms of magnetic mineralogy and grain size, suggesting that they may be suitable for relative paleointensity studies. The magnetic mineralogy of selected samples from each stratigrafic level was inferred from IRM experiments. Stepwise acquisition of IRM in fields up to 1.5 T shows that about 90% of the SIRM is acquired at an applied field of 0.3 T. Progressive removal of this SIRM by back-field indicates remanence coercitivity (Hcr) between 35 and 45 mT. The average value S=(-IRM-0.3T)/(IRM+1,5T) is nearly constant and is equal 0.9 for the interval. Beside that the IRM experiments using the method of Lowrie were made. The results indicate that magnetite and slightly oxidized magnetite is the dominant magnetic mineral. Values for the hysteretic parameter ratio Mrs/Ms (0.04 - 0.078) indicate that the magnetic grains are of PSD size. The ratio ARM/SIRM is rather constant over the whole profile. This indicates that the grain size variations are not very strong in general. The variation in the concentration of magnetic minerals typically can be monitored by the measurement of K and SIRM.

For Tuzla sediments both ratios of maximum to minimum values of K is equal 1.8 and SIRM is equal 2.9. Brief, the uniformity of rock magnetic results in terms of magnetic mineralogy, concentration and grain size is well within the criteria proposed by King for relative paleointensity studies. VRM is usually easily removed by AF demagnetization. All collection of the samples (2 samples from the level) was AF demagnetized from 15 to 30 mT. The mean direction calculated after AF demagnetization is close to the expected value for an axial-dipole field at the sampling site. After AF demagnetization distinct region with anomalous paleomagnetic direction was observed at 35-27 Ka, which correspond to the Mono excursion. For receiving the values of the relative paleointensity the NRM after thermal or AF demagnetisation was normalised on the magnetic susceptibility K, SIRM and ARM. The correlation between the various normalized records is always strong ($r>0,91$). The curves are in a good agreement with the curves of the relative paleointensity: world synthetic curves Sint-800 and VADM-21 and the Roxolana paleointensity curve but show some dissimilarity. Thus this discrepancy may be explained by climatic changes and the resulting effect on the NRM. This work was supported by INTAS fellowship grant for young scientists no.03-55-2310.