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Magnetic susceptibility distribution in lake sediments inferred from short cores collected in the Danube Delta and Razim – Sinoie Lagoonal Complex. I. Results from deltaic lakes

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The composite paper (in two parts) is focused on the enviromagnetic results obtained on short cores collected from deltaic and lagoonal lakes, located in the very important wetlands of the Southeastern Romania, *i.e*. the Danube Delta and Razim (Razelm) – Sinoie Lagoonal Complex. Hence, by using a transparent Hydro-Bios corer, sediments up to ca 56 cm depth were sampled from various aquatic ecosystems. The sedimentary environments investigated in the Danube Delta are located in the interdistributary depressions from both the Fluvial Delta Plain (e.g., *Lungu L*., *Cuteţchi L*., *Uzlina L*., *Isacova L*., *Matiţa L*., *Babina L*.) and the Fluvio-Marine Delta Plain (e.g., *Puiu L*. and *Roşu L*.). As regards the lagoonal complex, the magnetic susceptibility (MS) was measured for a series of short cores that were taken out from its four main lakes, *i.e*. *Razim* (*Razelm*) *L*., *Goloviţa L*., *Zmeica L*. and *Sinoie L.* The results from the deltaic lakes are only under attention in this first part of the composite paper.

The sediment cores were cut at an adequate number of slices in order to study the vertical distribution of the magnetic susceptibility, by measuring this enviromagnetic parameter in the laboratory, for each sediment packet collected from the respective sampling intervals.

Firstly, the results reveal the reliable correlation between the lithological description of the core sediments, made on board of the research vessels, and the MS regime determined in the lab. Also, the data make possible to compare the magnetic susceptibility characterisation of the bottom sediments, sampled with the grab sampler (e.g., RĂDAN & RĂDAN, 2009, 2010), with the MS data associated with the first 10-30 cm of sediments collected from the upper half of the cores, taken out from the same places within a lake. More interesting, yet, are the variations in the magnetic susceptibility regime along the cores, in many cases being observed the increasing of the enviromagnetic parameter "intensity" from the upper towards the lower parts (an example, in Fig. 1a). Even in the lakes characterised by "confined sedimentary environments" (RĂDAN & RĂDAN, 2009, 2010), k values assigned to the MS classes III, IV and V (k scale, in RĂDAN & RĂDAN, 2007; see also Fig. 1f) were measured on the sediments sampled from the depth interval 35 – 55 cm, while for those collected from the first 10 – 30 cm, the magnetic regime showed a lower k "intensity" level (defined by the MS classes I and II). Such data demonstrate the capability of the investigated magnetic parameter as sedimentogenetic indicator, the higher k values being possible to be correlated with the interception of a underwater sandy bar. On the other side, the lower k values measured on the sediment samples collected from the upper part of the cores are usually related to the muds with fine vegetal (organic) detritus and/or with shell fragments (e.g., RĂDAN & RĂDAN, 2010). Based on the values of the enviromagnetic parameter (k) and of the contents of the lithological components (i.e., TOM – Total Organic Matter; CAR – Carbonates; SIL – Mineral/Siliciclastic fraction), achieved for the samples collected from the different levels of the cores (Fig. 1a, b, c), several correlation coefficients (r) were calculated (an example, in Fig. 1d, e).

Beside of these applications, the vertical distribution of the magnetic susceptibility associated with the cores clearly illustrates the particular characteristics of the two main "sedimentary environments" that are developed within the Danube Delta lakes: the "confined sedimentary environments" *vs* the "dynamic sedimentary environments". The magnetic susceptibility data base, obtained by the investigation of the cores collected during the last five years, and which will be further completed, is also useful to make attempts to carry out lithological correlations inside of a lake or between the lakes. The future results will give complementary contributions in this respect. At the same time, the MS regimes achieved for the numerous short cores make possible to compare the sedimentary environments characterising the deltaic lakes with those from other aquatic areas, e.g. from the lagoonal lakes, where a series of results have been achieved as well (to be presented in the part II of the composite paper).

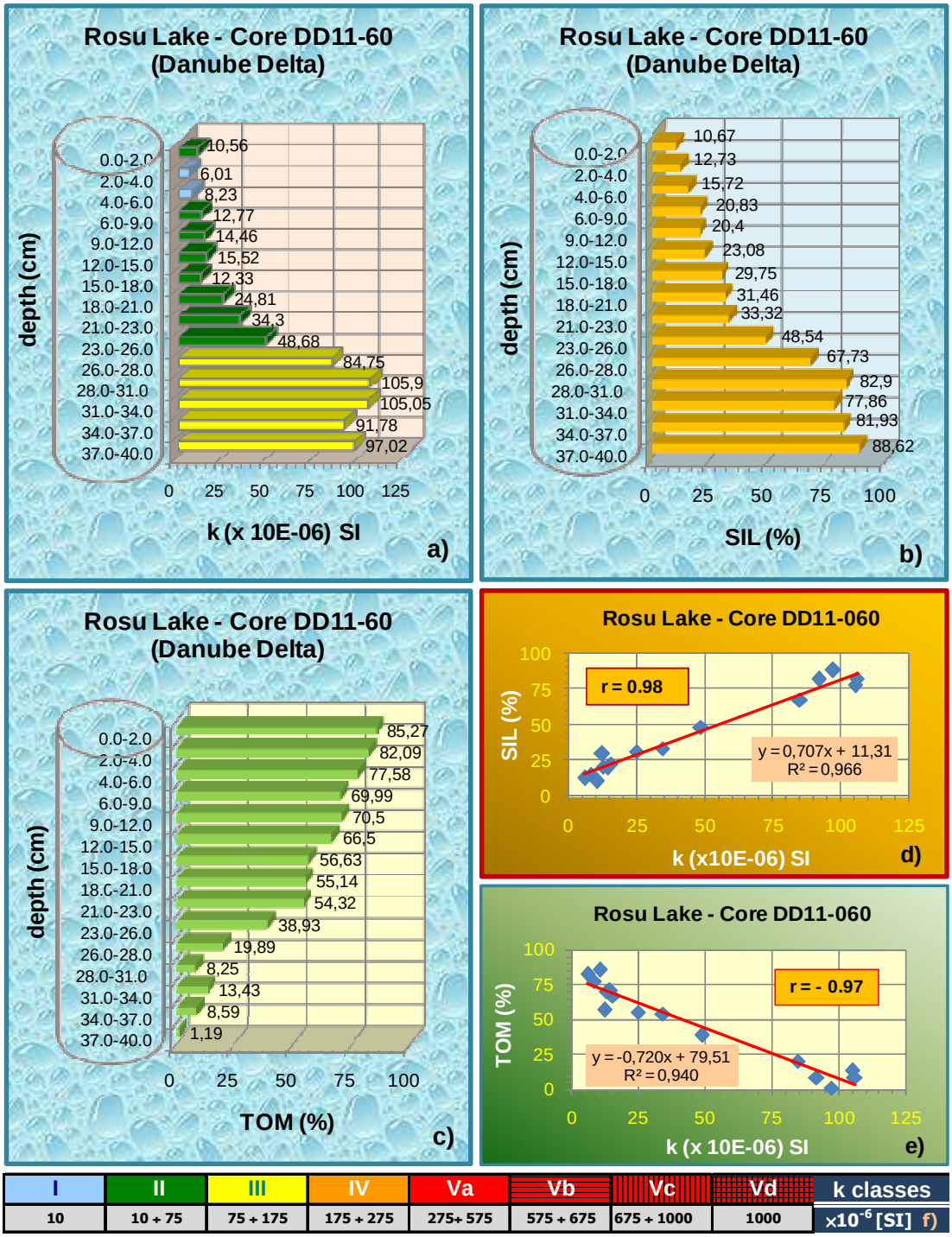

Fig. 1: An example of magneto-lithological model showing the vertical distribution of magnetic susceptibility [k] (a) and of two lithological components (b; c) along a short sediment core (DD 11-60) collected from the Roşu Lake, during the 2011 cruise in the Danube Delta. d) and e) correlation coefficients (r) for SIL vs. k and respectively, TOM vs. k; f) magnetic susceptibility scale (RĂDAN & RĂDAN, 2007), used to calibrate the recent sediments. Note: SIL – Mineral/Siliciclastic fraction; TOM – Total Organic Matter (see text).

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