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Anisotropies of magnetic susceptibility and of magnetic remanence in weakly magnetic sedimentary rocks of the Intracarpathian Palaeogene and their deformational implications

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All minerals in a rock contribute to fabrics defined by the anisotropy of magnetic susceptibility (AMS). In weakly magnetic sedimentary rocks, the strongest contributors are paramagnetic minerals, predominantly represented by clay minerals, as well as ferrimagnetic minerals typically represented by magnetite and/or maghemite. On the other hand, ferrimagnetic minerals solely control the anisotropy of magnetic remanence (AMR). An investigation of both AMS and AMR therefore helps one to reveal and untangle the deposition, diagenesis, and deformation histories of the paramagnetic and ferrimagnetic minerals present in a rock.

Palaeogene sandstones within the central areas of the Central Western Carpathians have primarily sedimentary AMS fabrics with magnetic foliations mostly within the bedding plane. Towards the NW margin of the Central Western Carpathians, some of the foliations are deflected away from the bedding plane, indicating an influence of Miocene tectonic deformation that "overprints" the sedimentary fabric. Just at the margin of the Central Western Carpathians, near the boundary with the Outer Western Carpathians, the tectonic overprint is very strong. There, the AMR magnetic fabric is often coaxial with the AMS magnetic fabric, but the two fabrics sometimes deviate. Interestingly, it seems that the ferrimagnetic minerals are more sensitive to deformation than the paramagnetic clay minerals. The deflections of AMR magnetic foliations from the AMS magnetic foliations are significantly higher in the direction of strata shortening than in the perpendicular direction. This is interpreted in terms of higher sensitivity of the ferrimagnetic minerals to deformation-induced reorientation than that of the paramagnetic clay minerals.