Abstract

The Earth's magnetic field has been in constant change, which has caused secular variations and magnetic reversals. The polarity reversals occur when the magnetic north and south poles fully switches while secular variations are more frequent changes and wiggles in the field. Therefore, examining the history of the geomagnetic field is essential to our understanding of its evolution reflecting the dynamic non-linear processes that generate the geodynamo. Sediments record the geomagnetic field behavior and thus are an important information source for investigating magnetic reversals and paleosecular variations throughout geological history. We use the paleomagnetic method to extract the information of geomagnetic field components from sediments. However, this is not always as easy as it sounds. Paleomagnetic records from sediments are very sensitive to past depositional and environmental changes. Possible effects of these two can alter or destroy the original magnetic record. Therefore, sediments need to be examined in detail using rock magnetic analyses. The substantial amount of rock magnetic data coupled with paleomagnetic data can identify whether there are any specific relationships between the remanence acquisition process, and environmental changes. Thus, this doctoral thesis aims at investigating the relationship among magnetic reversals, paleosecular variations, sedimentary magnetic recording, and disturbance on paleomagnetic record through 3 published papers and one unpublished manuscript. The first study investigates the recent paleosecular variations in the geomagnetic field during the Holocene period from the lacustrine record of the Upper Toporowy Lake in the Polish side of the Tatra Mts in Central Europe. The main results emphasize that the frequent fluctuations in the geomagnetic field reflect strong regional non-axial-dipole fields in Central Europe and should be investigated in more detail in the future. The second study examines the magnetic pole transition during the Matuyama-Brunhes magnetic reversal from a cave sediment section in the Za Hajovnou Cave in the Moravia region of the Czech Republic in Central Europe. The main findings provide a precursor event of the reversal as the signature character of the geomagnetic field in terms of identifying magnetic reversals just before the pole transition. The third study investigates the effect of sulfur diagenesis, which complexes the sediment magnetostratigraphy and the examination of the geomagnetic field behavior in sedimentary paleomagnetic records, on the lake sediments of the Most Basin in NW Czech Republic in Central Europe. The main results indicate that the growth of diagenetic greigite, as an iron sulfide mineral, causes disturbance on sedimentary paleomagnetic records due to a delayed chemical remanence acquisition. The fourth study investigates a remagnetization event caused by a late diagenesis and its consequences on

magnetostratigraphy of the Jurassic-Cretaceous boundary in the Rettenbacher marine section from Northern Calcareous Alps, Austria in Central Europe. The main results show that the intensity of disturbance in the magnetic mineralogy and paleomagnetic record depends on the change in the level of reductive diagenesis. Magnetic data indicate extensive normal polarity remagnetization event with substantial clockwise tectonic rotation. To sum up, from a local perspective, the results in this thesis have contributed to the chronostratigraphy of various geological formations in Central Europe. When viewed globally, these new paleomagnetic records have contributed to the improvement of spatial and temporal data distribution for a deeper understanding of the geomagnetic field behavior from sedimentary paleomagnetic records.