

Reduction of spurious magnetic phases in thermomagnetic experiments of sedimentary rocks using reductive chemical treatments.

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Sedimentary rocks often have secondary components of chemical remanent magnetizations (CRM) during post depositional processes, lithification, diagenesis, and/or later chemical events, in addition to primary detrital remanent magnetization (DRM). These secondary components are carried by secondarily formed minerals of iron-oxides, hydroxides, and/or sulfides. The secondary minerals often have a large thermal alteration during thermal demagnetization experiment. Thermal alterations at higher temperature steps often introduce large laboratory-CRM, which masks the primary component. Those CRM acquired in the furnace could be reduced by removing secondary magnetic minerals by metasomatism or weathering using reductive chemical demagnetization. In this paper, we show the results of thermomagnetic analyses of samples from the Upper Cretaceous Ezo Group, in order to see whether the RCD is effective reducing such spurious magnetic components.

A pair of chip samples were prepared from paleomagnetic cores. One of the chip samples was subjected to RCD, and the other remain intact. The RCD is performed by dipping the chip sample in the etchant for 72 hours (recipe: Ascorbic acid 5%, buffered by sodium bicarbonate, and adjusted to pH= ~5.6, ORP= -150 to -50 mv). Strong-field thermomagnetic analyses were conducted on both chip samples with and without the RCD. Thermomagnetic curve of the samples without RCD show 4 types of thermal alternation behavior. Type-A: magnetization (Js) drops at 150°C and then decreases smoothly to zero at 580°C. Type-B: Js drops at 210°C and it gradually decreases to zero at 580°C. Type-C: Js increases around 400°C. The increase of Js makes a peak at 450°C and then Js gradually decreases to zero at 580°C. Type-D: Js increases at 210°C and 400°C. The increases of Js make peaks at 250°C and 450°C, and then it slowly decreases to zero at 580°C. Abrupt increases of Js around 200°C and 400°C were not observed for the RCD sample, while the Js drops at 150°C and 580°C are the same as those observed for the samples without RCD. These results suggest that the iron-containing minerals, which changed to minerals carrying CRM around 200 and 400°C, had been effectively removed by RCD. The results suggested that the RCD pretreatment may suppress thermal alteration of sedimentary rocks. This approach has potential in effective reducing spurious secondary magnetic components, however, it remains not to be determined that the relation with the thermal alteration and spurious magnetic components. Further paleomagnetic research is required.

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