



Neoformed magnetic minerals as an indicator of moderate burial: the key example of Late Paleozoic sedimentary rocks, West Virginia, USA

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In order to help unraveling the thermal history of Late Paleozoic sedimentary rocks in West Virginia, a rock magnetic study was conducted with a focus on the Marcellus Shales which are of interest for petroleum exploitation. Vitrinite reflectance, fluid inclusions microthermometry data and conodont alteration index yield contradictory burial temperature within the range 150°C-250°C. The characterization of magnetite and pyrrhotite, among other magnetic minerals, may be used as an index to track burial temperature around 200°C. Low temperature and room temperature magnetic measurements were performed in order to determine the magnetic assemblage. Three magnetic assemblages were identified which were stratigraphically distributed. The goethite + nanosized magnetite (S1) assemblage is mainly found in the Clinton Group – Oriskany Sandstone stratigraphic interval. Nanosized fraction of magnetite and pyrrhotite (S3) assemblage essentially constitutes the Needmore Shale – Chemung Group sequence. Microsized pyrrhotite is the typical mineral for S2 that is only identified near the Alleghanian Structural Front. Overall, the lack of micron pyrrhotite in our samples suggests that the study area has not experienced burial temperatures higher than 200°C.