

Trace element abundances in Doushantuo cap dolostones from platform and slope settings, Yangtze Platform, South China

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Shallow and deep water facies cap carbonates of the Ediacaran Doushantuo Formation (Yangtze Platform, South China) were studied to evaluate the extent of diagenetic alteration and to assess temporal and spatial variations of Ediacaran seawater chemistry. The mineralogical composition and textures of the samples were prescreened using SEM and XRD, and 20 mg sample aliquots were obtained by drilling into presumably unaltered domains of polished rock chips. For analysis of major and trace element concentrations and Sr isotopic composition, sample powders were leached in 10 % acetic acid.

REE+Y patterns of deep water cap dolostones from a slope section (Huanglian section, Songtao, Guizhou Province) have high Y/Ho_{PAA5} ratios up to 1.9 and Pr/Yb_{PAA5} of 0.45 to 0.8 and may reflect relatively undisturbed seawater signatures. In detail, the base of the section shows a relative enrichment in MREE, no Ce anomaly and a positive Eu anomaly (1.2). The middle part of the section displays weak negative Ce anomalies (Ce/Ce* = 0.8-0.9) whereas the upper part of the section shows no Ce but a small positive Eu anomaly. These results are in contrast with data from nearby Panmen section [Becker et al., this meeting], where no or positive Ce anomalies are obtained from acetic acid leachates of cap dolostones.

REE+Y patterns of cap dolostones of the shallow water facies from Hubei Province (Tianjiayuanzi, Wuhe-Gaoxi, Jijiawan sections) are flat to variably depleted in the LREE and show variable Y/Ho_{PAA5} (1-1.3) or Ce/Ce* (1-1.4). These results are different from the shallow water section at nearby Jiulongwan section (Hubei Province), the latter displaying prominent negative Ce anomalies [1]. The most compelling explanation for the section to section variability in REE+Y systematics in both shallow and deep water sections is the variable influence of secondary processes such as diagenesis and fluid flow. ⁸⁷Sr/⁸⁶Sr ratios in deep water cap dolostones at Huanglian range from 0.7246 right above the diamictites and drop to values of 0.7175 at the top of the section. The ⁸⁷Sr/⁸⁶Sr ratios of cap dolostones from the shallow water sections are lower (0.7081 - 0.7113) and similar to recently published data for the Three Gorges Area [2]. Samples from slope sections show a strong overprint by hydrothermal fluids containing very radiogenic Sr, with limited redistribution of REE+Y. Cap dolostones from shallow water sections also reveal variable redistribution of REE+Y abundances. These observations indicate decoupling of REE+Y behavior from fluid mobile elements such as Sr or O. SEM work is helpful in the identification of homogeneous carbonate domains, but it does not guarantee that such domains have retained pristine compositions.

[1] Huang et al. (2009) *Chinese Science Bulletin* **54**, 3295-3302.

[2] Sawaki et al. (2010) *Precambrian Research* **176**, 46-64.

C-, O- and Sr-isotopes in marbles from the Eastern Alps

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Introduction

Marbles of the polymetamorphic, medium-grade, greenschist to eclogite facies Koralpe-Wölz nappe system (Eastern Alps) were investigated regarding their geochemical and isotope compositions. Focus was set on a characterization of different lithostratigraphic units by their distinct compositions and a comparison of revealed chemostratigraphic information with un- to weakly metamorphosed equivalents of the Austroalpine and Southalpine units.

Results and conclusion

Geochemical screening of the marbles using Mn/Sr, Rb/Sr-ratios and C-, O- and Sr-isotope signals, which reflect the diagenetic and metamorphic imprints, allows distinguishing between primary compositions and altered samples, as can be expected from highly metamorphosed metacarbonates. A limiting factor for Mn/Sr is proposed by ≤ 2 and for Rb/Sr by ≤ 0.02 . The upper limit of primary Sr-values is given by 0.709250 reflecting the highest Sr-seawater value. Feasible samples with regard to C- and O-isotope contents fall within -1 to 4 and -8 to 0, respectively. Mn/Sr-ratios scatter in a range of 0.036 and 2.814, from which just 4 samples exceed values above 2. The Rb/Sr-values vary between 0 and 0.132 (17 samples exceeding the upper limit). Two distinct groups of marbles, based on isotope compositions and different alteration signals, are present. Group I is characterized by relatively low and solely slightly variable Sr-values between 0.707997 and 0.708465. However, these marbles possess strongly scattering $\delta^{18}\text{O}$ (-11.08 - 0.10‰) and $\delta^{13}\text{C}$ -data (-1.58 - 4.78‰). Group II shows Sr-ratios above 0.708556 with a maximum at 0.711090. $\Delta 18\text{O}$ -values of this group are strongly scattering (-12.95 - -4.01‰), whereas $\delta^{13}\text{C}$ -isotope signatures fluctuate in a narrow span between -0.9 and 2.02. Due to best fitting geochemical and isotope constraints, marbles of at least two lithostratigraphic complexes, namely the Rappold and Millstatt Complexes, reflecting group I and group II respectively, are interpreted to possess most likely primary geochemical signatures.

These best preserved samples were used for further chemostratigraphic interpretation by means of a correlation with isotope seawater curves. For marbles of group I a depositional age in the late Early to Middle Devonian (400-385 Ma) is indicated. For metacarbonates of group II a sedimentation in the latest Silurian to Early Devonian (420- 405 Ma) is concluded.

Based on the depositional age, geochemistry and on its lithological successions, group I occurring in the southeastern part of the Austroalpine unit show similarities with the directly overlying Graz Palaeozoic, whereas units of group II which is present further north and west can be attributed to the other weakly metamorphosed Palaeozoic sequences of the Austroalpine and Southalpine units.