# Metasedimentary rocks as indicators of crustal growth

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Results of Sm-Nd isotopic analyses and U-Pb dating on metasedimentary rocks of two main basement uplifts of western part of the Siberian Craton (illustrated by paragneisses of Angara-Kan granulite-gneiss block of the Yenisey Ridge and Irkut granulite-gneiss block of the Sharyzhalgai Uplift) were summarized to constrain provenance of metasediments, time of sedimentation and finally to determine stages of crustal growth.

Sm-Nd model ages of rocks under consideration ($T_{Nd}$ (DM)=2.4-3.1 Ga for the Sharyzhalgay Uplift and 2.4-2.8 Ga for Angara-Kan block) indicate presence of the Archean and Paleoproterozoic sources in the provenance [1, 2]. As regarding U-Pb data on zircons there are three detrital core age groups (≥2.7, 2.3, 1.95-2.0 Ga) in rocks of the Sharyzhalgai Uplift and cores varying in age from ~2.6 to ~1.9 Ga in rocks of the Angara-Kan block [3, 4]. The age of metamorphic rims of ca. 1.85-1.86 Ga in both cases determines the upper boundary of sedimentation and together with the youngest core ages brackets sedimentation time between 1.85 and 1.95 Ga for the Irkut block and 2.0-1.9 and 1.86 Ga for Angara-Kan block.

Potential source areas for ancient mainly Neoarchean material might be rocks of the exposed basement of south-west margin of the Siberian Craton. Presence of juvenile Paleoproterozoic crust in source area is indicated by minimal values of model Nd ages of paragneisses in common with prevail Paleoproterozoic detrital zircon cores. These Paleoproterozoic juvenile crustal sources may have been presented by buried basement of western part of the Craton, where model Nd ages of 2.3-2.4 Ga for granites and 2.8-3.4 Ga for gneisses were determined by Kovach *et al.* [5].

Finally, examined Sm-Nd and U-Pb isotopic data allow to identify derivation of detritus from buried and exposed basement of the Siberian Craton and determine the Archean and Paleoproterozoic stages of crustal growth within the Siberian Craton.

[1] Turkina & Urmantseva (2009) *Lithology & Mineral Resources* **44**(1)**,** 43–57. [2] Nozhkin *et al.* (2008) *Dokl. Earth Sci.* **432A**(9), 1495–1500. [3] Urmantseva & Turkina (2009) *Acta Geol. Sinica* **83**(5), 875–883. [4] Urmantseva (2010) *IAGR Conf. Series* **9**, 18–19. [5] Kovach *et al.* (2000) *Petrology* **8**(4), 353–365.

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# Nanoscale observations of dolomite dissolution

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The dissolution of carbonate minerals plays a fundamental role in a large spectrum of geological and biological processes as e.g. the global carbon cycle, and biomineralization. Moreover the understanding of carbonate dissolution is essential in the preservation of the Cultural Heritage and building stone. Among other carbonates, calcite ($CaCO_3$) and magnesite ($MgCO_3$) dissolution has been thoroughly investigated over a range of environmental conditions and solution compositions. In contrast, there is a significant lack of understanding of the molecular-scale reaction mechanisms of dolomite ($CaMg(CO_3)_2$) [1]. In this work we present a systematic *in situ* Atomic Force Microscopy (AFM) study of dolomite dissolution in the pH range 3 to 10 aimed to unravel the nanoscale processes governing dolomite-fluid interactions. Dolomite dissolution under neutral to alkaline pH seems to be controlled by the removal of dolomite layers by spreading and coalescence of shallow etch pits, nucleated at point defects or in defect-free areas. Overall dolomite dissolution rate ($R_{AFM}$) values were nearly pH-independent in the range 5 to 10 ($7\text{-}9\cdot10^{-13}$ mol·cm$^{-2}$·s$^{-1}$), while a slight increase in $R_{AFM}$ values was observed at $pH < 5$ ($10\text{-}17\cdot10^{-13}$ mol·cm$^{-2}$·s$^{-1}$). At all pHs (and particularly at $pH < 5$) the formation of a Mg-rich surface precipitate (most probably nesquehonite) was detected. Our results suggest that the mechanism of dolomite dissolution inferred solely from measurements of the solution chemistry could be misestimated as a consequence of the precipitation of such a secondary phase, particularly at acidic pHs.

[1] Ruiz-Agudo *et al.* (2011) *Chem. Geol.* **281**, 364–371.