DETAILED CLAY MINERALOGY OF THE TRIASSIC-JURASSIC BOUNDARY IN THE EIBERG BASIN, AUSTRIA AT TWO LOCATIONS (KENDLBACHGRABEN AND THE GSSP AT KUJOCH)

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To help constrain scenarios for the Triassic-Jurassic boundary events, we obtained a temporally highly resolved, multidisciplinary dataset from the Kendlbachgraben section in the Northern Calcareous Alps in Austria, and also investigated a few samples from the same stratigraphic position from the newly selected base Jurassic GSSP (Global Stratotype Section and Point) at Kuhjoch. Both sections belong to the same paleogeographic unit (Eiberg Basin) and share similar stratigraphies. Here we present our observations on clay mineral.

Samples from the Kendlbachgraben section were investigated for detailed clay mineral determination (ZAJZON *et al.*, 2012). Swelling and heating experiments and cation exchange (Mg and K) were carried out on oriented samples. Observed clay minerals are ~15 Å smectite (Mg > Fe), together with vermiculite (K-bearing) and chlorite (Fe > Mg) (14.2–14.5 Å), illite and kaolinite. The identified "14 Å type" minerals are Mg-dominant, with varying Fe, K and Ca content. Chlorite is evident only after heating the samples to 560°C and diminishes upwards in the section. Kaolinite is dominant in the boundary marl, and shows a decrease in quantity and degree of crystallinity upwards in the section. Cation exchange and glycerol saturation indicates the mixing of high and low layer charge smectites with the dominance of the high-charge type. Vermiculite is of the low layer charge, expanding type.

The topmost sample of the Triassic Kössen Formation has a very different clay mineral content compared to the other samples. It contains dominantly high-charged smectite and also vermiculite. These clay minerals may be formed by the alteration of mafic and ultramafic rocks. Upwards in the section smectites has a Ca–Na enrichment and vermiculite (chlorite) becomes dominant. In the boundary shale the clay mineral distribution is the following: kaolinite≥ illite + muscovite >> smectite. This suggests weathering under humid climate, and intensive terrigenous input. Above the boundary interval the clay mineral pattern changes to illite + muscovite >> kaolinite >> smectite, which corresponds to a less humid, mainly moderate climate.

Some pale-green, opaque or slightly transparent grains, 70–80 µm in size, are found in the topmost layer of the Triassic Kössen Formation. Their shapes vary from the perfectly spherical (Fig. 1) to the angular. They are identified as illite/aluminoceladonite, their average EDX composition is $K_{0.49}Na_{0.08}Ca_{0.07}Mg_{0.65}Fe^{2+}_{0.07}Al_1Fe^{3+}_{0.41}[Al_{0.4}Si_{3.6}O_{10}(OH)_2]$. They presumably represent alteration products of volcanic material, on the basis of their shape and size. Most probably the rounded grains were altered from volcanic glass material.

Similar features can be observed also at Kujoch, the GSSP section. The mineral and clay mineral spectra are similar to the Kendlbachgraben section. The kaolinite content gradually increases in the basal part of the boundary shale ("Grenzmergel"). Similar pale-green spherules with the similar shape and size also can be found in this section in the same horizon (bottom of the boundary shale). The clay mineralogical features correlate well between the two sections, thus the observed features have at least regional extent throughout the Eiberg basin, but they likely represent global changes at the Triassic-Jurassic boundary interval.

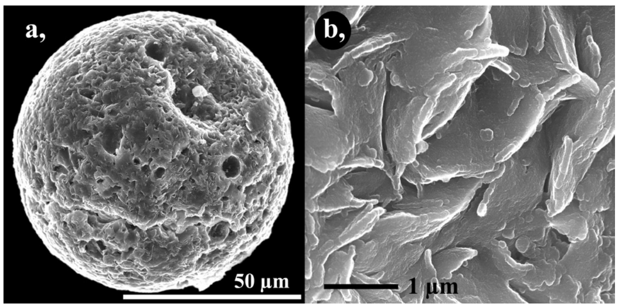

Fig. 1. *a: SE image of a pale-green clay spherule; b: enlarged surface of the same spherule.*

Reference

ZAJZON, N. *et al.* (2012): Clay Minerals, 47: in press.