MINERALOGY AND GEOCHEMISTRY OF THE CARNIAN (LATE TRIASSIC) OF THE GERECSE AND BALATON HIGHLAND BASINS, HUNGARY: IMPLICATIONS FOR PALEOENVIRONMENTAL CONDITIONS DURING THE CARNIAN PLUVIAL EVENT

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The Upper Triassic sediments both in NW Europe and in the Mediterranean region imply a generally arid climate regime which is reflected in the formation of evaporites and extensive dolomitization of platform carbonates. However, in the Carnian, a humid phase is assumed by many authors (e.g., RIGO *et al.,* 2007), based on various humidity-aridity paleoclimate proxies. In the western Paleotethys, it is more or less coeval with the demise of rimmed carbonate platforms and an exceptional high input of siliciclastics (GIANOLLA *et al.,* 1998). In the different parts of the Germanic Basin, deposition of mudstones, marls and evaporites of the Keuper was interrupted by sediments composed of dominantly fluvial sandstones (SIMMS *et al.,* 1994). Moreover, coal seams formed within Carnian deltaic successions of the Northern Calcareous Alps. This event was attributed to an increase in precipitation of regional significance (SIMMS & RUFFELL, 1989), and thus called “Carnian Pluvial Event” (CPE).

In this presentation, mineralogical and geochemical characteristics of Carnian (Late Triassic) marly sediments (Veszprém Marl Formation) of the Gerecse and Bakony (Transdanubian Range, W Hungary) are discussed and the results interpreted in a paleoenvironmental framework. 180 samples from four boreholes (Balatonfüred Bfü–1, Mencshely Met–1, Veszprém V–1 which are located in the Balaton Highland and Zsámbék Zs–14 from the Gerecse Mountains) were analysed by X-ray powder diffraction, XRF and ICP-MS to determine the mineralogical and chemical composition.

A relationship can be identified between lithology and clay mineral content in the studied successions; carbonate-rich intervals are enriched in illite/smectite mixed-layer phase (IS), while carbonate-poor intervals show illite-rich composition. This difference can be interpreted as a result of fluctuations of terrigenous input and/or sea-level changes. Kaolinite enrichments (~10–20%) in the clay fraction of the lower part of Mencshely Marl Member can be regarded as a manifestation of the climate shift from the prevailing aridity to the more seasonal climate with enhanced humid season. The large amount of smectitic clay (transformed to IS) could be partly derived from transport of weathering products from a distant source area and, subordinately, from diagenetic alteration of intermediate to basic volcanic rocks.

Based on different paleoredox and paleoproductivity proxies, periods of elevated degree of productivity and related poor oxygenated bottom water conditions can be proven in the studied successions located in the Balaton Highland. Contrarily, enhanced productivity is not evidenced in the Zsámbék Basin where the bottom water anoxia could be caused by a barrier related sluggish circulation. These features seem to be controlled by enhanced freshwater runoff, probably triggered by the CPE. Traces of transport of volcanic matter are apparent in the Mencshely Met–1 core as suggested by the presence of albite, elevated concentration of the rare earth elements and enrichment in Zr, Hf, Y, U, Ta and Nd.

On the basis of mineralogical and geochemical results of the Veszprém Marl Formation, a drastic change in the sedimentation is represented by these marl-dominated basinal sediments, which could have resulted from a composite effect of climatic change, sea-level variation and tectonism.

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References

GIANOLLA, P., RAGAZZI, E. & ROGHI, G. (1998): Rivista Italiana di Paleontologia e Stratigrafia, 93: 331–347.

RIGO, M., PRETO, N., ROGHI, G., TATEO, F. & MIETTO, P. (2007): Palaeogeography, Palaeoclimatology, Palaeoecology, 246: 188–205.

SIMMS, M.J. & RUFFELL, A.H. (1989): Geology, 17: 265–268.

SIMMS, M.J., RUFFELL, A.H. & JOHNSON, A.L. (1994): In: FRASER, N. & SUES, H.D. (Eds.): In the Shadow of the Dinosaurs. Cambridge University Press, 352–365.