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Blatt 96 Bad ischl

Bericht 2008 über Paläokarst-Phänomene im zyklischen Dachsteinkalk der Gretl-Rast auf dem Dachstein Plateau auf Blatt 96 Bad Ischl

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The Dachstein plateau is made up of Norian-Rhaetian cyclic Dachstein Limestone characterised by an alternation of peritidal and inner platform lagoon facies. In accordance with the aim of the work, exposures of the cycle boundary intervals i.e. the disconformity surfaces, the altered topmost part of the cycles and the usually variegated basal layers of the overlying cycles were selected for detailed observations and sampling. In the Gretl-Rast section a set of beds is exposed along a protected trail between Oberfeld and Wiesberghaus (N 47°30'55.5", E 13°38'55.6"). Widening of this trail improved the exposure conditions just at the critical part of the succession. Results of the microfacies studies are also presented.

The Gretl-Rast section represents an excellent example for a karstified cycle termination and peritidal deposits at the base of an overlying cycle.

Light brownish grey limestones containing several megalodonts are exposed in the lowermost part of the interval studied (Bed 1). It shows a bioclastic wackestone texture with micropeloidal microsparitic matrix. The bioclasts are molds of bivalves, gastropods and foraminifera. In some irregular patches, tiny solution pores are visible among the grains. Solution voids formed by enlargement of the moldic pores are also common. In larger pores geopetal fill occurs. This bed was formed under shallow subtidal conditions on the low- to medium-energy inner platform (C-facies). The carbonate sediment was subject to meteoric diagenesis, subsequently.

Bed 2 is macroscopically similar to the previously described, but it contains small solution cavities and dissolved megalodonts filled by dark red micrite. Peloidal wackestone-grainstone was the original texture but there are a lot of cm-sized solution cavities with geopetal fill. In the sample studied, the volume of the cavity fill exceeds the volume of the host rock. The internal sediment in the cavity fill is patchy micrite-microsparite in which thin-shelled ostracodes are common. The remnant parts of the cavities are filled by sparry calcite. The low-energy subtidal zone of the inner platform was the depositional area (C-facies). The more or less consolidated deposit was subject to intense karstification in the course of the subsequent subaerial exposure. The cavities were filled by ostracode-bearing mud probably of tidal flat pool origin, and meteoric cement subsequently.

The overlying Bed 3 is somewhat darker then the previous one, but macroscopically similar. Its texture is packstone, containing molds of mollusc fragments and foraminifera and oomolds. There are a few intraclasts. Solution pores formed by enlargement of moldic pores are common. They usually have geopetal fills. In some cases microbial encrustation was observed on the upper wall of the cavity i.e. above the sparry calcite of the geopetal fill. In the uppermost 20–50 cm of this bed there are a number of cm-sized karstic solution cavities that are filled by red argillaceous micrite. Under the microscope thin-shelled ostracodes were found in the micritic fill. In some cases secondary solution pores with sparry calcite occur within the micritic cavity fill.

There is an uneven erosional surface above Bed 3 that can be interpreted as a subaerial exposure horizon. The 10–15 cm deep karstic depressions of the bedding plain are filled by greenish-ochre clayey micrite. The disconformity surface is overlain by reddish-greenish argillaceous limestone, containing rip-ups of stromatolites, 1–20 cm in size, and black pebbles, 0.5–5 cm in size (Bed 4 – A-facies).

In a sample taken from the matrix a network of irregular cracks and circum-granular cracks filled by microspar and small microsparite nodules and elongated solution cavities, usually with geopetal fill was observed, which are characteristic features of the alpha calcretes sensu Wright (1990). A few cm-sized megalodont fragments, detritus of dasycladacean algae (*Teutloporella* cf. *peniculiformis*) and a number of microsparitized foraminifera were found.

In another sample 0.8 to 2.0 cm-sized lithoclasts were visible in a patchy micrite-microsparite matrix. Thin-shelled ostracodes are common in the matrix. There are a few mm-sized bioclasts (fragments of echinoderms, megalodonts, dasycladacean algae), and various lithoclasts. The following clast types were observed:

a) Blackened mudstone with a few thin-shelled ostracodes, micritized foraminifera, gastropods, and microsparite patches. There is a thin iron-oxide coating on the clast.
b) Blackened wackestone with fenestral pores; this clast is also encrusted by iron-oxide.
c) Red micrite with solution cavities and bioeroded bioclasts (fragments of megalodonts, dasycladacean algae, micritized foraminifera) and small blackened intraclasts.

The features of Bed 4 imply subaerial weathering, pedogenesis in a tidal flat setting, manifested by blackening, formation of clasts and lumps with iron-oxide coating, brecciation. The coarse- to fine-grained weathering material was subject to short-distance multiple reworking and redeposition in the tidal-flat pools. This deposit was also affected by incipient pedogenesis leading to formation of calcrete fabric.

The red argillaceous layer is overlain by a light greyish brown limestone bed (Bed 5) containing larger fragments of megalodonts. It has a clotted peloidal micritic-microsparitic texture. A great number of thin-shelled ostracode valves occur both in the micritic and microsparitic patches. Dissolution pores and small cavities with drusy calcite infillings are common. Textural features of this bed suggest microbially induced carbonate formation, but no trace of desiccation was observed. A tidal flat pool or a protected lagoon may have been the depositional environment. Abundance of ostracodes supports this opinion. The megalodont fragments are certainly reworked, probably storm transported.

The next white loferitic interval (Bed 6) continuously progresses from the previously described bed, there is no bedding plane between them. It is typified by mm-sized bird's eye voids and sheet cracks, 2–5 cm in length. It shows a calcrete-type micritic-microsparitic texture. The micritic patches are usually stained to brown and they contain fenestral pores. There are cm-sized irregular patches that may have been solution cavities, some of them formed in the place of roots. They often have geopetal fill, but in some cases the outer part of the cavities are filled by micrite whereas their central part by sparite, implying root cast origin of these objects. The cavity fill is micrite or microsparite-calcisilt, with a lot of ostracode valves, locally. This

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is a pedogenic carbonate bed, which was formed on the tidal flat under subaerial conditions. Tidal flat pools may have been the source of the ostracode-bearing cavity fill mud.

Above a sharp boundary the calcrete bed is followed by a thick limestone bed, abundant in megalodonts (Bed 7). It has a peloidal bioclastic packstone-grainstone texture, containing cm-sized fragments of chaetetid calcisponges, and Tubiphytes-type nodules and encrustations. It was formed under subtidal conditions (C facies).

Summing up, the section studied is made up by perididal and subtidal facies, characteristic elements of the Lofer cycles. In spite of excellent exposure conditions recognition of the basic cycles is not plausible. The macroscopic observations are not satisfactory, microfacies studies are needed to establish the real facies succession. For example, evaluation of traces of meteoric diagenesis in Bed 2 is rather problematic. Taking into consideration, that solution cavities in this bed are much more common than those in the overlying bed, the possibility of a short subaerial interval between deposition of Bed 2 and 3 cannot be excluded.

The cycle termination above Bed 3 is constrained by a well developed disconformity surface and evidences for karstification. The overlying beds (4, 5, 6) are probably tidal flat deposits, although Bed 5 formed in a permanently inundated environment, that was followed by a pedogenic period, represented by Bed 6. However, these facies changes are likely results of autocyclic processes, rather than sea-level changes. Abrupt appearance of subtidal facies in Bed 7 clearly indicates sea-level controlled transgression.

Conclusions

1) In the investigated Dachstein Limestone succession the Lofer cycles are usually bound by pronounced disconformities showing characteristic features of subaerial erosion, weathering and karstic solution on and below the paleosurfaces.
2) In some cases there are only subtle traces of the subaerial exposure, that has manifested itself in the more pronounced solution features, and meteoric diagenetic alterations below the bedding planes. In these cases the distinction of the cycles is poorly constrained, ambiguous. Accordingly proper identification of the facies stacking and distinction of the cycles need excellent exposure conditions and detailed microfacies investigations.
3) There are unambiguous traces of pedogenesis and meteoric diagenesis which affected the subtidal-peritidal carbonate deposits during the emersion periods. Calcretes forming on the top of the truncated bed-sets are typical. Rip-up chips of calcretes, pebbles of blackened carbonates are also common. They occur in the basal lag deposits of the overlying cycles together with clasts of the previously consolidated underlying carbonates, some of them had been encrusted by Fe-oxide.
4) Establishment of more or less permanent fresh-water pools over large parts of the tidal-flat may be considered as a herald of the rising sea-level. The first, typically ostracode-bearing pool deposits appeared in the karstic depressions and cavities.
5) Evidences for subaerial exposures between the subtidal-peritidal deposits strongly support the allocyclic control of the Lofer cyclicity in the study area. However the role of autocyclic processes which may have influenced the facies changes cannot be excluded.

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Bericht 2008 über paläobotanische Untersuchungen der Flora der Gosau-Gruppe von Jainzen NW von Bad Ischl auf Blatt 96 Bad Ischl

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The very small locality with a flora of the Gosau Group at the so called „Häuslkogel“ was detected by Winfried LEISCHNER (Mitt. Ges. Geol. Bergbaustud., **10**, 63–94, Wien 1959). The locality of bedded bituminous marly limestones (BMN RW: 470 630; HW: 287 630) is situated in the western creek of the two steep creeks in an altitude of about 600 m NW of Jainzen village. The flora is rich in angiosperms. Preliminary field inspection in summer 2008 revealed one type of conifer, six types of angiosperm leaves and two types of reproductive structures. The leaf fragments are preserved as impressions, however, cuticle preparation was not possible. The conifer twig is classified as *Brachyphyllum* sp. It shows quite unusual massive xenomorphic leaves helically arranged on the main axis. Angiosperm leaves are assigned to form genera. Entire margined fragments of leaves cf. *Myrtophyllum* sp. show intramarginal vein. *Juglandiphyllites* sp. is also entire-margined. This small type of probably juglandoid foliage shows loops of secondary veins and a robust midvein. Attenuate entire-margined leaves of *Dicotylophyllum* proteoides (UNGER) HERMAN & J. KVAČEK are the most common leaves in the locality. *Dicotylophyllum* sp. 1 shows spiny teeth on its central and apical parts of the margin. *Dicotylophyllum* sp. 2 represents a fragment of very small entire-margined leaf about 1 cm long. *Dicotylophyllum* sp. 3 shows entire-margined lamina with blunt apex. The reproductive structures are difficult to identify. They represent probably seeds or fruits and reproductive axes-bearing fruits.

The conifer twig and small leaves of angiosperms argue for mesophytic/xerophytic flora. Most of the angiosperm leaves are entire-margined only the leaf *Dicotylophyllum* sp. 1 has teeth, which seem to be spiny. As far as we can estimate from the preliminary data (small entire-margined or spiny leaves) the palaeoenvironment of the original site of the flora was probably quite dry and warm.

We can conclude that this flora shows quite moderate diversity. More intensive collecting in the field would probably enlarge considerably the number of species.

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