influence, and some correlation of carbon and oxygen isotopes is present. Strontium isotope ratios ($^{87}Sr/^{86}Sr$) range between 0.7078003 and 0.707980 and are similar to expected Middle Triassic sea water values and values from limestones of the same formation. This suggests early dolomitisation under the influence of Triassic sea water or formational pore waters. Dolomitisation under the influence of meteoric saline waters or metamorphic fluids can be ruled out based on isotope geochemistry.

Based on our isotope data no indications for evaporates or deep burial dolomitisation have been found. We favour post-depositional seawater dolomitization models for the Wetterstein dolomites which are driven by convection through major parts of the Middle Triassic carbonate platforms due to slope convection (thermal seawater convection due to temperature differences from open ocean versus warm platform top, and reflux of slightly evaporated seawater derived from above). This model is transitional to early burial dolomitization models. Predicted geometries of such dolomites are massive, platform-related, follow the bedding, and follow largely convection cells.

Tabun Khara Obo impact crater (Mongolia): Status of Research

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Tabun Khara Obo (TKO) is the only known meteorite crater in Mongolia. The crater is centered at 44°17’50"N and 109°39’20"E in South East Mongolia. It is a 1.3 km diameter simple bowl-shaped structure well outlined in modern topography and clearly visible on remote sensing images. The crater is located on a flat-top mountain range formed by Proterozoic metamorphic metasedimentary rocks. It is exposed in volcaniclastic sandstones and greywacke, quartz-feldspar-mica schist, and schistose terrigenic sediments. Gravity, magnetic, γ-ray, and resistivity data exist for the TKO structure (Bayaraa et al. 2005). The gravity correlates with the topography pretty well. The 2.5-3 mGal anomaly is similar to other same sized craters. The magnetic field depicts regional lithology NE trend. A weak magnetic low centered over the crater may be attributed to impact disruption and truncation of a regional trend. VE sounding data show an abrupt resistivity change from <30Ωm to 200Ωm at depths of 75-100m, which is attributed to the crater infill - target rock (breccia) boundary.

The TKO crater is slightly oval in shape, elongated perpendicularly to the regional NE lithology and foliation trend. We explain this by impact modification, when rocks of the crater rim slumped along the fracture planes preferentially developed along regional trend. A number of aligned hills at SE and NW may have formed by sliding of the blocks. Radial and tangential faults and fractures have developed abundantly through the periphery of the crater. Breccias found along the crater’s periphery but mostly at E-NE part of the structure. Monomict breccias form narrow (<1 m) lenses while polymict breccias form cover sheets outside of the crater’s Eastern rim. The base of these breccia cover is irregular which may imply it’s deposition on paleo-surface. While geophysics and morphological data are consistent with an impact origin, no diagnostic evidence for shock metamorphism, such as planar deformation features (PDFs), has yet been found. Previous authors reported finding planar fractures (PF), isotropic quartz grains, and breccias with suevitic texture (Shkerin 1976, Suetenko & Shkerin 1970). We also found cataclastic textures of quartz and PFs; however, such features are not wholly characteristic for impact processes and can also be formed by tectonic processes. A numerical model simulation was completed to reproduce the result comparable to observed geologic setting. For this the SALEB hydrocode modeling software code has been modified by to replicate the elevated platform. A drilling project is planned for August-September, 2008. We plan to drill a 200 m deep core drill hole at or near the center of the crater and hope to recover impact breccias below about 70 m depth.

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An extensional allochthon at the southern rim of the central Northern Calcareous Alps - the isolated Jurassic occurrence of Mount Rettenstein near Filzmoos

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Mount Rettenstein (also called Rötelstein, 2246 m.a.s.l.) southwest of the Dachstein massif in the central Northern Calcareous Alps nearby the small town Filzmoos is a conspicuous limestone peak within the rather smooth „Werfener Schuppenzone“ landscape. It is the southernmost major incidence of Upper Jurassic (Late Oxfordian to Kimmeridgian) Plassen Carbonate Platform rocks in quite a distance to all other prominent Plassen Formation occurrences. The some hundreds of metres thick Plassen Limestone sequence is stratigraphically underlain by an Early to early Late Jurassic basin succession of grey marly limestone (Scheiblberg Formation - ?Hettangian to Pliensbachian; dated by ammonites and radiolarians), condensed red limestone (Adnet Formation – Toarcian; dated by ammonites) and grey to red radiolarite (Callovian to Oxfordian; dated by radiolarians). The primary Triassic substratum is missing due to tectonic processes. This Early to Late Jurassic Rettenstein sequence sensu stricto is surrounded/underlain by the Scythian-Anisian Werfen-Gutenstein succession of the „Werfener Schuppenzone“ from which, however, it is separated by a some tens of metres thick chaotic Hallstatt Mélange complex, dated by means of radiolarians as Bajocian to Bathonian. This Hallstatt Mélange is in moment the oldest known Hallstatt Mélange in the Northern Calcareous Alps, comparable with the occurrences in the Bad Mitterndorf region.

Two major faults of regional significance affect the Rettenstein section, constituting the lower and the upper border of the Hallstatt Mélange. The lower fault not only separates individual stratigraphic successions of different age and paleogeographic origin but also juxtaposes two units with remarkable difference in thermal overprint: The Conodont Alteration Index (CAI) of 1.0 acquired for Hallstatt Limestones and Zlambach Formation of the Hallstatt Mélange and the excellent state of the radiolarians in the Jurassic basin sediments prove low diagenetic conditions in the hanging-wall. In contrast, the southern „Werfener Schuppenzone“ rocks of the footwall are thought to have generally been subject of high diagenetic to low-grade metamorphic conditions – at Mount Rettenstein this metamorphic overprint is reflected by the growth of authigenic illite defining a penetrative cleavage in some of the scarce pelitic intercalations within the Werfen sandstone succession.

While the Middle Jurassic Hallstatt Mélange forms a more or less circular frame around the Jurassic Rettenstein succession sensu stricto, the distribution of the latter itself is clearly asymmetrical: in the north there is only Plassen Formation with the occurrence of the youngest strata, whereas the oldest rocks are found in the south. This is in accordance with the N- to NW-dip of strata and the subhorizontal fault at the basis of this tectonic unit. Looking at the thermal imprint and the geometries, the situation is best explained by the assumption of a normal fault below the Hallstatt Mélange and a thrust fault at its top. Assumably, the normal fault cut through an already complicated tectonic wedge resulting form both long-distance and out-of-sequence thrusting. The prominent normal fault with some km of displacement is most likely the result of Late Cretaceous large-scale extensional faulting which has been described particularly from the central Alps (e.g. Ötztal-Stubai complex, Gurktal nappe, Graz Palaeozoic nappe complex).

Coexistence of siliceous basin and shallow-water carbonate sedimentation in the Oxfordian of the central Northern Calcareous Alps, Austria - a major step for the understanding of the early history of the Plassen Carbonate Platform

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The Late Jurassic succession of Mount Rettenstein is unique in comparison to all other sections known in the Northern Calcareous Alps, because it provides the oldest coexistence of radiolarite basin sedimentation with contemporaneous shallow-water carbonate intercalations. An up to 3.5-metres-thick debris flow made up of shallow-water carbonate detritus with a radiolaritic matrix is overlain by thin (calcareous) radiolarite, followed by several hundreds of metres of shallow-water carbonates of the Plassen Formation. Benthic foraminifers (*Labyrinthia mirabilis* and *Alveosepta* aff. *jaccardi*) and the extremely rich and well preserved radiolarian associations from the siliceous matrix sediments (e.g. with *Williriedellum dierschei*, *Eucyrtidiellum unumaense pustulatum*, *Eucyrtidiellum unumaense unumaense*, *Williriedellum dierschei*, *Williriedellum marcucciae*, *Archaeodictyomitra amabilis*, *Archaeodictyomitra mirabilis*, *Dictyomitrella kamoensis*, *Eucyrtidiellum semifactum*, *Gongylothorx favosus*, *Gongylothorax* aff. *favosus*, *Stichocapsa naradaniensis*, *Stichocapsa robusta*, *Stylocapsa oblongula*, *Theocapsomma cordis*, *Tricolocapsa conexa*, *Unuma gorda*, *Zhamoidellum ovum*, and *Zhamoidellum ventricosum*) indicate a depositional age of both the debris flow and the basal Plassen Formation in the Late Oxfordian. This is as yet the first unambiguous evidence of Oxfordian shallow-water sedimentation in the Northern Calcareous Alps. This early neritic stage with the settlement of ooid bars and coral-stromatoporoid-reefs, evidenced by the debris flow resediments in siliceous basin sedimentation, is followed by the definite, rapid progradation of the actual Late Oxfordian/Kimmeridgian Plassen Carbonate Platform (PCP) with its steep slope configuration. Assumably, this evolution was steered by a mixture of both global environmental and regional tectonic constraints.

Our investigations result in following conclusions:

1. The Mount Rettenstein Debris Flow, which underlies radiolarites of the Ruhpolding Radiolarite Group, yields direct evidence for an initial stage of Late Jurassic shallow-water carbonate platform sedimentation with the occurrence of ooid bars and coral-stromatoporoid patch reefs since approximately the Middle/Late Oxfordian boundary.
2. Progradation of the PCP over the radiolarite basin occurred at Mount Rettenstein already in the Late Oxfordian and thus earlier than at any other known location in the NCA with complete Late Jurassic stratigraphic sections.
3. At Mount Rettenstein shallow-water levels were apparently reached rapidly during platform progradation. This is indicated by the lack of transitional (hemi-)pelagic carbonates and the only very thin slope facies succession of the Plassen Formation, which is in line with a fast progradation and the formation of a steep slope.
4. Stratigraphic correlations of radiolarians and shallow-water organisms result in a slight modification of the stratigraphic range of characteristic Oxfordian radiolarian species and the biostratigraphic zones, respectively, towards younger times. The exact position of the borderline within the Late Oxfordian has to be tested.

Summarizing, Mount Rettenstein with its unique Oxfordian stratigraphic section yields an important input for the understanding of the early history of the PCP and its palaeoenvironment. Moreover, due to this uniqueness the Middle to Late Oxfordian Mount Rettenstein succession is of immense importance for palaeogeographic considerations. This, and the complex structural situation of the isolated, rootless Jurassic occurrence is beyond the scope of this stratigraphy-focussed article and will be depicted and discussed elsewhere.

Mineralisationsphasen in der Spatmagnesitlagerstätte Sunk/Hohentauern - Stmk./Ostalpen

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Die Spatmagnesitlagerstätte Sunk/Hohentauern in der steirischen Grauwackenzone liegt in unterkarbonen karbonatischen Wirtsgesteinen mit niedriggradig kretazischer Metamorphoseprägung (EBNER et al. 2004). Sie zeigt folgende karbonatische Bildungsphasen: 1.) flachmarine fossilreiche Kalke, 2.) frühdiagenetische, fossilführende dichte Dolomite und fein gebänderte mikrokristalline Kalke/Dolomite, 3.) div. Typen von Spatmagnesit, 4.) spätigen Dolomit am Kontakt zum Spatmagnesit, 5.) spätig-dolomitische Kluftausheilungen, 6.) Kokardendolomite 7.), submikroskopische Redolomitisierungen im Magnesit, 8.) idiomorphe Dolomitkristalle („Roßzähne“) und 9.) Dolomit als Kluftbeläge. Talk in Klüften/Störungen ist dasdie hydrothermale Reaktionsprodukt eines SiO_2-reichen Fluids mit Dolomit/Magnesit.

Die geochemische Charakterisierung erfolgte durch den Gesamtgesteinschemismus (RFA, AAS), Hauptelementen, Spuren- und SEE sowie Isotopen ($\delta^{18}O$, $\delta^{13}C$, $^{87}Sr/^{86}Sr$, $^{147}Sm/^{144}Nd$) an isolierten Einzelkristallen (AAS, MC-ICP-MS) und LA-ICP-MS ($^{87}Sr/^{86}Sr$) in Spatmagnesiten. Selbst makroskopisch als Magnesit erscheinende Proben zeigen mit erhöhten CaO- und erniedrigten MgO-Gehalten oft keine ideale Magnesitzusammensetzung. Grund dafür sind submikroskopische Dolomitrelikte (2) bzw. Redolomitisierungen (7) entlang von Spaltrissen und Klüften.