

## Environmental changes in the Lower Cretaceous of the Dolomites

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The main locality within the project is located in huge outcrops located at the southern margin of the Puez Plateau (LUKENEDER, 2010). It is located within the area of the Puez-Geisler Nature park in the northern part of the Dolomites (Trentino-Alto Adige; South Tyrol). Lower Cretaceous ammonites (n = 850) were collected at the Puez locality in the Dolomites of Southern Tyrol (LUKENEDER & ASPMAIR, 2006). The cephalopod fauna from the marly limestones to marls here indicates Late Valanginian to Albian-Cenomanian age. The underlying Rosso Ammonitico and Biancone Formations are of Early Valanginian to Hauterivian age.

The ammonite fauna comprises 53 different genera, each apparently represented by one to three species. Ammonite data from the lower part of the Puez Formation (Puez Limestone Member) suggest a biostratigraphical range from Upper Hauterivian *Balearites balearis* up to the Upper Barremian *Gerhardtia sartousiana* Zone. The upper, more marly part determined as Puez Marl Member, is almost barren of ammonites. Age was preliminary determined with foraminifera and nannofossils to reach from lowermost Albian up to the Albian-Cenomanian boundary. The ammonite fauna contains only descendants of the Mediterranean Province (Tethyan Realm). Most affinities of the cephalopod fauna are observed with faunas from the adjacent areas of Italy (Lessini Mountains, Belluno, southern Trento Plateau), the Northern Calcareous Alps and the Bakony, Geresce and Mecsek Mountains of Hungary. This is explained by the neighbouring position of the latter areas during the Early Cretaceous on the Apulian/Adria block and the Alpine-Carpathian microplate. Lower Cretaceous (Valanginian-Albian) deposits of the Puez locality in yield remarkable amounts of specimens of different ammonite taxa showing unique epifaunal encrustations by the scleractinian, ahermatypic solitary coral *?Cycloseris* LAMARCK, 1801 (LUKENEDER, 2008). The pattern of infestation clearly documents a preference of the adherent taxa for the outer shell surface of the ammonites, whereas the inner surface remains barren. The exact stratigraphically dating of the ammonite fauna allows synchronously to clear the age of the infested corals and the autecological history of this new ammonite/coral palaeocommunity. The symbiotic ammonite-coral relation from the Dolomites exists from the Valanginian to Albian times.

The cooperative project (FWF project P20018-N10; 22 international scientists): *An integrative high resolution project. Macro- and microfossils, isotopes, litho-, cyclo-, magneto- and biostratigraphy as tools for investigating the*

*Lower Cretaceous within the Dolomites (Southern Alps, Northern Italy) – The Puez area as a new key region of the Tethyan Realm*), is on the way since 2008 by the Natural History Museum in Vienna and the Southern Tyrol 'Naturmuseum Südtirol' in Bozen.

Results on stable isotope ( $\delta^{18}\text{O}$ ,  $\delta^{13}\text{C}$ ) analysis from the Lower Cretaceous Puez Formation show clearly and decreasing trend in oxygen isotope values throughout the log. Values decrease from Hauterivian with -1.5 down to -4.5 in Albian times. The decreasing values mirror an increasing trend in palaeotemperatures from 15–18°C in the Hauterivian up to warmer values in the Albian from approx. 25–30 °C. The trend probably indicates the positive shift in temperature induced by the well known Mid Cretaceous Ocean warming. This trend, measured on bulk samples, should be confirmed by analysis ( $\delta^{18}\text{O}$ ,  $\delta^{13}\text{C}$ ) on shell material of different marine fossil groups as brachiopods, belemnites foraminiferas. Carbon isotope values are relatively constant throughout the log. They appear with values around 1.5 to 2.0 with maximum values in the Upper Hauterivian with the peak of 3.0 at 24.5 m in log. This peak could hint to the well known  $\delta^{13}\text{C}$  shift at the Mediterranean Hauterivian Faraoni Level, but needs more detailed biostratigraphic analysis.

Producing major results with a broad impact requires using tools such as isotopes, magnetostratigraphy, cyclostratigraphy along with specific macrofossil groups like ammonites, belemnites, brachiopods, microfossil groups like radiolaria and foraminifera, as well as nannofossils, pollen and dinoflagellates. This combination will provide a picture of the Lower Cretaceous climate and sea level changes, allow conclusions to be drawn on palaeoclimate and yield results on the biostratigraphic age coupled with more stable, exact ages resulting from the well-established techniques of magnetostratigraphy. Additionally the Lower Aptian Oceanic Anoxic Event OAE 1 (OAE 1a = Selli Level) and the organic rich levels, as the Upper Hauterivian Faraoni Level and the Lower Albian Urbino and Paquier levels (both added to OAE 1b) followed by the Late Albian Breistroffer Level (OAE 1d), will be investigated within the Puez locality.

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