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New isotope data from the Lower Cretaceous Puez key-section in the Dolomites (Southern Alps; N-Italy)

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Investigations on different fossil groups within fields of isotopic, magneto- and cyclo-stratigraphic and geochemical analysis are combined to extract the Early Cretaceous history of environmental changes as displayed by the sea level and climate. This results in calibrating ammonite biostratigraphy and magnetostratigraphy through isotope data. The main investigation topics of the submitted project within the above-described framework are the biostratigraphic (Lukeneder and Aspmair, 2006), palaeoecological (Lukeneder, 2008), palaeobiogeographic, lithostratigraphic (Lukeneder, 2010), cyclostratigraphic and magnetostratigraphic development of the Early Cretaceous of the Puez area.
The main locality within the project is located in huge outcrops located at the southern margin of the Puez Plateau. 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 ammonoids (n = 890) were collected at the Puez locality in the Dolomites of Southern Tyrol (Lukeneder and Aspmair 2006). The cephalopod fauna from the marly limestones to marls here indicates Hauterivian to Albian/Cenomanian age.
Results on stable isotope (δ18O, δ13C) 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 (δ18O, δ13C) 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 δ13C shift at the Mediterranean Hauterivian Faraoni Level, but needs more detailed biostratigraphic analysis.
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. 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 radiolarians and foraminiferans, as well as nannofossils. This combination will provide a picture of the Lower Cretaceous 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.

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