Palaeoenvironmental and climatic changes in the uppermost Jurassic to lower Cretaceous in the southern Hemisphere (Central and southern Chile, Antarctica)

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The palaeoenvironmental development of the upper Jurassic (Tithonian) to lower Cretaceous (Hauterivian) of the southern hemisphere is analysed in high-resolution by a multidisciplinary study. It is focused on palaeoenvironmental and sea level changes and its connection to climatic pertubations. In the carbonate shelf system of central Chile two transgressive cycles are identified in this interval. The relatively low sea level in the uppermost Tithonian with proximal to inner platform deposits is followed by the first transgressive interval in the Berriasian, leading to deep shelf to basin depositional systems. The early Valanginian shows again a relatively low sea level with inner platform to slope deposits, followed by the second transgressive phase in the upper Valanginian to Hauterivian at the top of the sections, represented by deep shelf to basin deposits. Sedimentary organic matter (OM) in the sections is mostly terrestrial with only very minor amounts of marine OM, showing strong terrestrial input even in transgressive intervals. The first transgression (Berriasian) led to organic-rich marlstones and micritic limestones, representing euxinic conditions within this basin. But also calpionellids are found in this interval, indicating warm, oxygen-rich conditions above the euxinic bottom waters. No organic rich sediments are recorded from the second transgression due to more oxic conditions in this phase. In both intervals of lower sea level (uppermost Tithonian, early Valanginian) microscopic glendonite is found. The occurrence of glendonites in these shallow marine shelf environments indicates very cold temperatures in the water column but also cold air temperatures. This gives evidence for climatic cooling in the uppermost Tithonian and early Valanginian and a strong influence of climatic pertubations on facies and sea-level changes in the upper Jurassic to lower Cretaceous shelf system of central Chile.

Time equivalent sections from southern Chile and the South Shetland Islands, Antarctica, show continuously clastic sedimentary successions. Nevertheless first samples also recorded microscopic glendonites in the early Valanginian, indicating certain carbonate level in the primary sediments. High resolution sample sets are studied from these areas, enabling long distance correlations of climatic changes in the southern hemisphere and its impact on palaeoenvironmental changes identified by lithofacies and palynofacies analysis.