This multidisciplinary study seeks to develop a new metallogenic model that correctly places the mineralisation in the regional context of extensional magmatism and core complex exhumation. This includes a new interpretation of old and the generation of new isotope and fluid-inclusion data in order to determine the origin and evolution of mineralisation-related magmas, fluids and ore components. Set against a refined understanding of the spatial and temporal distribution of magmatic–hydrothermal ore deposits in the south Balkan region, this will enhance our knowledge of ore generation processes in post-collision, orogenic belts and significantly aid future exploration. Our work will inform current exploration models through improved understanding of magma processes and hydrothermal systems associated with mineralisation in a province which has a particular complexity reflected by the uneven distribution of deposits in time and space. The KMD is ideal for developing such models due to the juxtaposition in space and time of a range of mineral deposit types; all with known economic importance.

New results and assessment of the geochronology of the youngest volcano of the Carpathian region: Ciomadul (Csomád), East Carpathians

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In the Carpathian-Pannonian region volcanic eruptions of various magmas have occurred for about 20 Ma. The last eruption took place at the Ciomadul (Csomád) volcano, Southeastern Carpathians, a lava dome complex with two explosion craters. The lava domes are built up by potassic dacites with fairly homogeneous composition. Plagioclase, hornblende and biotites are the main phenocryst phases in addition to less amounts of apatite, sphene, clinopyroxene, quartz, K-feldspar, FeTi-oxide, zircon and occasional olivine. The lava dome rocks are crystal rich with up to 40-50vol% crystal abundance sitting in a glassy matrix. The pumices formed during the explosive phases show similar bulk chemical composition and mineral assemblage, but significantly less crystal volume.

The precise chronology of the volcanic activity is still unclear. Previous K/Ar radiometric data suggested that an earlier effusive phase at about 900-500 ka was followed by explosive volcanic eruptions at least in two stages (about 220 ka and 10-40 ka, respectively). Combined petrographic and mineral chemical investigations have revealed, however, that most of the volcanic products consist of a mixture of mineral phases formed at different time and different stage of magma evolution. The reconstructed magma chamber evolution before formation of one of the lava domes (Kis Csomád) involves remobilization of an older crystal mush by fresh magma. This fact limits the traditional radiometric age determination of the volcanic eruptions. On the other hand, occurrence of charcoal fragments in two localities of pumiceous pyroclastic products helps to determine the age of the youngest eruptions. Former radiocarbon measurements from the Tusnad locality (western margin of Ciomadul) provided ambiguous results between 10-40 ka. Our new high-precision AMS radiocarbon data of a charcoal sample from the pyroclastic flow deposit in this locality give 41,300 cal (BC) In addition, we found further charcoal samples at another locality (Bixad) at the southern margin of the volcano. Here, three samples provided consistent ages of 29,500 cal BC. These data suggest that the product of the youngest eruption is exposed at the southern margin of the volcano (Bixad locality) and not at the western one (Tusnad locality) as was previously thought. Furthermore, it indicates volcanic activities with fairly large, distinct periods. The

youngermost 30 ka age of the final eruption is implicitly indicated by lake succession analysis and palynological data obtained by new drillings made in the ≤20 m-thick loose lake sediments of the younger crater (St. Ana). As for the character of the final explosive activity, volcanological observations imply that both volcanic products could somehow belong to lava dome activities, i.e. explosive collapse of growing lava dome rather than collapse of an eruption column.

In order to constrain the age of the eruptions more directly we carried out U-He measurements on zircons. The obtained U-He ages for zircons separated from the pumices of the Tusnad and Bixad localities reproduced those ages obtained by radiocarbon dating. These data can be accepted as eruption ages only in the case if the zircons were crystallized at least >200 ka. Our interpretation based on the combined textural and geochemical observation seems to fit with this requirement. In agreement, new biotite Ar-Ar ages from Tusnád, Bixad and other localities that yielded apparently older ages (of 270 to 470 ka) suggest that magma crystallization started to occur significantly earlier than the final eruptions. As for zircon formation we suggest that they were growing in a granodioritic crystal mush and their margins were crystallized at low temperature from a rhyolitic melt. If this hypothesis is correct, then we can assume long-lived magma chambers beneath Ciomadul. Age of the main lava dome formation is still unclear, but it could be much younger than previously thought.

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Submerged Holocene Baltic landscapes (The SINCOS project)

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Sea level change has to be regarded as a global problem, influencing the human population not only in present days. Even in early phases of cultural development human populations have been faced with marine transgressions and changes of climate and the natural environment.

In order to investigate longer termed trends (on the millennial time scale) the Baltic Sea has been selected as a model region for an interdisciplinary research project SINCOS (Sinking Coasts – Geosphere Ecosphere and Anthroposphere of the Holocene Southern Baltic Sea) because changes in crustal vertical displacement interacting with eustatically driven sea level rise and climatic–meteorological influence to coastal morphogenesis can be studied in an exceptional manner, here. In the southern Baltic area where sinking coasts cause permanent transgression of the sea, remnants of human settlements are preserved under water, recording the reaction of the human population living in the ancient coastal zones since Mesolithic times.

As study area served the southern coast of the Baltic Sea where the process of a retreating coastline initialized by the Littorina transgression about 8 000 cal. BP that shifted the environment from fresh water to brackish/marine conditions can be studied here directly in relation to global sea level rise.

For the development of a model first, proxy data have been acquired in order to reconstruct the process and the effect of Littorina transgression within the research area. Data acquisition was mainly bound to sea expeditions. By methods of marine geology and underwater archaeology samples and information have been acquired which did provide the proxy–data for the reconstruction of palaeoclimate, sea level rise, palaeoecology and socio–economic development of the human population having lived along the palaeo–coastlines.

Modelling procedures have been used for the historical reconstruction of palaeolandscapes submerged by the Holocene sea level rise.

For the historical reconstruction a GIS approach was deployed to derive transgression–regression scenarios for the development of the Baltic Sea basin after the Littorina