Monitoring activities in several caves along a transect stretching from the Adriatic Sea to the Aggtelek Karst (NE-Hungary): trace element and stable isotopic compositions of drip waters and cave carbonates

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Several caves have been monitored along a transect stretching from the Adriatic Sea to the Aggtelek Karst (NE-Hungary) including two caves in Croatia and three caves in Hungary: 1) Cerovacke cave (~25 km far from the sea, Velebit Mt.), 2) Baraceve cave (~70 km far from the sea), 3) Csodabogyós Cave (~320 km far from the sea, Keszthely Mt.), 4) Béke and Baradla Caves (~700 km far from the sea, Aggtelek Karst). The monitoring activities in each caves included microclimate measurements, analyses of the elemental and stable isotope compositions of drip water and precipitation, as well as stable isotope measurements of modern calcite precipitates formed on light bulbs or glass plates.

The stable isotope compositions of the drip waters in all cases (except one) show systematically lower values than those found in amount-weighted annual precipitation suggesting that the source of the infiltrating water dominantly derives from winter precipitation. Moreover, the relative contribution of winter precipitation can vary even within same cave system reflecting also the local morphology of the karst above the cave. The d-excess values of the drip waters show an increasing trend from the Aggtelek Karst towards to Adriatic Sea, showing higher values than 10‰ (Béke-C.: 10.3‰; Csodabogyós-C.: 11‰, Baraceve-C.: 12‰, Cerovacke: 15‰). These observations indicate significant contribution from moisture originated from the Mediterranean Basin to the infiltrating water. The monitoring of the precipitation support these findings as among the marine moisture source the Mediterranean is the most dominant even relative far from the sea.

The trace element systematics in drip waters indicate that PCP likely took place during relatively
dry periods. In some caves the change of the hydrological condition affected both the trace element composition of the drip water and the stable isotope composition of the modern calcite precipitates. Although the calcite-water isotope fractionations show significant scatter even within individual caves, the majority of the data fall close to the Coplen (2007) and the Tremaine et al. (2011) fractionation values in both Croatian and Hungarian caves.

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