Seasonal Climate Change in Central-Eastern Europe at the Mid-Late Paleolithic Transition ~ 40 ka ago.

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We report on last glacial stable C and O isotope records from two Romanian speleothems. Between 30-50 ka, $\delta^{13}C$ in the southerly record (Ascunsa Cave) from the Danube region matches the pacing and relative change in amplitude of the Greenland ice $\delta^{18}O$ record as well as the abundance of coastal winter sea ice in the Black Sea. A second record (Tausoare Cave) from northern Romania lacks any similarity with the Greenland or the southern Romanian record in $\delta^{13}C$ and $\delta^{18}O$, but matches northern Black Sea summer temperature change. This is in agreement with the first-order temperature sensitivity of speleothem $\delta^{18}O$ in northern Romania [2]. Based on similarity with the Black Sea climate proxy records we interpret the combined two speleothem records in terms of seasonal temperature change in central eastern Europe.

The Austrian Willendorf-II loess-paleosol profile in the upper Danube Valley contains some of the oldest finds of Early Aurignacian lithic artifacts of Europe attributed to anatomically modern humans (AMH) [1]. Speleothem $\delta^{13}C$ generally reflects soil formation above the cave. This allows a mechanistic correlation along the Danube watershed of the U-Th dated Ascunsa Cave record to the ^{14}C dated Willendorf-II profile and therefore to AMH evolution. The emergence of the Early Aurignacian after ~ 43 ka BP and the expansion of Gravettian artifact assemblages after ~ 35 ka BP happened immediately after GS 12/11 and GS 7/6, each marked by extreme winter cooling. An extended cold interval in both seasons that comprises GS 10/9 and subsequent Heinrich stadial HS4 (GS 9/8) – from 40.6 to 38.0 ka – may have been an important cause of the termination of Neanderthal population in Europe, recently re-dated to 41.0 to 39.3 ka [3].

[1] Nigst et al. 2014, PNAS, 111, 14394–14399; [2] Dragusin et al 2014, Clim. Past., 10, 1363-1380; [3] Higham et al., Nature, 512, 306-309.