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Ice cores and calcite precipitates from alpine ice caves as useful proxies in paleoclimate reconstructions

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In the last years a growing set of research campaigns have been undertaken in the European southeastern Alps. The aim of such interest is mainly due to the peculiar climatic conditions of this area, allowing the existence of periglacial and glacial evidence at the lowest altitude in the Alps. The reason for such "anomaly" is likely ascribable to very high mean annual precipitation and local topoclimatic amplifications. In the frame of this research, in the fall 2013 a 7.8 m long ice-core has been extracted from a permanent cave ice deposit located in the area of Mt. Canin (2,587 masl) in the Julian Alps. The ice-core has been cut and analysed in terms of: a) oxygen and hydrogen isotope composition; b); black carbon and dust concentrations; c) water conductivity; d) mineralogical analyses via X-ray powder diffraction. In the fall 2016, in the same area, a set of 1.0 m long horizontal ice cores have been extracted in another ice cave deposit, intercepting a preserved layer of coarse cryogenic cave carbonates (CCCcoarse). Such original finding represents the first alpine evidence of in situ CCCcoarse and the first occurrence from the southern side of the Alps. A unique opportunity to better understand the processes associated with the formation of CCCcoarse and the well-preserved status of samples allow planning, besides U/Th datings, several different analyses which may be associated with the precipitation of CCC. Subglacial calcite crusts, widespread in the area, represents a further proxy able to help understanding the evolution of climate during the holocene in this alpine sector. In the light of accelerated climate change we discuss here the potential of this still untapped and fragile cryospheric archives for paleoclimatic reconstructions in high elevated areas of the Alps.