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SUB-ANNUAL RESOLUTION PROFILE OF BIOGENIC SULPHATE RECORD ALONG THE HOLOCENE IN THE EPICA-DML ICE CORE

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High-frequency variations of chemical markers are potentially able to describe short-time changes (secular, decadal or seasonal scale) involving the complex interactions between climatic forcings and environmental feedbacks. In particular, changes in oceanic productivity are assumed to play a key role in controlling the climate in clean marine environment by several processes, including atmospheric CO2 uptake (trough biological pump transfer) and albedo variation (via changes in cloud coverage by emission of gas-phase precursors of cloud condensation nuclei). Besides, the strong seasonal cycle of the phytoplanktonic bloom at high latitude oceanic areas closely control the annual cycle of biogenic compounds into the atmosphere. Such compounds, determined in snow deposition, can be used as seasonal markers if accumulation rate allows distinguishing winter and summer layers. Due to the relatively high annual accumulation rate (around 64 mm w.e.) and the high ice thickness (about 2750 m), the EPICA-DML ice core, drilled at Kohnen Station (Dronning Maud Land – East Antarctica, 75° 00’ S, 00° 04’ E, 2892 m a.s.l.), yielded very high-resolved stratigraphies of chemical, isotopic and physical parameters able to reconstruct past atmospheres along the last glacial cycle. Here we report the sub-annual resolved profile of sulphate coming from marine biogenic emissions. Total sulphate profile was obtained by on-site Fast Ion Chromatographic (FIC) measurements of ice core strips, continuously supplied by a melter device, with a 1-cm depth resolution. In the Holocene, such depth resolution correspond to a sub-annual frequency, able to reveal, for a large part of the record, the seasonal oscillation of the biogenic source. For this purpose, extra-biogenic contributions, such as crustal, sea spray and volcanic sources, were computed and subtracted from sulphate concentration. A stratigraphic dating was attempted for the late Holocene, using known sulphate spikes and isotopic features as tie points. Changes in biogenic sulphate concentrations and fluxes, revealed also by a spectral analysis, were discussed in relation to the contemporaneous climatic conditions.