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Centennial climate variability during MIS 11 and MIS 5 : insights from new high resolution deuterium measurements conducted on the EPICA Dome C ice core.

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The low resolution stable isotope analysis conducted on the EPICA Dome C ice core (sampling length of 55 cm) has revealed distinct behaviours of Antarctic temperature over the past interglacials with differences in duration, intensity and trends (Jouzel et al, Science, 2007). Many questions remain however open regarding not only the mean state but also the millennial and centennial variability during warm periods. Here we present new high resolution deuterium measurements conducted on 11 cm samples and covering Marine Isotope Stage (MIS) 11 ($\sim$400ky BP) and 5 ($\sim$125ky BP). Thanks to these new measurements ($\sim$800 samples for MIS 11 and $\sim$2400 for MIS 5), the temporal resolution has been improved from 220y to 45y for the first one and from 50y to 20y for the second one, making therefore possible a detailed comparison with the current interglacial period, the Holocene.

The new resolution for the MIS 11, used to be considered as a good analogue for the present Holocene because of a quite similar orbital configuration, brings really new rich climatic information. First, the power spectra of the two interglacial periods reveal interestingly similar submillennial periodicities. This point suggests that similar processes involved in the centennial scale variability may be operating during these two warm periods. However, both the long term trend and the time evolution of the centennial to millennial variability are quite different between the Holocene and the early MIS 11. We therefore point at strong limitations in the use of MIS 11 as a simple analogue of the present warm period and its future.

Measurements are still being conducted on MIS 5 in order to characterize the variability associated with the warmest of EPICA Dome C interglacial periods, occurring with an orbital context quite different from the current interglacial. At the time of preparation of this abstract, 1200 samples have already been measured. MIS 5.5 trend and variability will then be compared to the results obtained and previously described for early MIS 11 and Holocene. Moreover our results regarding not only mean Antarctic climate but also centennial climatic variability are expected to be valuable for the comparison with simulations conducted with climate models, as the phase 3 of the Paleoclimate Modelling Intercomparison Project will include MIS 5.5 amongst the target modelling periods.