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# Dating the 800 ka - long EPICA DC ice core by tuning the air content and $\delta O_2/N2$ records on local summer insolation.

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A new method of dating the long glacial-interglacial ice core records has emerged during the last 10 years. It is based on properties measured on the air extracted from the ice that are used as proxies of local summer insolation. This dating method is referred to as "local orbital tuning dating". It's an almost absolute dating, providing we better understand the link between the influence of the local summer insolation on the snow grains at the surface and the measured properties in the ice, namely the content and the $O_2/N2$ ratio of the air enclosed in the ice. Changes in these two properties have already shown convincing correlations with orbitally forced local summer insolation on several Antarctic and Greenland long ice core records. Moreover, both $O_2/N2$ and air content have recently been measured for the first time on the same ice core (Vostok). The same methods of spectral analysis were applied on these records. The two experimentally independent local insolation proxies lead to orbital timescales that agree well together (within less than 1ka on average).
We present here new air content (V) data obtained along the Antarctic EPICA DC ice cores. These data extent the existing record, which covers the last 430,000 years, to about 800,000 years, i.e. they add four glacial-interglacial cycles. The new record has a time resolution of 2,000 years on average. The spectral properties of the new 430 – 800 kyr V record are primarily obtained by continuous wavelet transform (CWT) analysis. It confirms and refines the results from the Blackman-Tukey (BT) and Multi-Taper Method (MTM analysis). The spectral signature of V is compared to its specific Integrated Summer Insolation (ISI) target and the time delay between the V signal and its ISI target is used to propose a V chronology for the oldest part of the record (800-430 kyr BP). The spectral signatures of V and the insolation targets will be compared between the 800 -430 ka BP period (this work) and the 430 - 0 ka BP period (Raynaud et al, 2007). The differences between the two periods will be discussed. A V chronology will be proposed for the full length of the record (0-800ka) and its limitations discussed. Finally we will compare the orbital dating of EDC by using air content with the one recently obtained on the same core for more specific periods using $O_2/N2$ (Landais et al., in press).