



Air content and O₂/N₂ tuned chronologies on local insolation signatures in the Vostok ice core are similar

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An accurate chronology of ice cores is needed for interpreting the paleoclimatic record and understanding the relation between insolation and climate. A new domain of research in this area has been initially stimulated by the work of M. Bender (2002) linking the record of O₂/N₂ ratio in the air trapped in the Vostok ice with the local insolation. More recently, it has been proposed that the long-term changes in air content, V, recorded in ice from the high Antarctic plateau is also dominantly imprinted by the local summer insolation (Raynaud et al., 2007). The present paper presents a new V record from Vostok, which is compared with the published Vostok O₂/N₂ record for the same period of time (150-400 ka BP) by using the same spectral analysis methods. The spectral differences between the two properties and the possible mechanisms linking them with insolation through the surface snow structure and the close-off processes are discussed. The main result of our study is that the two experimentally independent local insolation proxies lead to absolute (orbital) time scales, which agree together within a standard deviation of 0.6 ka. This result strongly adds credibility to the air content of ice and the O₂ to N₂ ratio of the air trapped in ice as equally reliable and complementary tools for accurate dating of existing and future deep ice cores.

References:

M. Bender, Orbital tuning chronology for the Vostok climate record supported by trapped gas composition, *Earth and Planetary Science Letters* 204(2002) 275-289.

D. Raynaud, V. Lipenkov, B. Lemieux-Dudon, P. Duval, M.F. Loutre, N. Lhomme, The local insolation signature of air content in Antarctic ice: a new step toward an absolute dating of ice records, *Earth and Planetary Science Letters* 261(2007) 337-349.