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Climate dynamic of Terminations 2 and 3 in East Antarctica as inferred from the combination of water and air isotopes in Dome C and Vostok ice cores

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Ice cores are important tools to decipher the influence of different forcing on climate evolution. They are particularly adapted to depict the past variations of polar temperature and greenhouse gases. Indeed, the water isotope composition of the ice is often taken as a reference to provide a continuous and high-resolution local temperature record.
Terminations 2 and 3 are the fastest terminations of the last 800 kyrs. The only deep polar ice cores enabling description of Terminations 2 and 3 are located on the East Antarctic plateau. Still this region is characterized by very low temperature and accumulation rate (even lower during glacial periods) and climatic reconstructions from water isotopes are questioned in these regions because of strong post-deposition effects. Isotopes of inert gases trapped in ice cores are a complementary tool to document past evolution of accumulation and temperature. Indeed, d15N and d40Ar of air trapped in ice cores directly reflect the dynamic of past firn depth, itself related to surface climatic parameters through firn densification processes.
Here we provide new high resolution measurements of d15N and d40Ar over Terminations 2 and 3 on the EPICA Dome C and Vostok ice cores. While the water isotopic profiles show very similar increases over the two studied Terminations at Vostok and Dome C, air isotopes show a much smaller increase at Vostok than at Dome C. The measurements of air isotopes suggest a 2 step accumulation rate increase over Termination 3 at Dome C and over the last phase of Marine Isotopic Stage 6, an evolution that is not obvious from the water isotope profiles but supported by dating constraints.