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Absolute dating of deep ice cores with ^{40}Ar and ^{81}Kr isotopes

Content

In the search for very old ice, finding the age of the ice is a key parameter necessary for its interpretation. Most ice core dating methods are based on chronological markers that require the ice to be in stratigraphic order. However, the oldest ice is likely to be found at the bottom of ice sheets, where the stratigraphy is disturbed, or in ablation areas, where the classical methods cannot be used. Absolute dating techniques have recently been developed to provide new constraints on the age of old ice, but their development in the context of ice cores is limited by the large sample size required. Here, we review the performances of two complementary methods: ^{81}Kr and ^{40}Ar on the bottom of the TALDICE and Dome C ice cores. We describe the recent analytical developments that have allowed for a dramatic reduction in the sample size requirement, and discuss the implications for the optimal use of precious ice to date the bottom of ice cores.

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