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Constraint on the ice flow in the deepest part of the Vostok core through gas analysis

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Understanding in detail the ice flow of the Antarctic and Greenland ice sheets requires a number of observational constraints together with physically sound ice sheet models. Among the observations, depth-age relationship deduced from deep ice coring is one of the most important. A number of modelling studies (Ritz, 1992) have tried to reproduce the ice sheet flow in the vicinity of the Vostok site, constrained by different assumptions regarding the Vostok chronology. The latter has been recently revised taking into account the bedrock topography upstream from Vostok (Parrenin et al., 2004).

Here we present new high resolution data of two greenhouse gases (CH_4 and CO_2), performed on the deepest section of the Vostok glacial ice (between 3310 and 3520 m of depth), allowing to discuss over the corresponding sections the possible flow disturbances affecting the ice sheet. The content of these two gases in the atmosphere is homogenous over Antarctica. By comparing the Vostok CH_4 and CO_2 data pairs with their phase diagram deduced from the European drilling EPICA/Dome C (Spahni et al., 2005; Siegenthaler et al., 2005), we are able to propose possible ages for the different Vostok strata below 3310 m.

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