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Clim. Past, 3, 243-259, 2007

www.clim-past.net/3/243/2007/

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1-D-ice flow modelling at EPICA Dome C and Dome Fuji, East Antarctica

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Abstract. One-dimensional (1-D) ice flow models are used to construct the age scales at the Dome C and Dome Fuji drilling sites (East Antarctica). The poorly constrained glaciological parameters at each site are recovered by fitting independent age markers identified within each core. We reconstruct past accumulation rates, that are larger than those modelled using the classical vapour saturation pressure relationship during glacial periods by up to a factor 1.5. During the Early Holocene, changes in reconstructed accumulation are not linearly related to changes in ice isotopic composition. A simple model of past elevation changes is developed and shows an amplitude variation of 110–120 m at both sites. We suggest that there is basal melting at Dome C (0.56 ± 0.19 mm/yr). The reconstructed velocity profile is highly non-linear at both sites, which suggests complex ice flow effects. This induces a non-linear thinning function in both drilling sites, which is also characterized by bumps corresponding to variations in ice thickness with time.

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Citation: Parrenin, F., Dreyfus, G., Durand, G., Fujita, S., Gagliardini, O., Gillet, F., Jouzel, J., Kawamura, K., Lhomme, N., Masson-Delmotte, V., Ritz, C., Schwander, J., Shoji, H., Uemura, R., Watanabe, O., and Yoshida, N.: 1-D-ice flow modelling at EPICA Dome C and Dome Fuji, East Antarctica, *Clim. Past*, 3, 243-259, 2007. [Bibtex](#) [EndNote](#) [Reference Manager](#)

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