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The Variability of Stable Water Isotopes in an Alpine Ice-core over the last 1000 Years

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Water isotopes(δ^{18}O or δD) preserved in high Alpine glaciers may provide temperature proxy records complementary to those of polar ice cores, including a potential extension of the 250a instrumental temperature series available for the Greater Alpine Region. To minimize the influence of glacio-meteorological noise, which challenge the reconstruction of long-term temperature changes from Alpine ice core sites, a multi-core array established at Colle Gnifetti (Monte Rosa, 4450m a.s.l.) was supplemented by a new ice core to bedrock, specifically dedicated to the millennial time scale.

The 62m core is shown to offer an outstanding small annual snow accumulation rate (11 cm water i.e. up to a factor of 2-4 lower than at previous cores), an accordingly increased distance of the 1000a horizon to bedrock at around 16 m and an approximately 2m bottom section possibly older than 10.000a.

Main features of the new δ^{18}O-record are discussed over last 1000a in view of constraints arising from the implementable time resolution, dating uncertainties (up to $\pm$ 80a), the varying isotope/temperature relationship and the glaciological up stream effects. Overall, over last 250a common isotope variability is seen among the different cores (though considerably differing by their depositional regime), with a fairly good correspondence to the instrumental time series. Beyond that period, there is no clear sign of a LIA related cooling, but two striking periods of relative warm isotope temperature around 1400 ($\pm$ 50a) and 900 ($\pm$ 100a) AD , with the latter, possibly associated with the medieval warming phenomenon.