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A continuous record of temperature evolution over a sequence of Dansgaard-Oeschger events during Marine Isotopic Stage 4 (76 to 62 kyr BP).

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Our knowledge of the temperature evolution over Greenland during Dansgaard Oeschger events (DO) is currently qualitatively described through the detailed water isotopic profile in ice cores. Using two independent paleothermometry methods, one based on air isotopic measurements (d15N and d40Ar) and the other on the combined measurements of water isotopes (dD and d18O to extract the second order parameter, deuterium excess), we show a complete and quantitative reconstruction of temperature at the NorthGRIP site over the period 76 to 62 kyr BP (DO 18, 19 and 20). We first confirm that the associated warmings are larger than those conventionally depicted by the water isotopes (11°C, 16°C and 11°C for DO 18, 19 and 20). Secondly, we demonstrate that the relationship between temperature and d18O varies rapidly during the last glacial period, even over a DO. Our temperature reconstruction over DO 19 agrees well with that predicted from simple climate models linking the DO to iceberg discharges. However, the large amplitude of the warmings suggests that strong atmospheric feedbacks amplify the northern Atlantic temperature response to the thermohaline circulation variations. Finally, we show that if the temperature evolution that we propose is quite independent of the chosen timescale, some constraint on accumulation rate can be obtained through our high resolution combined measurements of air and water isotopes.