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The glacial inception in Greenland versus Antarctica, the first Dansgaard-Oeschger event and the role of the hydrological cycle as inferred from air and water isotopes in ice cores.

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Numerous studies have underlined the importance of the hydrological cycle and increase of polar precipitations under the obliquity control to explain the glacial inception and building of the polar ice sheets. Using air isotopes (d15N, d40Ar, d18O) and water isotopes (d18O, dD) in the NorthGRIP ice core, we show that parallel to the ice sheet growth, increased polar precipitations could have driven the onset of the rapid climatic variability in the northern hemisphere. A comparison with marine data and the Antarctica Vostok ice core highlights the specificity of this first Dansgaard-Oeschger (DO) event 25. Moreover, the understanding of the hydrological cycle variation in the Northern Hemisphere at that time should be improved using the deuterium excess (d=dD-8d18O) as a tracer for evaporative regions conditions. Again, the use of deuterium excess confirms the specificity of DO event 25 with a unique signature different to the one of other DO events. Based on a comparison with deuterium excess measurements in NorthGRIP during the glacial period, we finally suggest a significative southern shift of the evaporative regions for Greenland precipitation between glacial inception (i.e. small ice sheets) and glacial conditions (i.e. large ice sheets), a result contrasting with the southern hemisphere hydrological cycle where the ice sheet extent has no influence.