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The evolution of the North Atlantic Oscillation for the last 700 years inferred from D/H isotopes in the sedimentary record of Lake Azul (Azores archipelago, Portugal).

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The δD plant leaf wax variations provide insights on precipitation and evaporation evolution through time. This proxy has been used to reconstruct the temporal evolution of the North Atlantic Oscillation (NAO) climate mode since this mode rules most of the climate variability in the central North Atlantic area. A total lipid extraction preparation and the correspondent analyses in the IRMS have been done for 100 samples from the uppermost 1.5 m of the sedimentary infill of Lake Azul (Azores archipelago, Portugal). According to the chronological model, established by 210Pb profile and 4 AMS 14C dates, this record contains the environmental history of the last 730 years. The reconstructed precipitation variations obtained from D/H isotope values, suggest that this area has suffered significant changes in its distribution and intensity rainfall patterns through time. The end of the Medieval Climate Anomaly (MCA, 1100- 1300 AD) is characterized by a progressive enrichmentof D/H isotope values which meant decreasing arid conditions. These rainfalls' increase might be interpreted by a shift from positive to negative dominance of the NAO. The Little Ice Age (LIA, 1300 - 1850 AD) was characterized by two humid periods (1300- 1550 AD and 1650 - 1850 AD) separated by a relatively dry period. These precipitation oscillations are clearly visible by marked changes in the D/H isotope values. The LIA was followed by the persistence of the positive NAO mode, exhibited by the depletion of the D/H isotope signal, which indicated an overall decrease of the precipitation in the central North Atlantic area. Surprisingly, the D/H of the last 100 years, characterized by the present global warming and a persistent positive NAO mode, display large fluctuations most possibly linked to an enhancement of the storminess which is in concordance with the data fluctuations observed in the instrumental record for the last 80 years in the archipelago. This climatic evolution is in accordance with other NAO records of the North Atlantic region (Trouet et al., 2012) highlighting the validity of the D/H isotopes as precipitation proxy.

Trouet V., Scourse J.D., Raible C.C., 2012. North Atlantic storminess and Atlantic Meridional Overturning Circulation during the last Millenium: Reconciling contradictory proxy record of NAO variability. Global and planetary change.