Geophysical Research Abstracts
Vol. 14, EGU2012-1563, 2012
EGU General Assembly 2012

Monitoring the water vapor isotopic composition in the sub-tropical North Atlantic

H. C. Steen-Larsen (1), A. E. Sveinbjörnsdottir (2), A. Peters (3), and J. Rosset (3)

(1) Cooperative Institute for Research in Environmental Sciences, University of Colorado, Boulder, USA (hanschr@gfy.ku.dk), (2) Science Institute, University of Iceland, Reykjavik, Iceland, (3) Bermuda Institute of Ocean Sciences, St. George, GE01, Bermuda

Water stable isotopes from ice core records have during several decades been used as climate proxies. However the precipitation composition of the snow falling in Greenland is controlled by variations in the moisture origin and condensation history. Furthermore does the northward moving air mass likely get re-moisturized along its path.

To support the interpretation of ice core records we installed an autonomous continuous isotopic water vapor monitoring station in a likely major source region at Bermuda(Tudor Hill) (32.26 N 64.86 W) in November 2011.

The isotopic monitoring station consists of a Picarro water vapor isotope analyzer build together with an autonomous calibration system, which allows for unmanned operations of several months. Three inlets at different heights on the tower allows for filtering out any possible local-site signal due to for example leaf transpiration from local vegetation or re-evaporation of rain. The system is automatically drift corrected every 6 hours, which results in sufficiently high accuracy and precision to allow for analysis of the d-excess in the water vapor.

Due to the isolation of the Bermuda Island in the Atlantic Ocean the monitoring station is optimal for studying the processes of the atmospheric boundary layer and the ocean-atmosphere interactions. Bermuda is also situated in the area of major cyclogenesis for the North Atlantic. It is therefore the plan for this station to work in tandem with a similar station installed in 2010 on the south coast of Iceland.

Preliminary results show a very strong support for the relationship of d-excess vs. relative humidity as predicted by Merlivat&Jouzel 1979. This is contrary to our results from the station on the south coast of Iceland. However our measurements show a reverse correlation between d-excess and temperature compared to prediction by Merlivat&Jouzel 1979. We find a near perfect correlation between the d-excess and the isotopic composition as well as large-scale variations in the observed isotopic composition of the vapor and specific humidity.