

# **Driven by the ice and Sun: understanding the abrupt and high frequency climate changes in New England during the late Pleistocene and early Holocene**

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Hydrogen isotopic ratios of behenic acid have been demonstrated to accurately record the precipitation hydrogen isotopic ratios in cool and wet regions such as New England. In this talk, we will present decadal scale resolution hydrogen isotopic records of behenic acid from Blood Pond and Rocky Pond in MA, New England. We analyzed samples from section of the sediment cores with exceptionally high sedimentation rates (1 to 2 cm/10 years) in the two lakes. The decadal resolution H isotopic record from Blood Pond shows that there are six distinctive hydrogen isotopic reversals (10 to 30 per mil) during the early Holocene (7 to 11 ka). These hydrogen isotopic reversals lasted from a couple of decade to two centuries, indicating abrupt climatic reversals. We show that the timings of the abrupt climatic changes are coeval with the main periods of weakened AMOC as a result of freshwater outbursts from Laurentide ice sheet, indicating a strong impact of AMOC on New England climate. The sedimentation rate of Rocky Pond is exceptionally high from 15 to 11 ka, allowing decadal resolution hydrogen isotopic analysis. The long term hydrogen isotopic trends in Rocky Pond between to 15 to 11 ka match our published Blood Pond record well. More importantly, we identified strong cyclic changes (amplitude of temperature change is  $\sim 1$  to  $2$  oC) in hydrogen isotopic record of Rocky ponds with frequencies at 88, 232 years, corresponding to prominent cycles of solar variability. The lower resolution Blood Pond also shows 232 year cycle. Taken together, our hydrogen isotopic records from Rocky and Blood Ponds indicate strong impact of the sun on the climate of northeastern United States.