

Topic: Investigating Middle to Late Holocene climate transition from Greenland temperature reconstruction

Middle Holocene is possibly the warmest period over the past 10,000 years in northern high latitudes (Wanner et al., 2008). Since then, it cooled toward present because of the earth's orbital change. To investigate this transition, we will analyze argon and nitrogen isotopic ratio of trapped air in ice cores from Greenland for the period from 6000 to 4100 years ago. The isotopic ratios will tell us about past temperature gradients in the snow layer (firn) on ice-sheet (Leuenberger et al., 1999). Then, the data can be used to reconstruct surface temperature changes using firn densification/heat diffusion models (Kobashi et al., 2011).

The data will provide precise multidecadal temperature data during the transition with precise age control. From the reconstructed temperature as well as other climate records, it may be possible to identify the drivers of Greenland temperature variability such as changes in solar activity, large volcanic eruptions, and greenhouse gas concentration. The understanding of the variability during the past warmer climate will be crucial for projecting the behavior of Greenland ice-sheet in a future warmer world.

The student will analyze argon and nitrogen isotopes in ice cores using an isotope mass spectrometer, and reconstruct Greenland temperatures for the period of 6000-4100 years ago. This will complete the project with the earlier analyses for the past 4100 years (Kobashi et al., 2015; Jeltsch-Thömmes, 2016).

Further information:

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