

## Atmospheric Hydrogen as a new climatic parameter

We know much about the past atmosphere; E.g. the pace at which greenhouse gas concentrations have varied in the past. Our knowledge stems from the air trapped in ice cores. Interwoven with CH<sub>4</sub> and CO are production and destruction processes of molecular hydrogen. Hydrogen thus offers complementary information on important components of the chemistry in our atmosphere.

To our knowledge neither concentration nor isotope records of molecular hydrogen exist prior to 1993 (2). Our final goal is to extend this record based on ice core measurements. However, several aspects of such an endeavor are unclear. 1) Due to the small molecule size of H<sub>2</sub> it is expected that hydrogen is lost after recovery of the ice core. 2) Hydrogen may fractionate during the last step of air occlusion in the ice. Both aspects need clarification.

The master thesis has two aspects 1) Measure the permeability of molecular hydrogen through natural ice. 2) Investigate the potential fractionation during air occlusion in polar firn. For the measurement a system needs to be designed and built.

Our current deep drill project EGRIP (<http://eastgrip.org>) offers access to freshly drilled core to investigate above mentioned questions.

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### References

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2. Prinn RG, *et al.* (2000) A history of chemically and radiatively important gases in air deduced from ALE/GAGE/AGAGE. *Journal of Geophysical Research: Atmospheres* 105(D14):17751-17792.