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Inferences from the total air content measurements of RECAP ice core

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Total air content of RECAP ice core (drilled in summer 2015 on Renland ice cap) is measured as a part of investigating the elevation history of the Greenland Ice Sheet (GIS), especially during the transition from Glacial to Holocene, an important milestone in the earth's climatic history. Though Greenland experienced fairly uniform climatic conditions during the Holocene, the response of the GIS has been erratic at different locations [Vinther, B.M. 2009]. Renland ice cap is isolated from the GIS and has not suffered significant ice flow or drastic elevation changes owing to the surrounding topography which provide it with an advantage over the other ice cores on GIS [Vinther, B.M. 2009]. Thus the data from Renland ice core is indispensable and can act as a reference point in this study. Total air is a credible proxy to track down the elevation at which the ice was originally formed as the air content in ice cores is predominantly influenced by elevation and conditions like temperature and local summer insolation [Raynaud, D. 1982].

The total air content measurements in this study are made using the vacuum volumetric technique with discrete cubical samples that are cut at specific depths of interest. The air content data is corrected for cut bubble effect [Martinerie, D. 1992]. The total air content values in the Holocene period, especially during the climatic optimum (6000-9000 yrs. B2K) are as low as 60 cc/kg with an average value of 80 cc/kg. In contrast, the Glacial period (11700-119000 yrs. B2K) has high and stable air content values with an average of 100 cc/kg. The low air content values in the Holocene can be attributed to the presence of many melt layers in the ice core as investigated from the light scan data of Renland core. In order to be able to interpret the total air content data in terms of past elevation or past temperature changes it is crucial to remove the effect of melt layers from this data. Melt correction in air content data is performed by quantifying the melt in the samples and then by assuming a linear relationship between air content and percentage melt in the samples [Herron, S.L. 1987].Furthermore, a thorough melt correction based on light scan data is in progress which could directly account for the effect of melt on the air content data.