



## The Greenland ice sheet in a 6 deg World

Dorthe Dahl-Jensen

University of Copenhagen, Niels Bohr Institute, Copenhagen, Denmark (ddj@gfy.ku.dk)

There is much doubt and uncertainty on the big ice sheets contribution to sea level rise in a warming world. As it continues to warm the ice sheets will become the biggest contributors to sea level rise as other sources have limited capacity: the total volume of the glaciers and ice caps equivalent to 0.5 m sea level rise, thermal expansion and land water will not change sea level more than 1 m. In the past there have been warm climatic periods where the ice sheets have been reduced. During the last interglacial (LIG or the Eemian) 130-115 thousand years ago the mean global sea level has been estimated to be 6-9 m above the present. Ice cores from the Greenland ice sheet inform that the Greenland ice sheet contributed no more than 2 m to the Eemian sea level so 75% of the ice sheet remained even though the Greenland temperatures up to  $8\pm 3$  deg C warmer than at present, with an Eemian average of  $5\pm 3$  deg C. Studies of the ancient DNA in the last ice cores before bedrock, 3000m below the present surface of the Greenland ice sheet inform that the temperatures here were 10-15 deg C warmer than the present when the vegetation was present and the Greenland ice sheet melted away. The threshold for the existence of the Greenland ice sheet, determined from the palaeodata is an Arctic warming between 5 and 12 deg C. An Arctic warming of 12 deg C corresponds to a global warming of 6 deg C so in this case the Greenland ice sheet was gone with a 7.5 m contribution to the even larger sea level rise at this time. Our findings suggest this happened 1-3 million years ago at a time where the temperatures were much warmer than the present.