



Is the South Greenland Divide Moving Westward ?

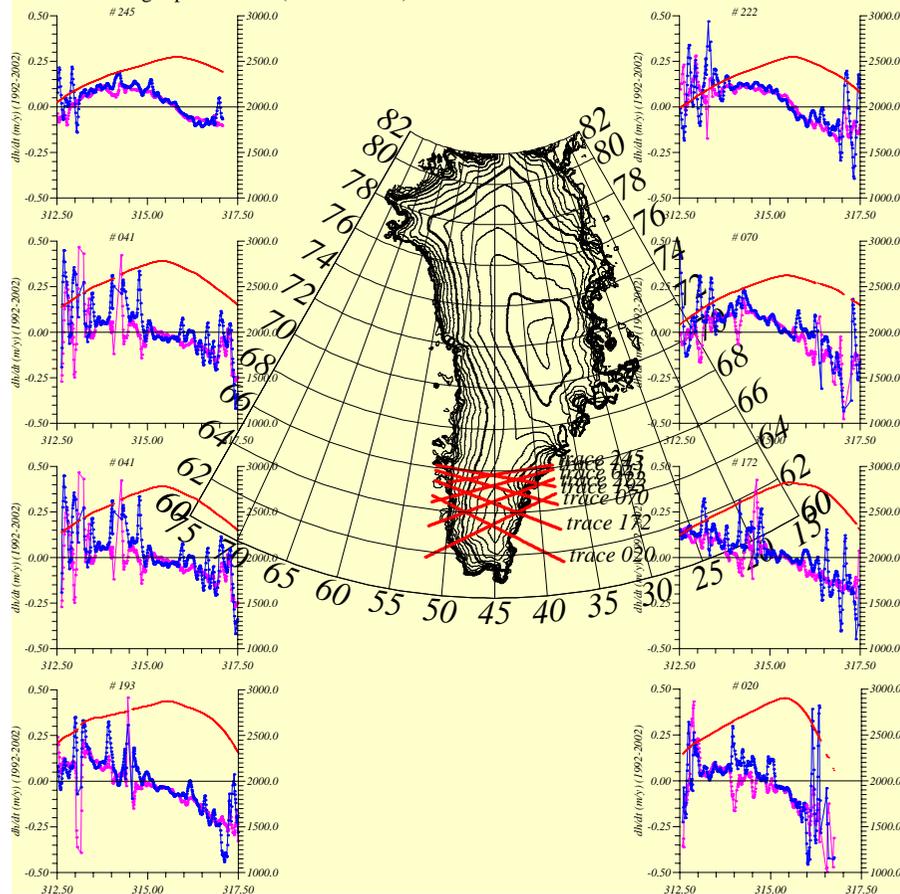
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1. Introduction

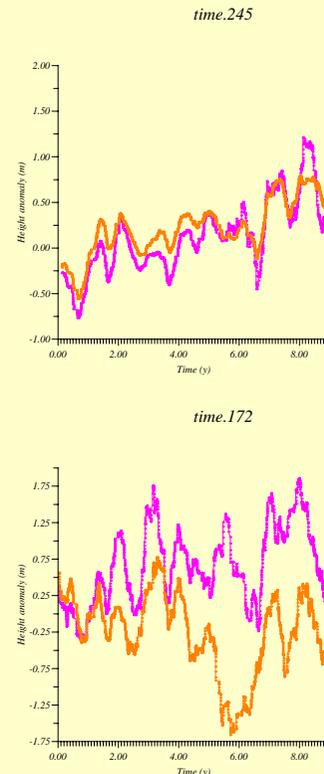
Since Topex/Poseidon was launched in 1992, it regularly releases altimetric data in C and Ku band every 10 days. As the satellite inclination only allows observations below 66 degree North latitude, only the southern part of the Greenland ice sheet is covered by a few tracks. The dual frequency altimetric information has been found useful for ice sheet surface properties investigation and for snow penetration induced error on the height measurement control. 8 years of data are now available. We have reprocessed the sensor level data of the time series for 8 tracks that cross Greenland and adapted the processing chain to the repeat track investigation. The result of this analysis tends to show that the western part of the Dome is thickening while the eastern part is thinning. We can furthermore trust that the western thickening is linked to change in accumulation process and compaction of the snowpack. Eastern thinning may be more linked to dynamic longer term processes which are observed on emissary glaciers of this flank.

2. Trend in ice sheet surface height

The central plate display the location of the 8 topex tracks of interest over the greenland ice sheet topography deduced from ERS1 altimetry. The 8 surrounding diagrams display the height trend measured since the beginning of Topex mission. In blue for C band, pink for Ku band altimeter, and in red the height profile in m (left side scale).



3. 'Ice sheet level anomalies'



Here we displayed some time series of height measurement along the 9 years of data available. In orange Ku band measurement time serie, in pink the Cband one. The top panel correspond to the intersection of track 245 and longitude 45W. We can see the regular trend, the annual cycle of accumulation and a consequent interannual signal. Below is the time serie corresponding to the point at the top of track 172. Even if the trend is not important here, there is a very large interannual signal and large differences between Ku and C band. This indicates that not only the volume of snow accumulated varies, but also its quality implying large change in penetration depth of radar waves, particularly sensitive in C band. This appens particularly on the western flank of the ice cap indicating a trend sensitive to accumulation in this part while the trends are similar in the eastern part indicating a trend in relation to ice flow.

4. Conclusion & Future work

Topex/poseidon helped us to answer yes to the title question and also helped to discriminate some reasons of this behavior of the southern greenland ice sheet. Accumulation leads to thickening of the western part of the ice cap while flow enhancement of the eastern emissary glaciers lead to thinning of the western part. Jason first data indicate that it keeps locked relatively well on the continental areas and should continue the time series to survey the southern greenland. Envisat has the same dual frequency as Topex (except Ku and S band instead of Ku and C) and should allow us this kind of analysis to 90% of the polar caps in the future.

