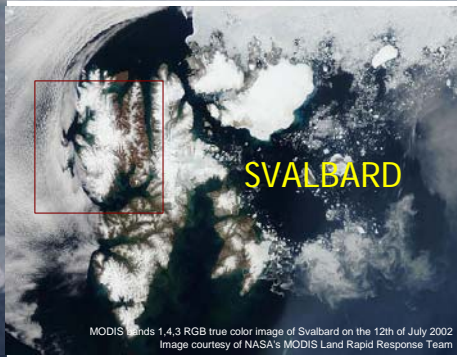
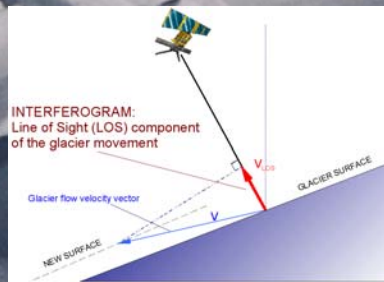
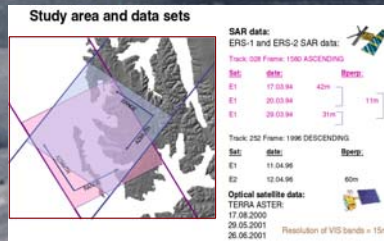


GLACIER MOVEMENT MEASUREMENTS WITH SATELLITE RADAR

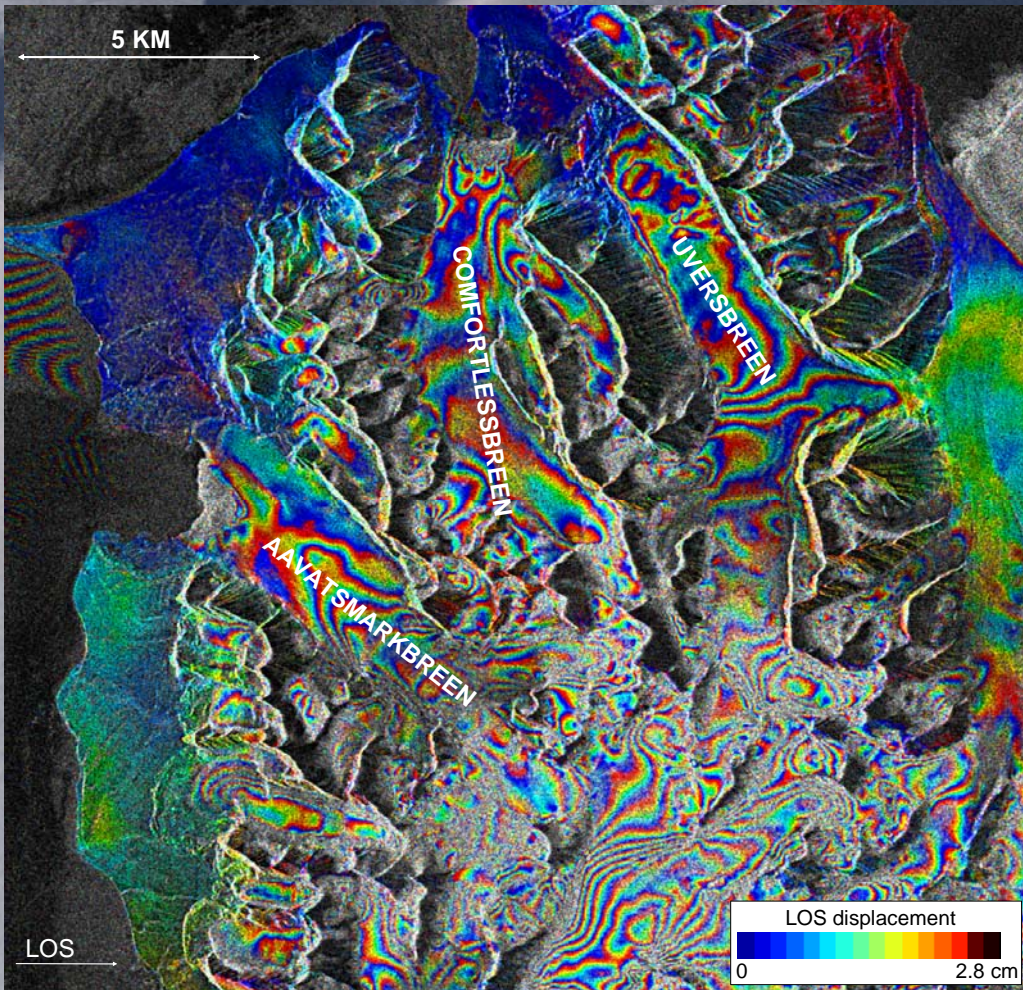


Flow velocities of two large tidewater glaciers in Svalbard, Aavatsmarkbreen and Comfortlessbreen, have been observed in July 2000 and April 2001 using static and kinematic GPS data. Moreover, flow velocities have been calculated from ERS-1/2 SAR interferometric satellite measurements using both ascending and descending satellite passes.



SAR interferometric measurements are sensitive to line-of-sight (LOS) surface displacements. As a result, single track observations only observe one velocity component. However, assuming that surficial ice is constrained to flow parallel to the glacier surface allows for the calculation of vertical and horizontal velocity components.

Using ascending and descending observations it is possible to calculate the 3D flow velocity field for the entire glacier surface. Precise topographic information is required to compute glacier slope with a high level of accuracy. The 20-m DEM provided by Cartographic Branch of the Norwegian Polar Institute (NP) is used. In case of Svalbard, the topographic information is very inaccurate. Elevation data for glaciers are collected in 1936 from photogrammetric surveys. Due to low accuracy and significant changes in the glacier's elevation and extent in the last 60 years those data cannot be combined with interferometric data. To avoid this problem, the NP DEM has been updated for Aavatsmarkbreen and Comfortlessbreen areas using field GPS elevation data acquired in 2001. The front position was also updated using optical satellite ASTER images acquired in 2001.



ERS-1 SAR ascending interferogram presenting LOS surface displacements due to the ice flow during 12 days (17.03.1994 – 29.03.1994)

