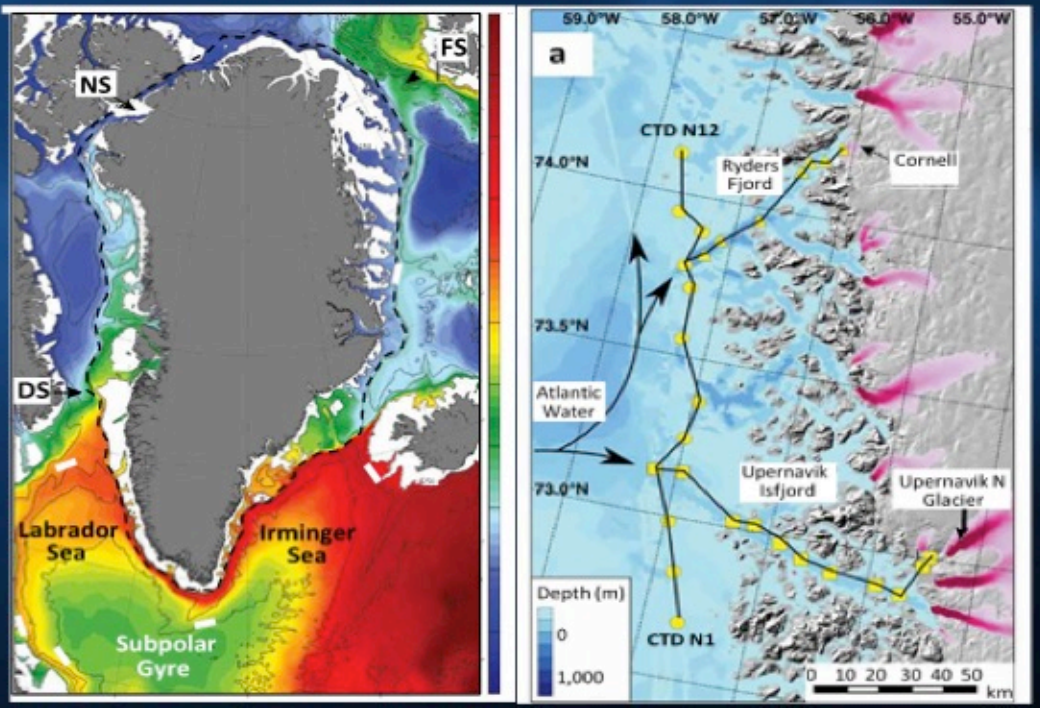
Oceans Melting Greenland: Early Results from NASA's Ocean-Ice Mission in Greenland

Fenty, I., J.K. Willis, A. Khazendar, S. Dinardo, R. Forsberg, I. Fukumori, D. Holland, M. Jakobsson, D. Moller, J. Morison, A. Münchow, E. Rignot, M. Schodlok, A.F. Thompson, K. Tinto, M. Rutherford, and N. Trenholm. |Oceanography| December 2016| doi:10.5670/oceanog.2016.100

NASA-funded scientists analyzed ocean and bathymetry data from the first 1.5 years of NASA's Oceans Melting Greenland (OMG) mission, demonstrating the mission's potential to improve our understanding of ocean-ice interactions in Greenland. Based on extensive hydrographic and bathymetric surveys, the researchers found important clues about how Atlantic Water changes as it moves north along Greenland's west coast, revealing which glaciers terminate in deep water and are thus susceptible to Atlantic Water warming. Additionally, the first survey of glacier surface elevation using NASA's Glacier and Ice Surface Topography Interferometer (GLISTIN) provided a baseline against which future changes in glacier surface topography will be computed for the vast majority of marine-terminating glaciers in Greenland. Each year between now and 2020, OMG will observe changes in ice elevation for nearly all of Greenland's marine-terminating glaciers, as well as changes in the hydrographic properties of Atlantic Water on the shelf, providing critical information about ocean-driven Greenland ice mass loss in a warming climate.



Melting of the Greenland Ice Sheet represents a major uncertainty in projecting future rates of global sea level rise. Much of this uncertainty is related to a lack of knowledge about subsurface ocean hydrographic properties, particularly heat content, how these properties are modified across the continental shelf, and about the extent to which the ocean interacts with glaciers.

Left: Ocean temperature at 250 m from a 4 km horizontal resolution simulation by the MIT ocean-ice general circulation model. The locations of Fram Strait (FS), Davis Strait (DS), and Nares Strait (NS) are shown. ***Right:*** Atlantic Water likely approaches the inner fjord along the southern edge of the deep trough. Yellow symbols indicate conductivity, temperature, and depth (CTD) instrument locations.