Denis
Volkov
University of Miami / NOAA-AOML
Felix Landerer, Jet Propulsion Laboratory / California Institute of Technology
Poster
Time variable gravity observations from the GRACE satellites reveal strong non-seasonal bottom pressure variability in the Arctic Ocean on 2 to 6 months time scales and a record-high bottom pressure anomaly in February of 2011. Here, we examine the nature and driving forces behind those variations. Our findings indicate that the non-seasonal variability of the Arctic Ocean mass is strongly coupled to wind forcing. The zonal wind pattern is correlated with a di-pole pattern of Arctic Ocean mass changes. Westerly wind intensification over the North Atlantic at about 60°N and over the Russian continental shelf break causes the ocean mass to decrease in the Nordic seas and in the central Arctic, and to increase over the Russian Arctic shelf. The time evolution of this pattern is significantly correlated with the Arctic Oscillation index. Basin-wide Arctic Ocean mass fluctuations are related to northward wind anomalies over the northeastern North Atlantic and Nordic seas, and over the Bering Sea. We show that positive (negative) Arctic Ocean mass anomalies are associated with anticyclonic (cyclonic) anomalies of the large-scale ocean circulation pattern. Based on an ocean model output, we conclude that the observed non-seasonal Arctic Ocean mass variability is mostly explained by the net horizontal wind-driven transports, and the contribution of fresh water fluxes is negligible. We demonstrate that the net transport anomalies across the North Atlantic (Bering Strait) contributed about 3 cm (1 cm) to the record-high mass-related sea level anomaly in February 2011.
OSTS session
Science Results from Satellite Altimetry
Meeting name
Ocean Surface Topography Science Team (OSTST) Meeting
Download to PDF