Geophysical Research Abstracts
Vol. 13, EGU2011-5673, 2011
EGU General Assembly 2011

Baroclinic tides and their impact on bottom boundary layer evolution and vertical mixing in the Laptev Sea

Markus Janout (1), Jens Hoelemann (1), and Harper Simmons (2)

(1) Alfred-Wegener-Institute for Polar and Marine Research, Bremerhaven, Germany (Markus.Janout@awi.de), (2) Institute of Marine Science, University of Alaska Fairbanks, USA

3 consecutive years of moored ADCP and bottom temperature and salinity records at a ∼40 m deep location on the Laptev Sea shelf show strongly amplified internal tides with a period of ∼14 days during two highly stratified winters of 2009 and 2010, while no internal tides were identified during winter of 2008 when conditions were barotropic. The observations likely result from the combined effect of stratification induced by the Lena river freshwater plume (2009) or near-bottom inflow of denser waters (2010) with the proximity of the critical latitude of the M2 tide. The high velocity core found 10-15 m above the bottom during spring tide cycles appears to migrate upward in the water column, which suggests that the bottom boundary layer thickness increases due to shear instability beneath the pycnocline. This potentially has important consequences on the vertical distribution of heat and freshwater in the water column. In addition, measurements show that nutrients are available in near-bottom waters while depleted near the surface, hence upward mixing of nutrients by baroclinic tide-induced turbulence in winter may be a key mechanism for the success of the spring bloom. Currently, one-dimensional numerical experiments are performed to verify the suggested mechanisms and to further investigate the impact of baroclinic tides on bottom boundary layer evolution and water column stability in the Laptev Sea.