



The Laptev Sea Region Of Freshwater Influence: Oceanography And Ecosystem implications

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The Arctic Ocean ecosystems are experiencing dramatic changes, with vast seasonally ice-free waters in most of the Arctic shelf seas. The Eastern Arctic features vast shelves that receive enormous river runoff rates that provide a first-order contribution to the Arctic Ocean freshwater budget. The Arctic regions of freshwater influence (ROFI) generally feature ecosystems characterized by strong stratification, distinct biogeochemical signatures and freshwater-adapted species. River water distributions are mainly controlled by summer winds, which lead to exceptionally strong variability in the frontal zones. Detailed shipboard expeditions to the Laptev Sea in the Siberian Arctic in 2013 and 2014 complemented by oceanographic moorings highlighted the impact of contrasting atmospheric conditions on physical and biogeochemical processes on the shelf. Locations within the ROFI maintained water column stratification until spring, while waters outside the ROFI were well-mixed by early winter. Riverine runoff is rich in CDOM and solar radiation is absorbed in the upper few meters, which leads to enhanced warming and the concentration of chlorophyll in the surface in the ROFI. In contrast, deep chlorophyll-maxima are found in the mid-waters outside of the ROFI, along with higher temperatures that are maintained well into the freezing period and thus present a source of heat that can further delay freeze-up. Recent years featured early ice break-up along with extremely warm ocean temperatures, which will be amplified under a continuing global warming and could ultimately result in subpolar conditions in this Arctic region. The Siberian interior shelves cannot be viewed as isolated systems, but are well connected through river plumes that either spread into the transpolar drift, or alternatively propagate along the coast into the East Siberian Sea which underlines the larger-scale importance of these vast Arctic river systems.