

Freshwater Discharge into the Russian Sector of the Arctic Ocean via the Mighty Lena River and the Lena Delta

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Abstract: Oceanographic studies in the Arctic Ocean have shown that approximately 60% of the total riverine water discharge to the Arctic Ocean is delivered by large Siberian rivers such the Yenisey, Lena and Ob. Much of this freshwater is transformed into sea-ice on the shallow Arctic continental shelf, with the shallow Laptev Sea being an important area for sea-ice formation in the Arctic Ocean. Variations of sea-ice flux from the Arctic to the North Atlantic Ocean are known to cause major changes in thermohaline circulation. Via this mechanism, the influx of freshwater from Siberian rivers plays a significant and poorly understood role in ventilation of the Arctic and North Atlantic Oceans and thereby, global climate change.

Our work involved two scientific cruises to the Russian Arctic. The first cruise traveled 3600 km on the Lena River and Lena River Delta during June-August 2003 using the passenger ship *Moscowsky 11* in order to conduct a modern hydrologic calibration study of the Lena Delta estuary and historical hydrological records. This study involved the first-ever ADCP-based hydrological studies in the Lena River and delta coupled with measurements of particulate and dissolved carbon in the delta and with high-resolution studies of sediment cores from the Lena River delta slope, flood plains, and a shallow shelf zone of the Laptev Sea. Our first major goal was to reconstruct high-resolution records of freshwater discharge variability and terrestrial organic carbon flux to the Arctic Ocean via the Lena River for the last 50-150 years. These records will be used to examine the effects of anthropogenic activities and global warming trends on freshwater discharge and organic carbon supply to the Arctic Ocean during this time interval.

The second cruise during the 2003 field season took place on the Laptev Sea and Eastern Siberian Sea during September-October using the Russian hydrographic vessel, *RV Ivan Kireev*. During this trip we collected sediment cores and performed ADCP measurements of current speed and direction. At the end of our cruise we returned back to the Laptev Sea and collected sediments cores and ADCP data from Lena River delta slope. Our second major goal was to reconstruct the late Holocene record of freshwater discharge and organic carbon flux to the Arctic Ocean for the last 2,000 years.

Also to be described during the talk will be how our research had a strong educational outreach component involving Russian and American undergraduates and an informal science education program with a new childrens museum (*EdVenture*) in Columbia, SC.

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