Hydrologic variability and floodplain sedimentation of major West Siberian Rivers

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The Russian Federation contains the world largest Arctic land mass and contributes about 85% of the total terrestrial runoff to the Arctic Ocean. Combined annual flows of the Yenisey, Ob and Lena Rivers total more than 1500 km3, a significant freshwater input that affects the thermohaline circulation and sea-production of the Arctic Ocean. Despite the very large size of these rivers, suspended sediment loads are well below the world average. In the Eastern Siberia the bed loads are rather high, and the rivers deliver most part of sediment yield to the ocean. In the Western Siberia with its flat relief and relatively low floodplains the delivery ratio is much less. For example, on the Ob River, measurements of Russian Hydrometrical Survey show a net reduction in sediment load between Belogorye and Salekhard through a several hundred km reach of anastomosing channels and floodplain lakes. Like most Arctic rivers, flows in the high-latitude parts of Ob, Yenisey, Taz, Pur Rivers are seasonally controlled and closely follow the annual temperature cycle. Peak discharge typically occurs in late May or early June, with at least half of the total annual flow occuring during the annual spring flood. Synthetic aperture radar (SAR) data collected over the area from 1993 to 1996 suggest that floodplain lakes, anastamosing channels, and wetlands are linked in a seasonally inundated network, enhancing sediment deposition on the floodplain. Hydrologic exchange between these aquatic ecosystems and channel waters is also believed to cause organic carbon enrichment. The satellite data show that during peak flows, over 90% of the floodplain lakes actively exchange with primary and secondary river channels. This area of active exchange shrinks one order of magnitude by September. Our results indicate that the hydrology and floodplain geomorphology of large West Siberian rivers play a critical role in determining the volume and composition of channel waters prior to their entry to the Arctic Ocean.