

SALT INTRUSIONS IN SIBERIAN RIVER ESTUARIES: OBSERVATIONS AND MODEL EXPERIMENTS FOR OB AND YENISEI

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Observations in Siberian river estuaries show a very pronounced vertical stratification during summer. In particular the Yenisei estuary reveals salinity profiles which are strongly affected by freshwater runoff and bottom following salt intrusions, that penetrate actively into the estuary.

In order to study the estuarine variability and to investigate the physics behind these intrusions, numerical circulation models are applied to the Kara Sea and the estuaries of Ob and Yenisei. The models are based on the realistic topography, forced with realistic density, wind fields and river runoff.

Model results from summer reveal a general northward flow of river water at the surface out of the estuaries. Near the bottom however, a south-eastward transport of saline water from the Taymyr coast towards the estuaries prevails. A salt intrusion occurs when the direction of the wind induced offshore Ekman transport is aligned with the axis of the estuary and the runoff. In this case, the enhanced surface offshore transport has to be compensated by an onshore near bottom flow that may penetrate into the estuary.

Salt intrusions can be observed in the Yenisei estuary in connection with north-easterly winds, a frequent wind direction during summer. In the Ob estuary, however, salt intrusions are almost absent and the haline stratification is weaker than in the Yenisei. This is due to enhanced tidal mixing in the Ob but also due to the shape of the sea bed. The Yenisei estuary sea bed is narrow but deep and carved, providing better inflow conditions than the Ob estuary which is broader and shallow.