Relationship between Amur River runoff and surface salinity in the Tatar (Mamiya) Strait

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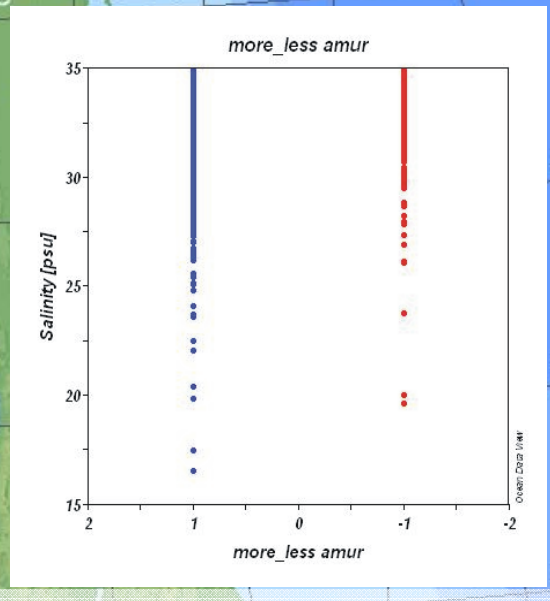
The Amur River runs into the Sea of Okhotsk. About 30% of Amur River water penetrates through the Nevelskoy Strait from the Amur Liman to Tatar Strait and impacts the oceanographic condition.

Seasonal and year-to-year variations of the sea water salinity in the Tatar Strait show the relation to the Amur River discharge anomaly.

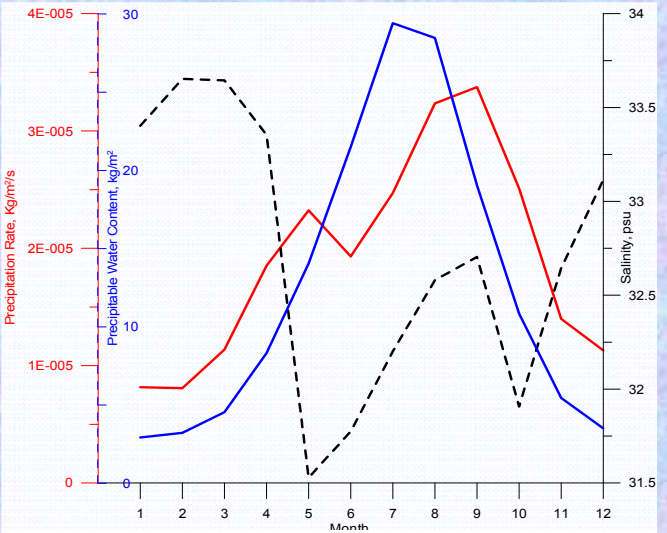


Salinity scatter plot in Tatar Strait classified by annual anomaly of Amur River discharge (1930-2005):
" 1" - positive,
"-1" negative. .

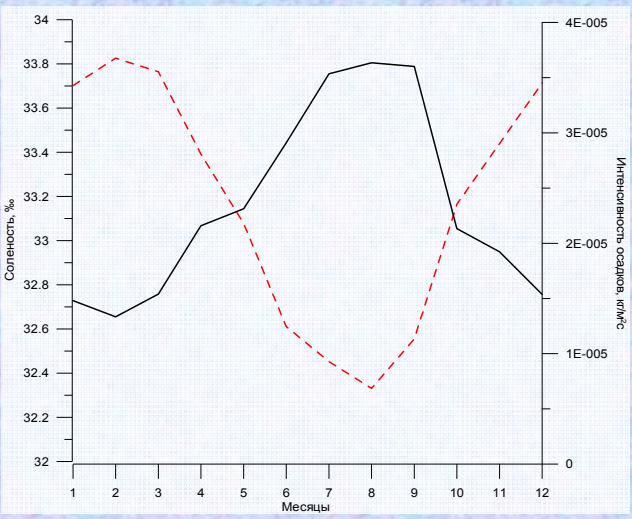
D a t a

- Archival salinity from Japan Sea Data Base (1930-2005); [POI FEB RAS]
- Amur River Discharge in Khabarovsk (1896-2004) and in Bogorodskoe (1900-1985); [GGI, RivGIS 1.1]
- Precipitation at coastal station; [RIHMI-WDC]
- Grid precipitation over Tatar Strait; [NCEP/NCAR http://www.cdc.noaa.gov/]

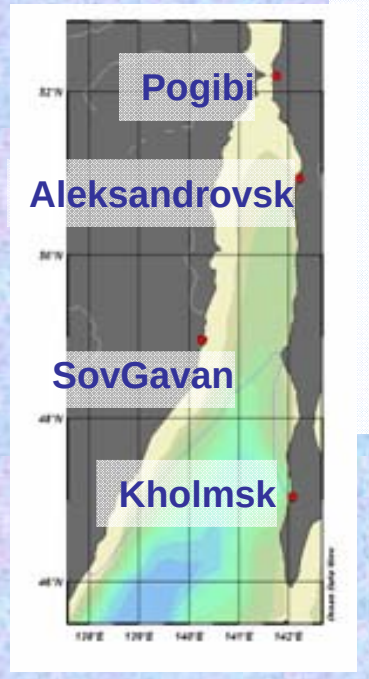
Seasonal cycles of Tatar Strait surface salinity and region precipitation

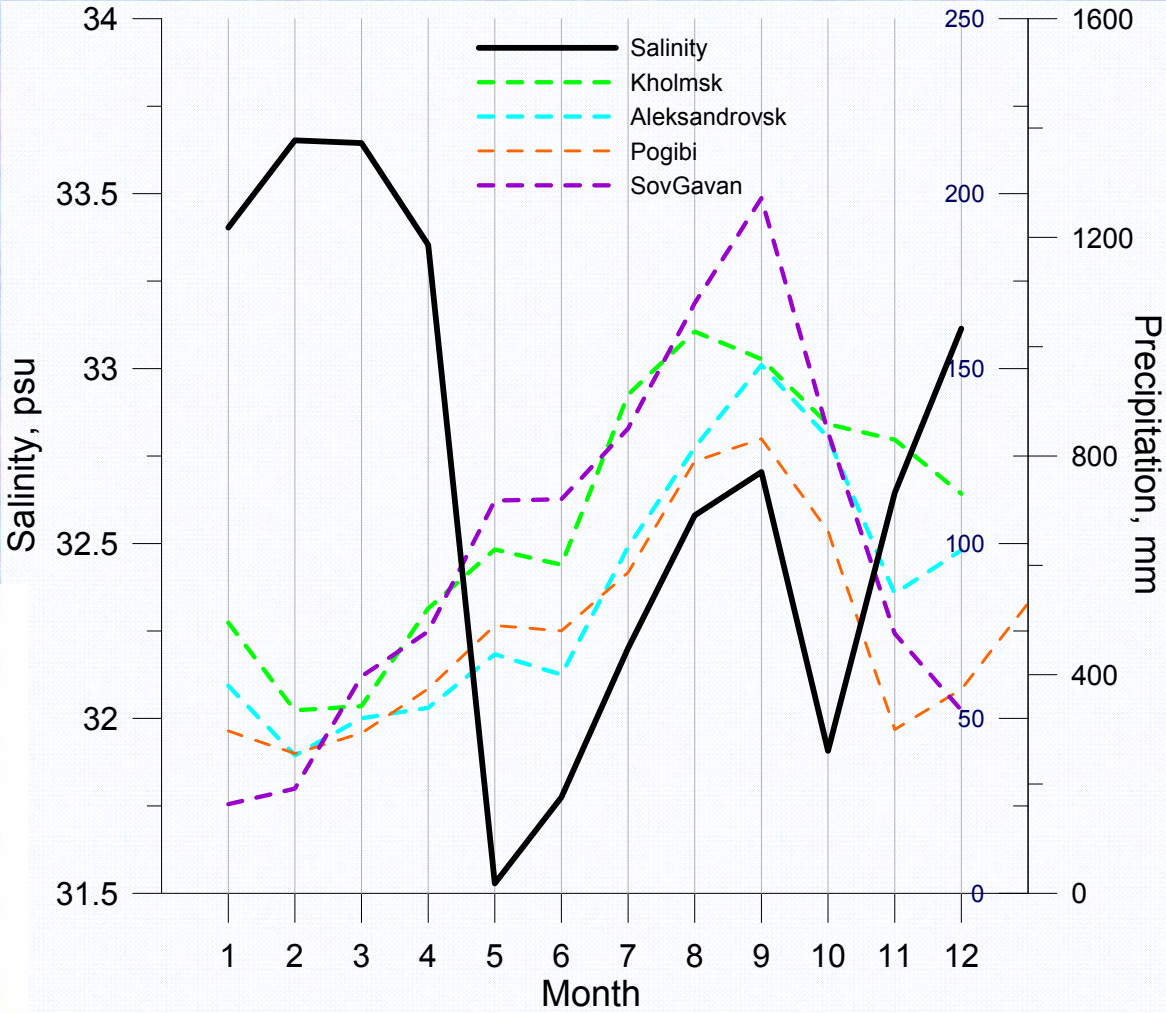


Annual variation of salinity and precipitation in Tartar strait

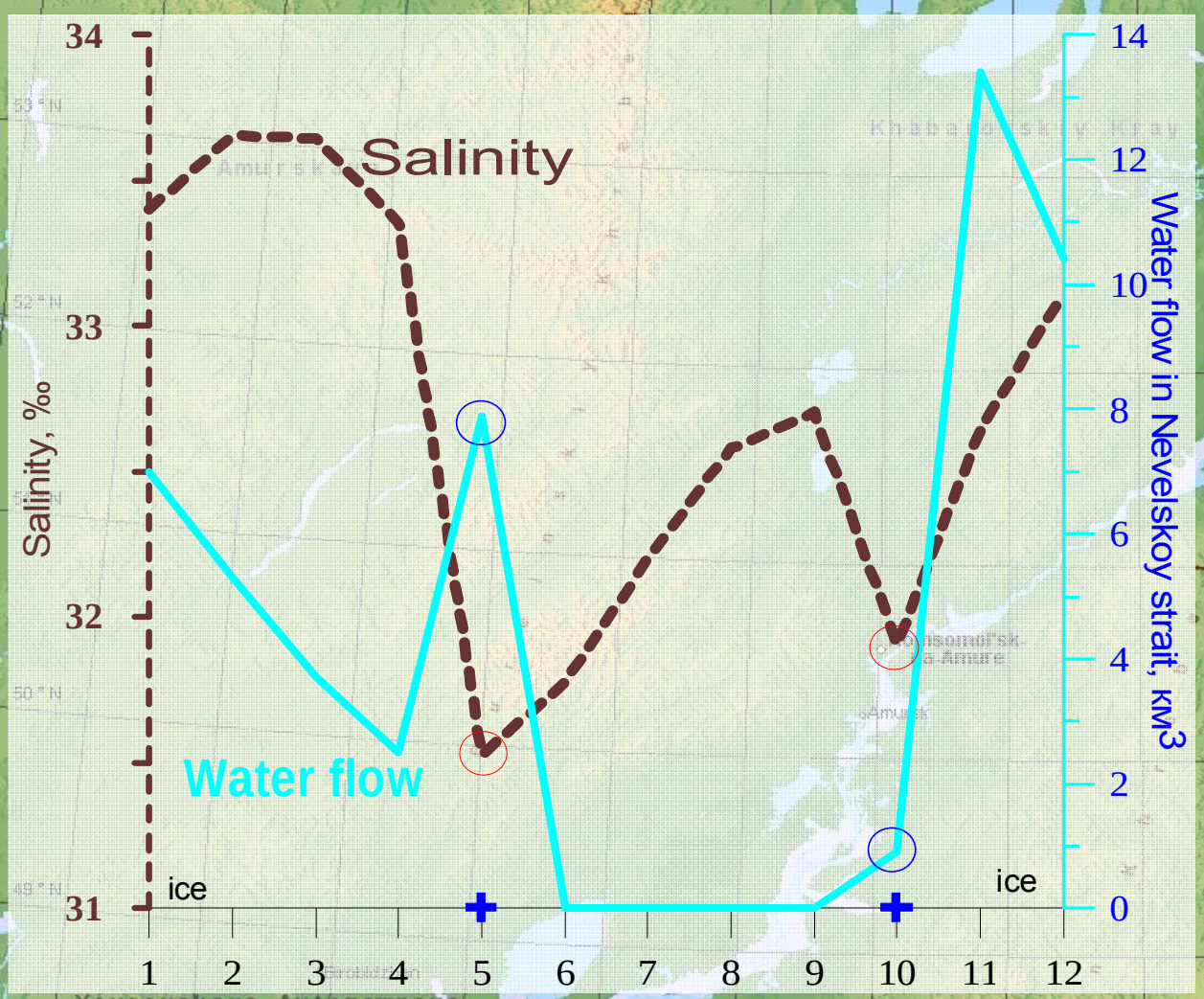


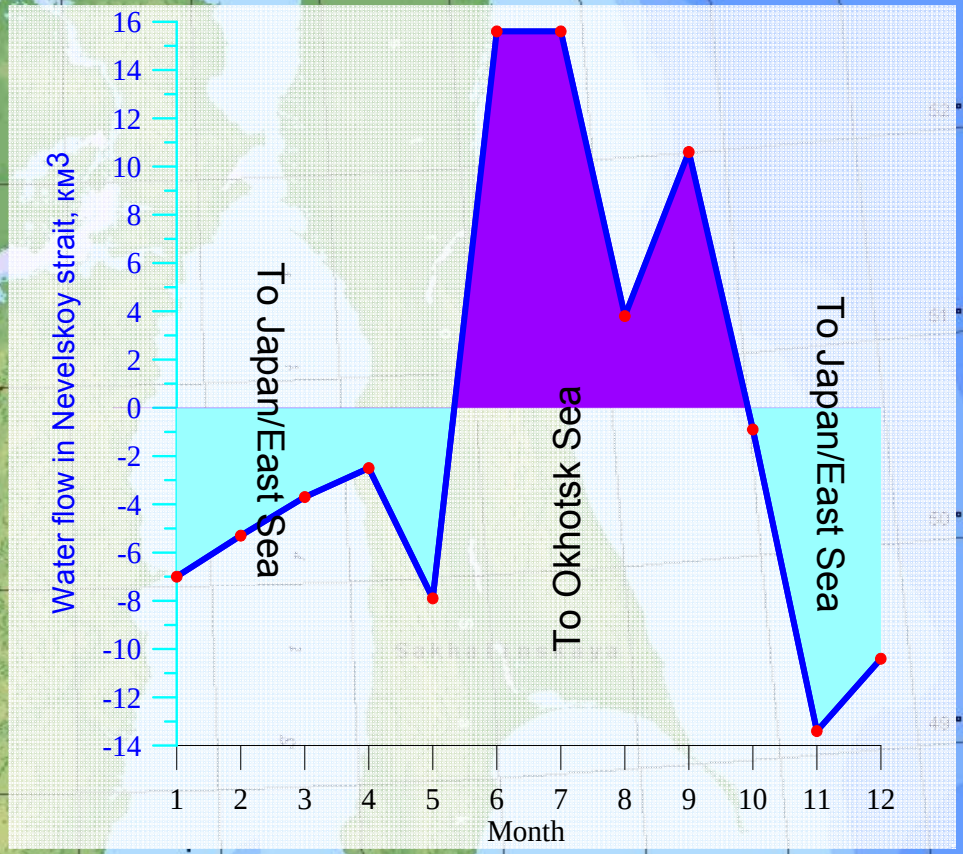
Annual variation of salinity and precipitation in Japan/East Sea coastal zone





Annual variation of salinity and precipitation at coastal station in Tatar Strait region

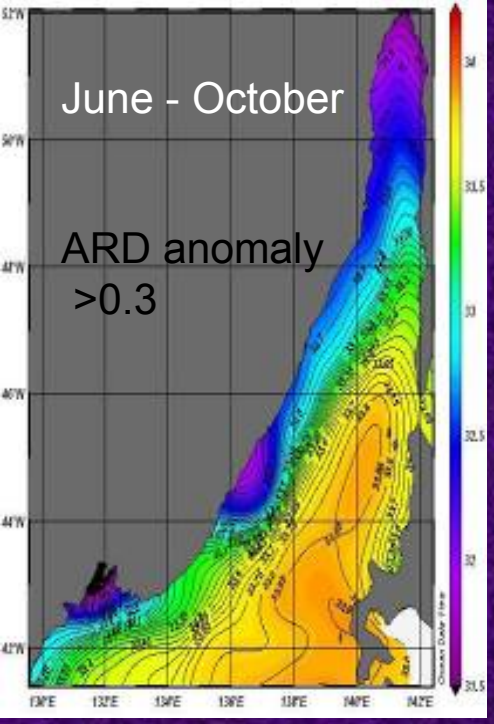


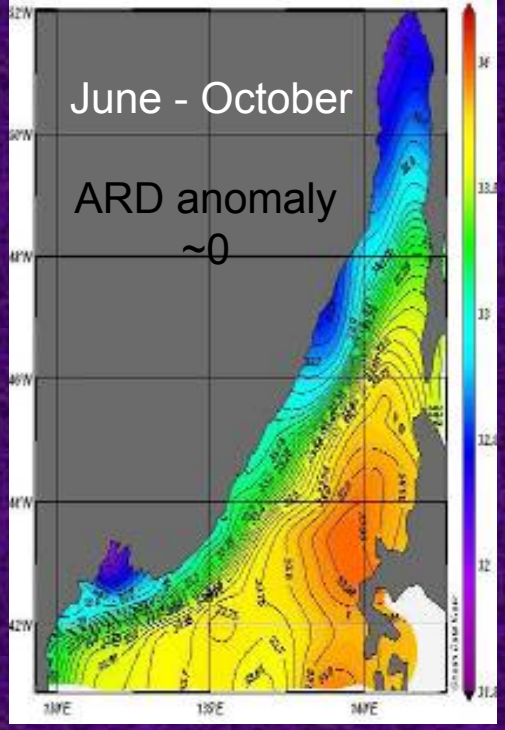


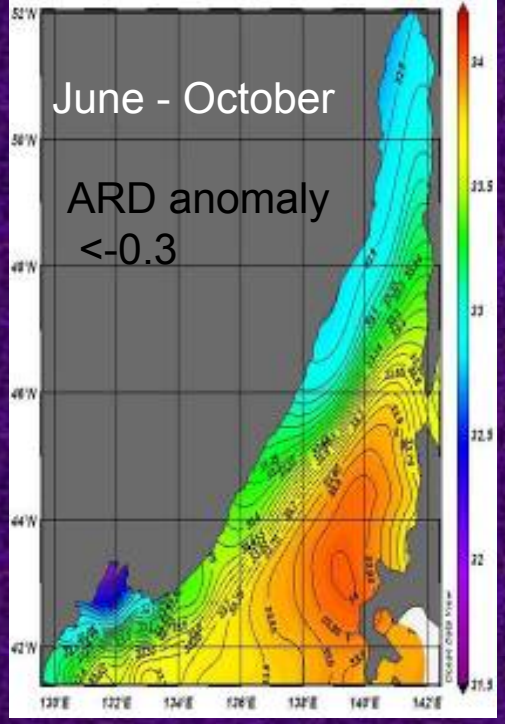
Water flow through Nevelskoy Strait

Season Tatar Strait surface salinity and water flow in Nevelskoy Strait from Amur Liman (Yakunin, 2001)

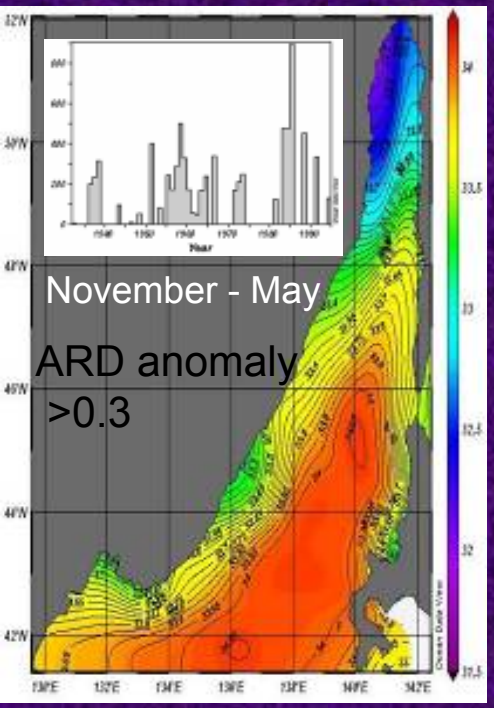
Reference: Yakunin L.P. 2000 (in russian)
Якунин Л.П., Дударев О.В., Боцул А.И., Аникеев В.В., Уткин И.В. О влиянии гидрометеорологических факторов на распределение взвешенного стока р. Амур в Охотоморской части эстуария //Тем.вып. ДВНИГМИ №3. Владивосток, 2000. С.139-149

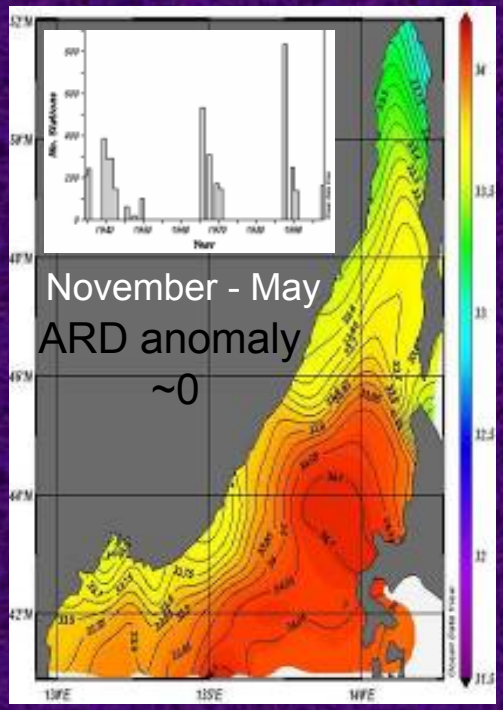


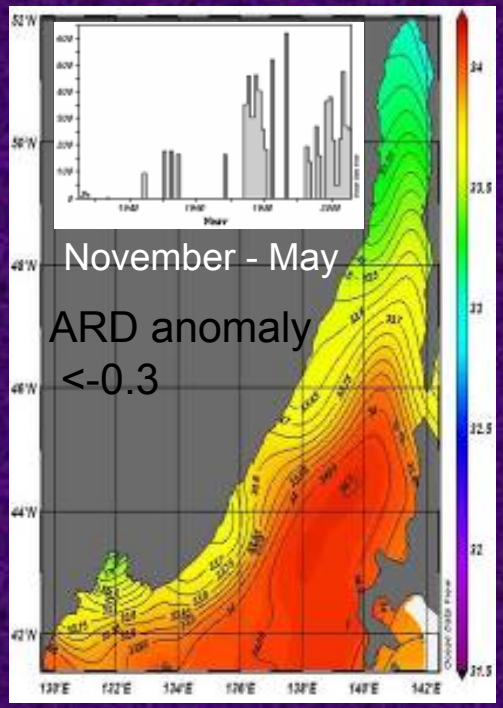




Amur River input impact on Tartar strait salinity on the whole



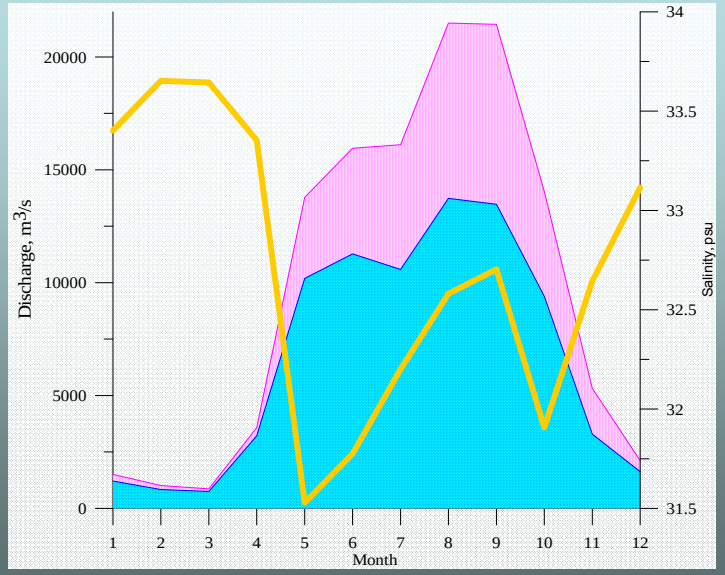




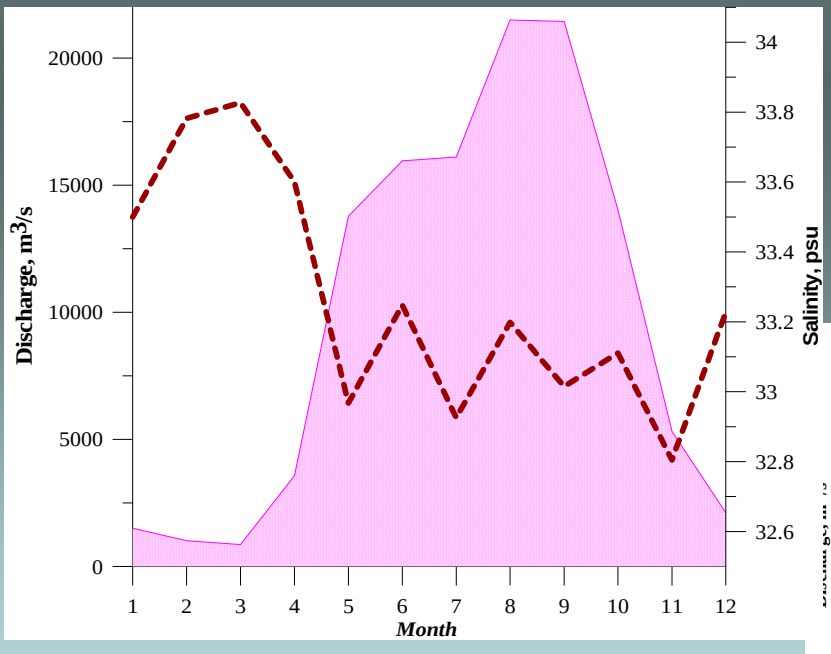
Minimum salinity of the Tartar Strait waters is marked in May and October. There are closely related with Amur River run-of and monsoon.

Salinity distribution in the north part of the Japan/East Sea over time periods of different Amur river discharge (ARD) anomalies

Annual variation of surface water salinity in Tartar strait and Amur River discharge

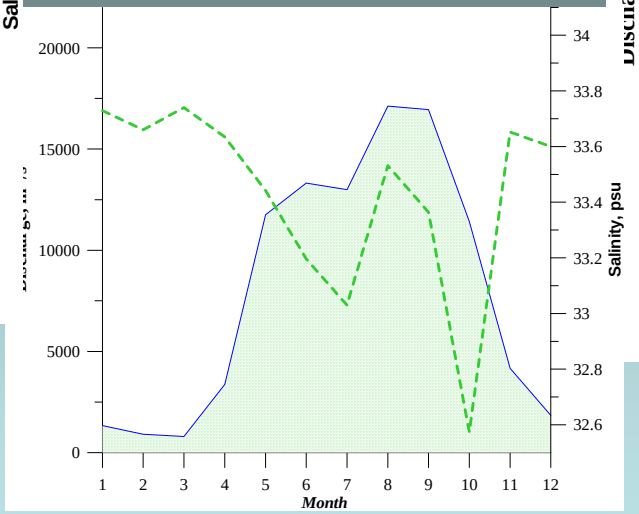


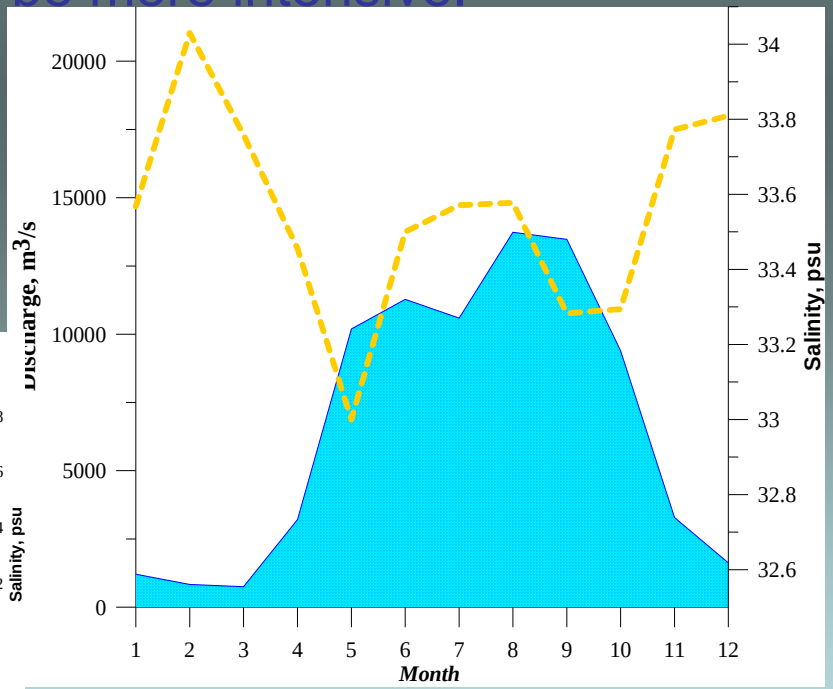
May salinity minimum is pronounced over Amur River low-flow period. When Amur River is full-flowing Tartar strait surface water has low salinity over all worm season. When Amur River run-off is normal minimum salinity become apparent at the October when northern wind begin be more intensive.



Positive ARD anomaly

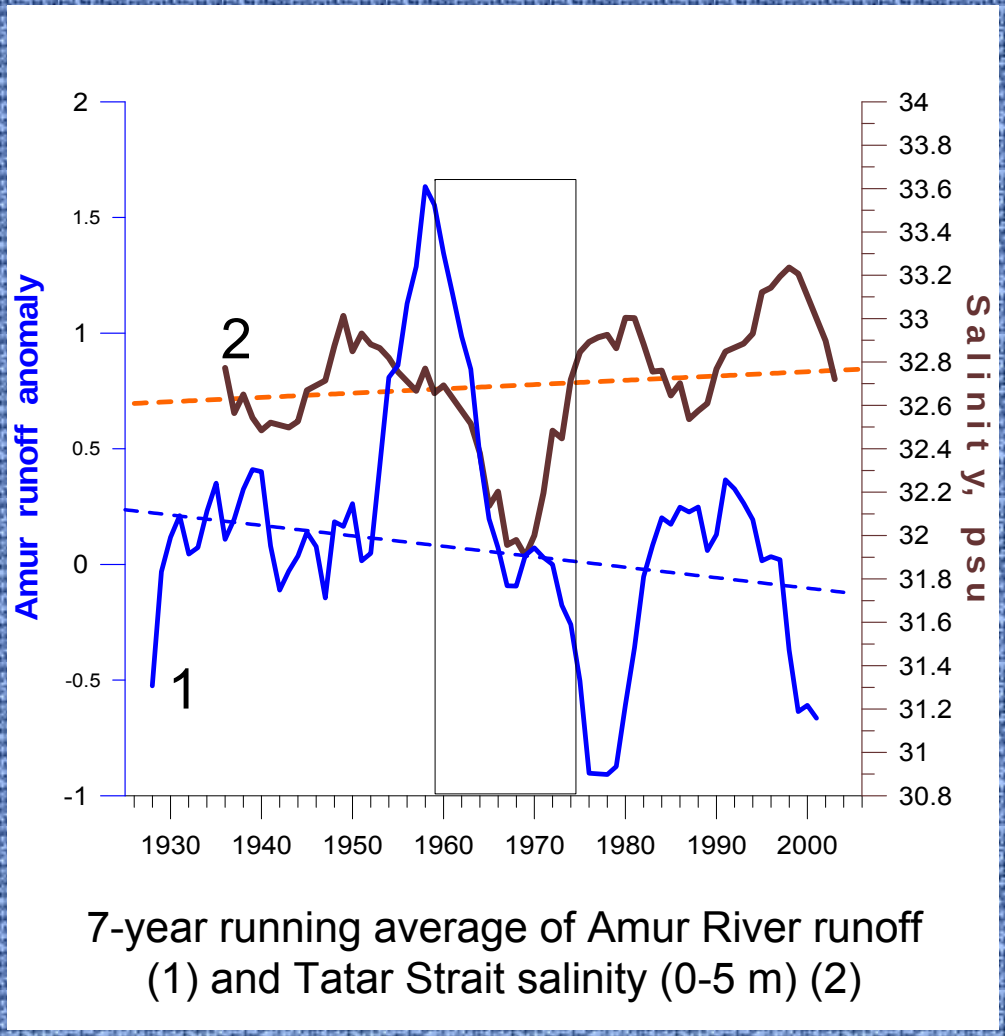
ARD anomaly about 0



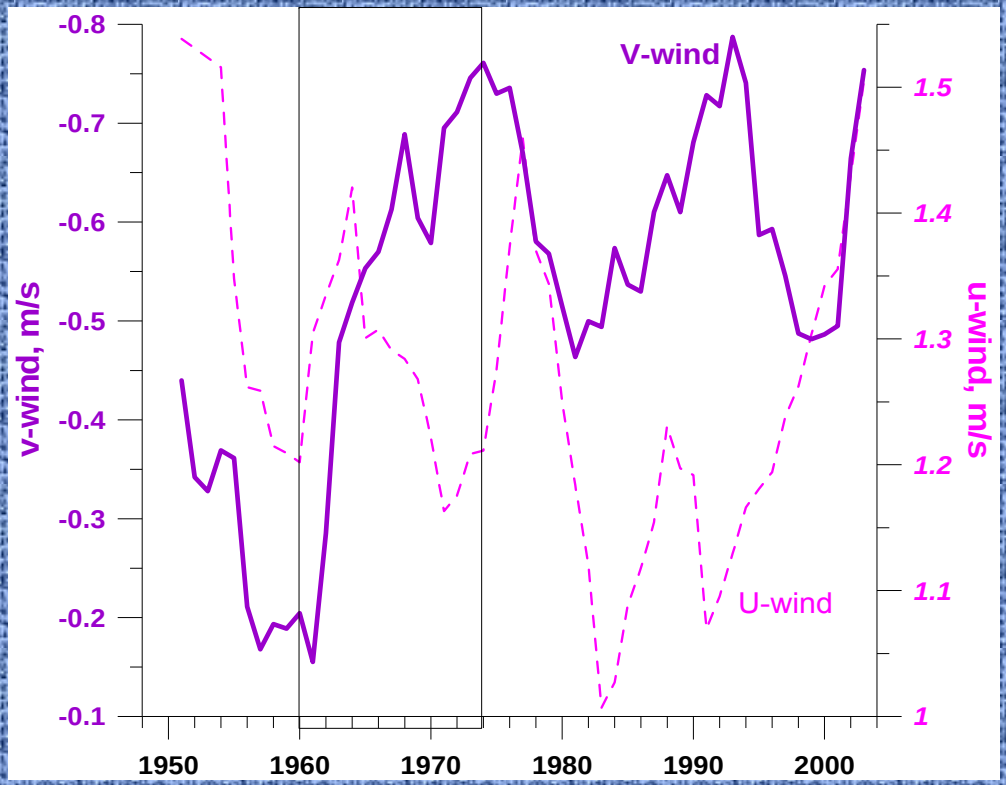


Negative ARD anomaly

Wind impact on Amur River discharge and Tatar Strait salinity correlation

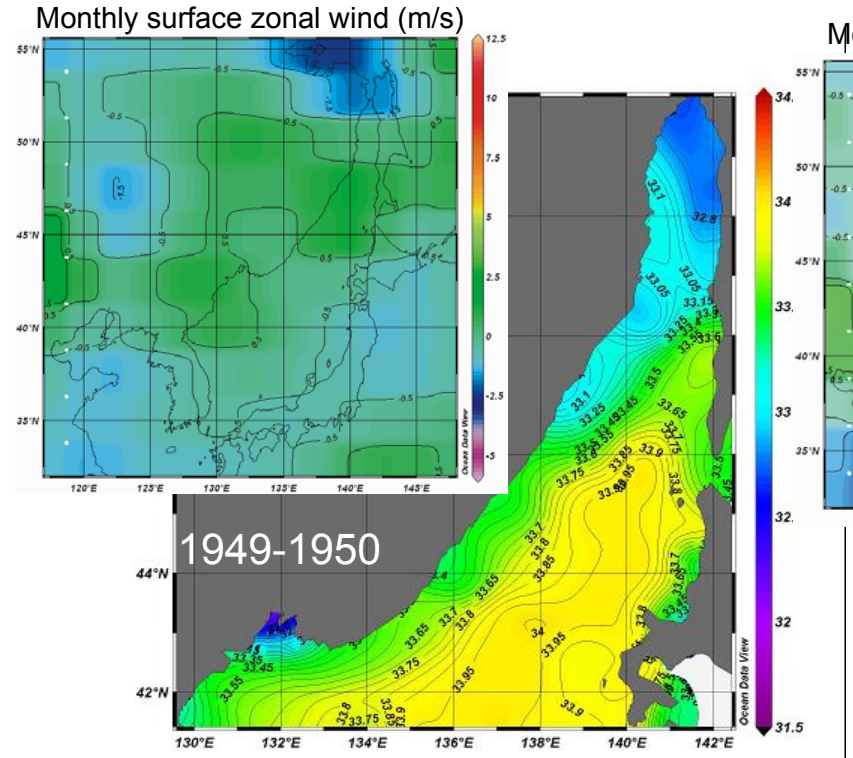


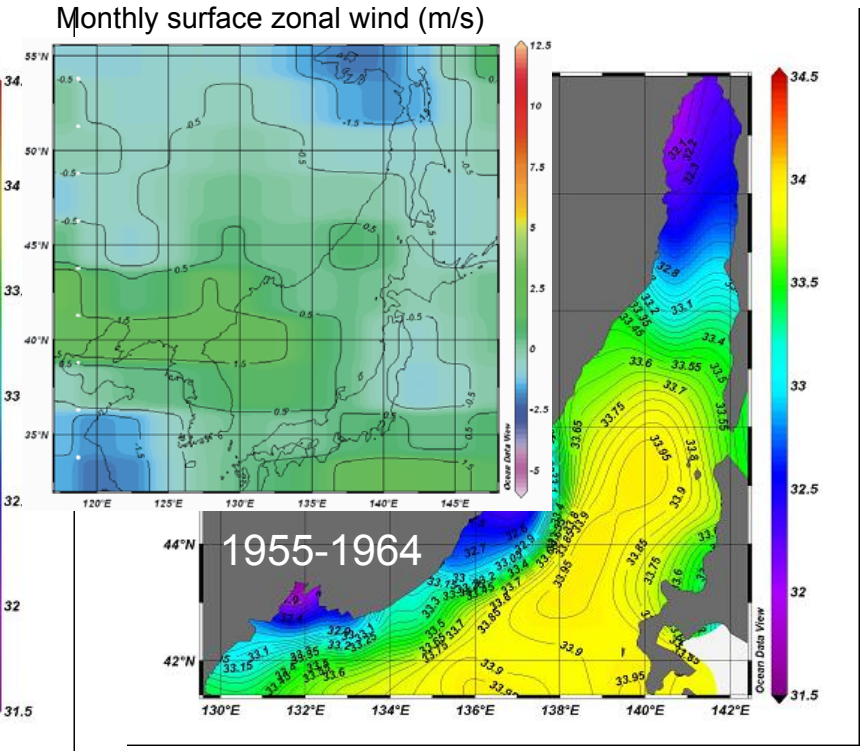
7-year running average of Amur River runoff (1) and Tatar Strait salinity (0-5 m) (2)



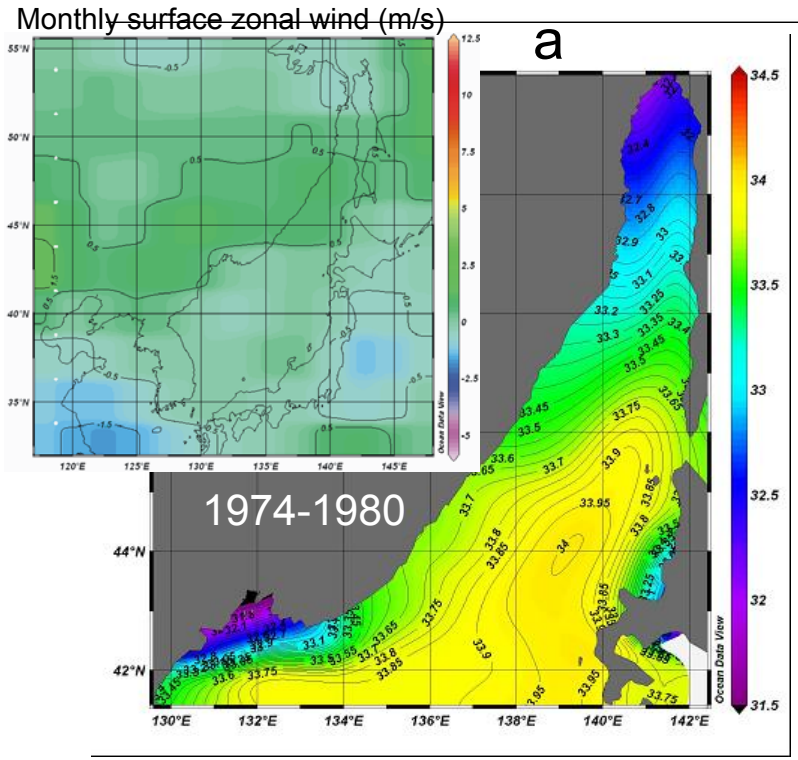
7-year running average of wind components over Tatar Strait

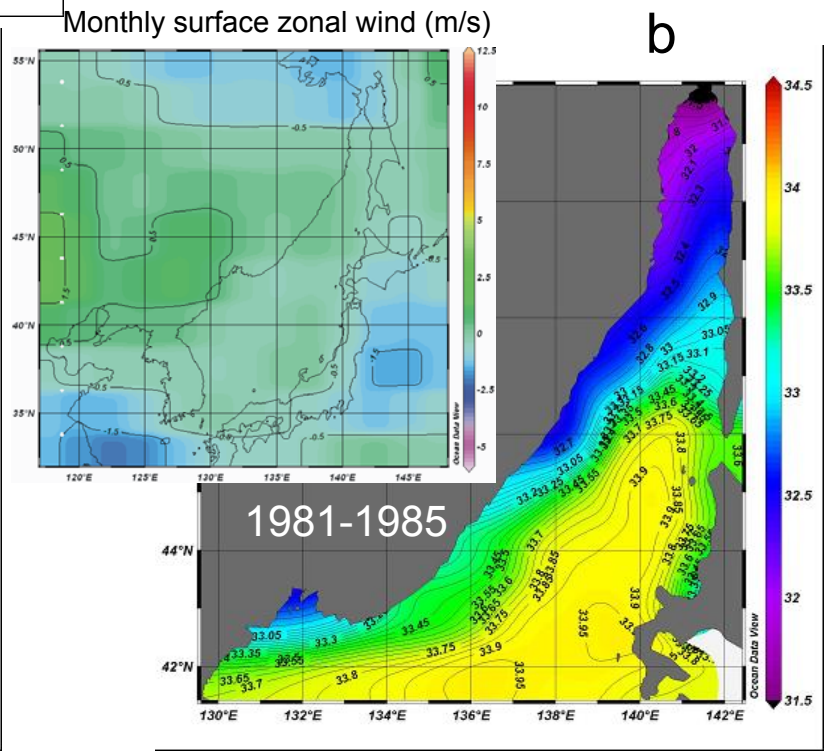
Increase of salinity for the period 1990-2003 at moderate easing meridional wind component is explained by Amur River runoff decrease in this time.





Some easing of summer monsoon is reflected in the freshening of Tatar strait and farther penetration desalinated water to the south. When summer monsoon is strong the Amur River effect is weak traced.





Tatar strait surface salinity and the wind zonal component for June-September within negative (a), and positive (в) ARD anomalies

Conclusion

- Two seasonal minima of waters salinity in Tatar Strait are caused by:
- (1) ice melting and river flood in Spring, including Amur River flood
- (2) maximum of the Amur River runoff in Fall.

Conclusion

- There is a relationship between the Amur River discharge anomalies and interannual fluctuations of the Tatar Strait waters salinity


Thank you
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SEA OF OKHOTSK
Khabarovskiy Kray
Amurskaya
Komsomol'sk-na-Amure
Amursk
Sakhalinskaya
Yevreyskaya Avtonomnaya
Birobidzhan
RUSSIA
Khabarovsk
Korfovskaya
Khor
CHINA
Vyazemskiy
Fujin
Heilongjiang
Lermontovka
Bikin
Shuangyashan
Primorskiy Kray
Chekhov
Sokol
Kholmsk
Yuzhno-Sakhalinsk
Korsakov
SEA OF JAPAN
Strait of Tartary
Sea of Okhotsk
Bureinskiy Khrebet
Sikhote-Alin Khrebet
53 °N
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