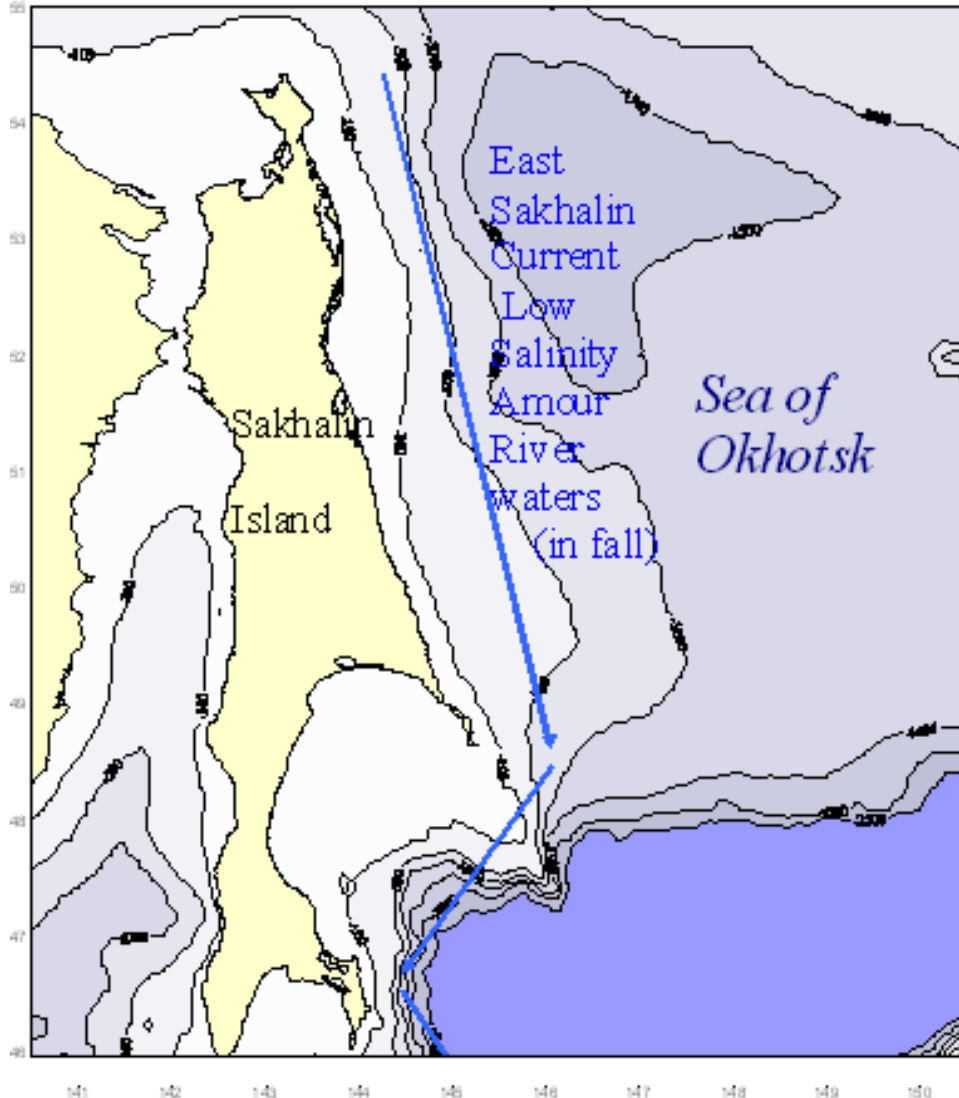


# SEASONAL CHANGES OF THE EAST SAKHALIN CURRENT FROM CTD DATA ANALYSIS

**George Shevchenko and Valery Chastikov**

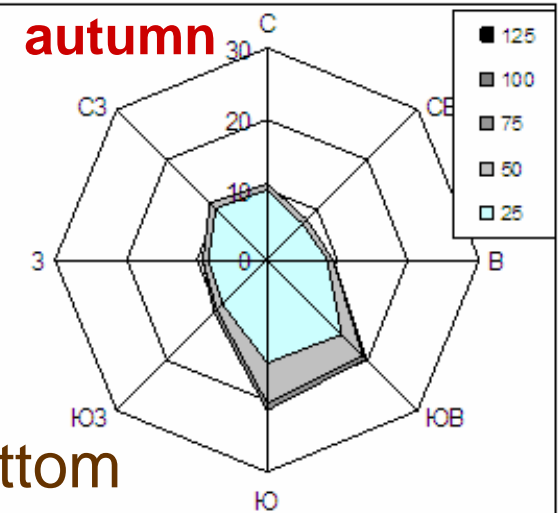
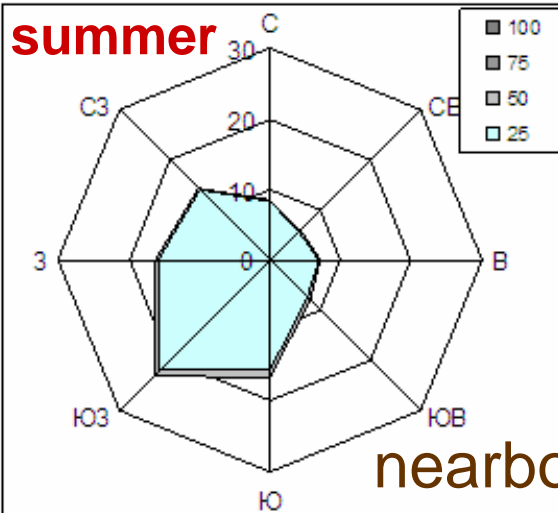
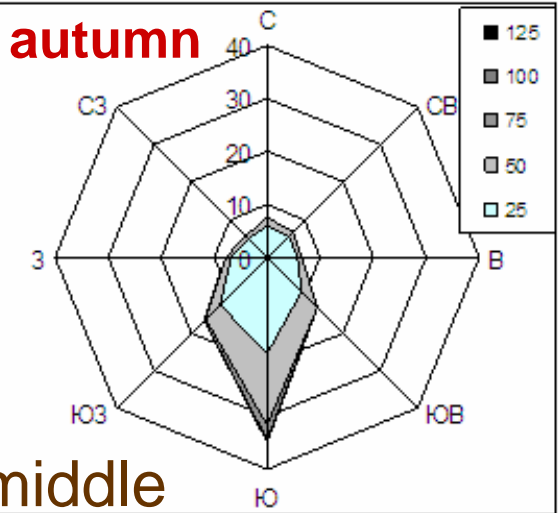
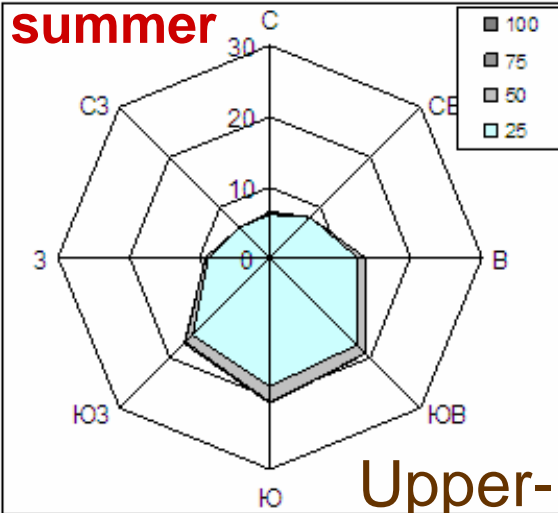
***Institute of marine geology and geophysics FEB RAS***

***Sakhalin research institute of fisheries and oceanography***



# What do we know about ESC seasonal changes?

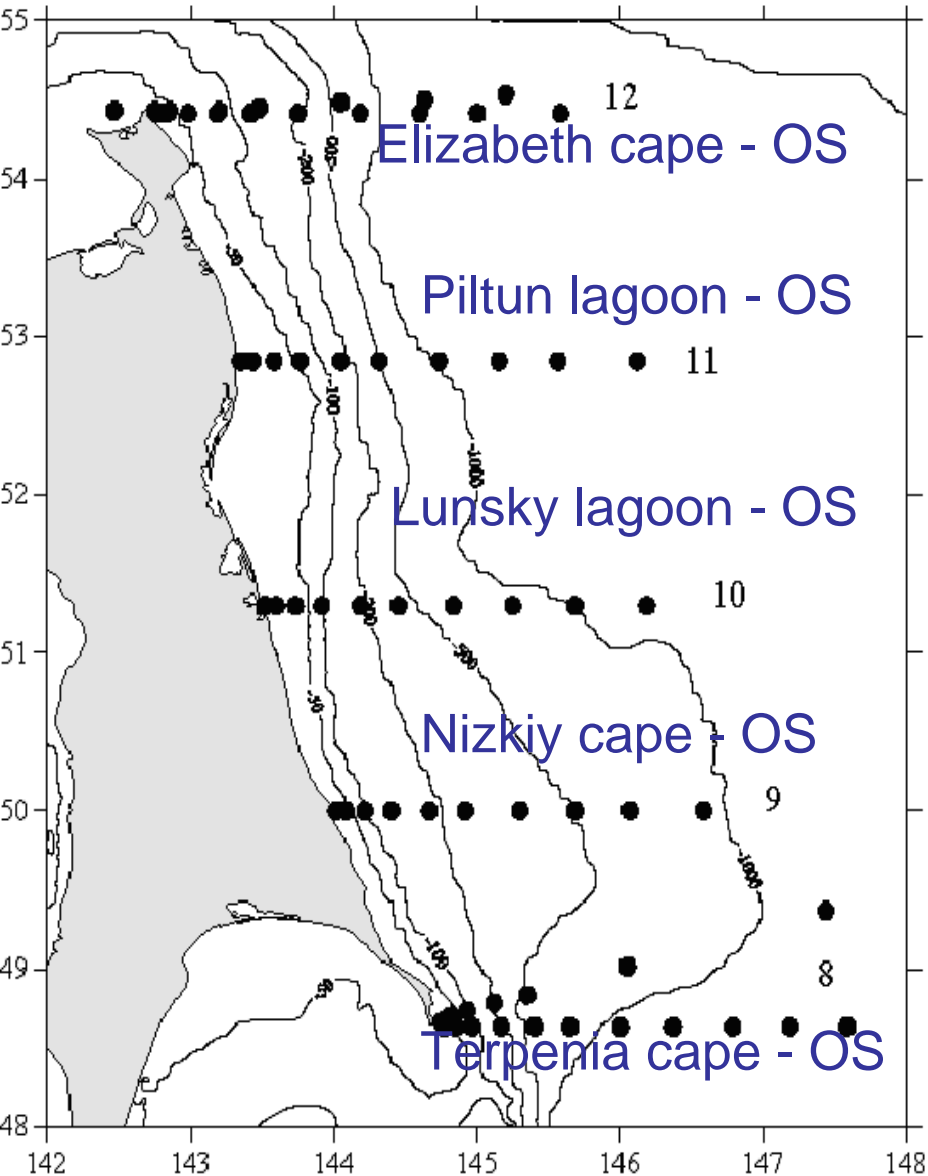
**Summer:** weak southerly current (southwesterly in nearbottom layer) on the shelf (from Piltun-Astokh area 1987-1991, 1996-1998 mooring observations, *Shevchenko, 2004*)



**Autumn:** Amplification of southerly currents (southeasterly in nearbottom layer) on the shelf, depth 30-50 m

Weak currents both in summer and autumn seasons in the deep area adjacent to continental slope (*Mizuta et al, 2003*)

# Oceanological surveying on NE Sakhalin shelf



Five standard (repeated) oceanological sections are crossing northeastern Sakhalin shelf and slope.

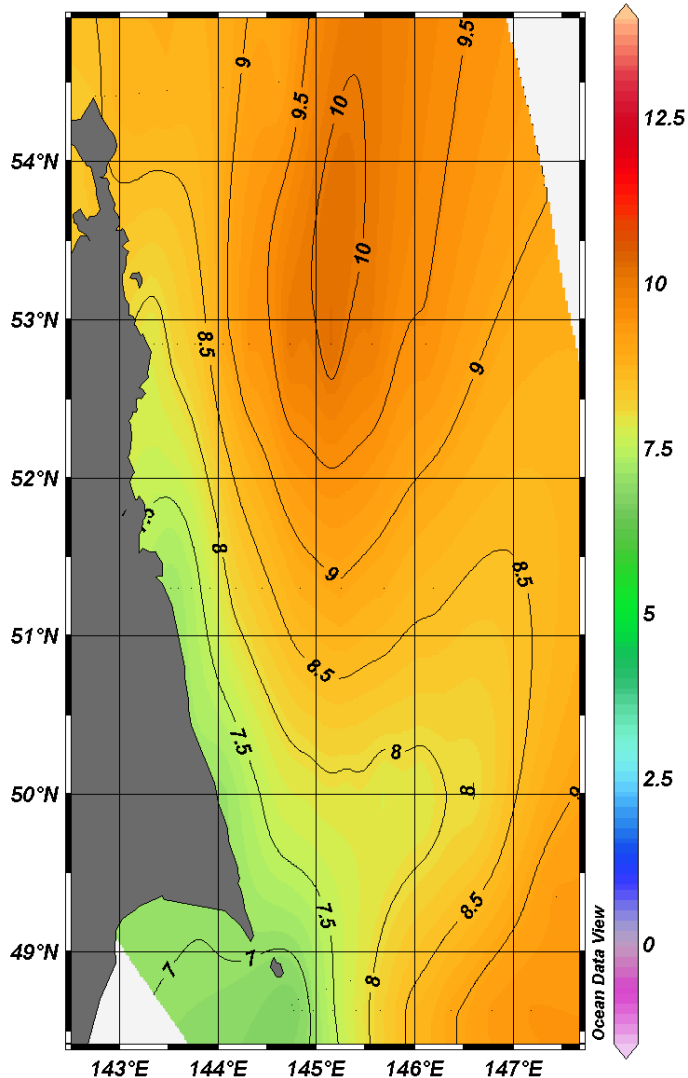
**Data:** Multiyear mean temperature and salinity distributions (July – October) (Pishchalnik, Bobkov, 2000) +

CTD data of SakhNIRO ship expeditions that were carried out in different seasons

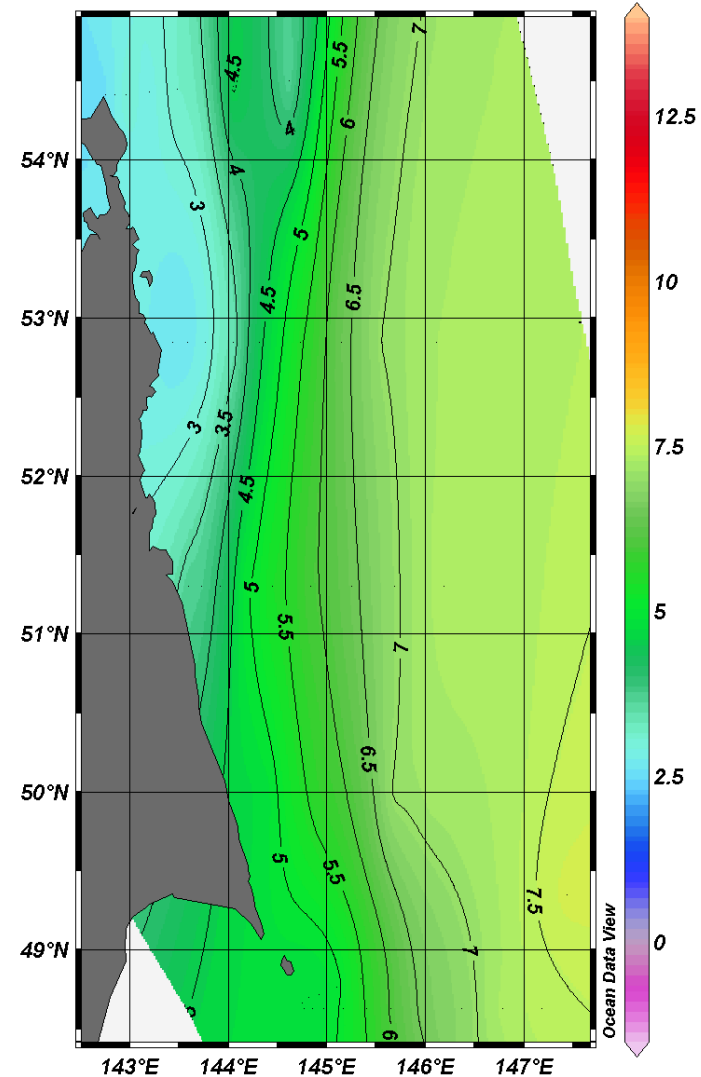
**Goal:** comparison of TS distributions (vertical and spatial) in summer and fall seasons

# Multiyear mean water temperature distributions (°C) at the depth 0 and 20 m in summer (August)

Temperature [°C] @ Depth [m]=Top

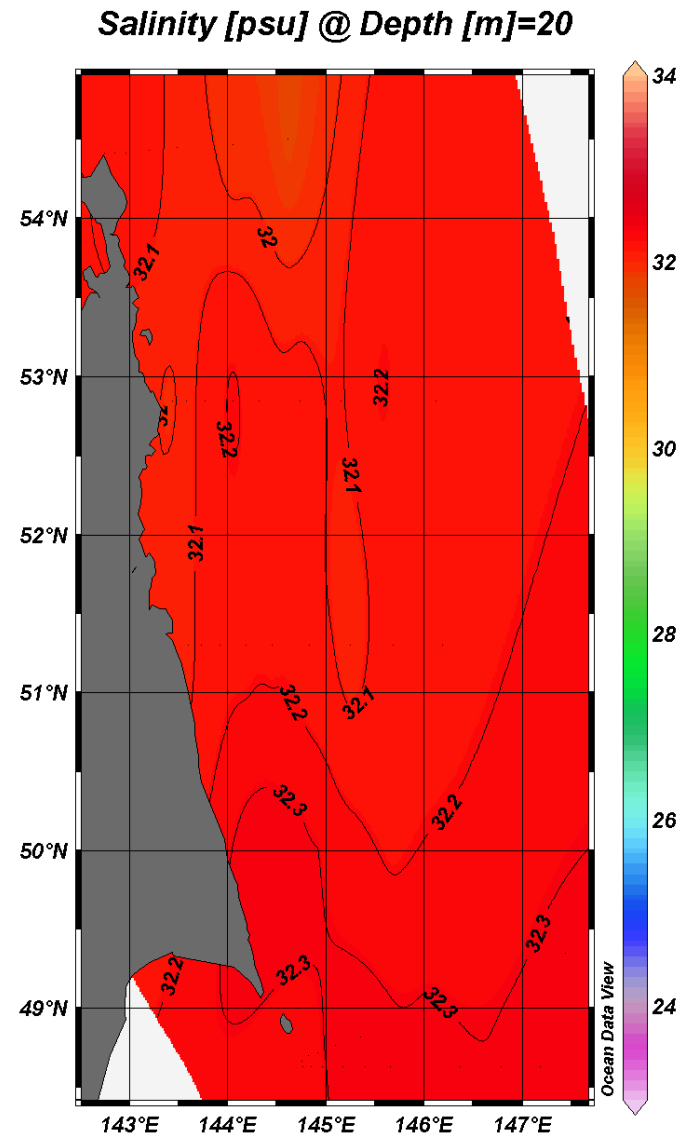
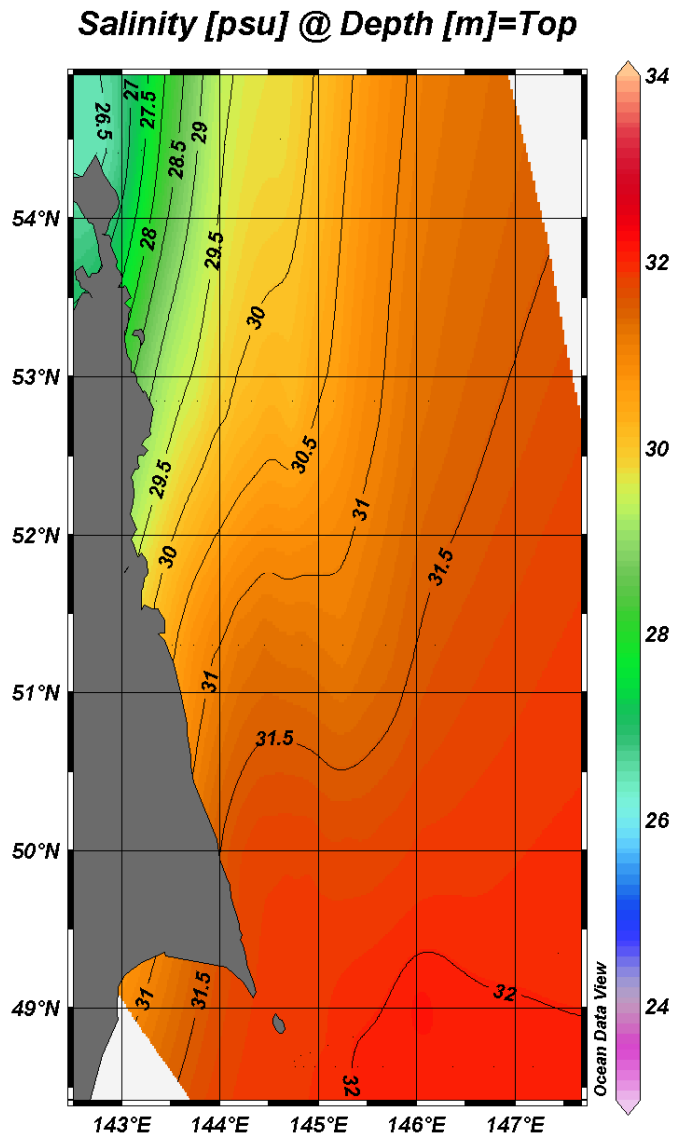


Temperature [°C] @ Depth [m]=20



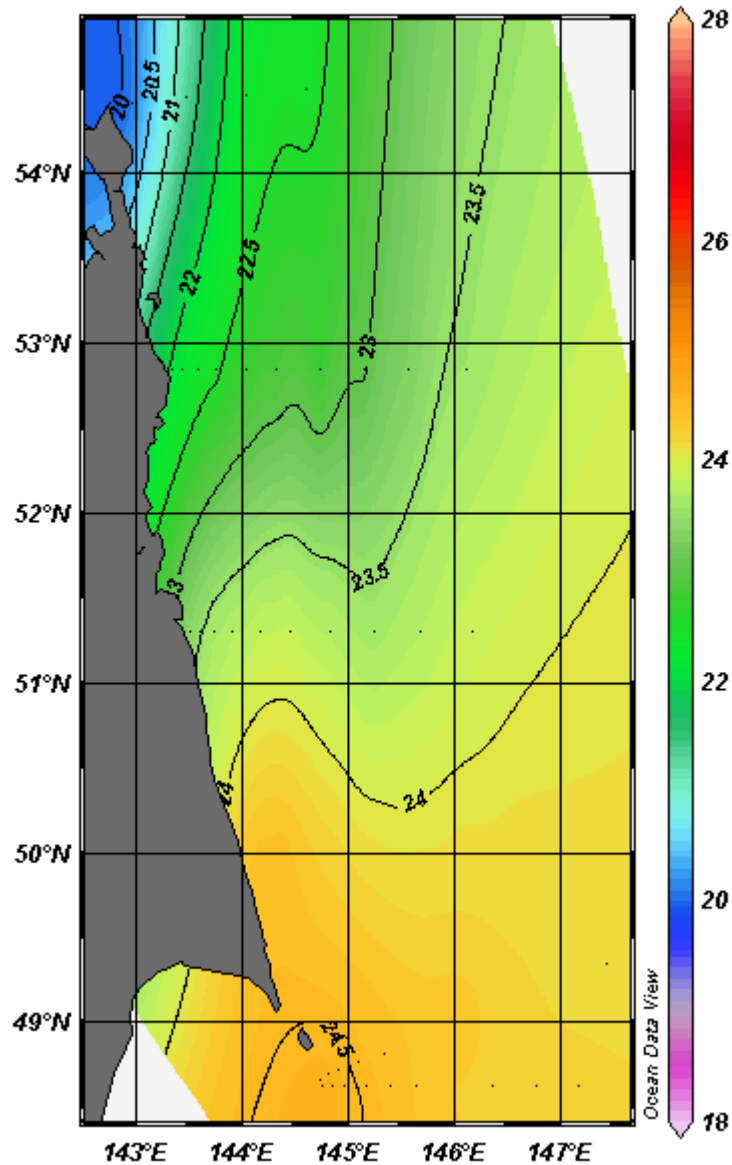
**Point of attention – upper layer 0 – 20 m**

# Multiyear mean water salinity distributions (‰) at the depth 0 and 20 m in summer (August)

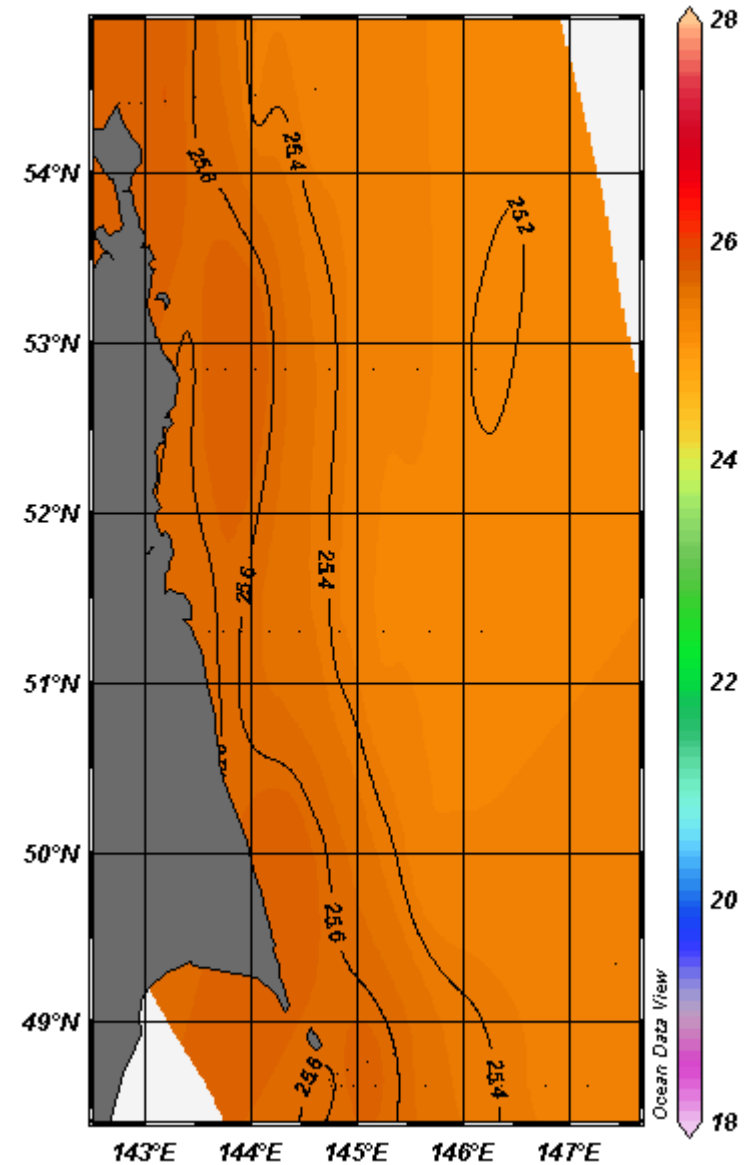


# Multiyear mean water density distributions ( $\text{kg/m}^3$ ) at the depth 0 and 20 m in summer (August)

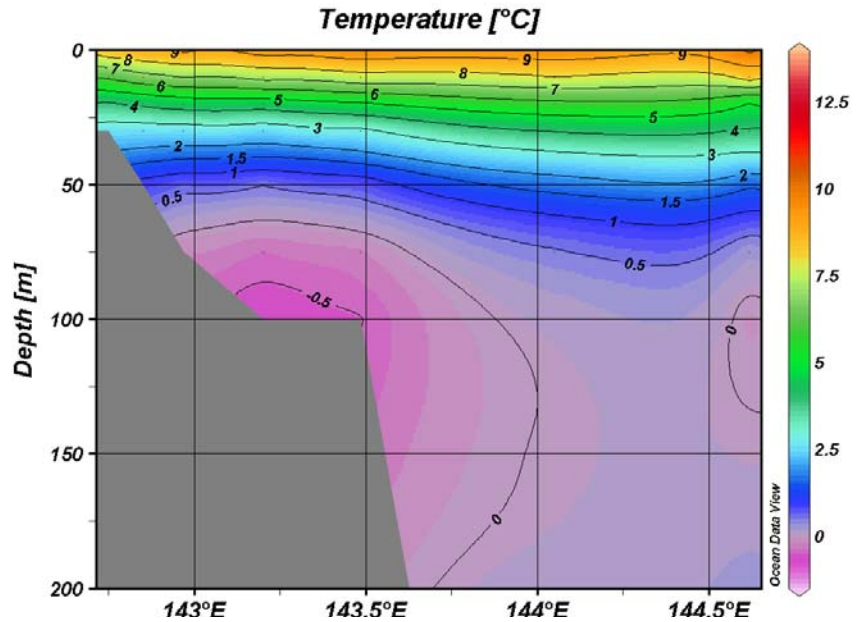
in situ Density( $z, T, s$ ) [ $\text{kg/m}^3$ ] @ Depth [m]=Top



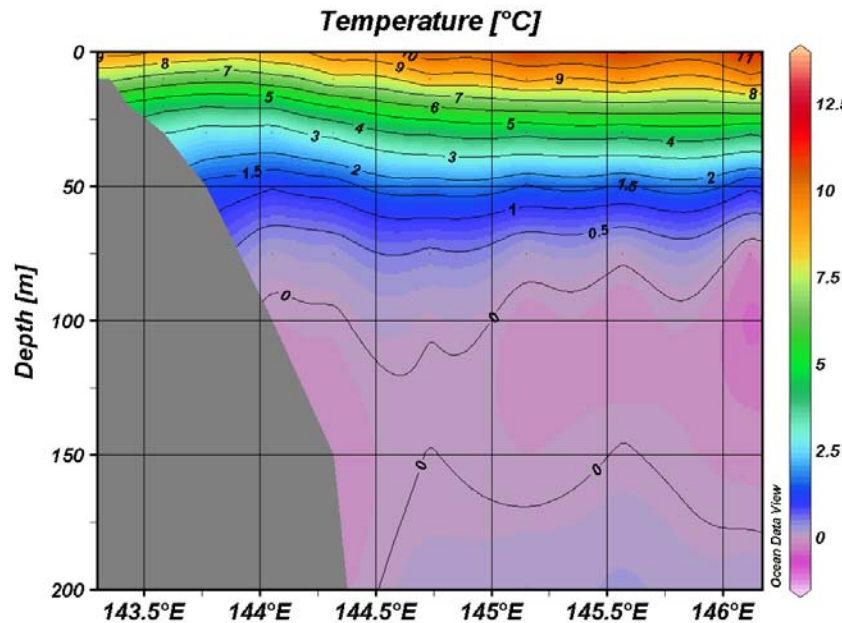
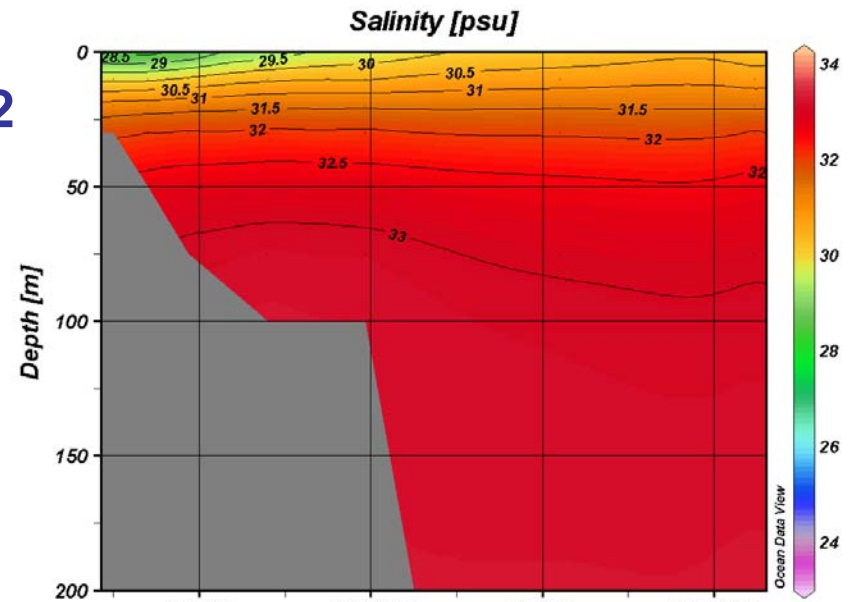
in situ Density( $z, T, s$ ) [ $\text{kg/m}^3$ ] @ Depth [m]=20



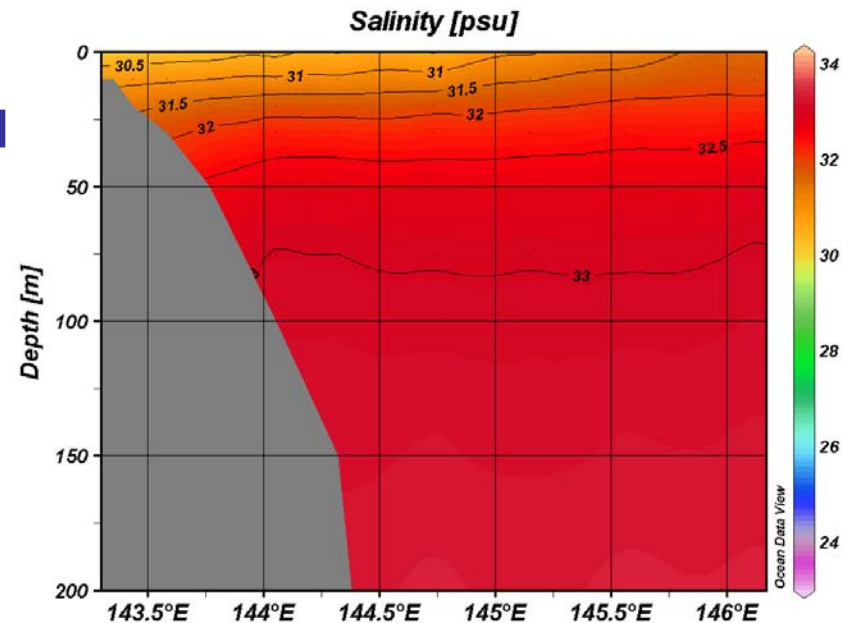
# Multiyear mean vertical TS distributions in summer



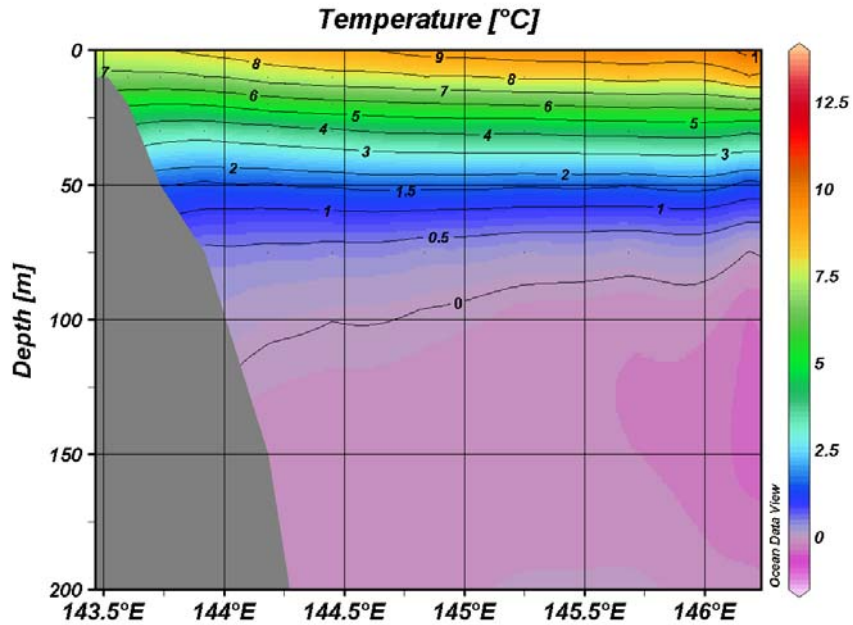
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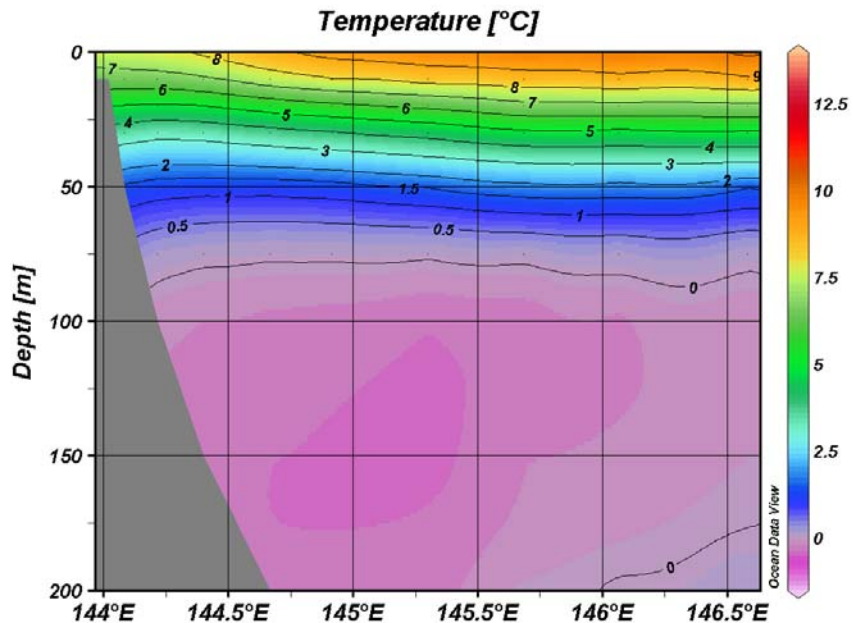
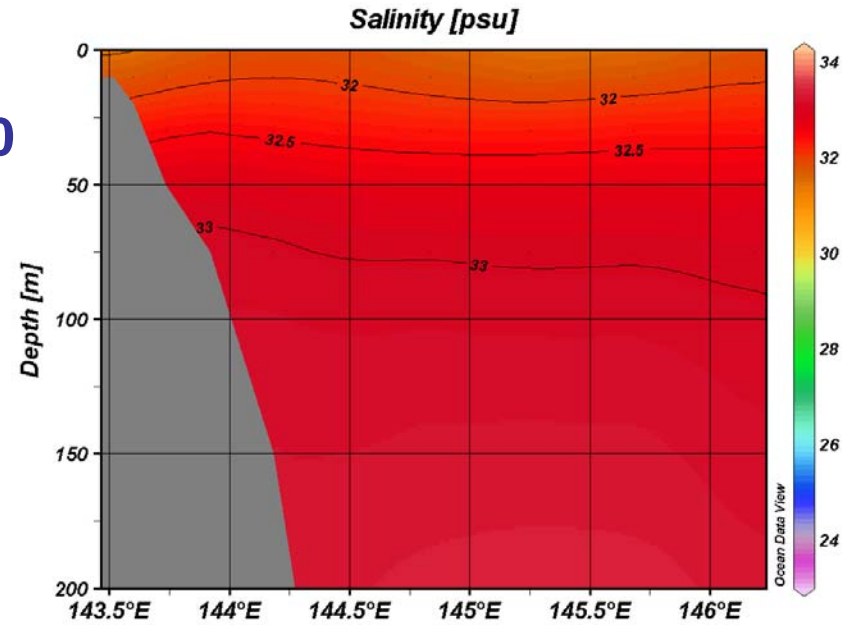
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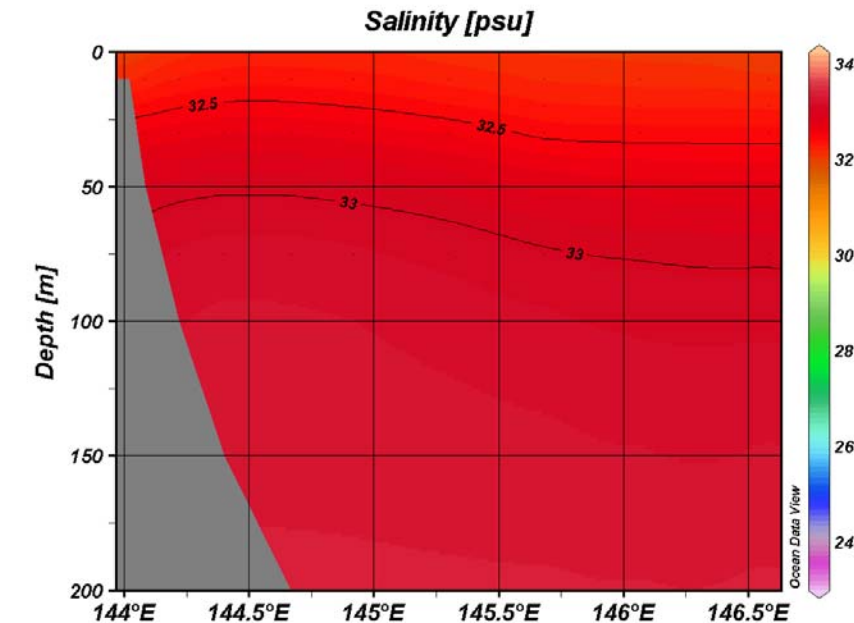
# Multiyear mean vertical TS distributions in summer



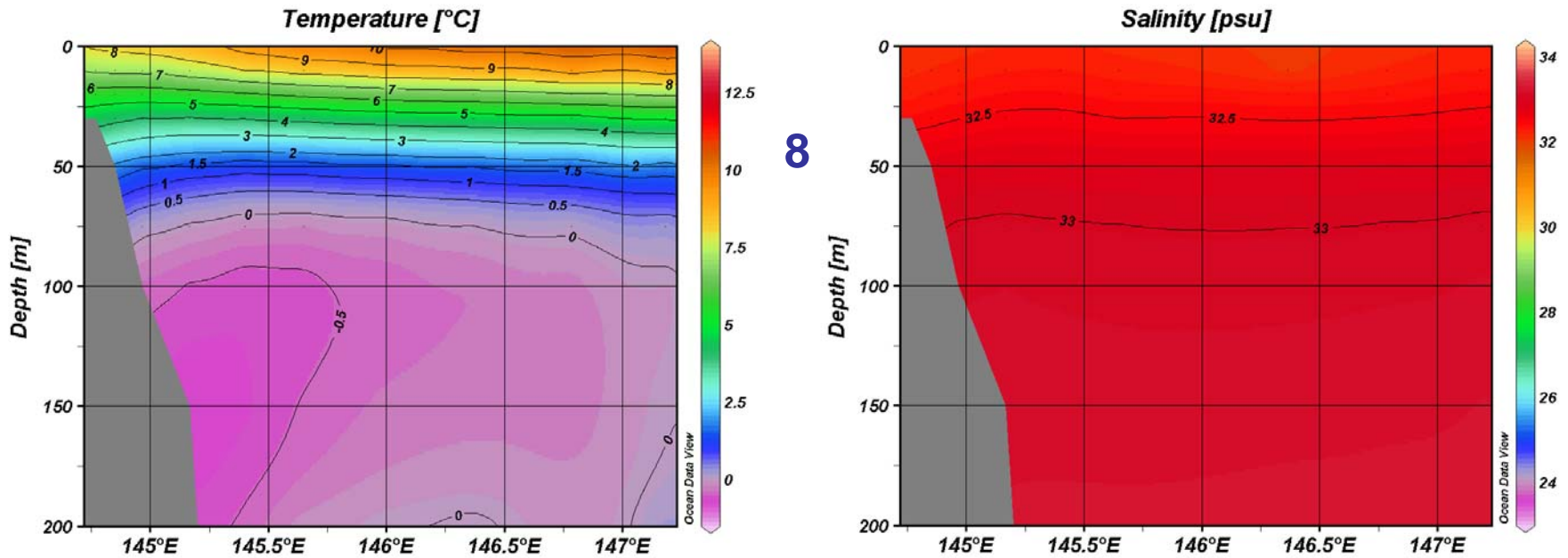
10



9



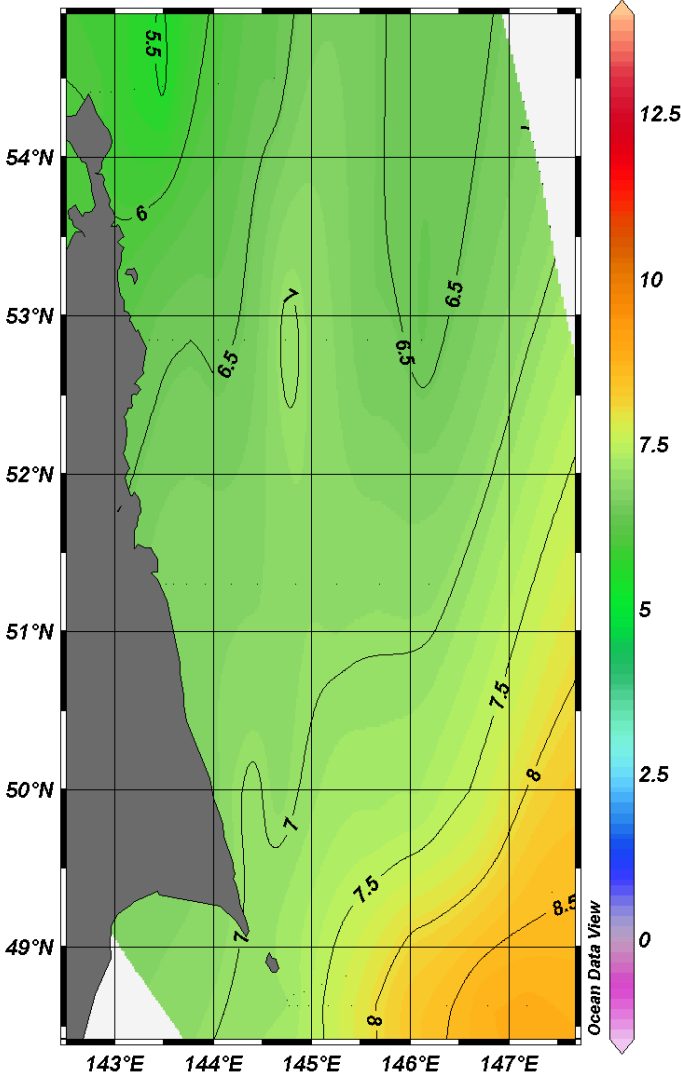
# Multiyear mean vertical TS distributions in summer



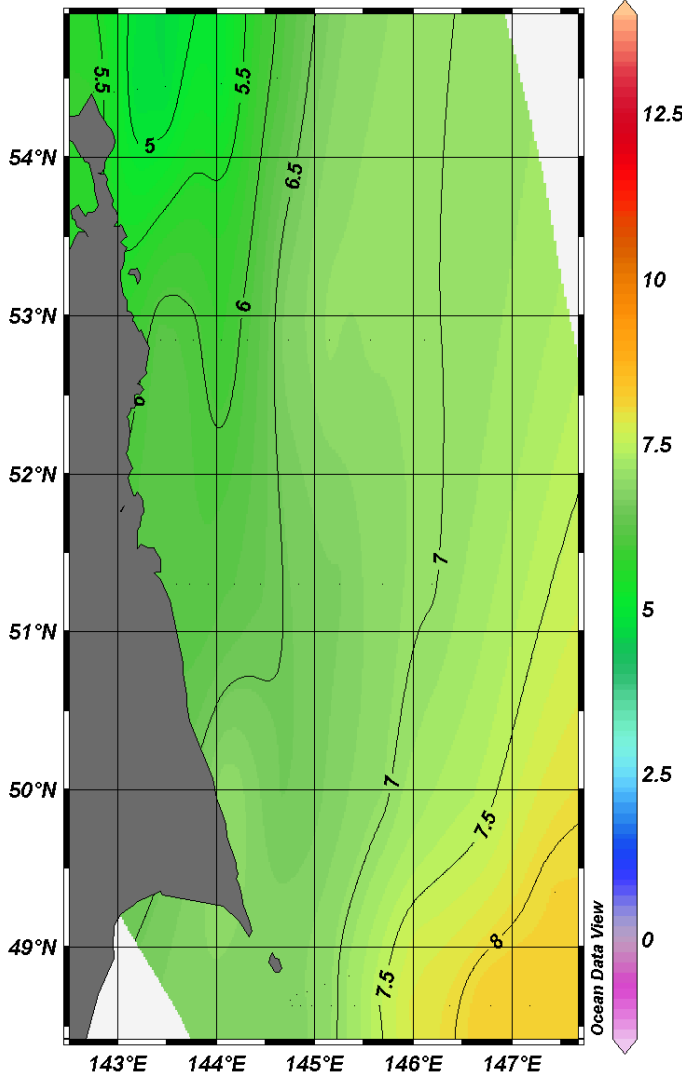
1. Typical for summer season: in upper layer water temperature increasing with off-shore distance (upwelling); great difference between northern and southern parts of NE shelf
2. Well-expressed cold intermediate layer (70- 200 m depth)
3. Significant influence of Amour River low salinity water on the 12 and 11 sections, weak influence southward of 52°N
4. Relatively small spatial salinity changes at the depth more than 20 m

# Multiyear mean water temperature distributions (°C) at the depth 0 and 20 m in fall season (October)

Temperature [°C] @ Depth [m]=Top

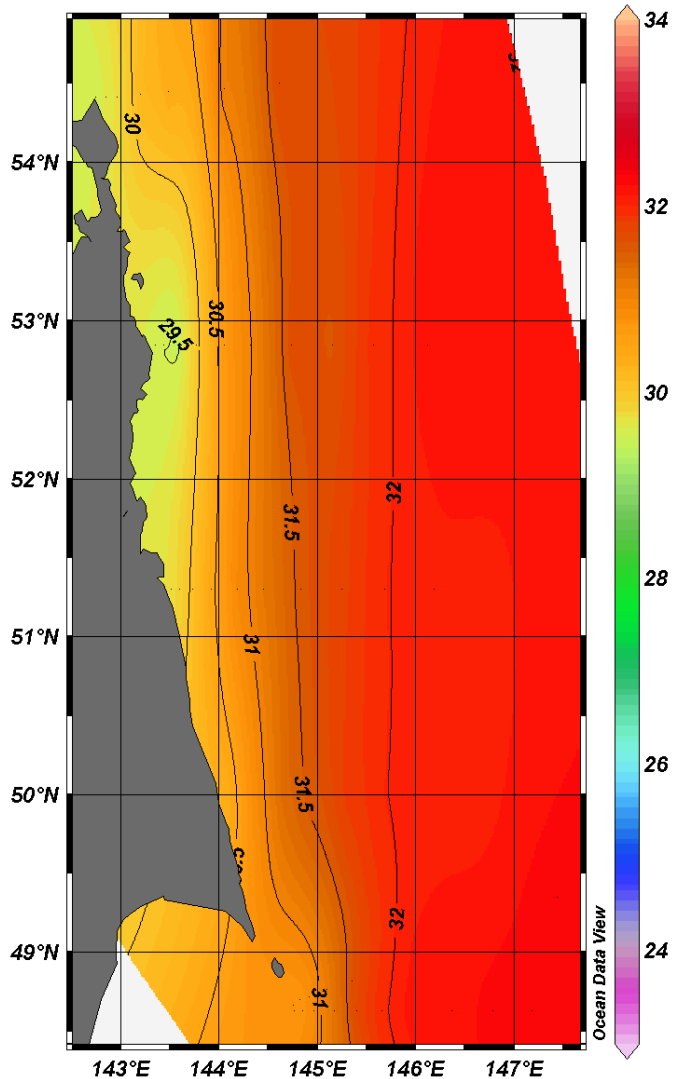


Temperature [°C] @ Depth [m]=20

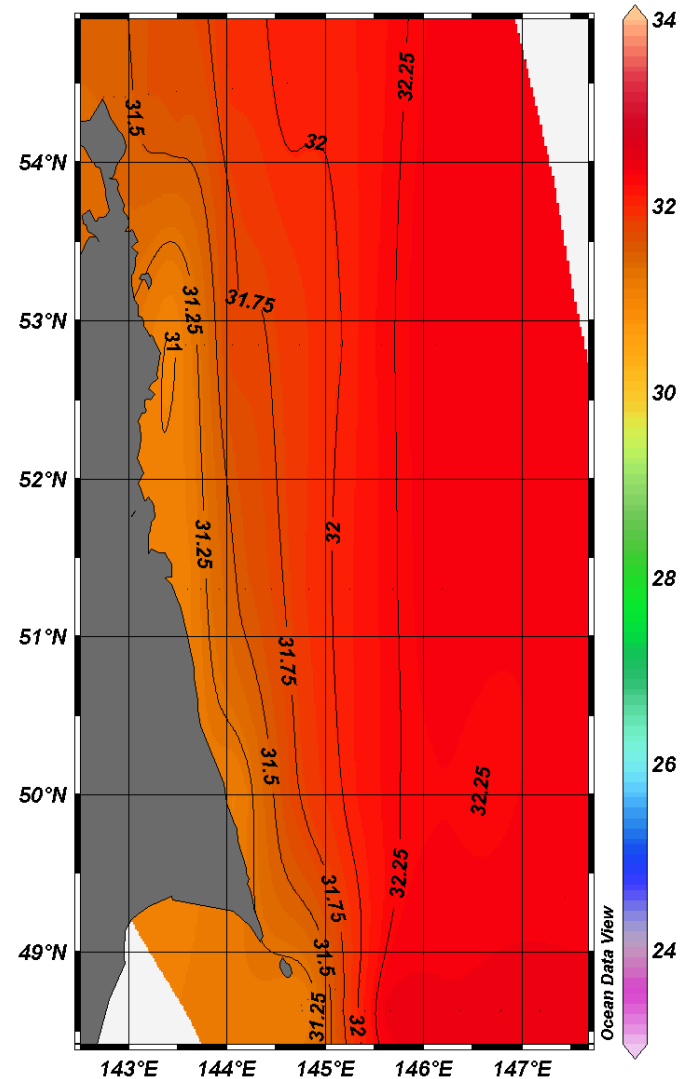


# Multiyear mean water salinity distributions (‰) at the depth 0 and 20 m in fall season (October)

Salinity [psu] @ Depth [m]=Top

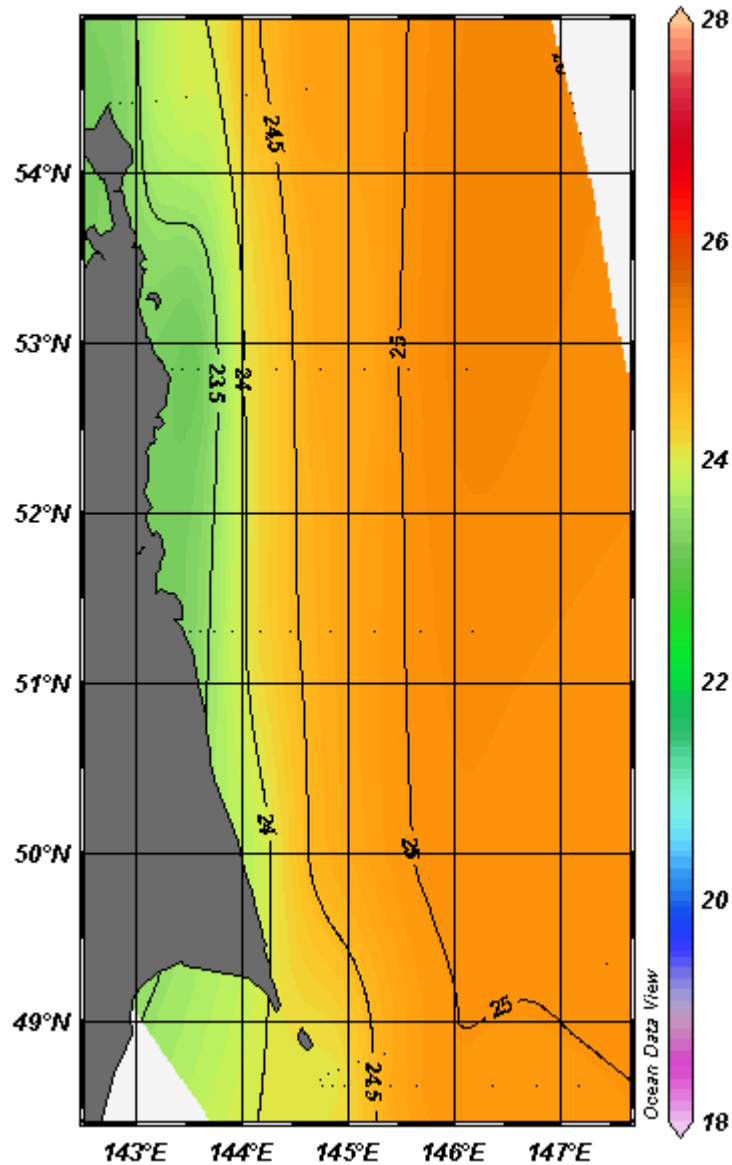


Salinity [psu] @ Depth [m]=20

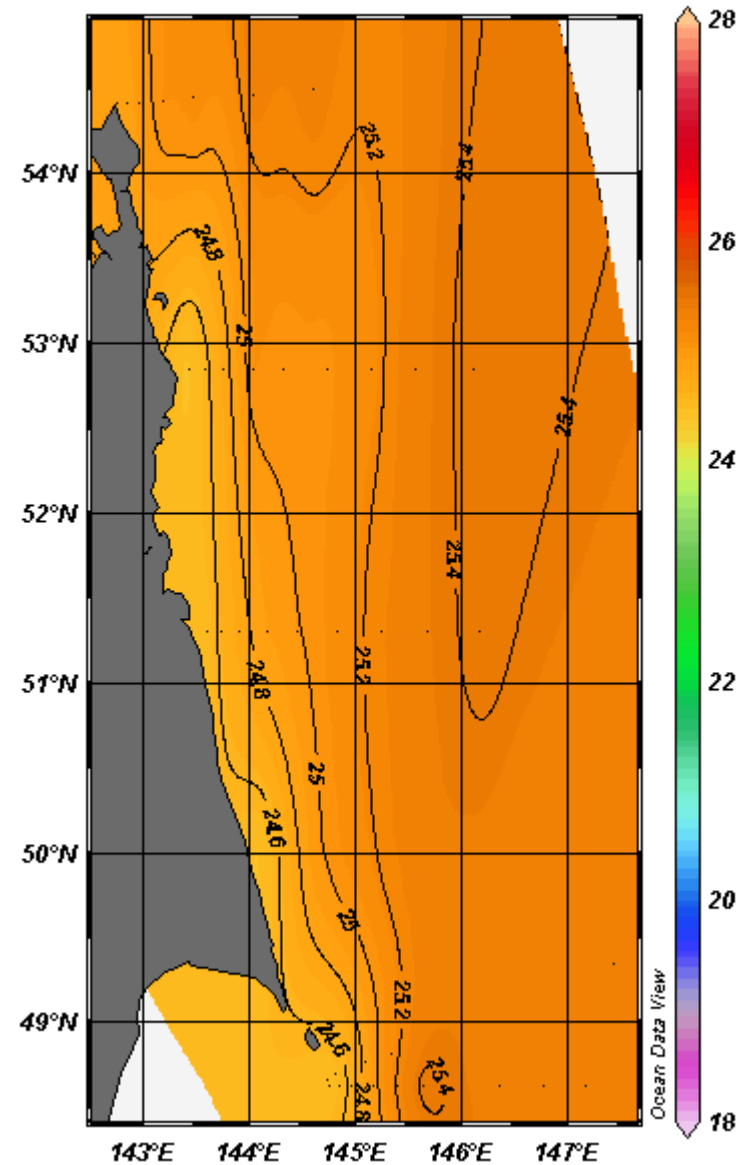


# Multiyear mean water density distributions ( $\text{kg/m}^3$ ) at the depth 0 and 20 m in autumn (October)

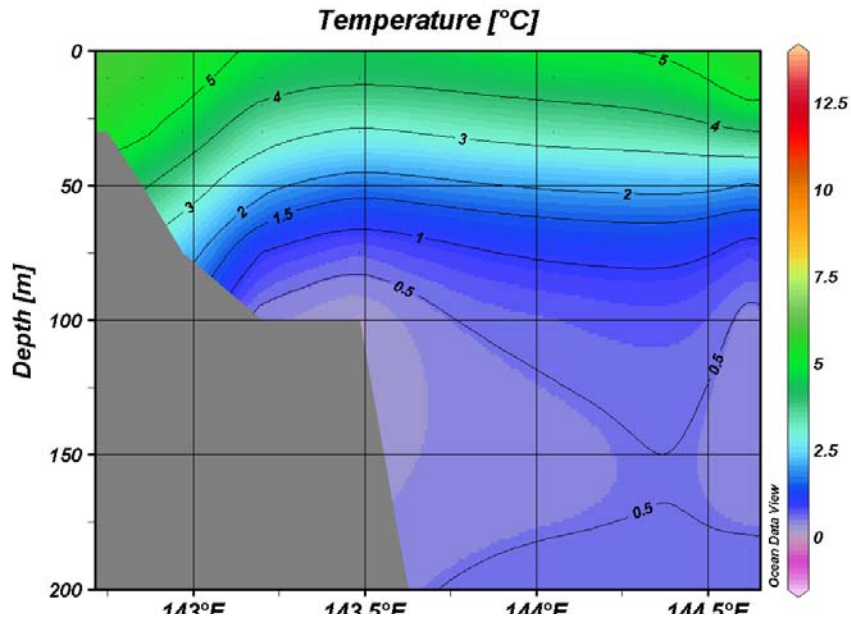
in situ Density( $z, T, s$ ) [ $\text{kg/m}^3$ ] @ Depth [m]=Top



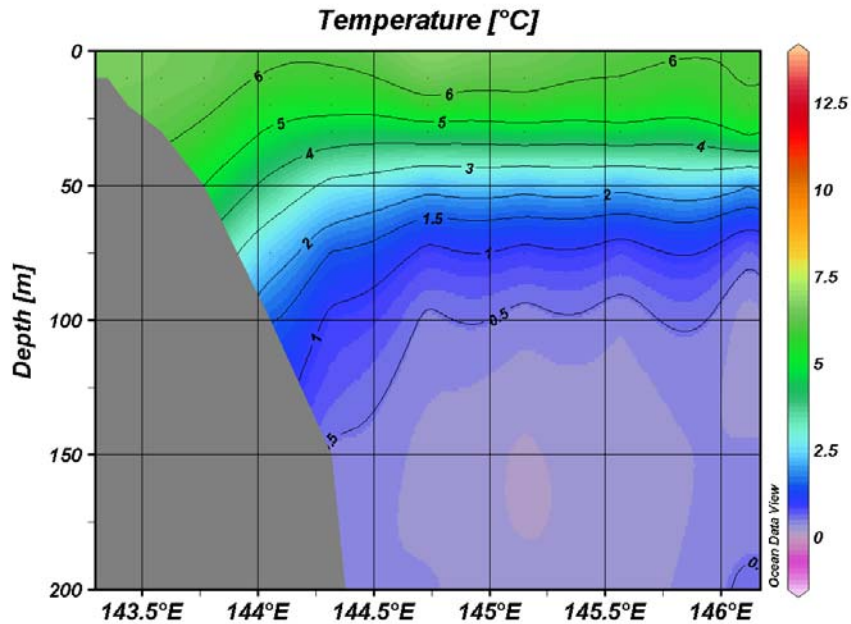
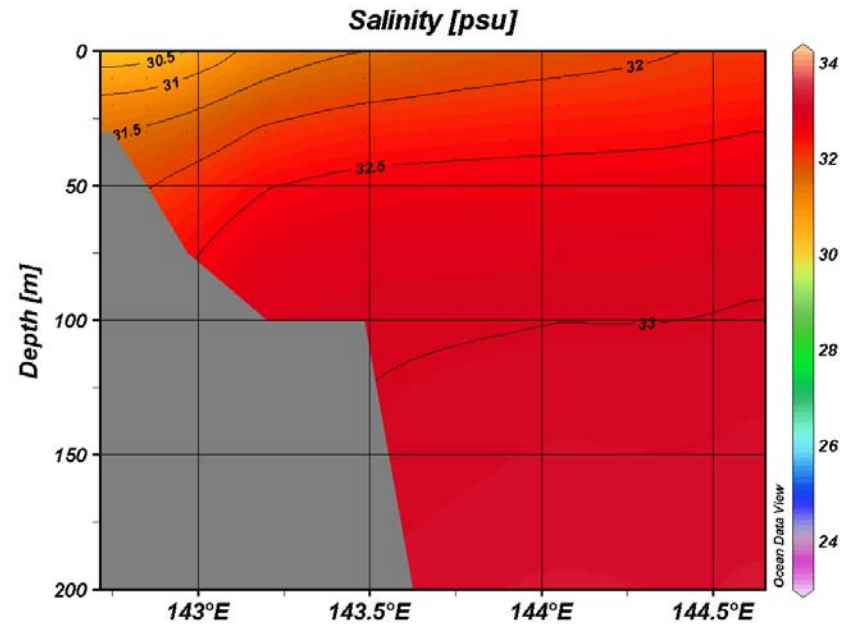
in situ Density( $z, T, s$ ) [ $\text{kg/m}^3$ ] @ Depth [m]=20



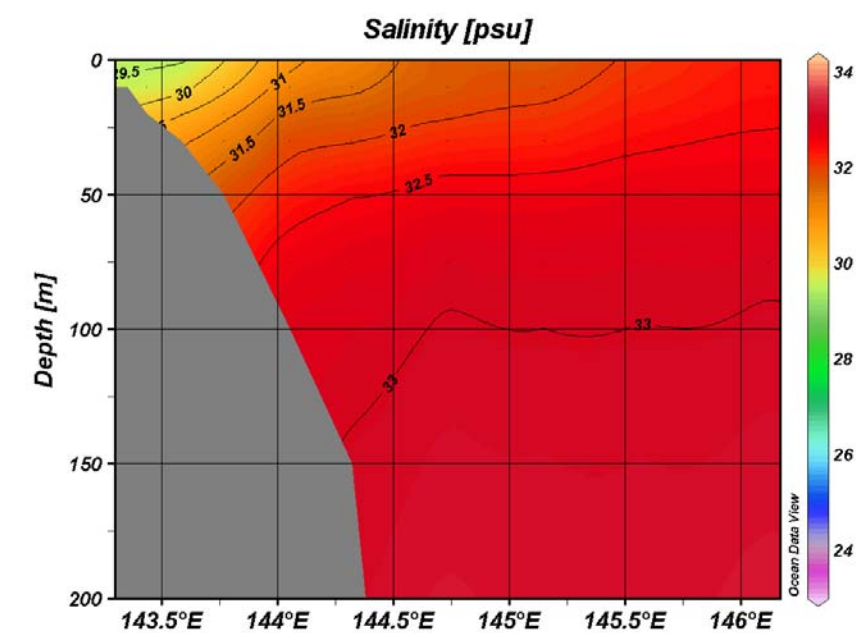
# Multiyear mean vertical TS distributions in fall season



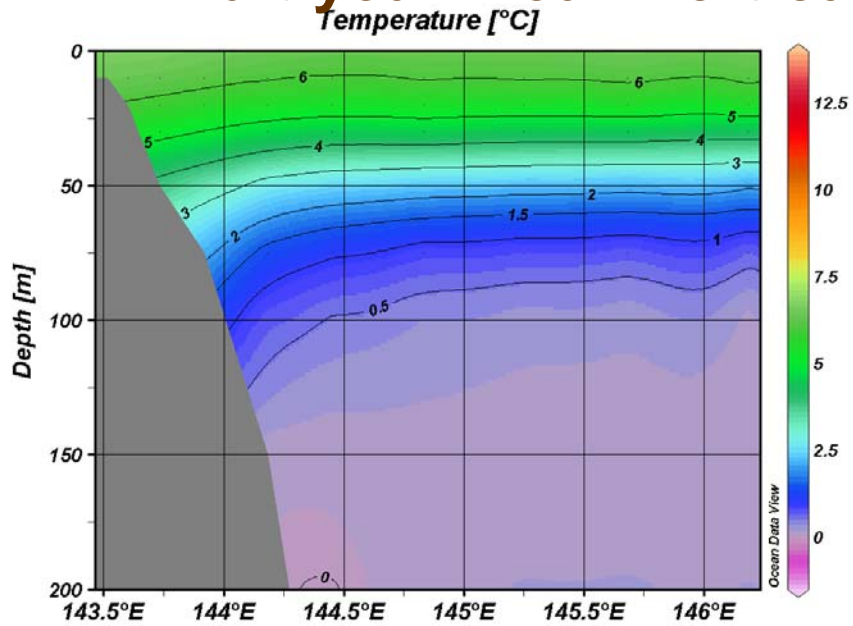
12



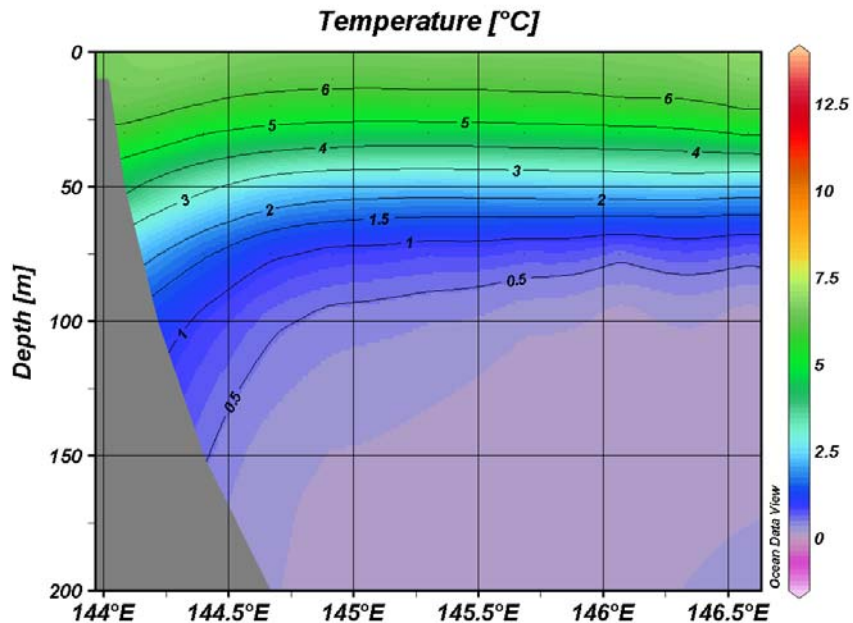
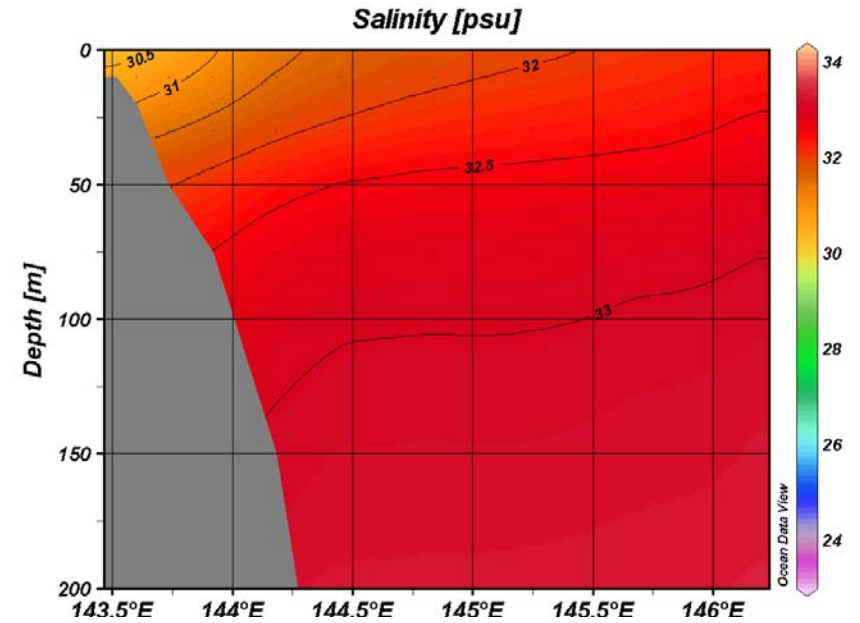
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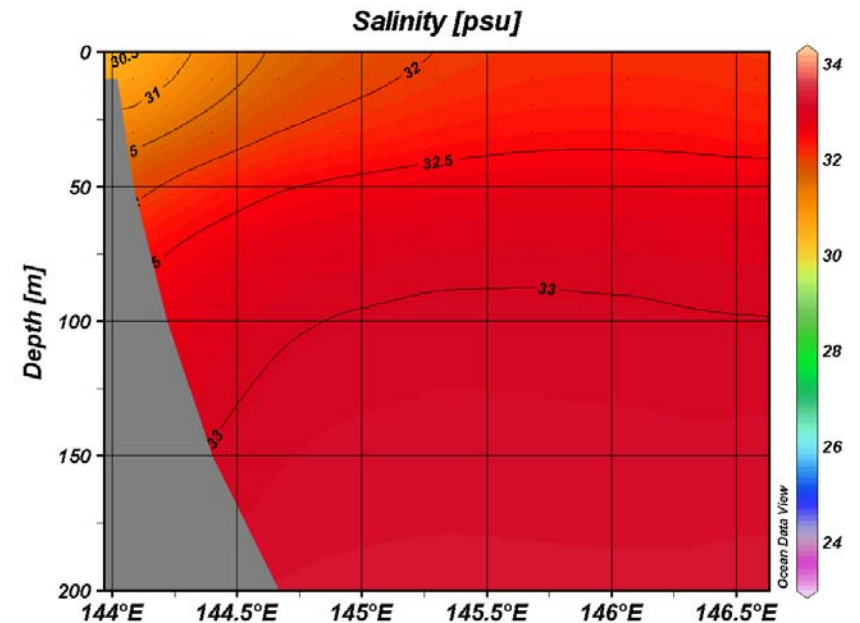
# Multiyear mean vertical TS distributions in fall season



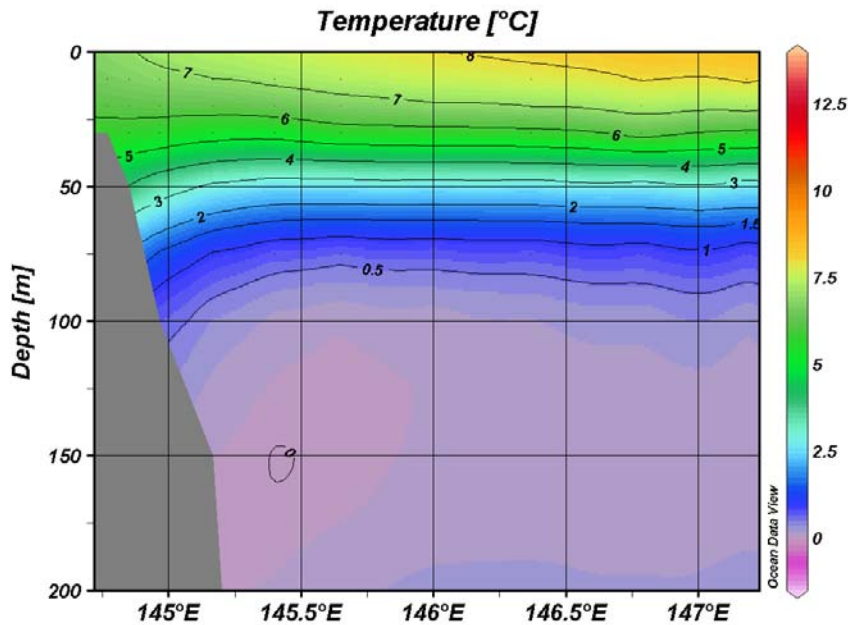
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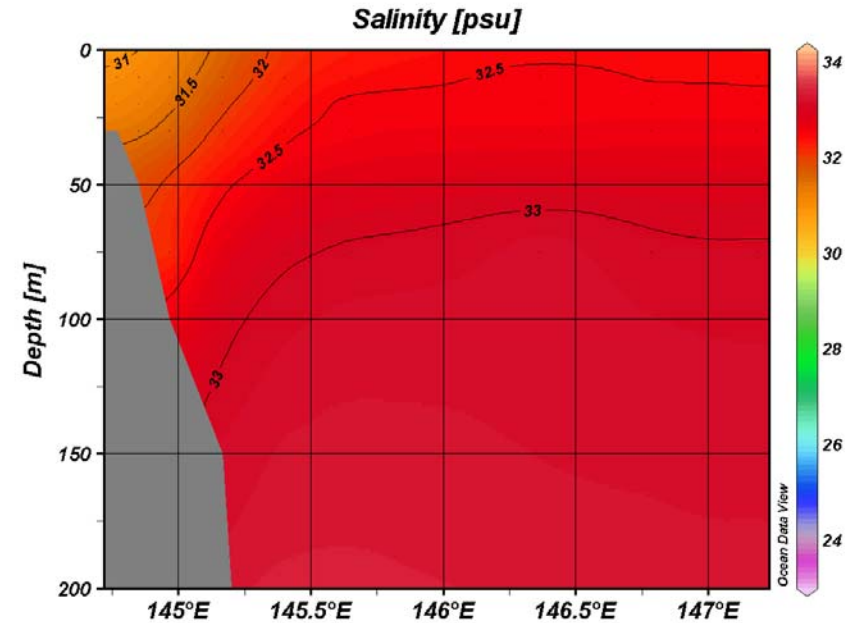
9



# Multiyear mean vertical TS distributions in fall season



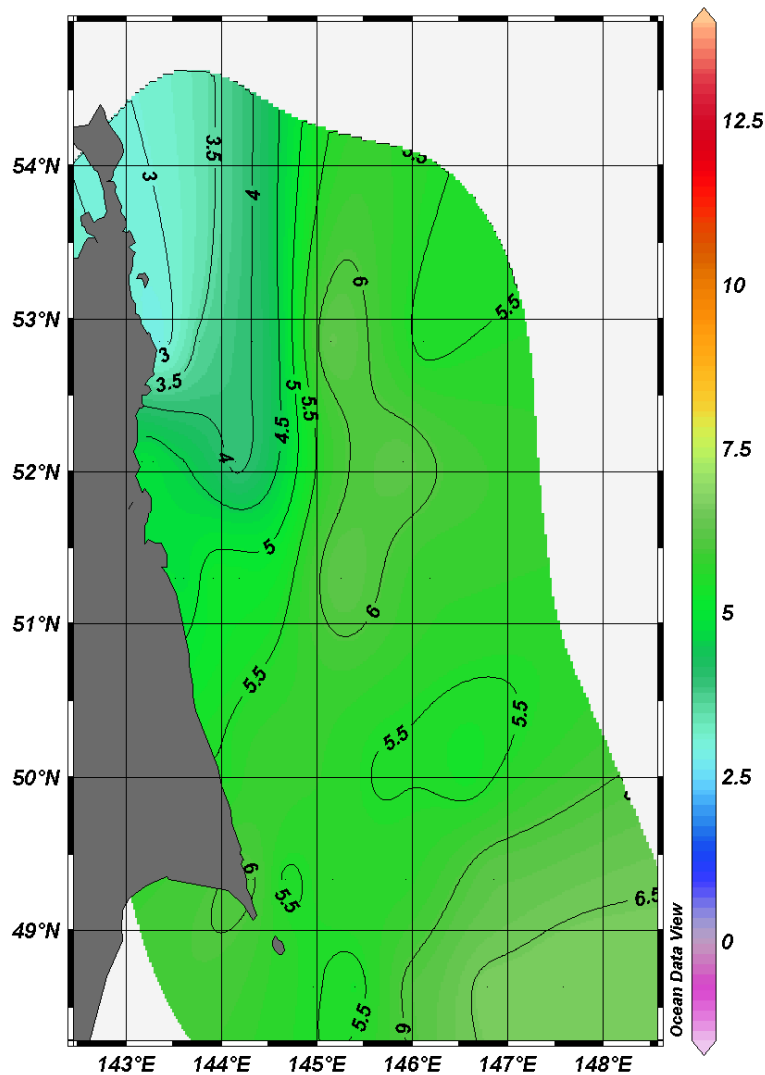
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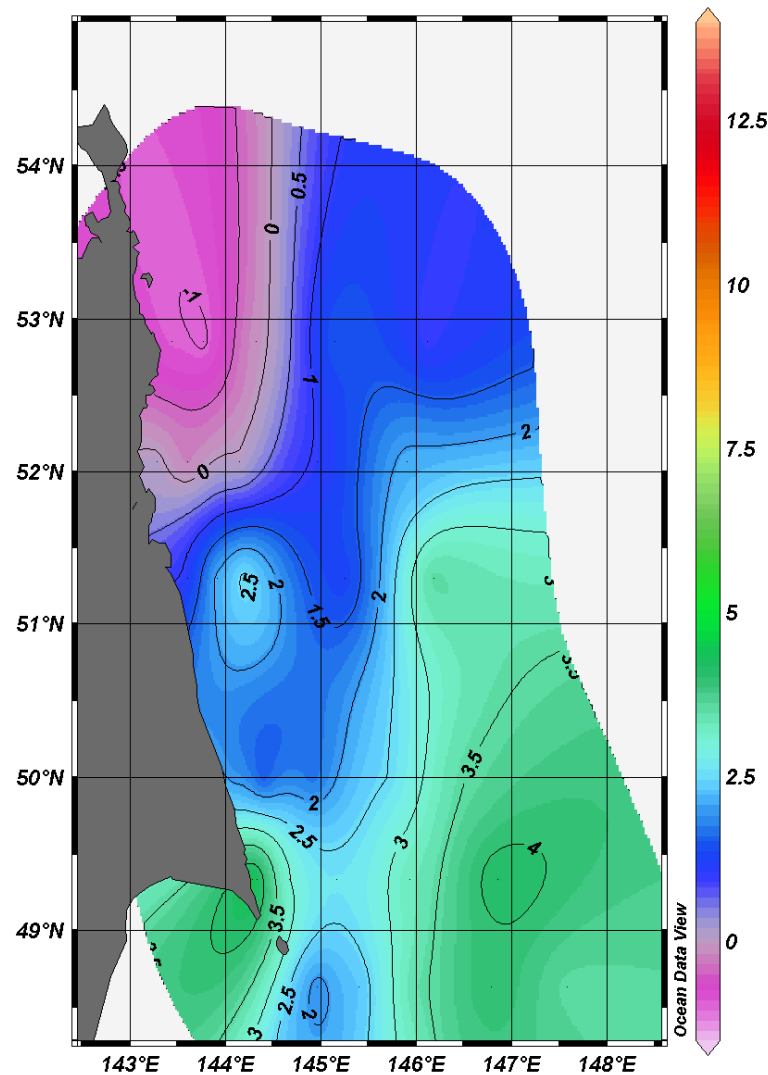
1. Water temperature distributions at the depth 0 and 20 m are similar in contrast to summer season.
2. Weakening of cold intermediate layer in fall season.
3. Residual influence of warm water was found in deep southern part of study area.
4. Low salinity water was found near NE Sakhalin coastline from Elizabeth Cape till Terpenia Cape

# Water temperature distributions ( $^{\circ}\text{C}$ ) at the depth 0 and 20 m in spring season (June 24-28, 1994)

Temperature [ $^{\circ}\text{C}$ ] @ Depth [m]=Top

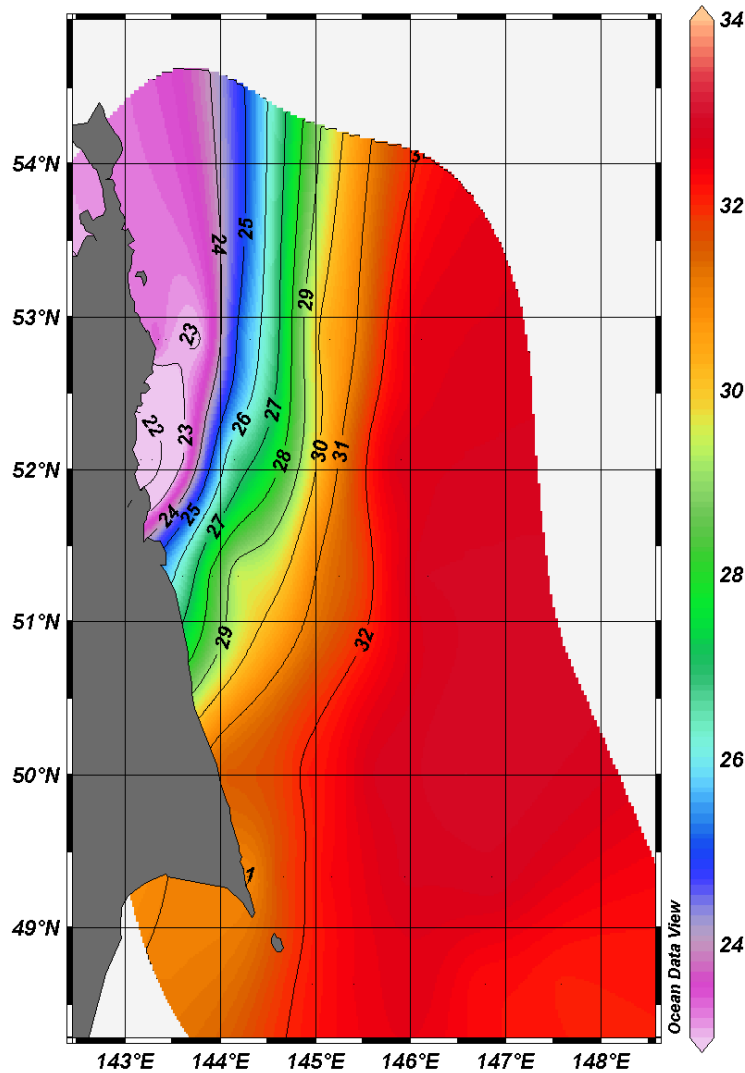


Temperature [ $^{\circ}\text{C}$ ] @ Depth [m]=20

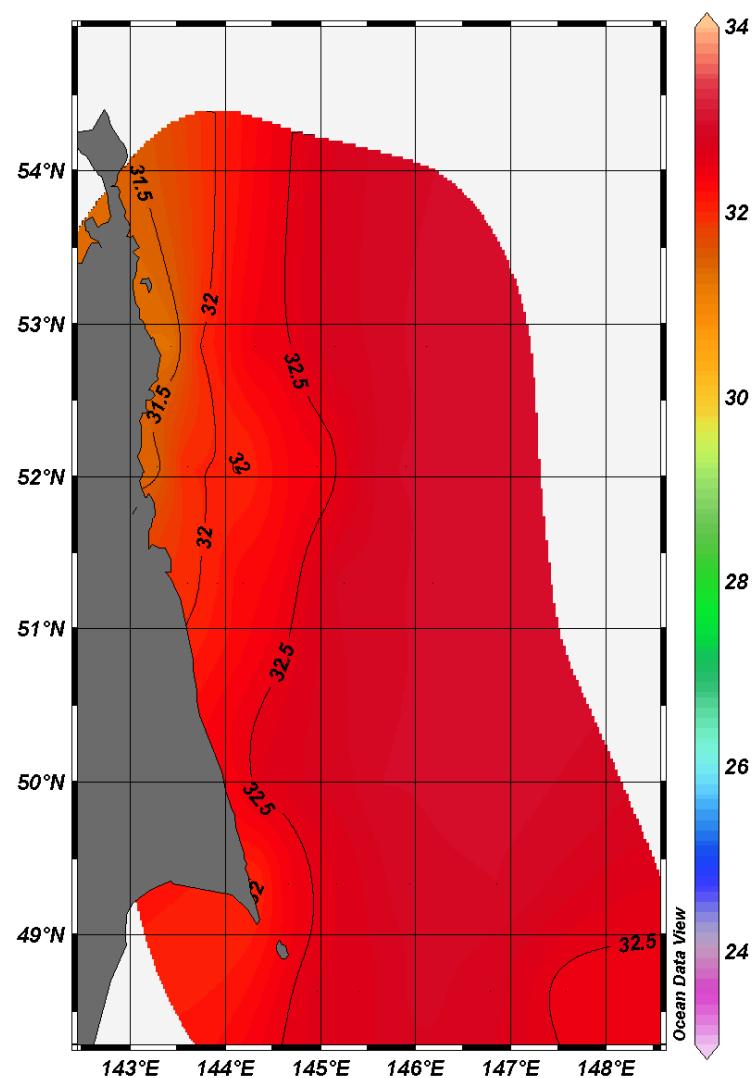


# Salinity distributions (‰) at the depth 0 and 20 m in spring season (June 24-28, 1994)

Salinity [psu] @ Depth [m]=Top

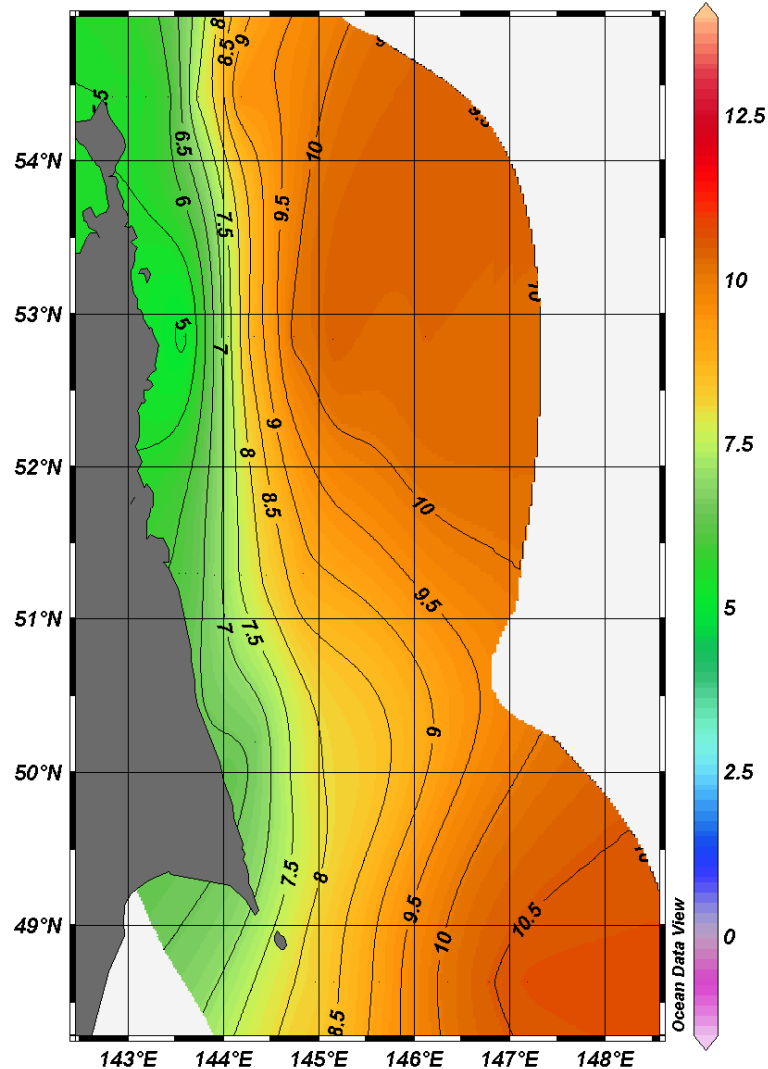


Salinity [psu] @ Depth [m]=20

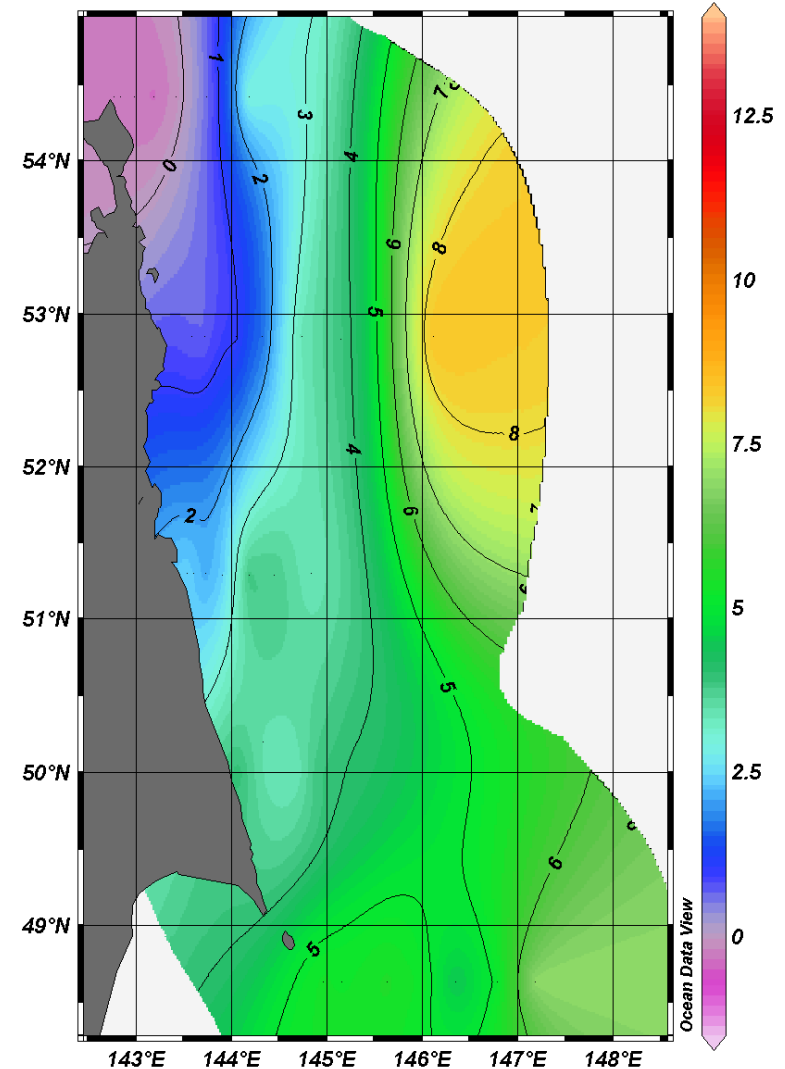


# Water temperature distributions ( $^{\circ}\text{C}$ ) at the depth 0 and 20 m in summer season (August 1-5, 1992)

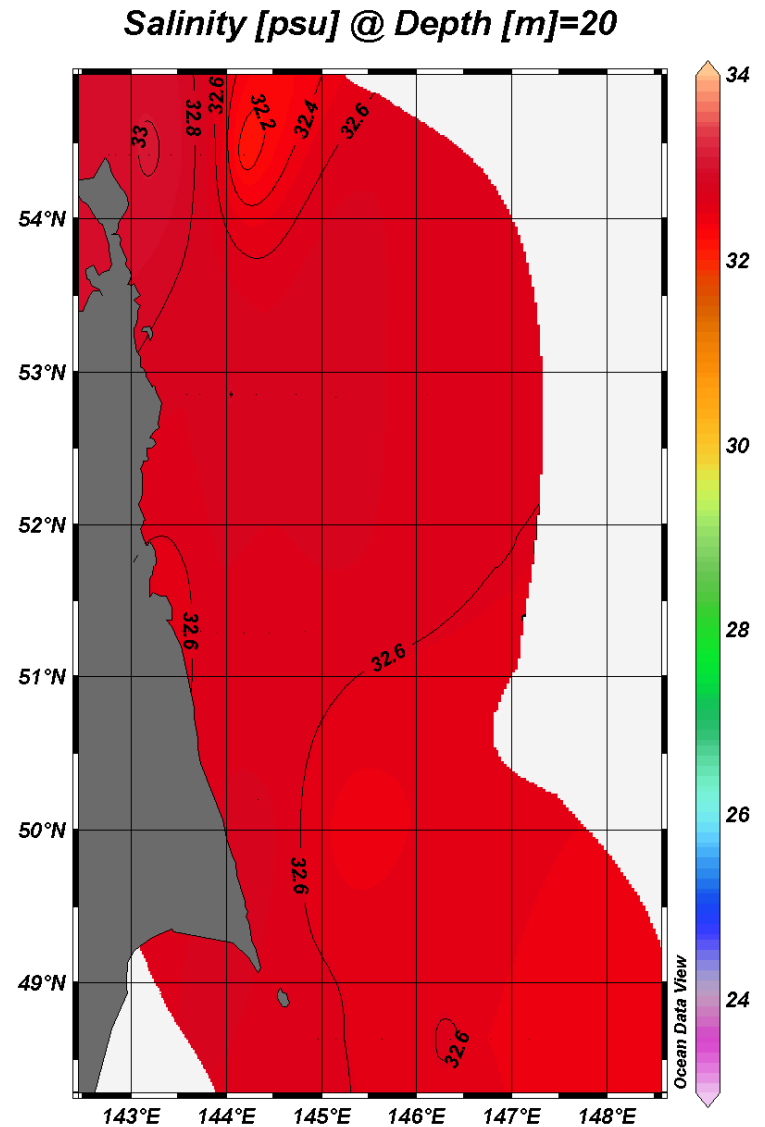
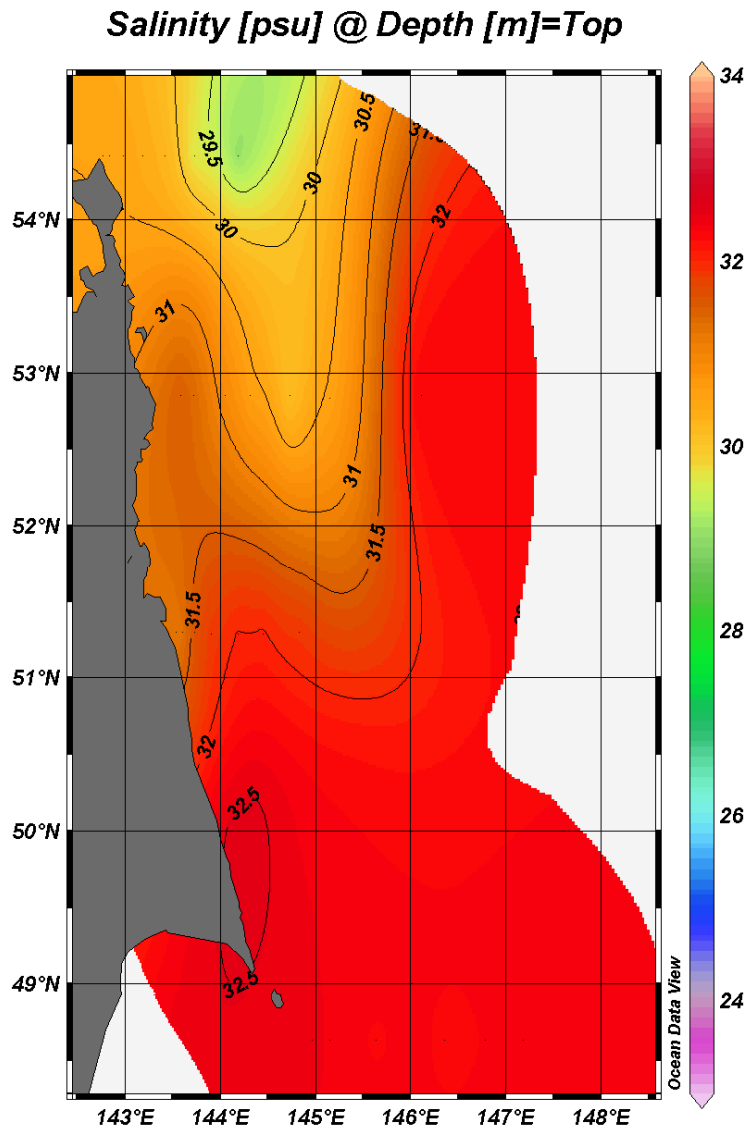
Temperature [ $^{\circ}\text{C}$ ] @ Depth [m]=Top



Temperature [ $^{\circ}\text{C}$ ] @ Depth [m]=20

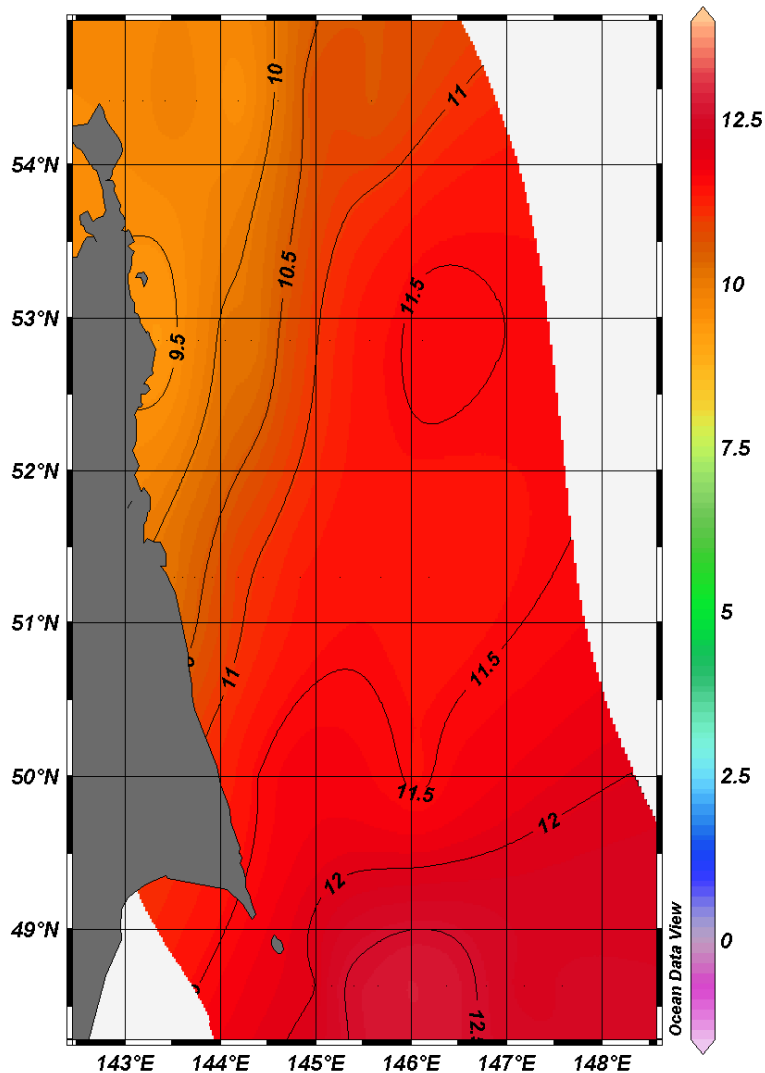


# Water salinity distributions (‰) at the depth 0 and 20 m in summer season (August 1-5, 1992)

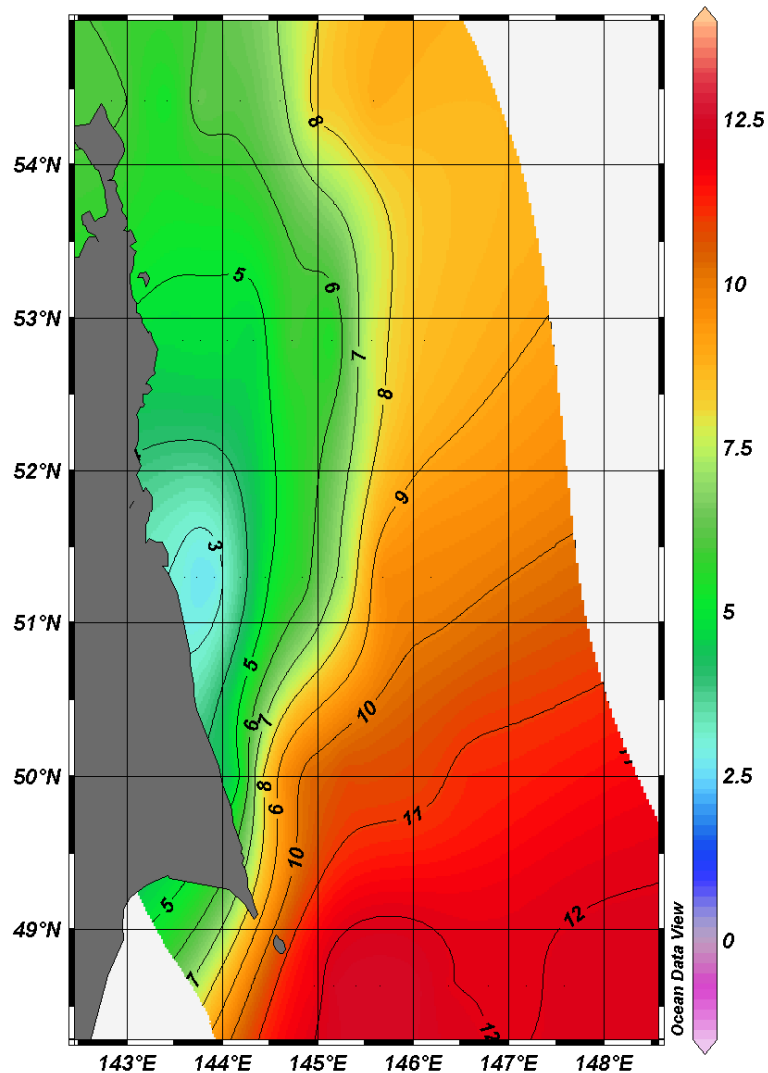


# Water temperature distributions ( $^{\circ}\text{C}$ ) at the depth 0 and 20 m in fall season (September 29 - October 4, 1994)

Temperature [ $^{\circ}\text{C}$ ] @ Depth [m]=Top

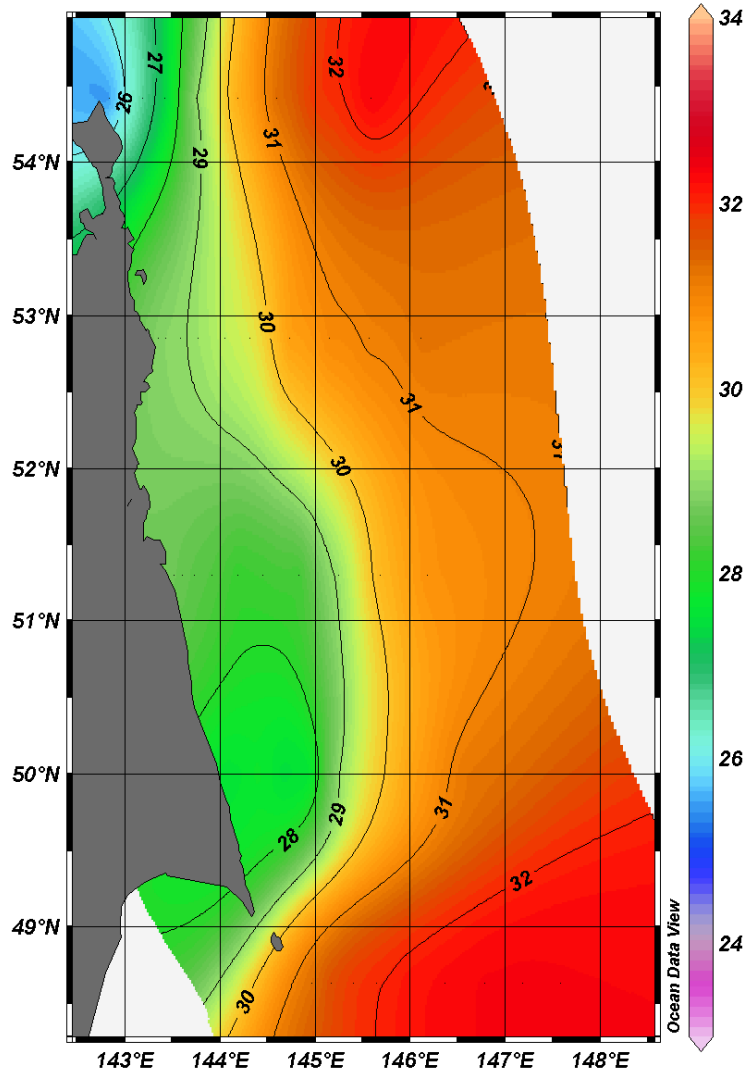


Temperature [ $^{\circ}\text{C}$ ] @ Depth [m]=20

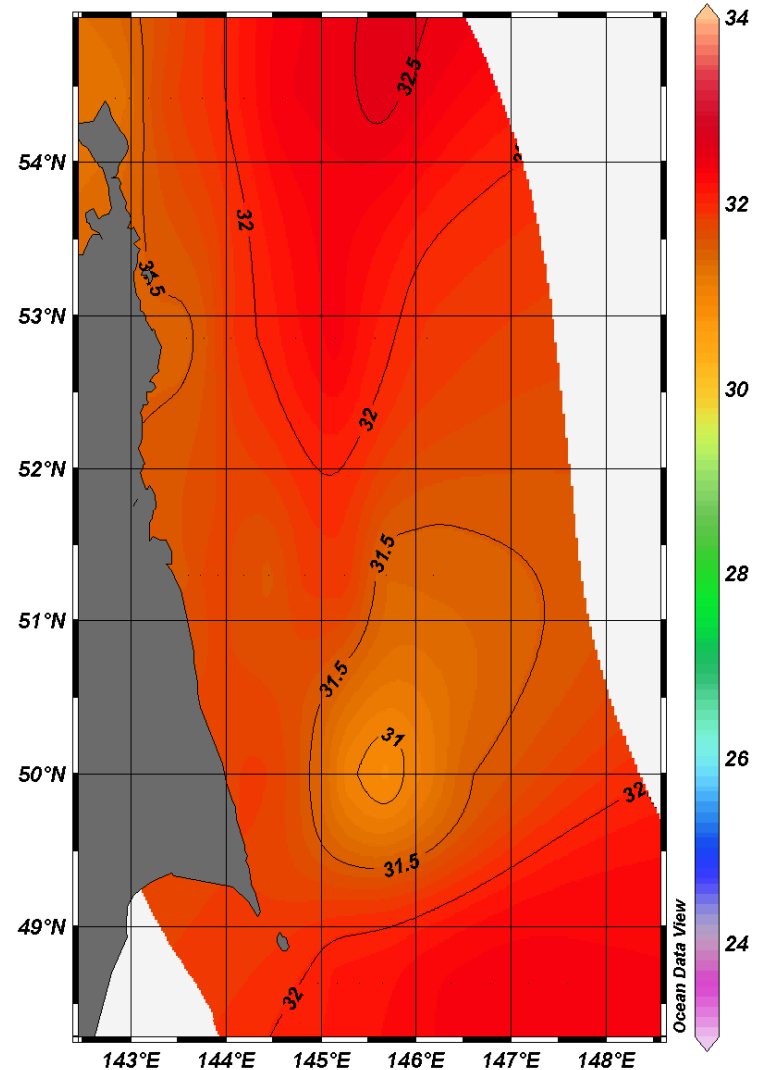


# Water salinity distributions (‰) at the depth 0 and 20 m in fall season (September 29 - October 4, 1994)

Salinity [psu] @ Depth [m]=Top



Salinity [psu] @ Depth [m]=20



## CONCLUSION

East Sakhalin Current is cold current in summer season because of upwelling event induced by southerly wind. Cold intermediate water was found in the northern part of NE Sakhalin shelf at the depth more than 20 m. Water temperature increases with off-shore distance. Low salinity Amour River water locates northerly from 52°N. It is intensive mixing of cold and salt upwelling water and warm low salinity Amour River water in the northern part of NE Sakhalin shelf under influence of strong tidal currents.

ESC is not cold in fall season. Deepening of low salinity water on the shelf and amplification of southerly flux under influence of northerly winds were found in October. Low salinity water reaches Hokkaido and Kunashir Islands in November – December. This flow is a cause of cold intermediate layer weakening along the edge of NE Sakhalin shelf.

***Thank you for  
attention***