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Lagrangian hydrographic features of the Mixed Water Region in the North Pacific derived from Argo data

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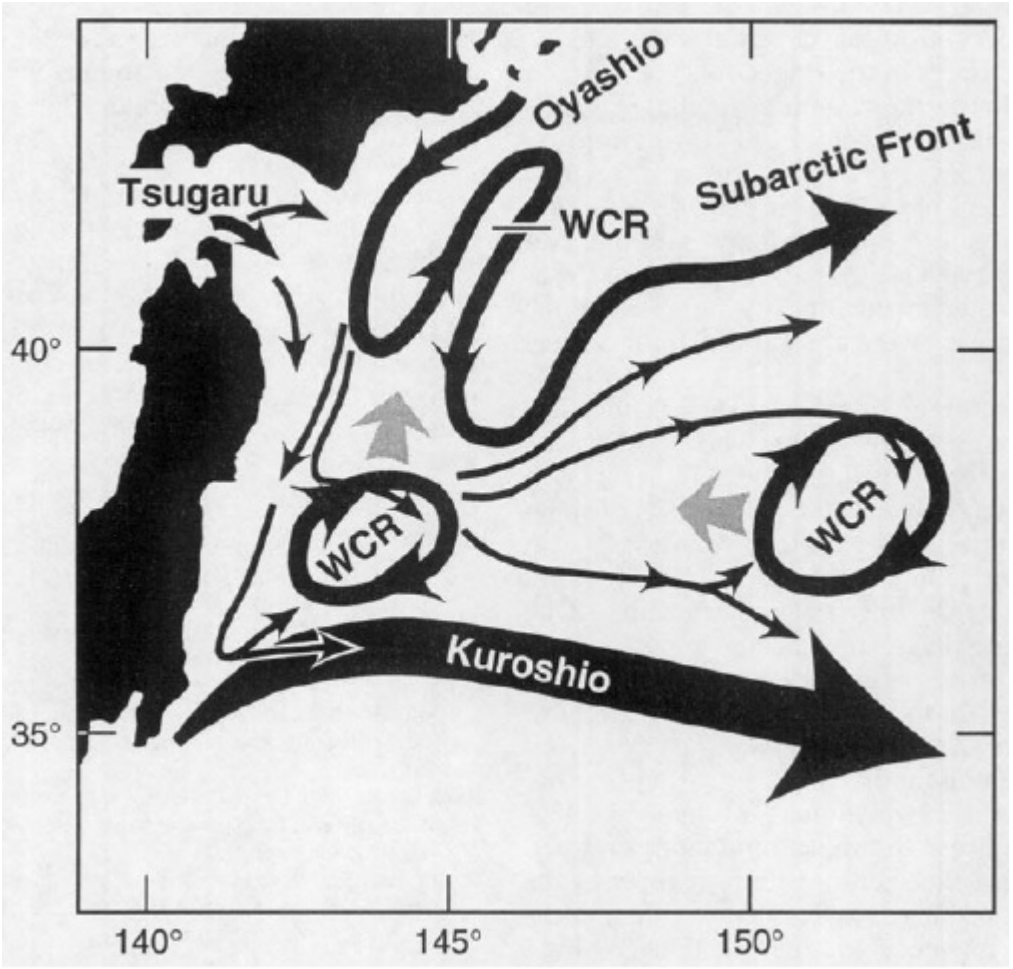
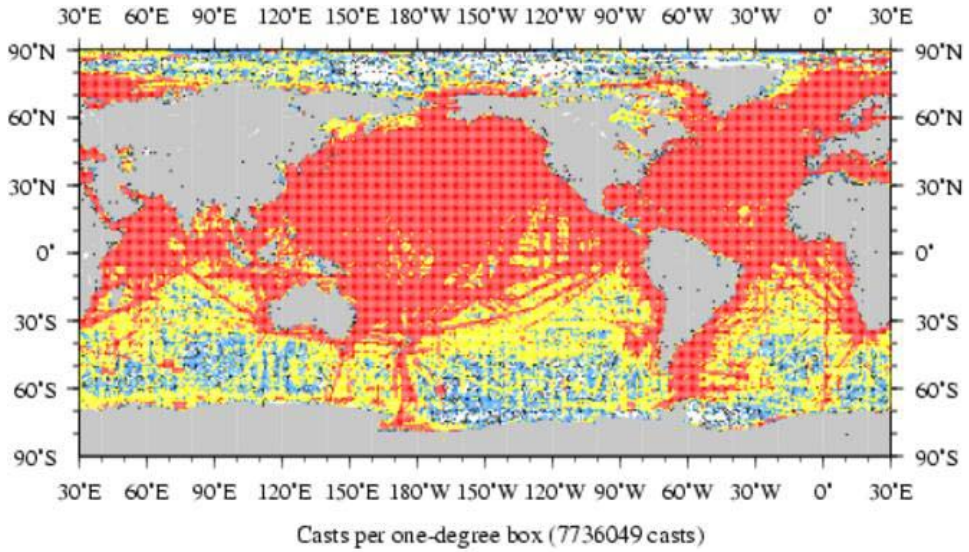
Outline

- Mixed Water Region
- Observations and Analysis
- Discussions

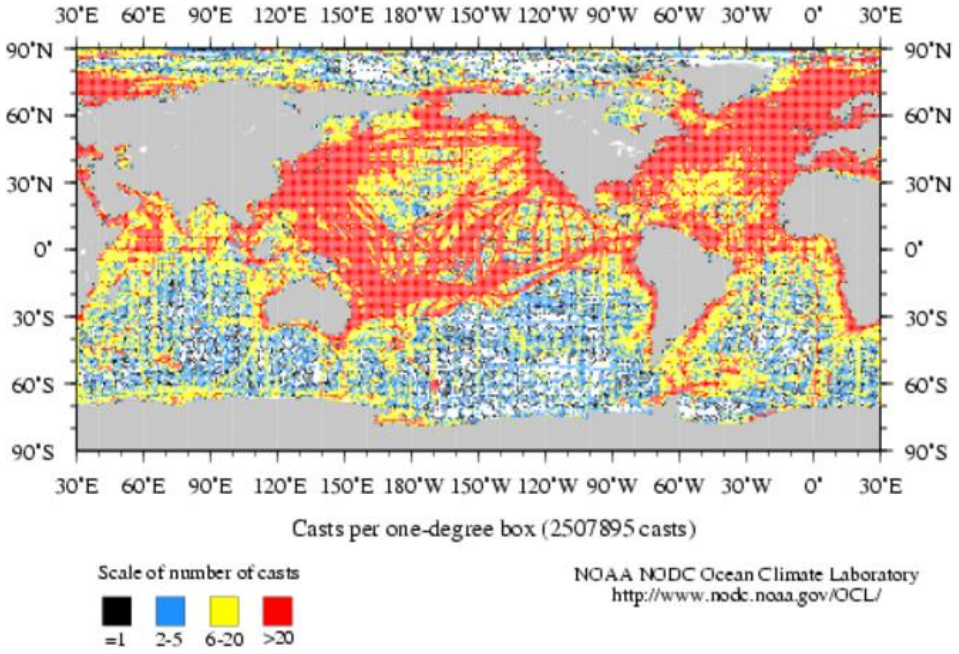


Talley et al., 1995

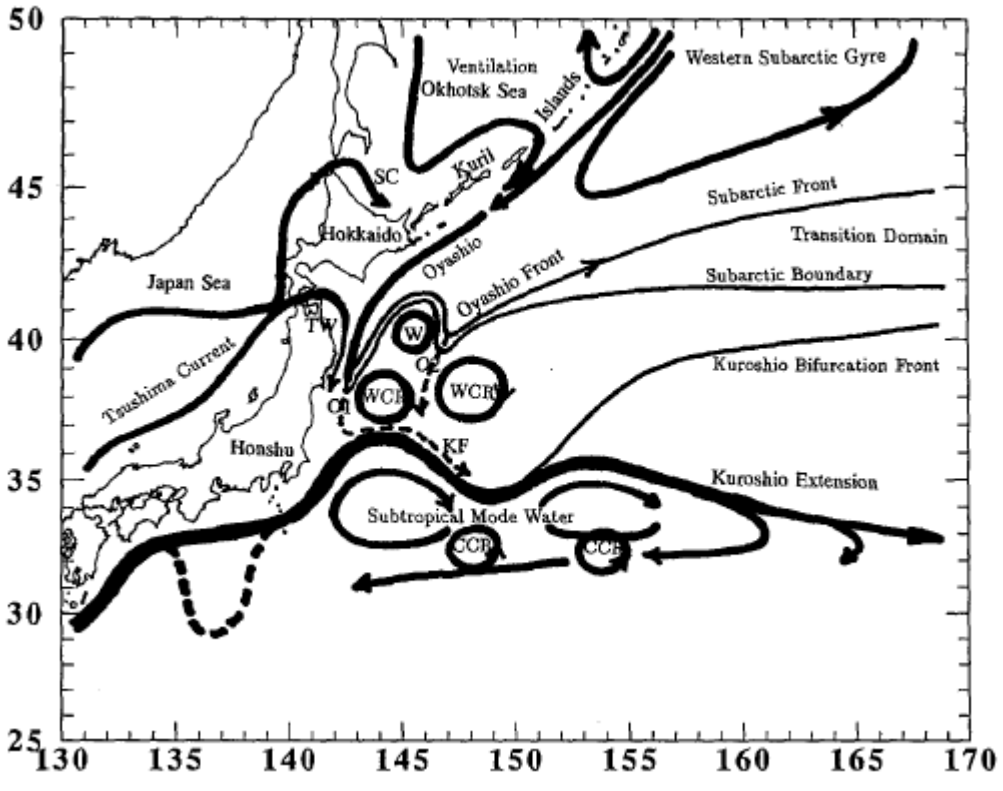
Temperature profiles from WOD2005



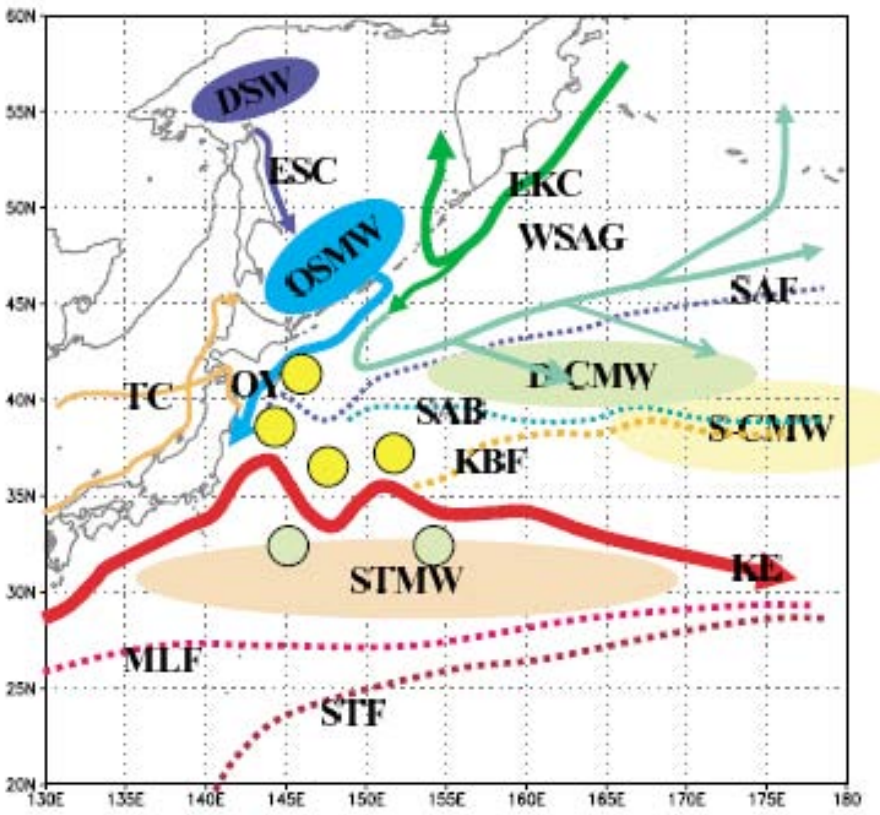
Salinity profiles from WOD2005



Schematic represents of current and frontal systems in the area.



Yasdua et al., 1996

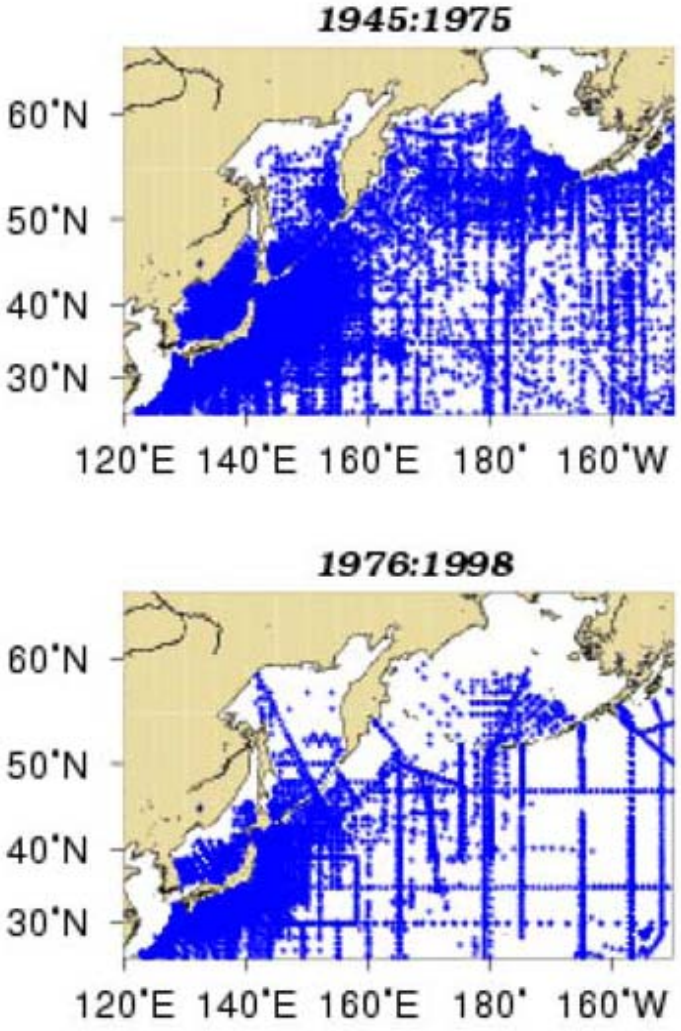


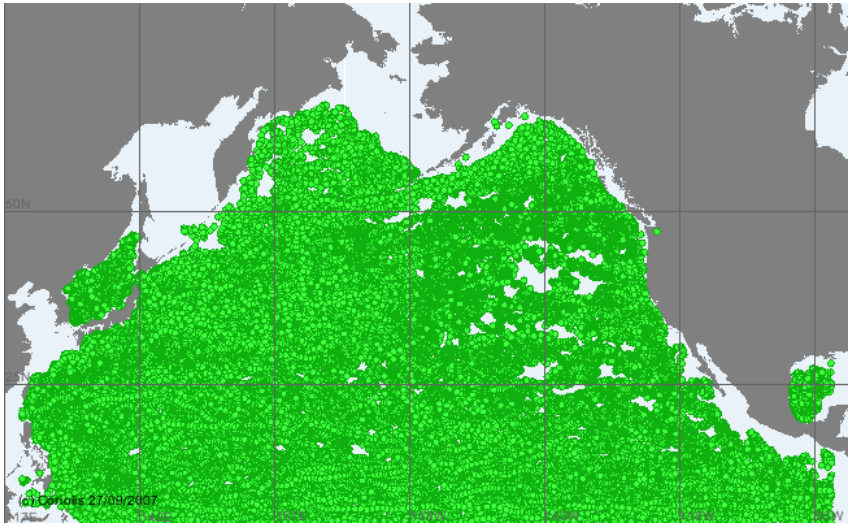
Yasdua, 2003

1. The mixing process between cold and fresh Oyashio and relatively warm and saline old-NPIW

2. The density of salinity minimum in the Kuroshio-Oyashio interfrontal zone (Mixed Water Region)

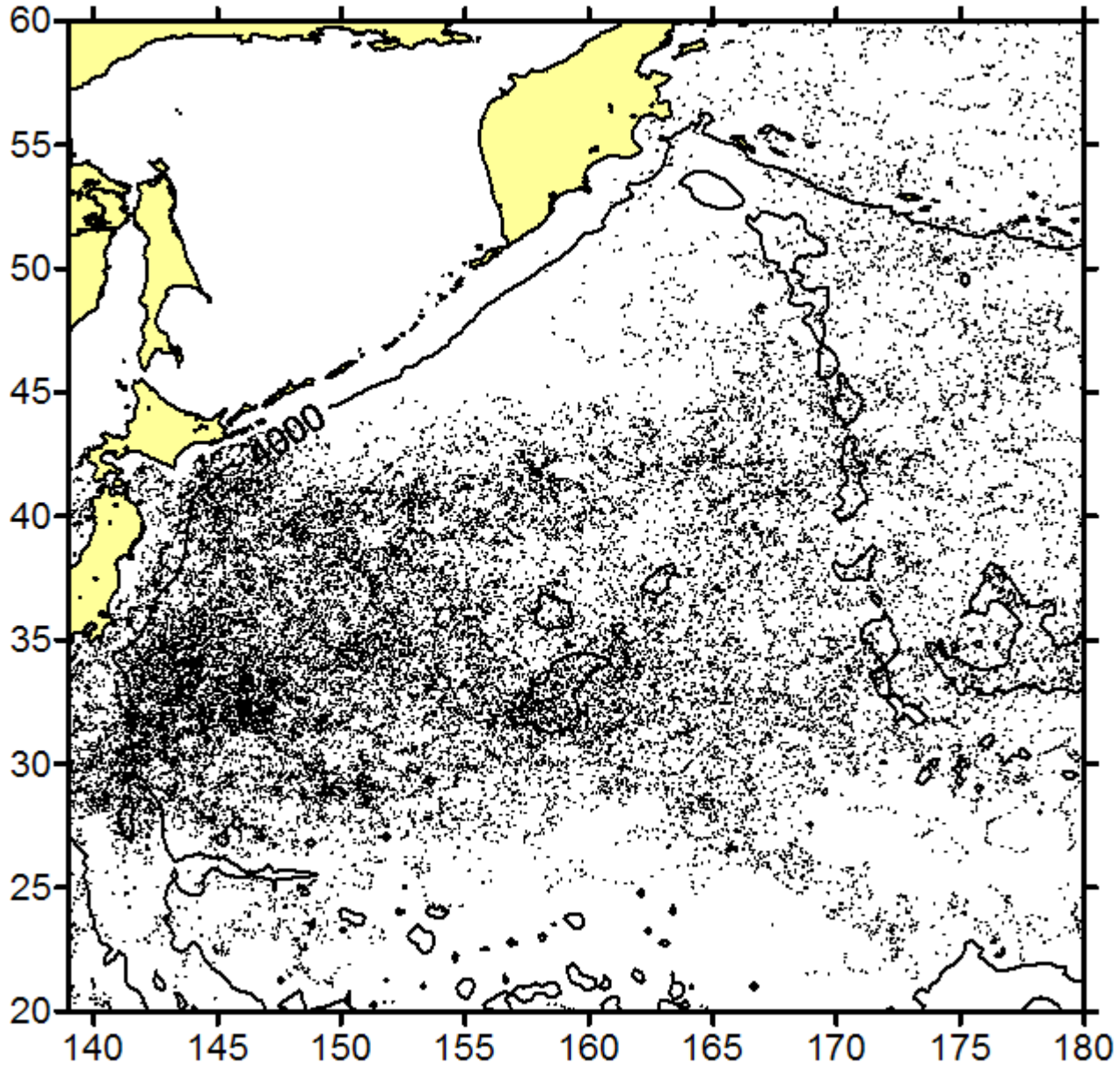
Argo

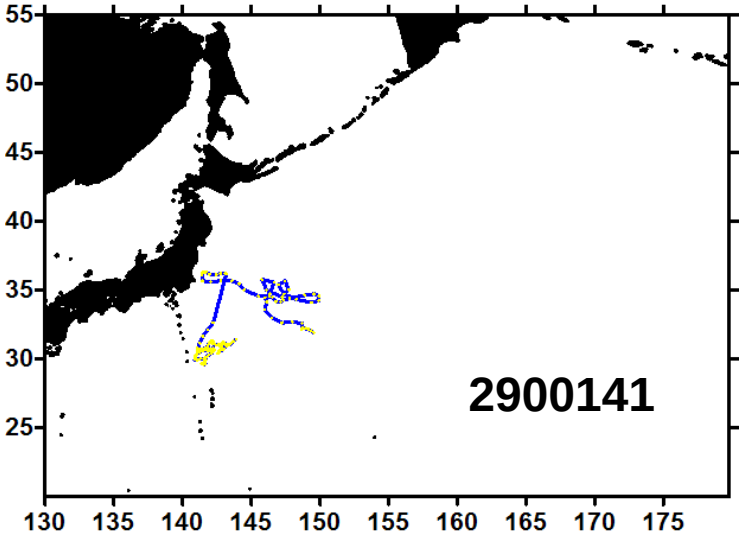


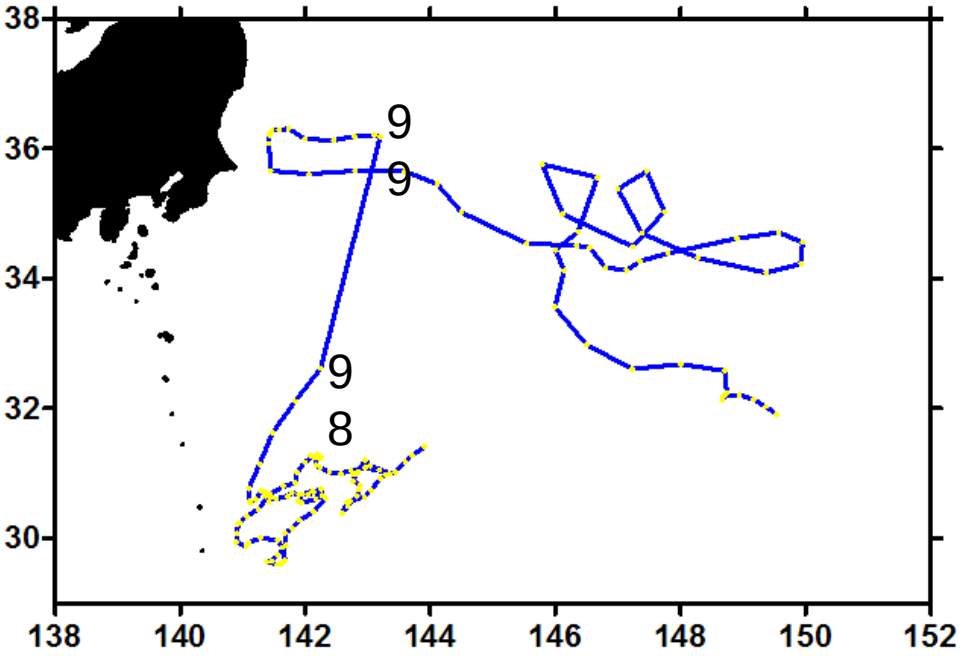


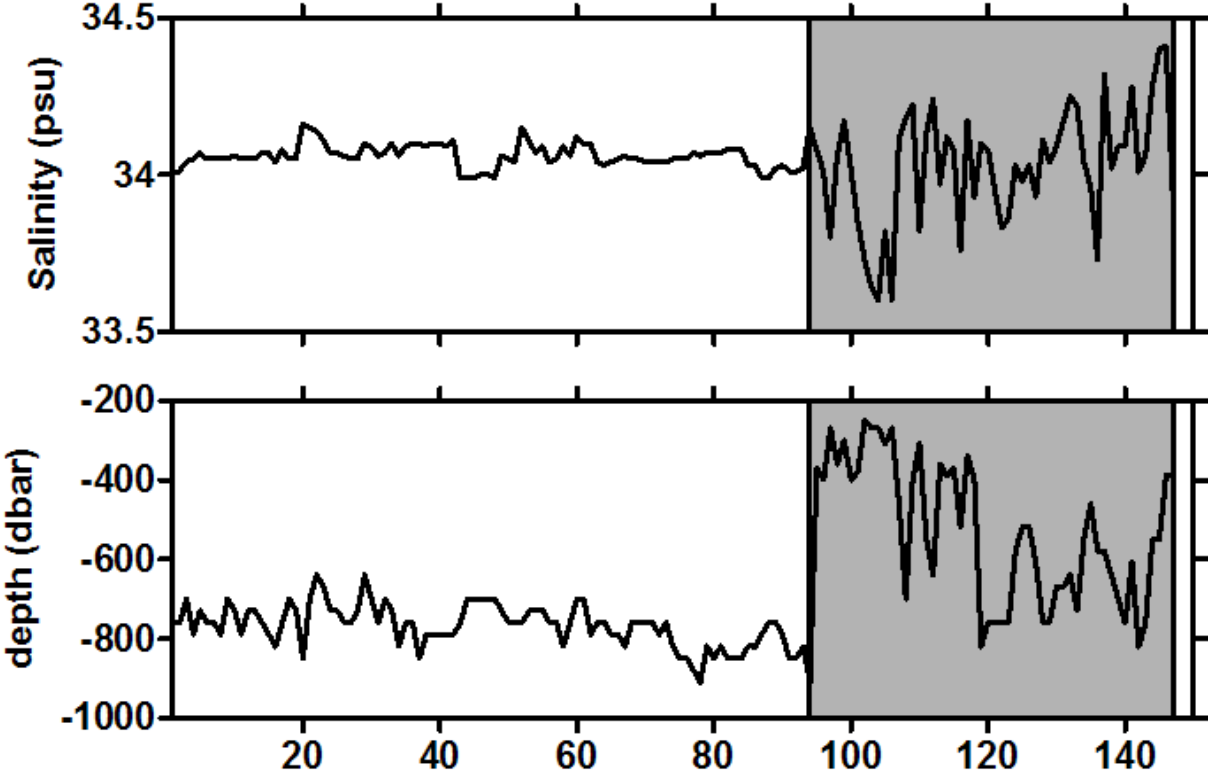
Joyce and Baker, *GRL,* 2003

Research Area with all Argo-float observed profiles.









Minimum Salinity
&
Corresponding depth

Data Processing (971 floats and about 67,000 profiles):

1. **Interpolate all T-S profiles into isopycnal layers**
2. **Find the isopycnal layer with minimum salinity (NPIW)**
3. **Take the average of the density of the isopycnal layer**

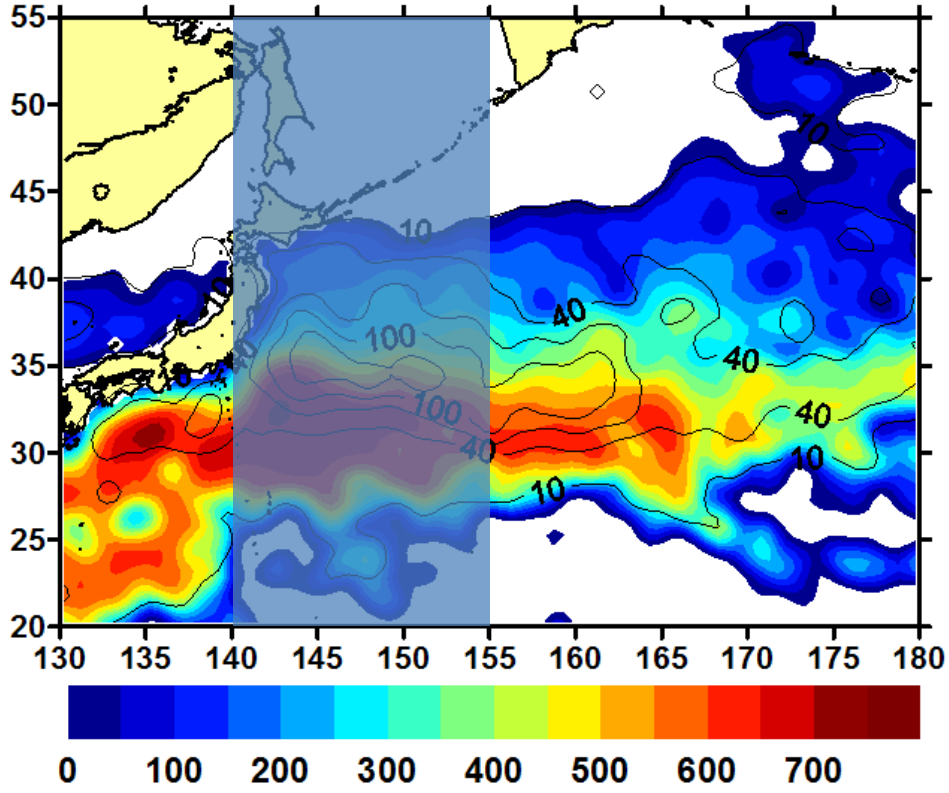
   mean density -----> 26.84 kgm^{-3}

   standard deviation -----> 0.21 kgm^{-3}
4. **Compute mean depth of isopycnal layers in the density range 26.84 ± 0.21 kgm^{-3}**
5. **Optimized interpolated into 0.5 x 0.5 degree grid**

   ------> depth of the NPIW (dp-NPIW)
6. **Simultaneously, compute the STD of each grid**

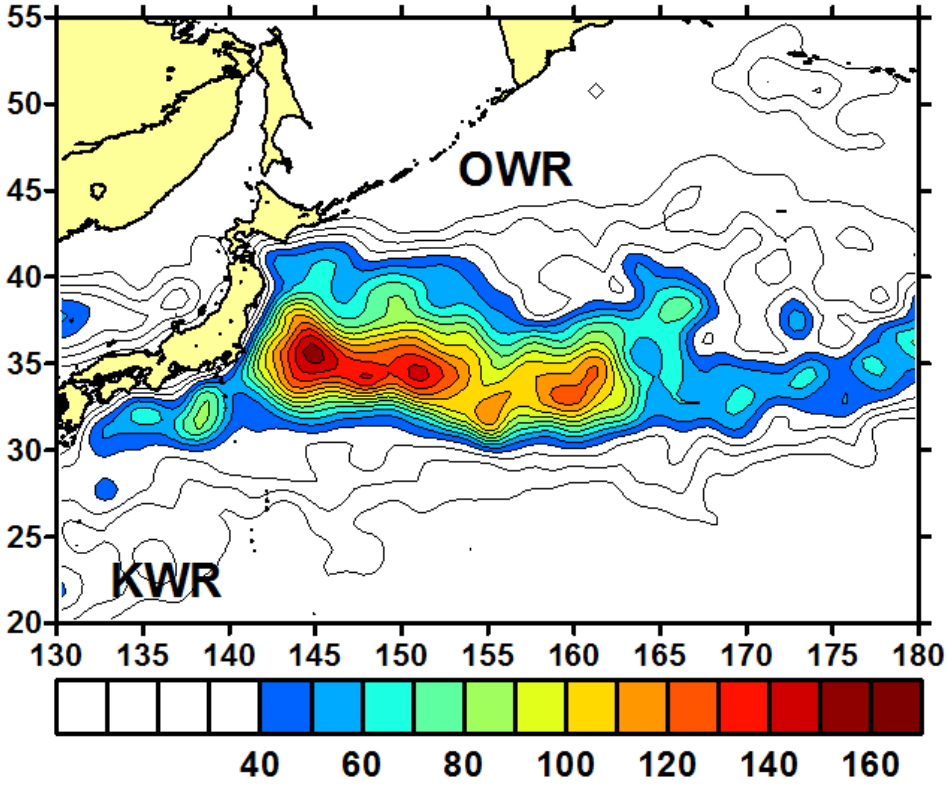
   ------> variation of the minimum salinity layers (STD-dp-NPIW)

Depth with Minimum-Salinity



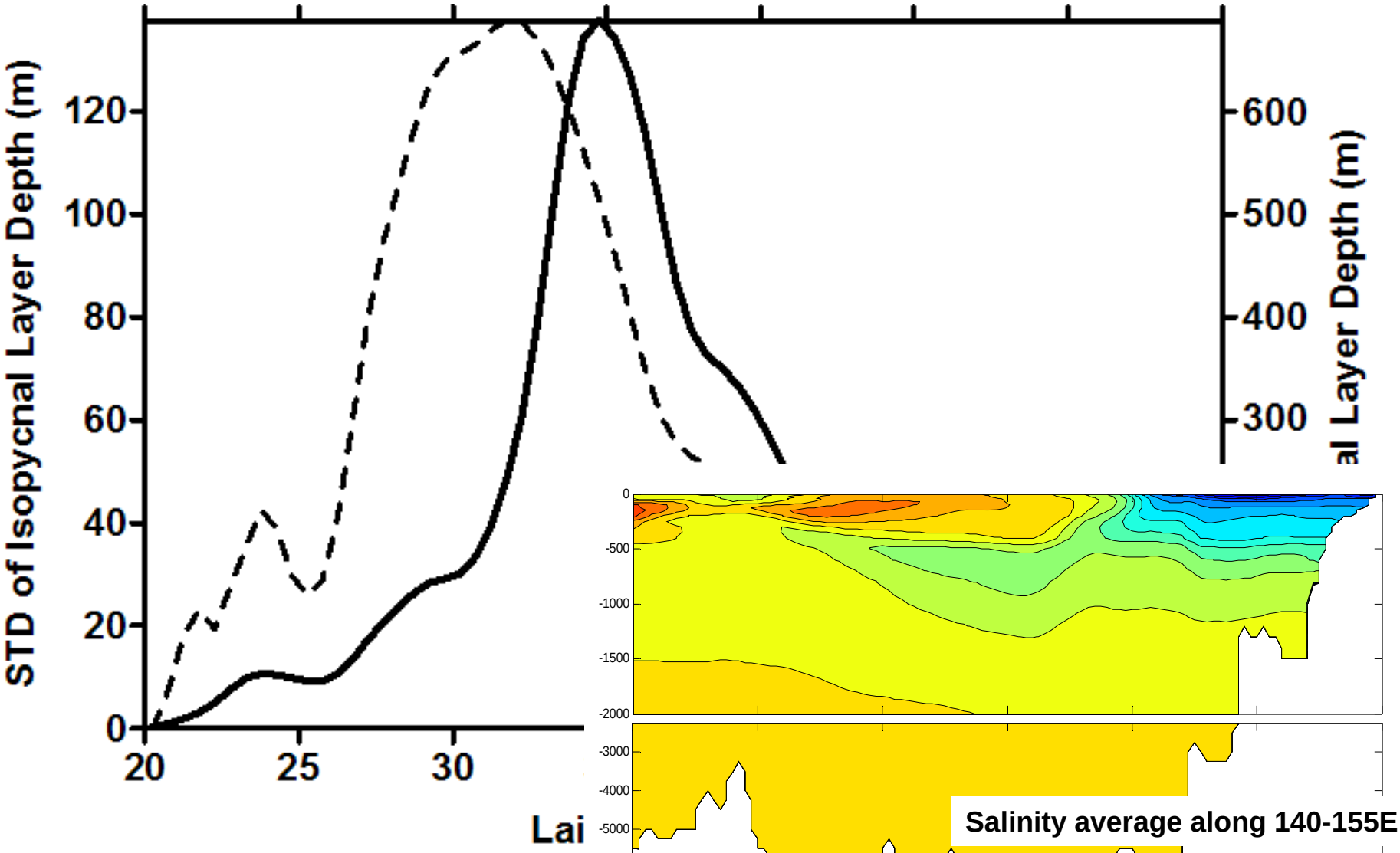
dp-NPIW

of which, the STD of the min-Salinity De



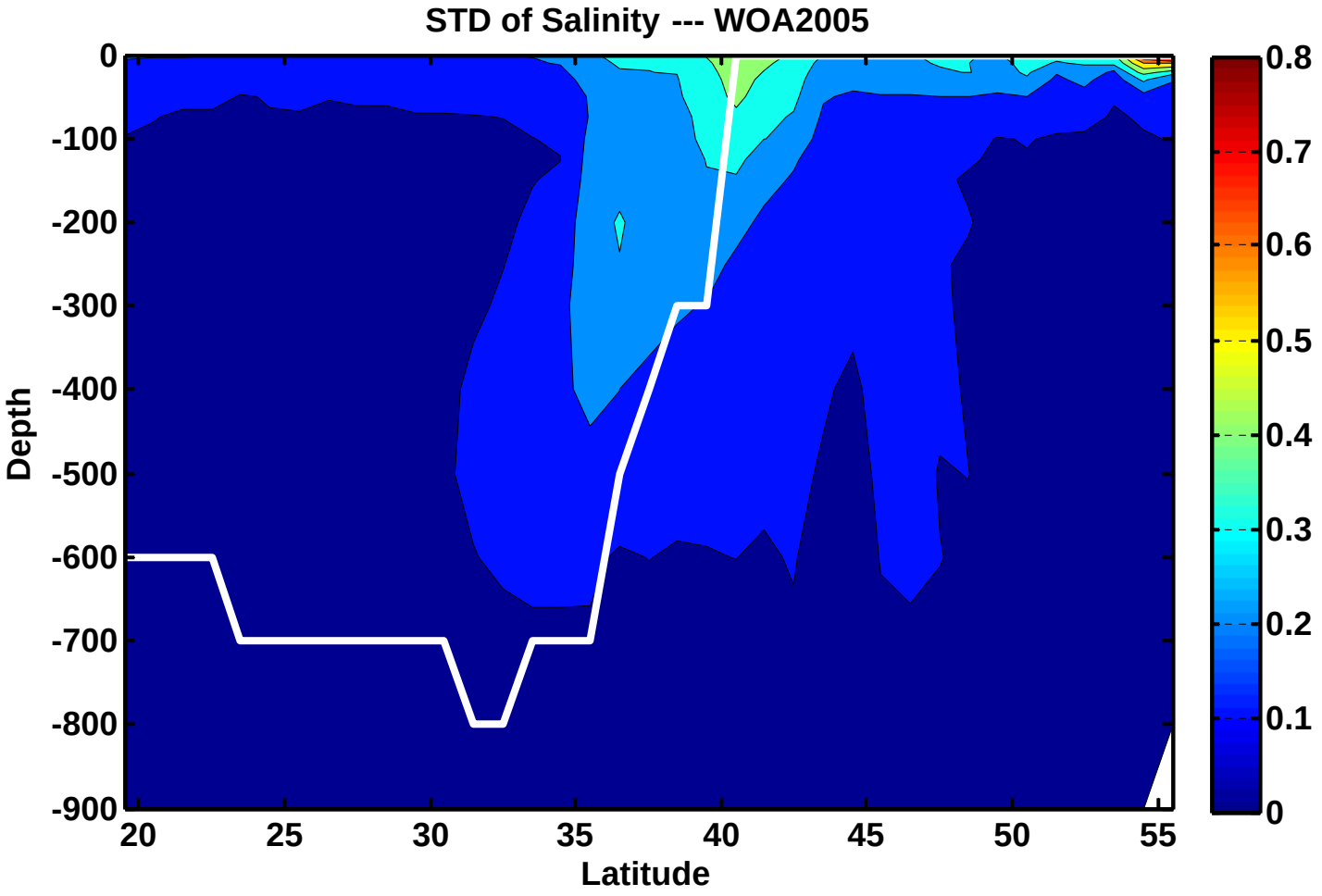
STD-dp-NPIW

Isopycnal Layers : 26.63~27.05, meridional average from 140-155E

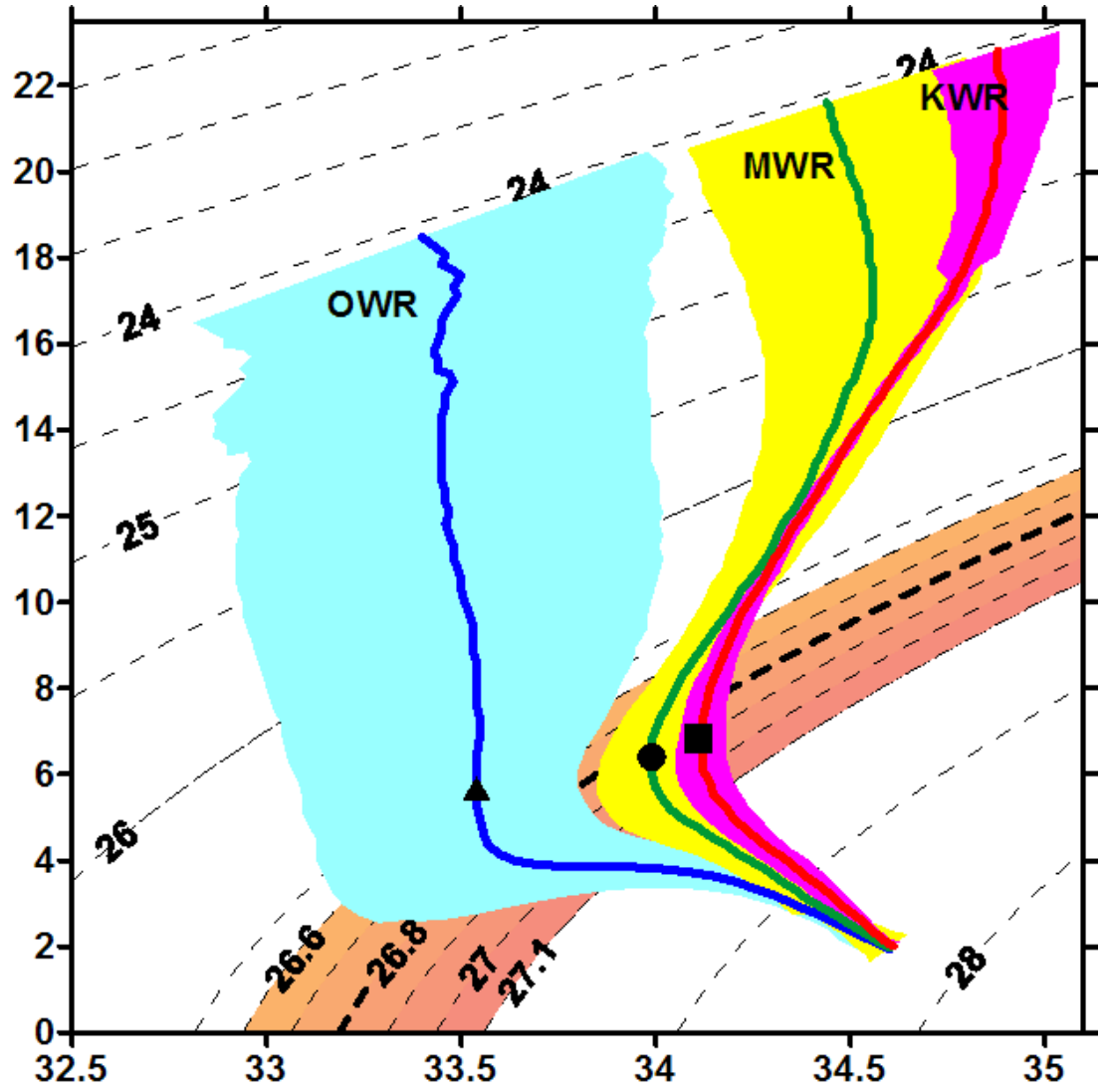


WOCE global hydrographic climatology dataset

Climatology of World Ocean Atlas 2005



White line is the depth with minimum salinity of each vertical profile.


OWR
MWR
KWR
24
24
24
25
26
26.6
26.8
27
27.1
28
0
2
4
6
8
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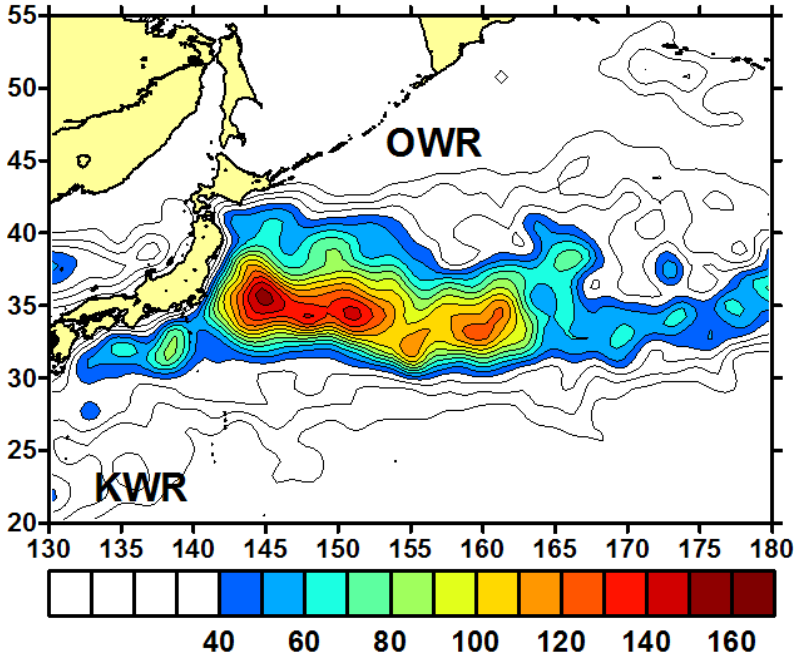
12
14
16
18
20
22
32.5
33
33.5
34
34.5
35


OWR
KWR
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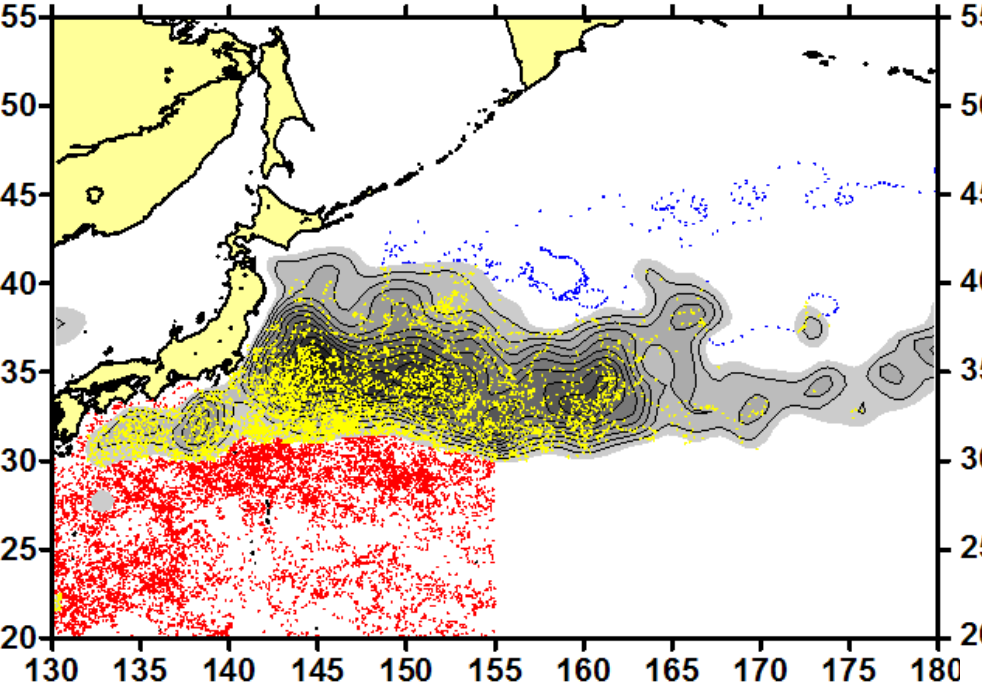
160

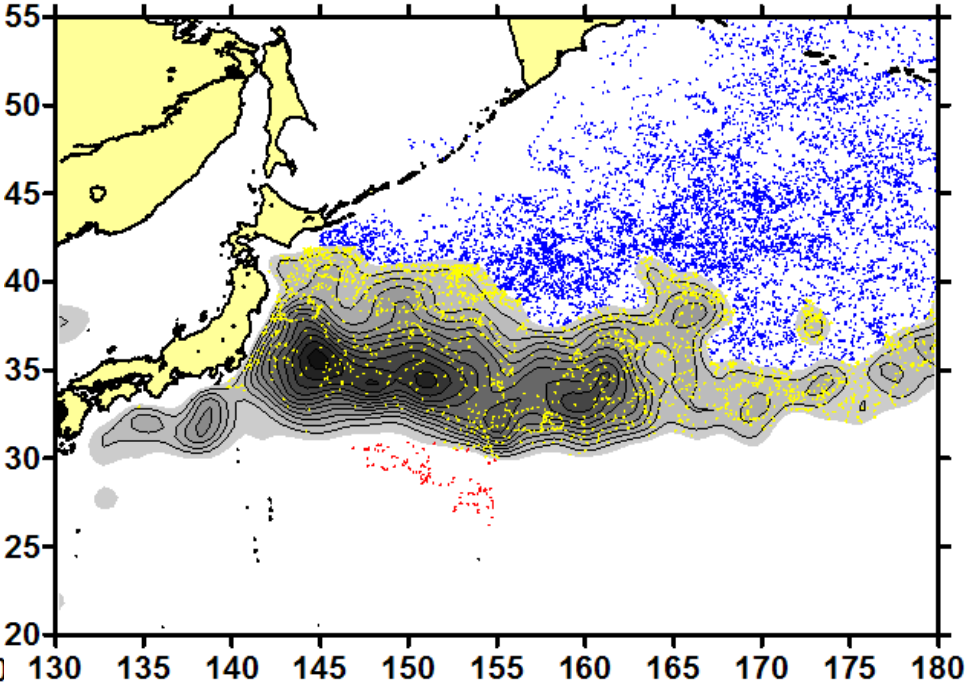
Most interesting results of the derived Mixed Water Region



Total : 156

Enter MWR: 73

Enter OWR: 2



Total : 147

Enter MWR: 67

Enter KWR: 1

Discussions and Conclusions:

- **While the NPIW is characterized by the salinity minimum in the subsurface, the depth where the minimum salinity is observed and its variation could be a good indicator of the mixing between the fresh water and saline water.**

- **The salinity minimum and its depth of each profiles shows an out-phase feature in the mixed water region, which coincide with the fresh Oyashio water in the surface and the saline Kuroshio water in the depth.**

- **The Argo floats deployed in this area are physically confined into three regions by the strong sub-surface mixing between the fresh and saline water, but the main reasons are remain unclear due to the uncertainty and the complexity of the movement of Argo float.**

- **The result gives a preliminary pattern of the mixing procedure between the Kuroshio and Oyashio water in the mixed water region (MWR), which mainly benefits from the Argo float observations.**

Thank you!