Relationship between Sei Whales distribution and the environmental conditions in the western North Pacific using multi-sensor remote sensing

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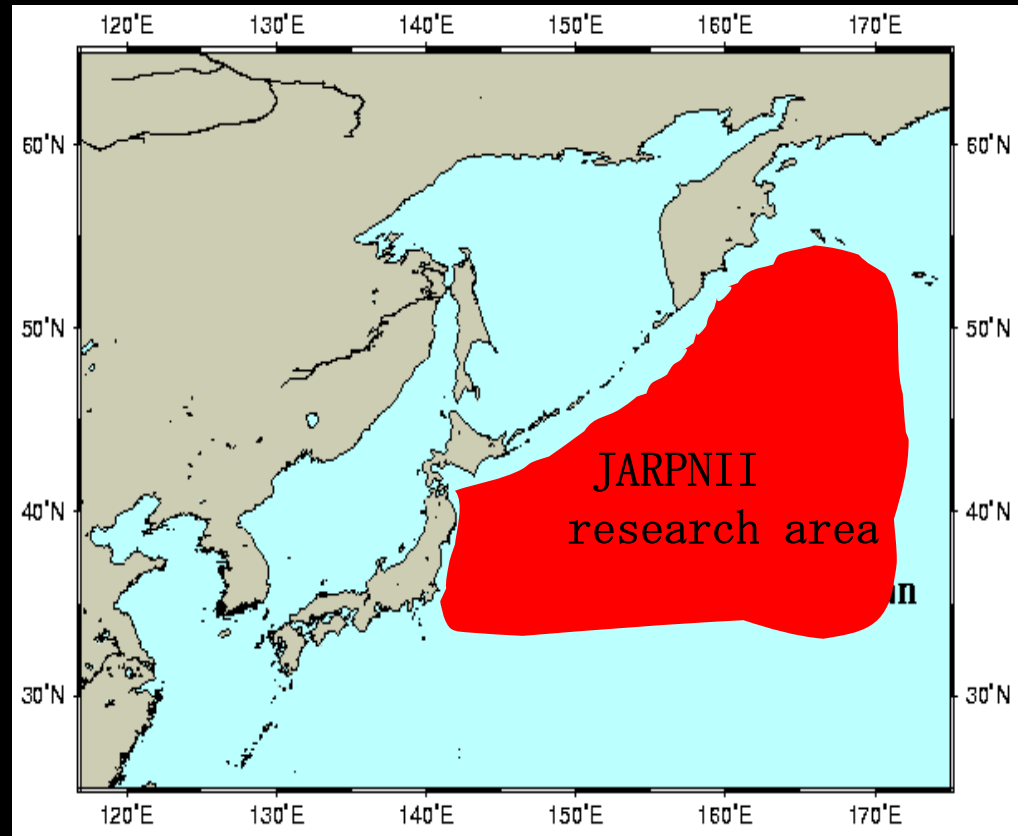4. Conclusion

1. Background

The Japanese Whale Research
Program under Special Permit
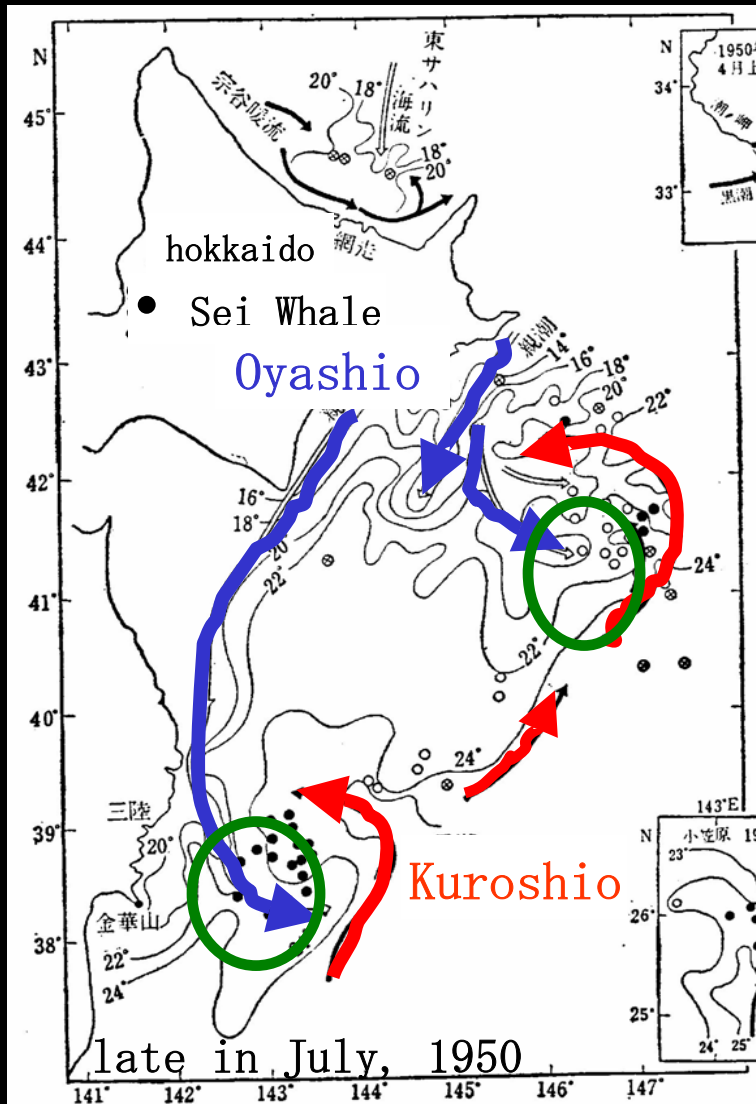in the Western North Pacific
(JARPN/JARPNII)

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Ecosystem studies
Feeding ecology = competition between whales and fisheries

➡ Many Sei Whales were sighted in 2001 JARPNII survey

JARPNII
research area

(http://atelierjam.hp.infoseek.co.jp/imghtml/se

Relationship between Whales and oceanic conditions

late in July, 1950

A whaling ground in the sea near Japan

A center area where the Oyashio cold current and the Kuroshio branch form anticlockwise eddy

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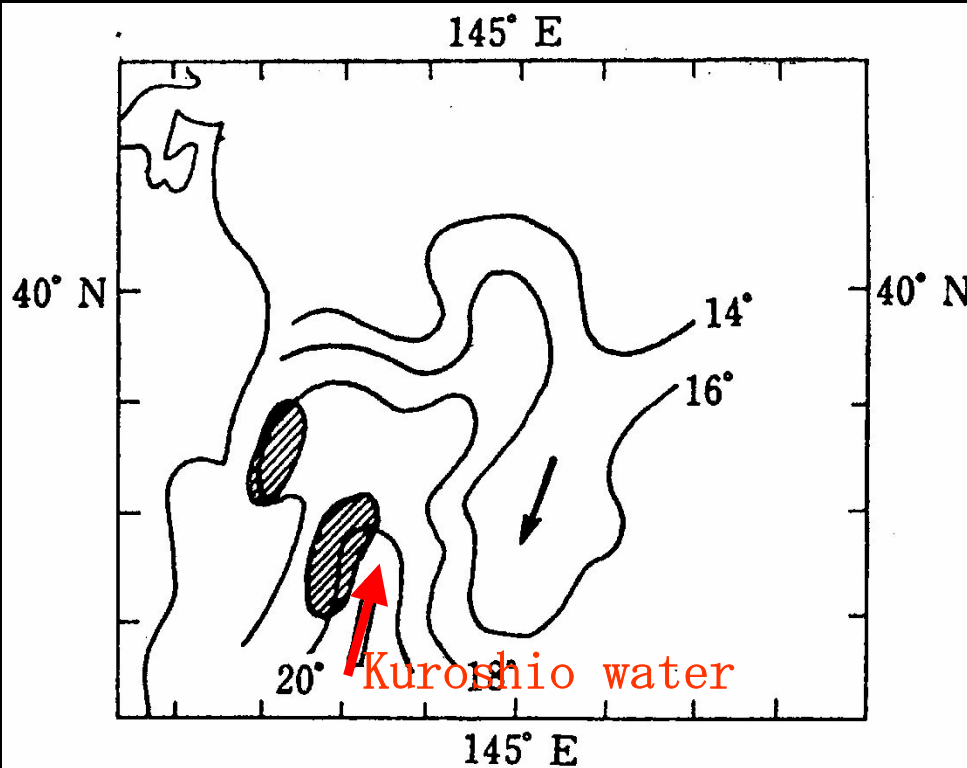
High density area of Whales

(Uda, 1954)

Relationship between Whales and oceanic conditions

Distribution of Sei Whales and sea surface temperature in June, 1954

A west area of the moving Kuroshio System water mass northward
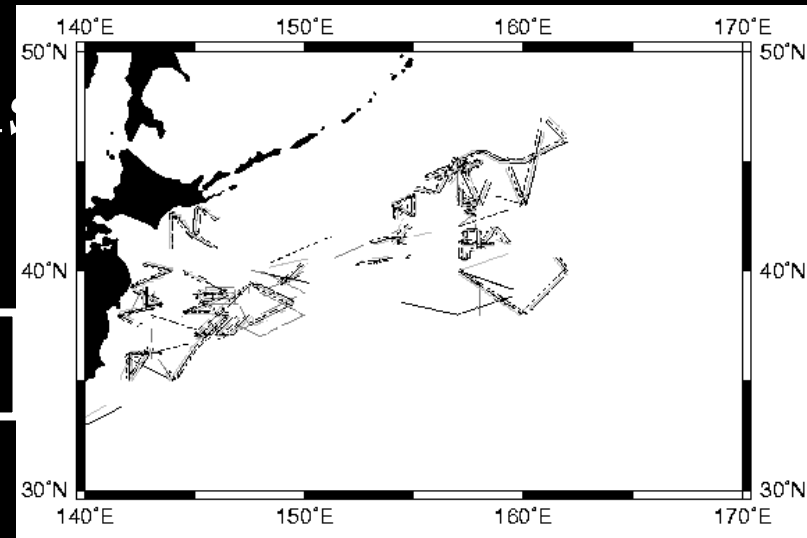
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High density area of Whales

(Nasu, 1956)

another factor：
bottom topographic feature

past observation methods
shipboard survey

monitoring limitation

sighting survey effort in 2001 JARPN2

ocean environmental
change in vast area

objective

To investigate relationship between Sei
Whales and oceanographic environment
using multi-sensor remote sensing

2. Data and Methods
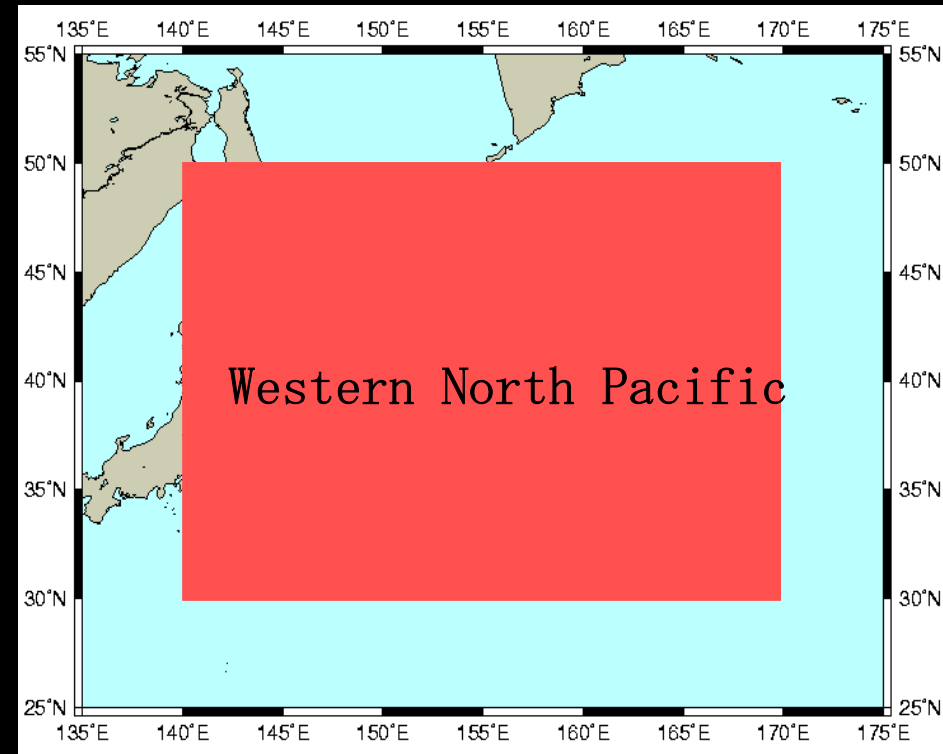
Western North Pacific

In situ data
JARPNII survey 5/10-8/4, 2001
- sighting surveys
  sighting position of Sei Whales

- oceanography observations
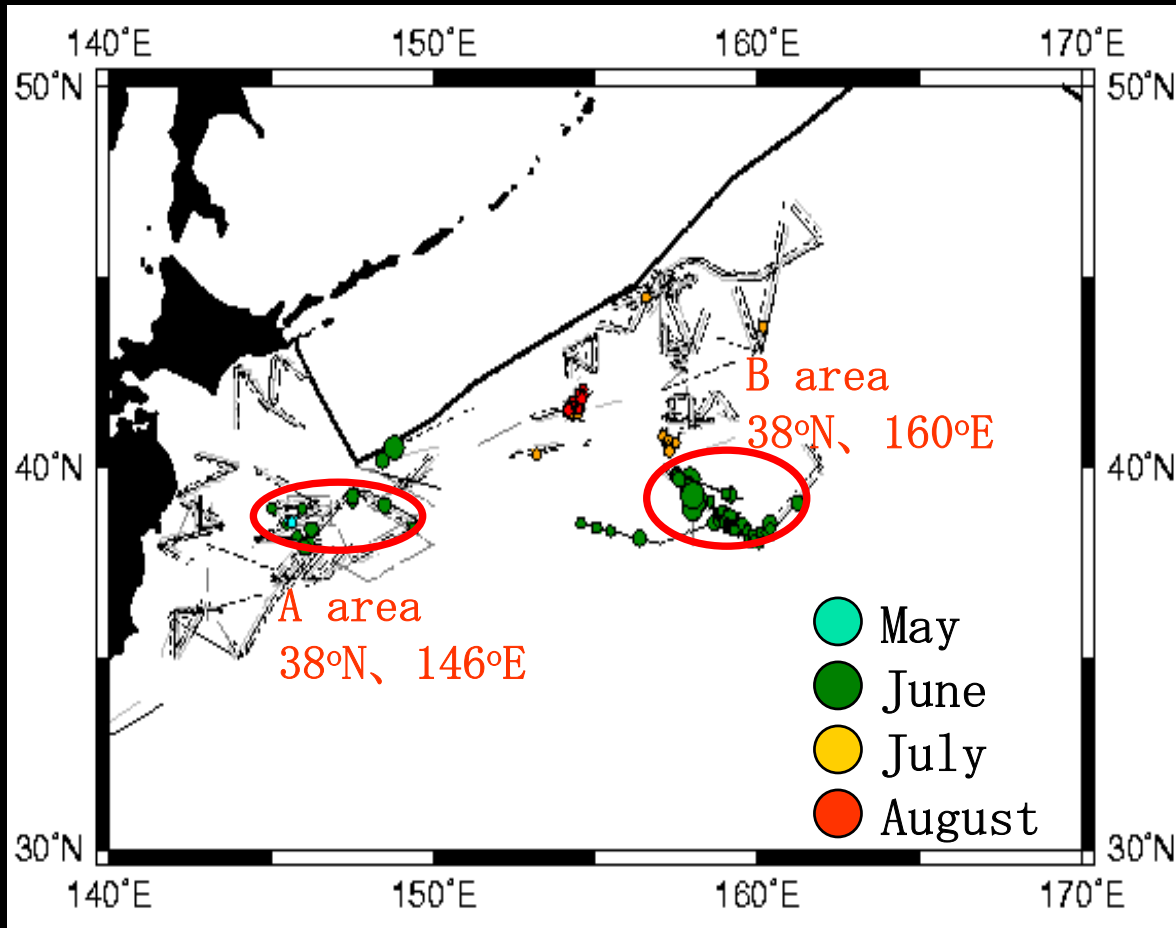 sea surface temperature & salinity

Satellite data   May-August, 2001
sea surface temperature (SST) : NOAA/AVHRR } monthly, 8days data
chlorophyll *a* (chl-a) : Orbview-2/SeaWiFS
sea surface height anomaly (SSHA) : TOPEX/ERS-2

· bathymetry data : ETOPO5 data provided by NESDIS/NGDC

Sighting of Sei Whales
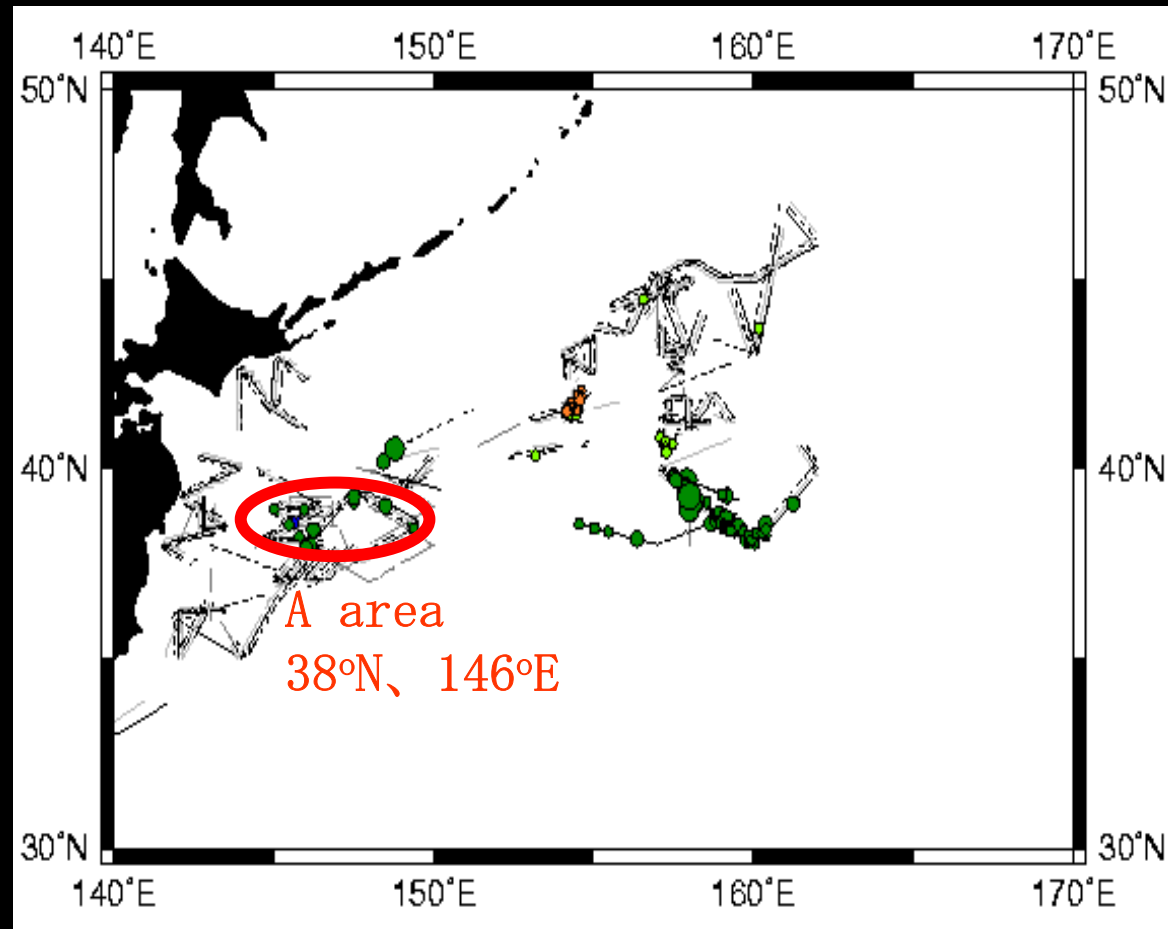
Sighting survey effort & sighting position of Sei Whales

Sea surface temperature
12.9℃–22.4℃
salinity
32.7psu–34.5psu

B area
38ºN、160ºE

A area
38ºN、146ºE

May
June
July
August

·widely distributed
·two high density

Environmental conditions in A area
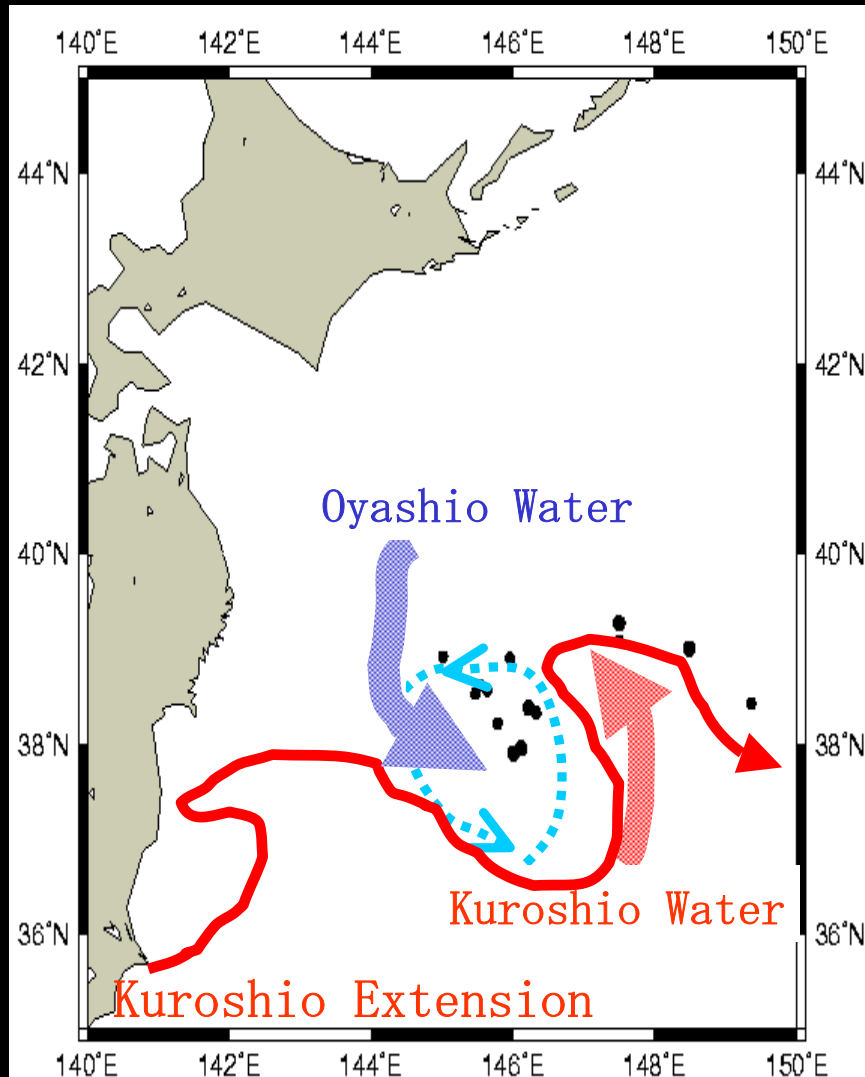Sighting surveys during 25, May-17, June

A area
38ºN、146ºE

High density area of Sei Whales

・edge of warm tongues of the secondary Kuroshio Front
・between negative and positive sea surface height anomaly
・edge of high chl-*a* concentration area > 0.2mg m^{-3}

higher biological productivity area

8 days chl-*a* image
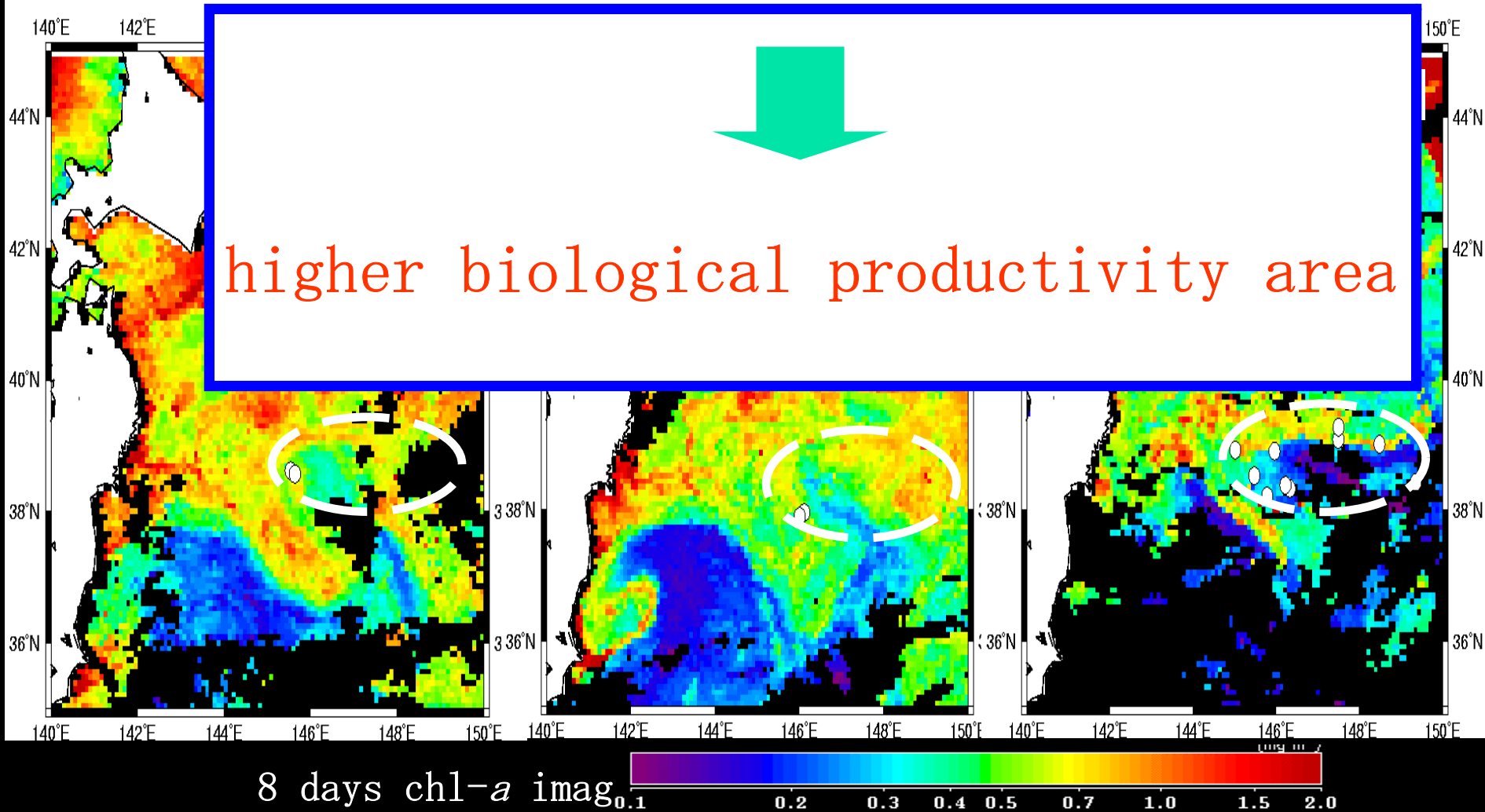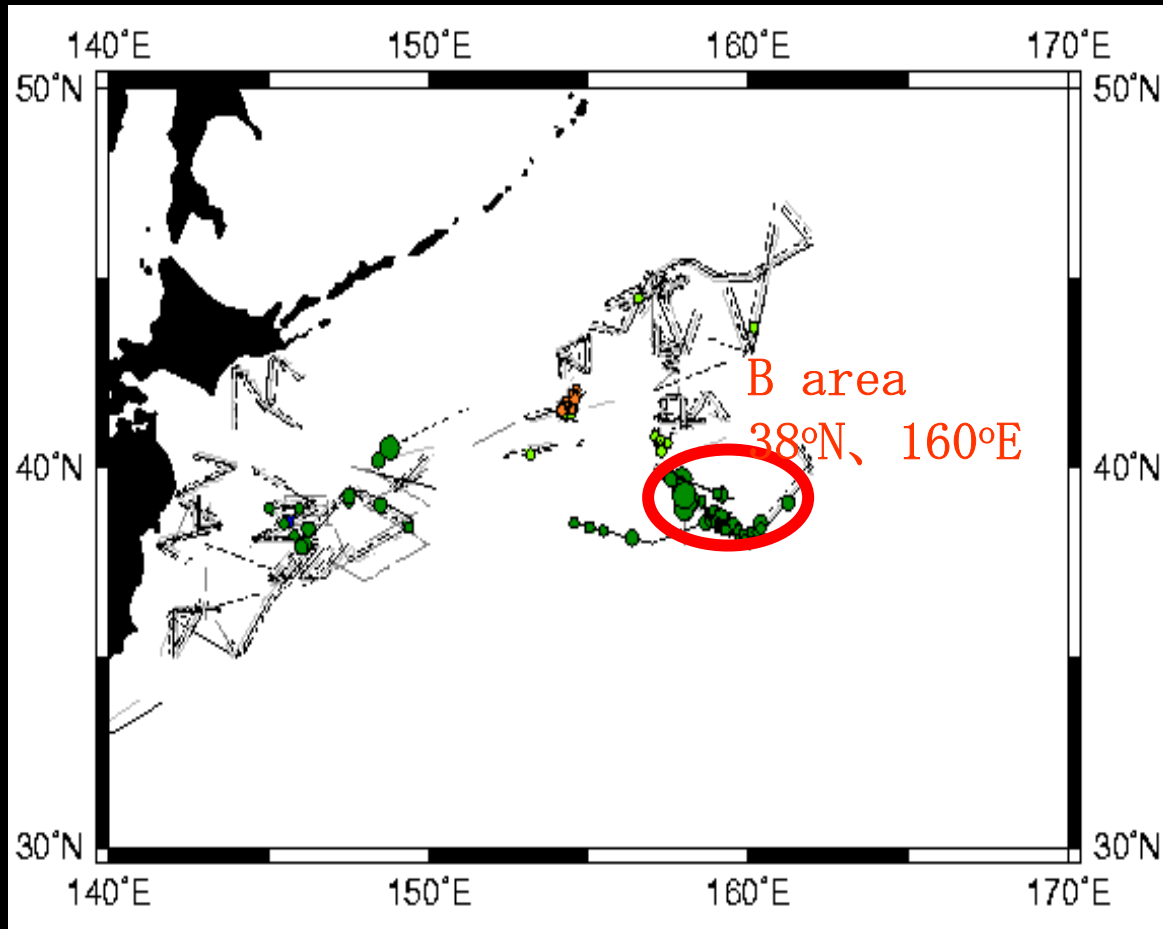
Environmental conditions in A area

higher biological productivity area

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·the accumulation of nutrient rich water of Oyashio Water
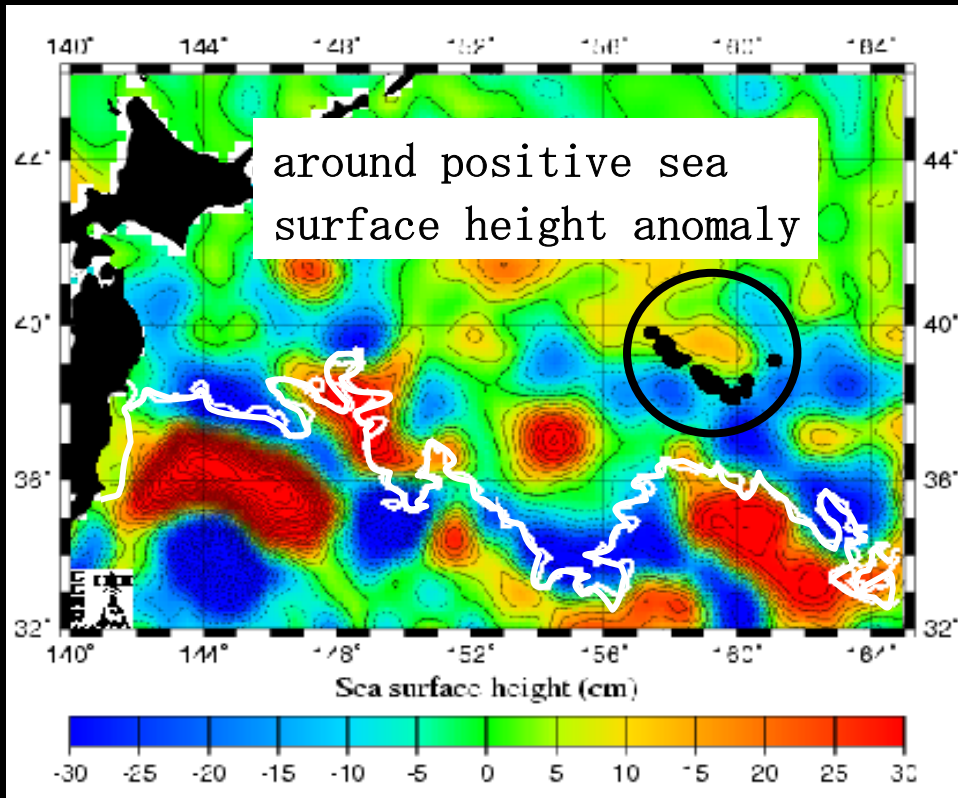
·complicated frontal structure

Environmental conditions in B area
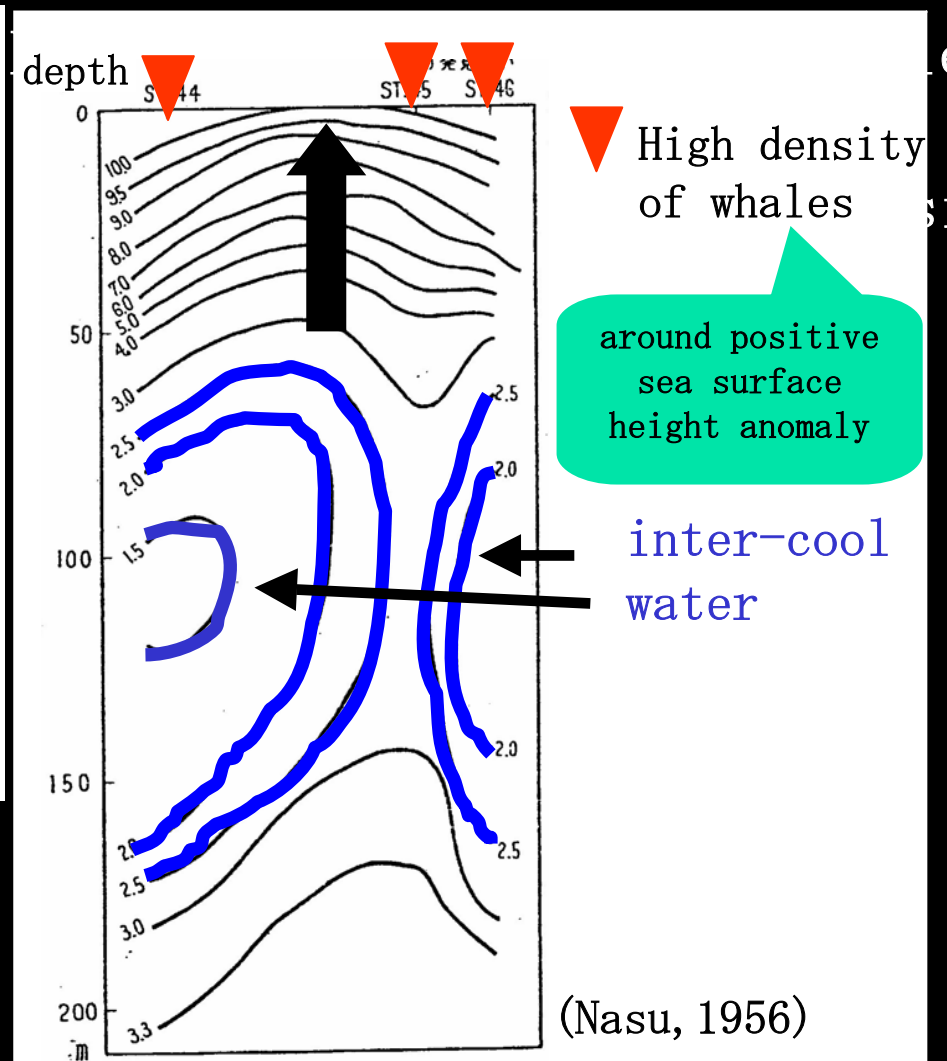
Sighting surveys during 26-30, June

Environmental conditions in B area
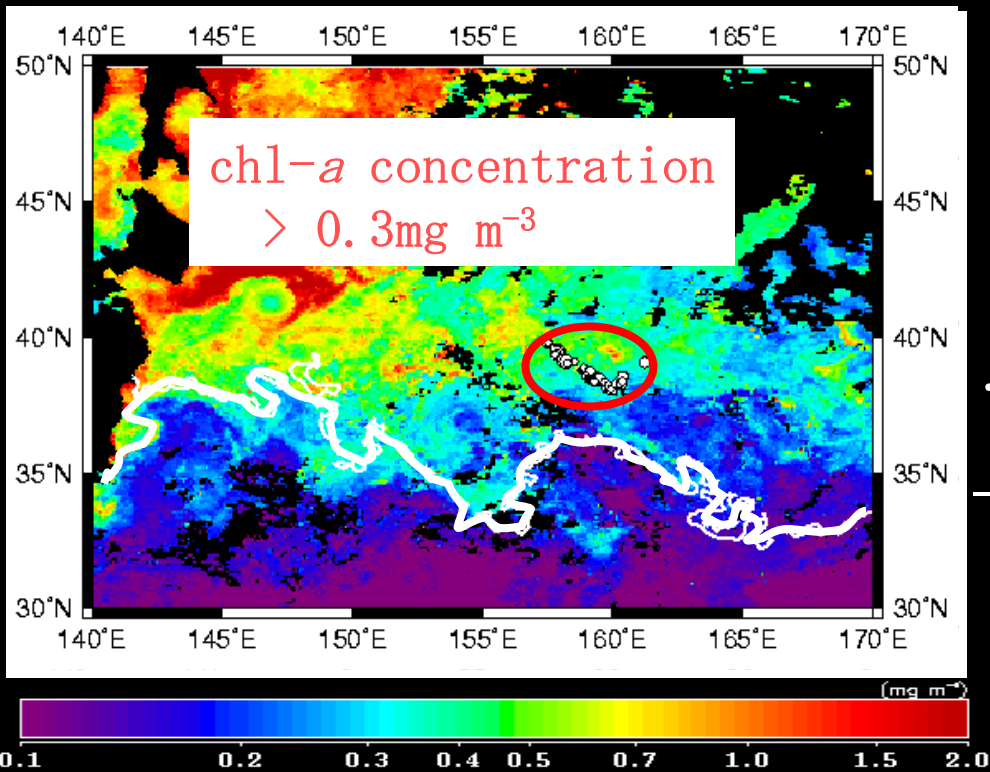
Sighting surveys during 26-30, June

around positive sea surface height anomaly

Sea surface height (cm)

SSHA at 28, June

consistent

depth

▼ High density of whales

around positive sea surface height anomaly

inter-cool water

(Nasu, 1956)

Environmental conditions in B area

chl-*a* monthly image in June

High density area of Sei Whale

·north of the Kuroshio Extension

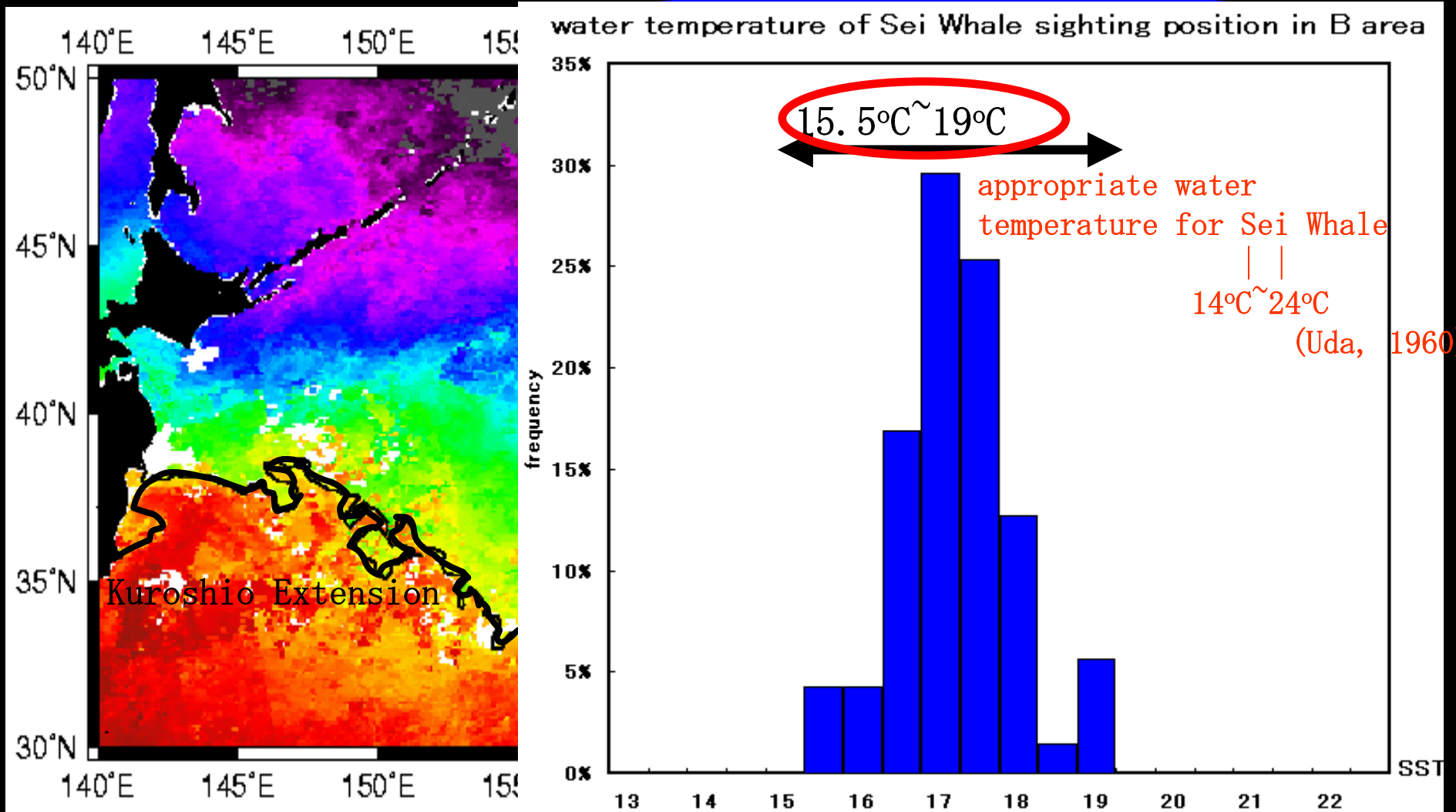·around positive sea surface height anomaly

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nutrient rich water in the subsurface layer

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·chl-*a* concentration > 0.3mg m^{-3}

Environmental conditions in B area
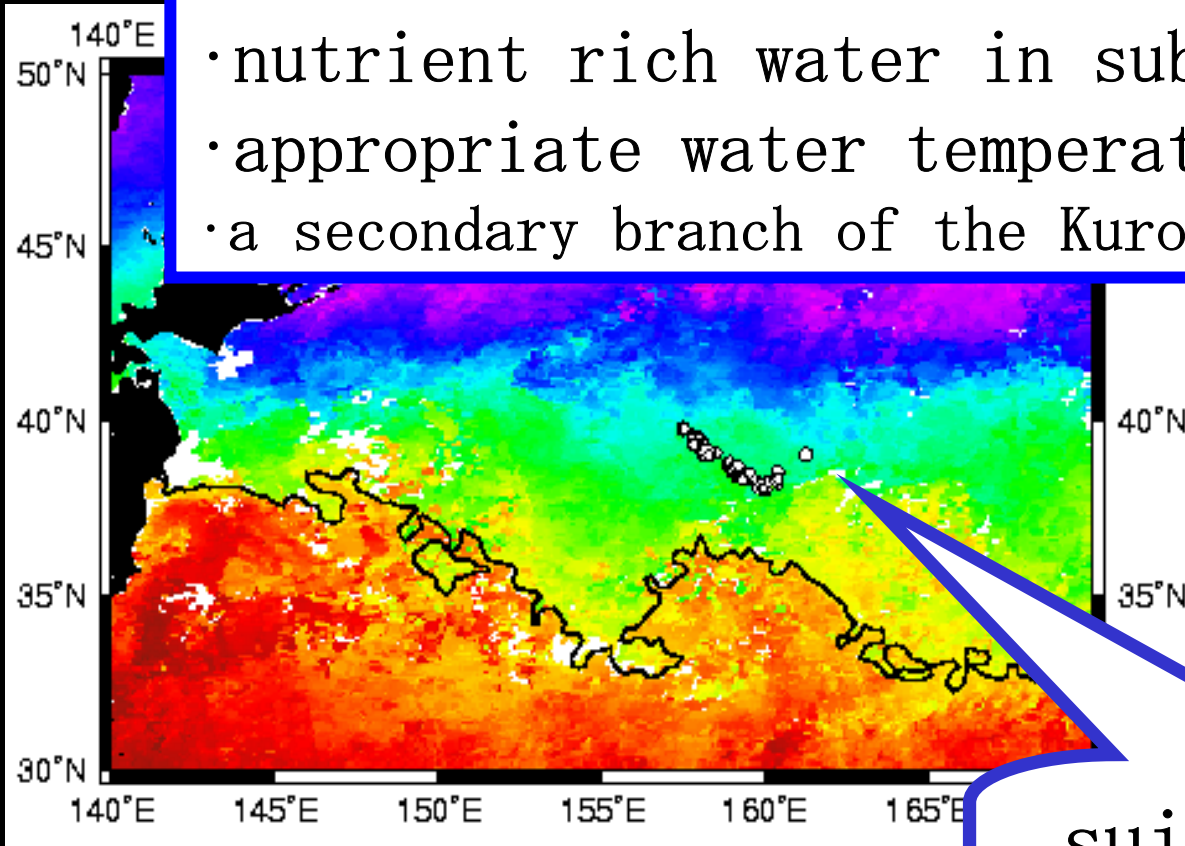## Sighting surveys during 26-30, June

SST monthly image at June

Environmental conditions in B area

Sighting surveys during 26-30, June

- nutrient rich water in subsurface layer
- appropriate water temperature
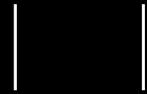- a secondary branch of the Kuroshio Extension

SST monthly image at June

suitable habitat for Sei Whales

5. Conclusion

the high density area of Sei Whales
| |
higher biological productivity

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suitable foraging habitats for Sei Whales