Marine Heatwave of Sea Surface Temperature of the Oyashio Region in Summer since 2010

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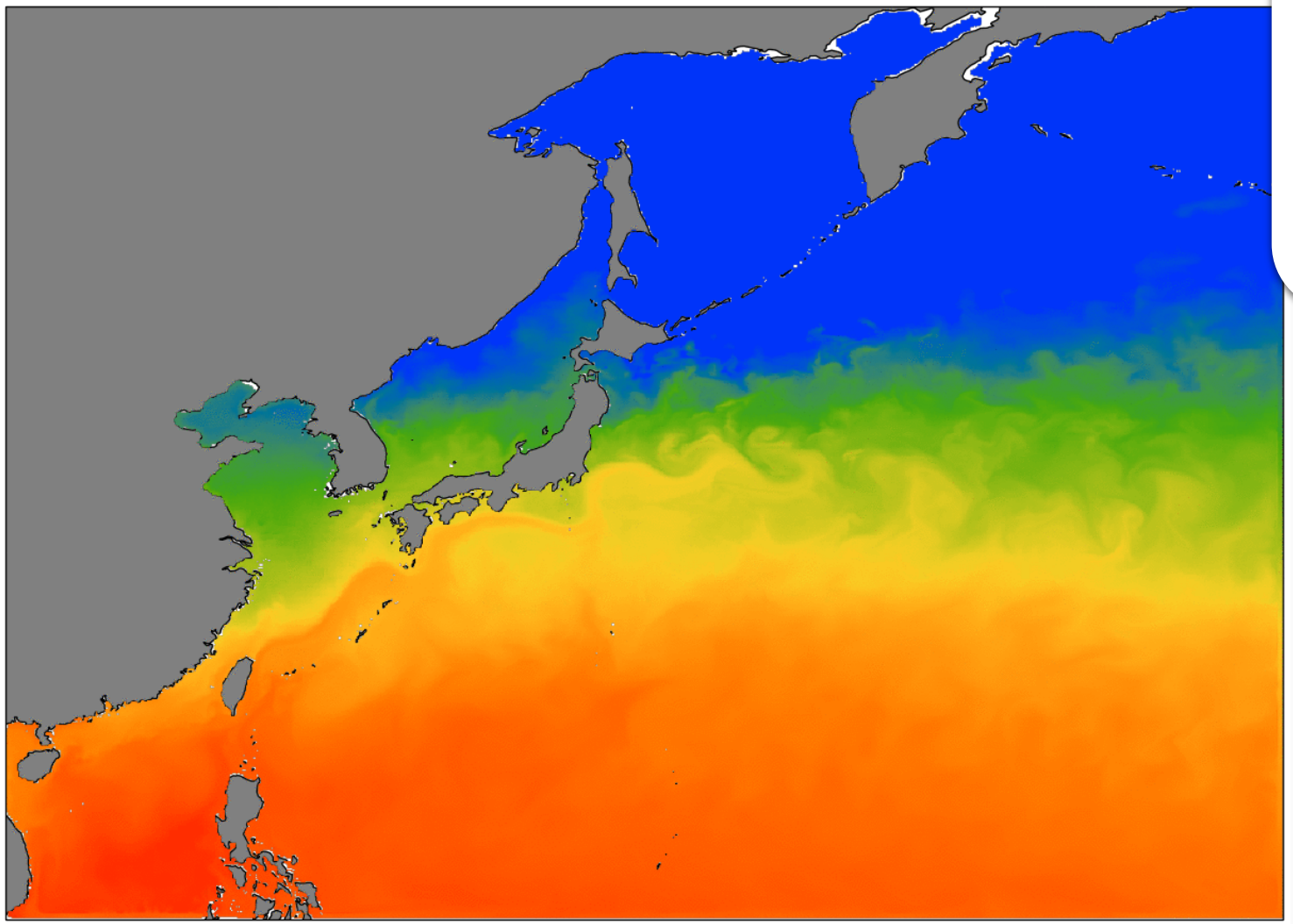
   → impact on fisheries

Multi-scale prediction (1)



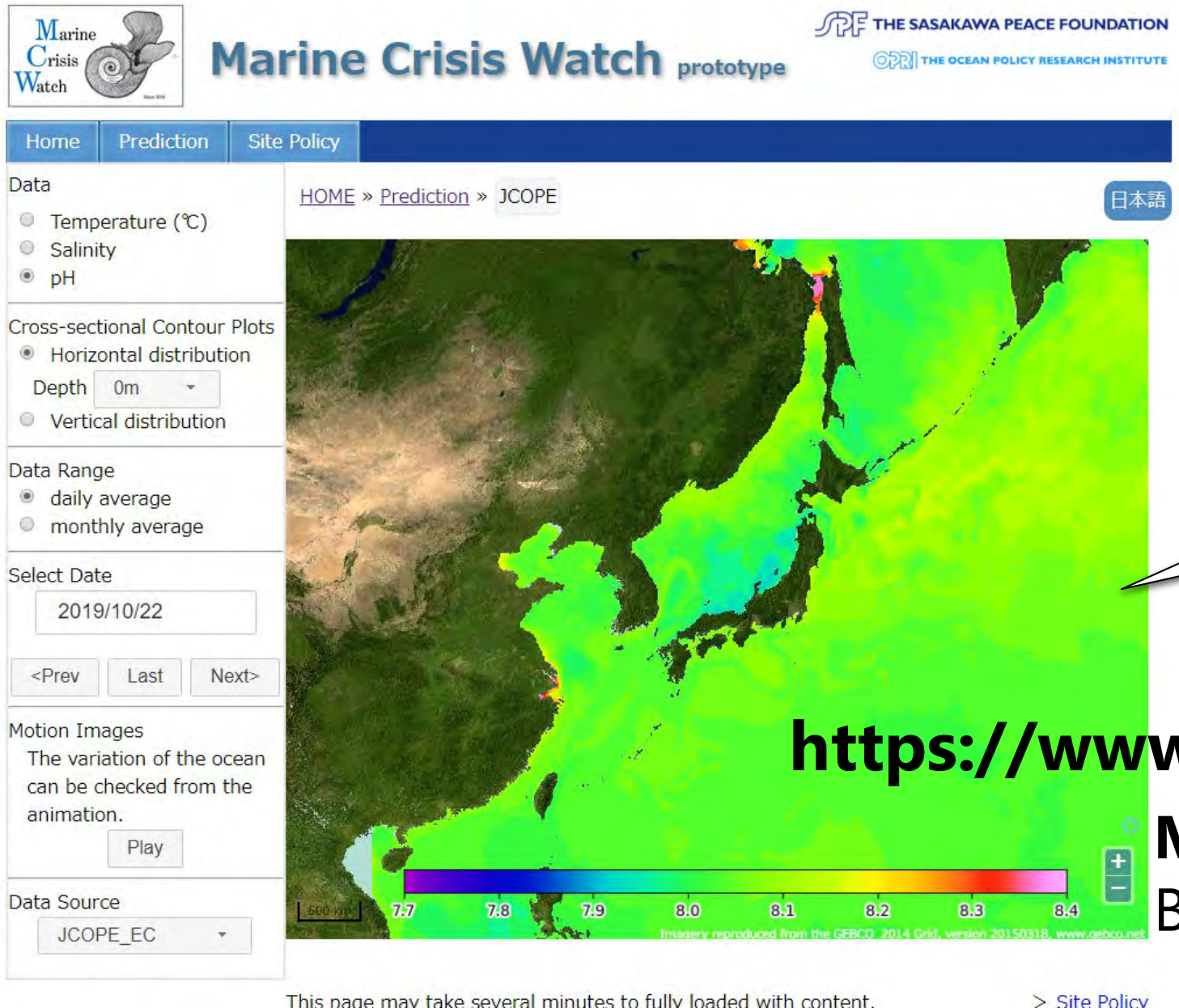
1. JCOPE2M

Resolution **1/12°** (~ 9km)

2-month forecast,

twice a week

Experimental prediction of PH



JCOEP_EC

Resolution 1/12°(~ 9km)

Offline tracer model driven by JCOPE2M

(Ishizu, et al, 2019

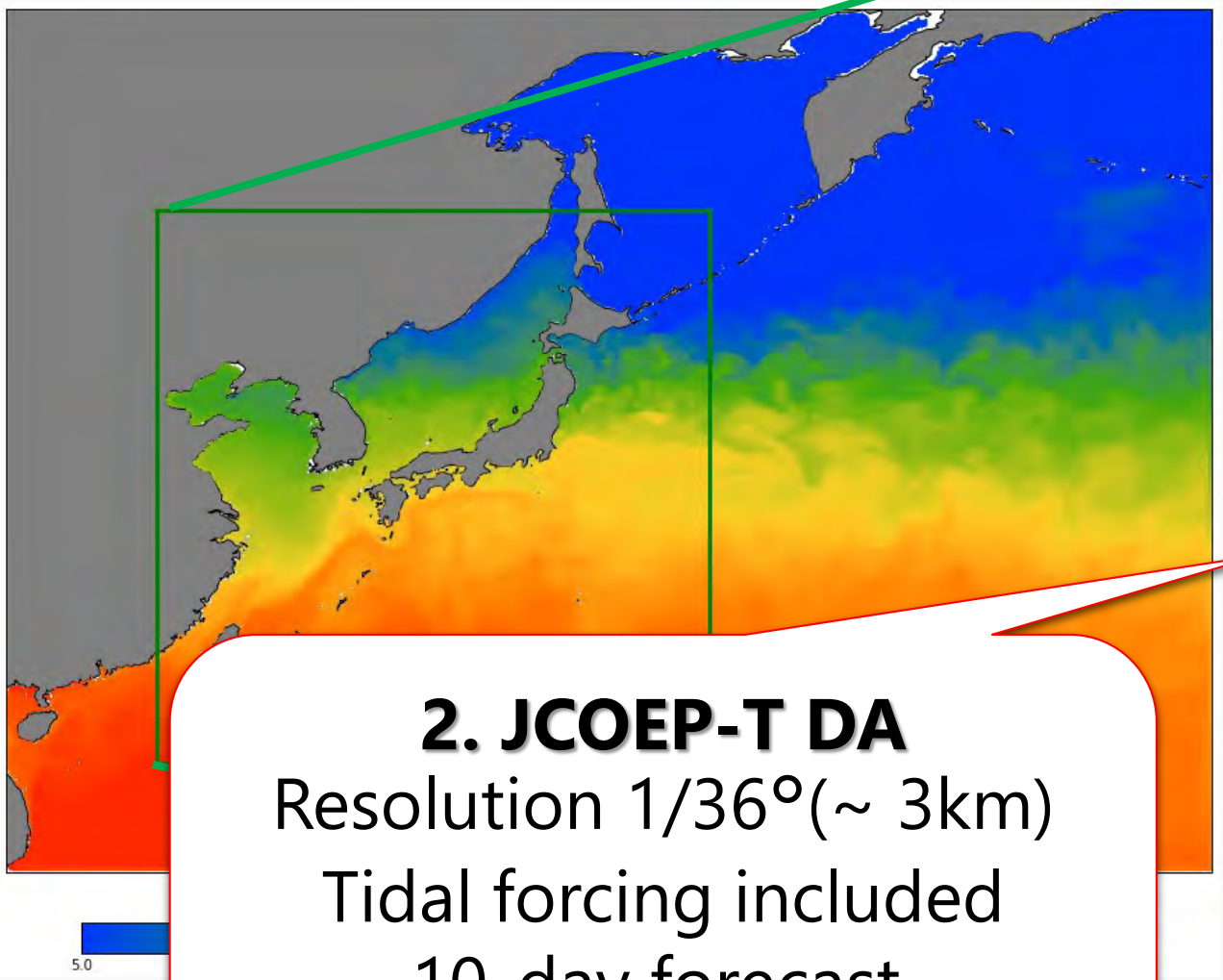
in *Sustainability*)

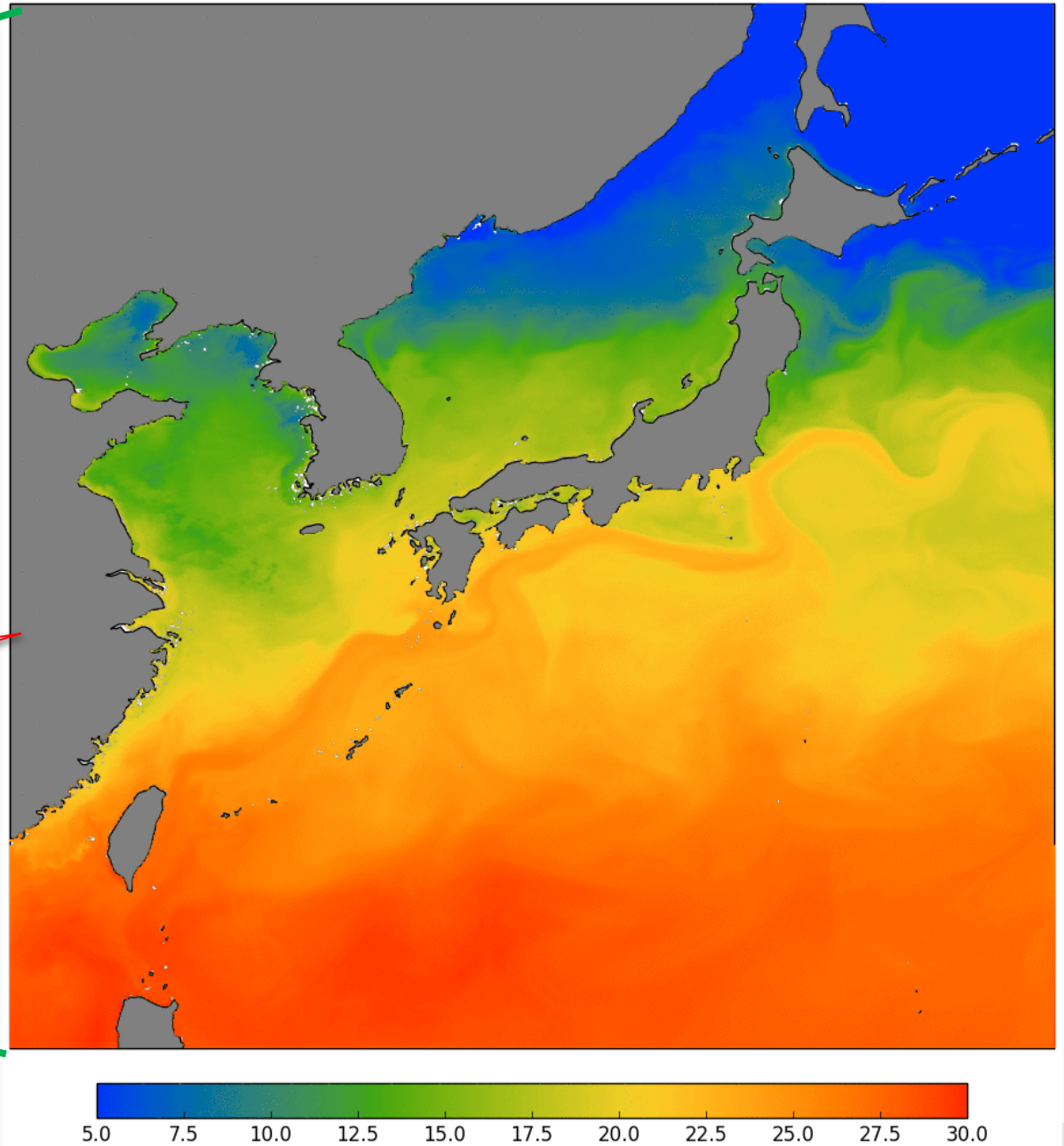
https://www.marinecrisiswatch.jp/

Marine Crisis Watch prototype

By Sasagawa Peace Foundation

Multi-scale prediction (2)





2. JCOEP-T DA

Resolution 1/36°(~ 3km)

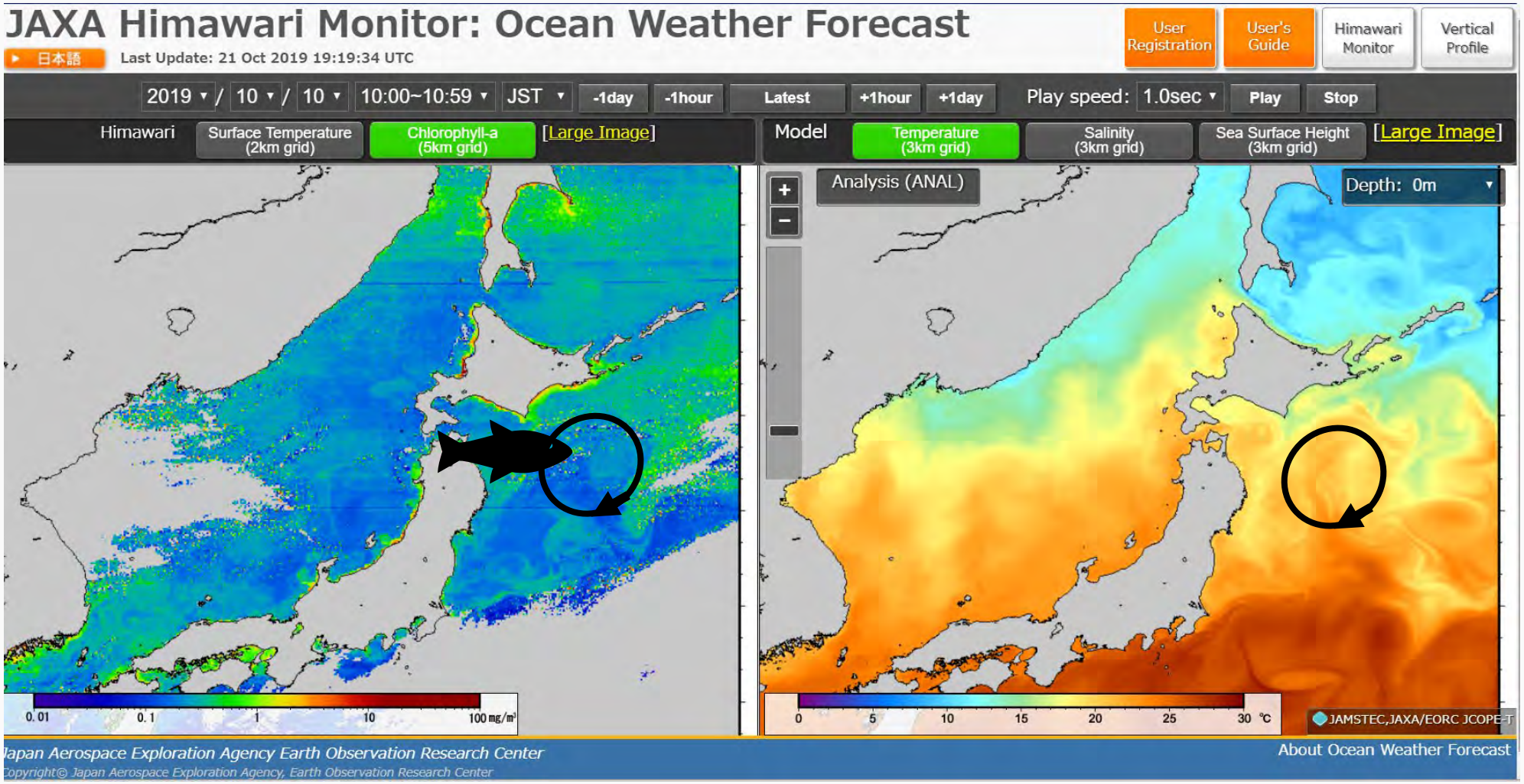
Tidal forcing included

10-day forecast,

every day

JAXA Himawari Monitor

https://www.eorc.jaxa.jp/ptree/ocean_model/index.html



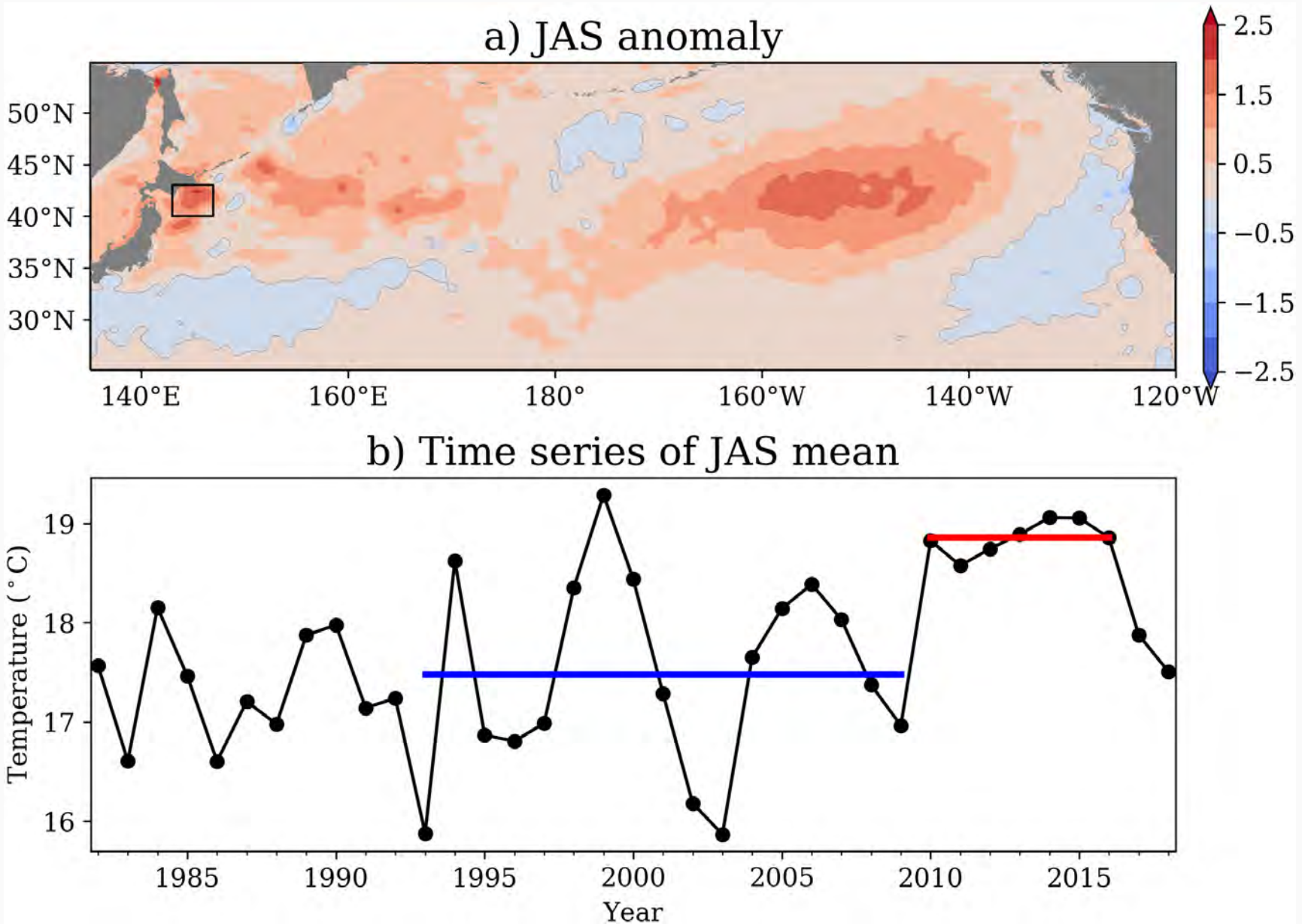
Chlorophyll-a by Himawari-8 satellite

SST by JCOPE-T DA

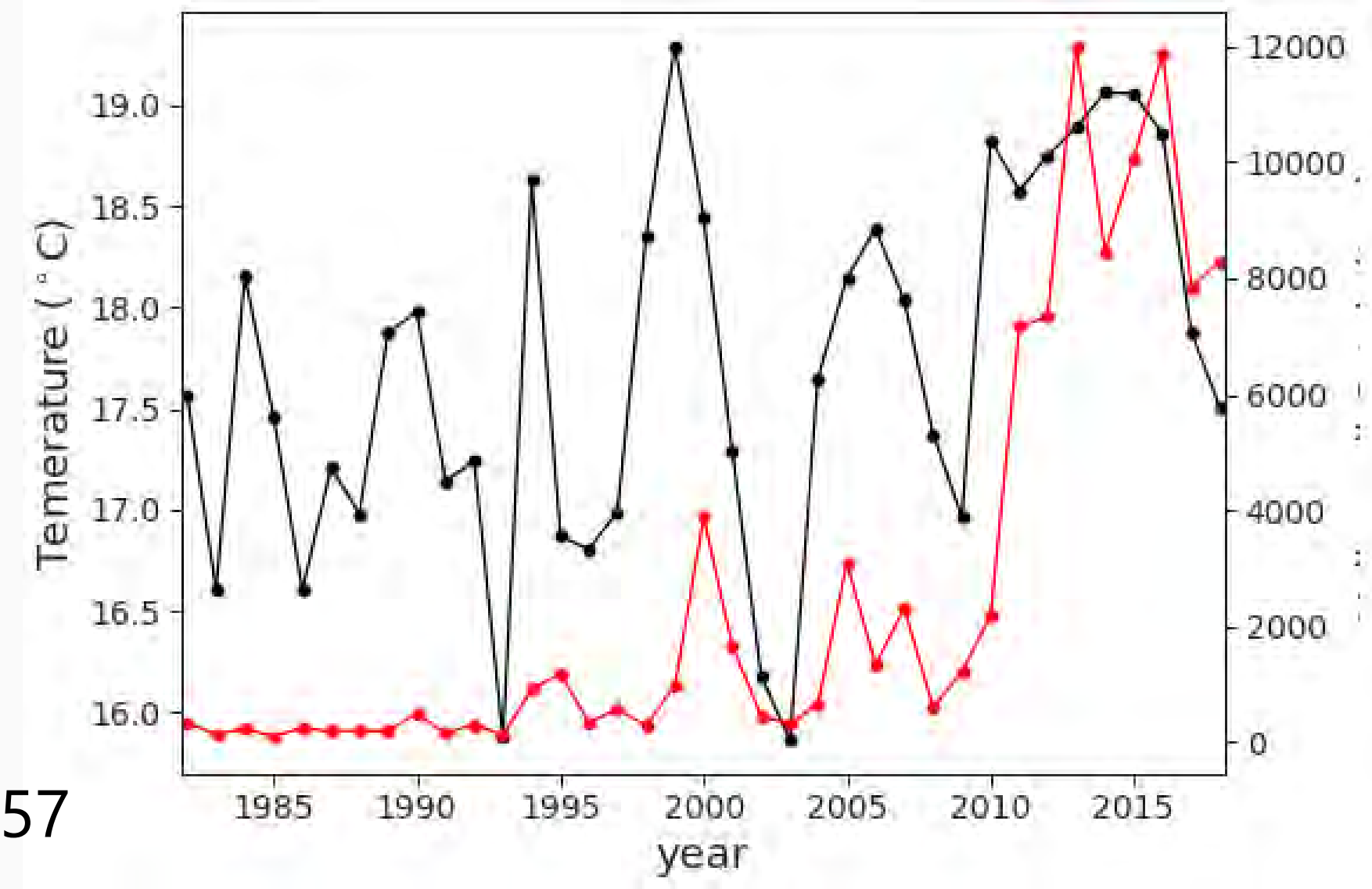
July-August-September mean SST

2010-2016 minus 1993-2009 average

Data source: NOAA OISST



Catch of yellowtail and SST



Catch of yellowtail in Hokkaido

Corr. 0.57

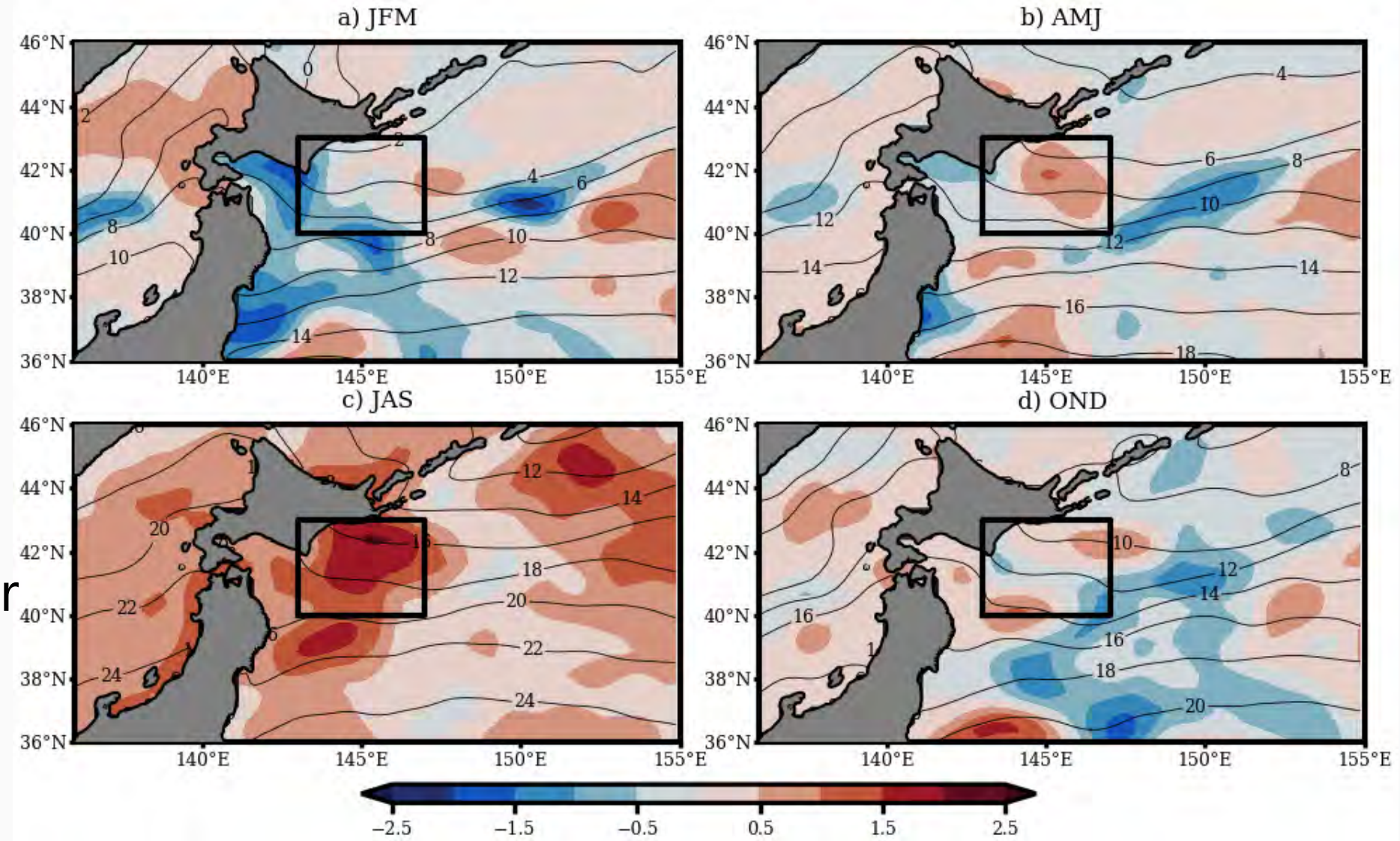
SST change in each season

Winter

Spring

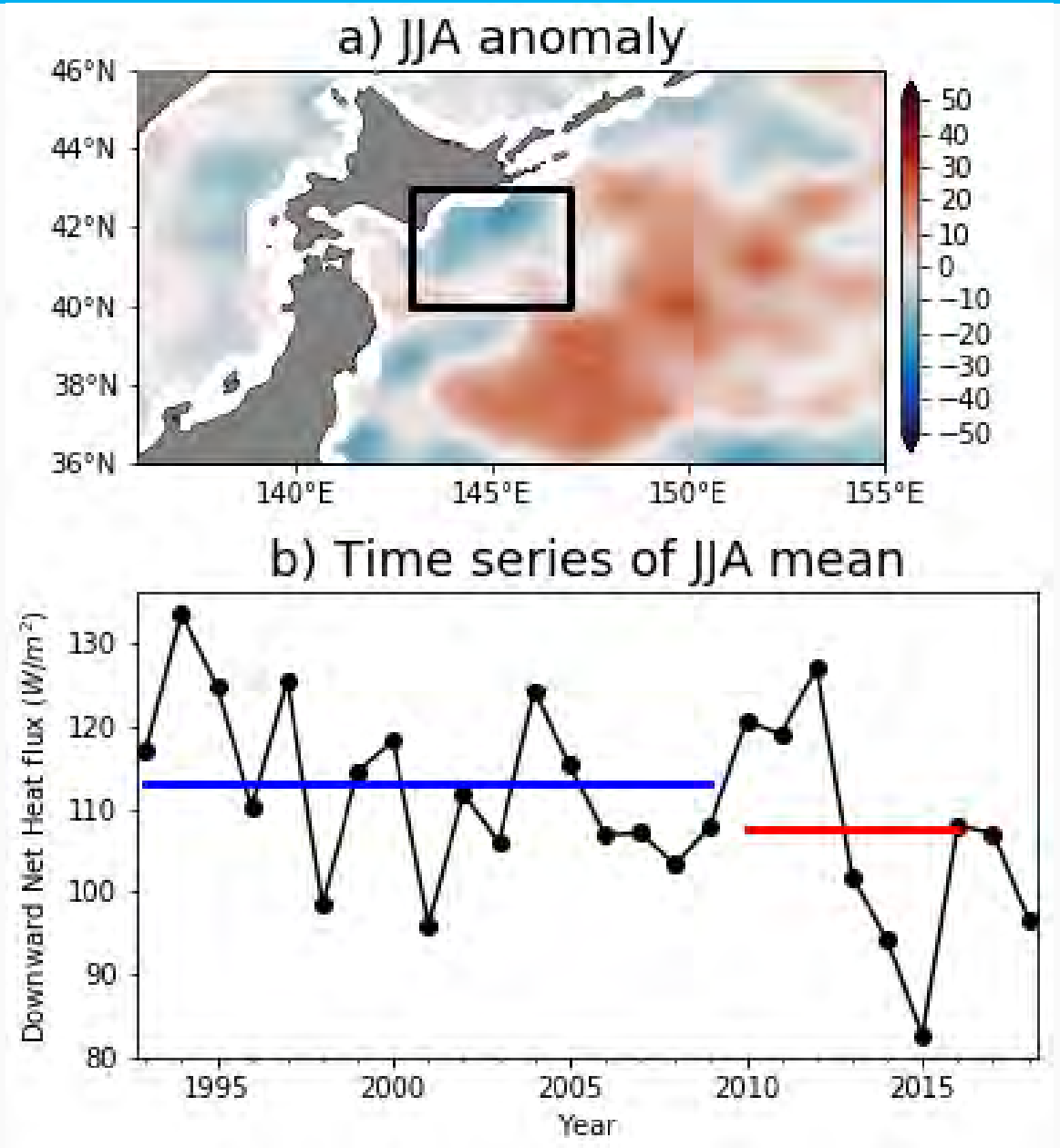
Summer

Fall



2010-2016 minus 1993-2009 average

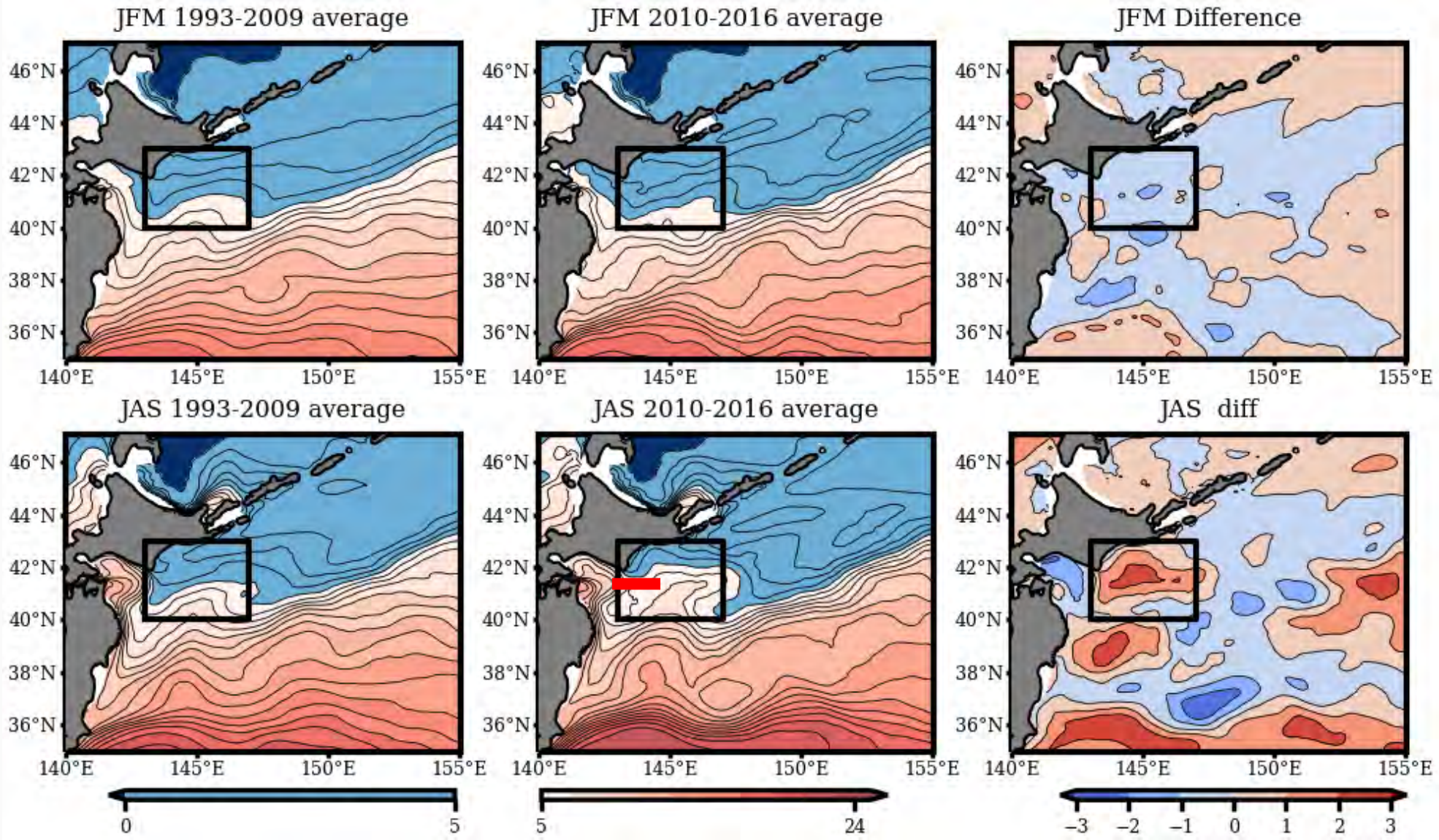
Downward Air-Sea Heat flux



Subsurface temperature (100m)

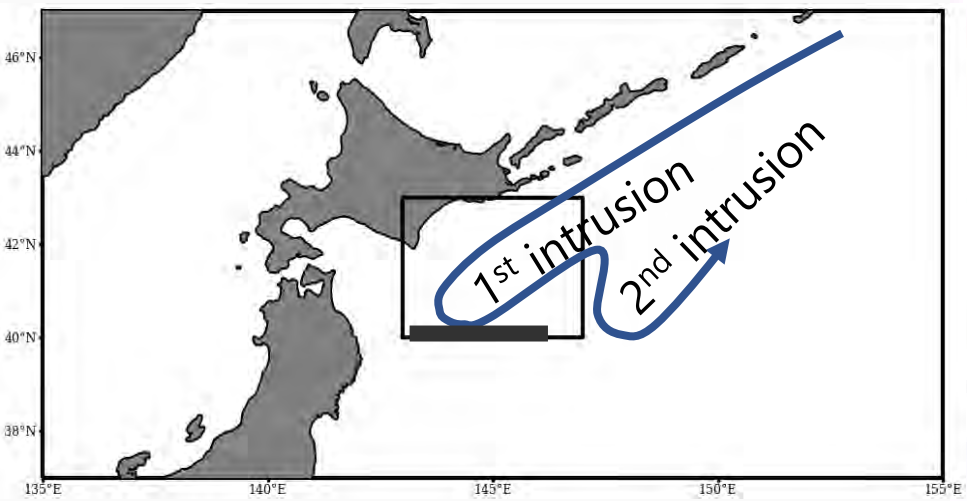
Winter

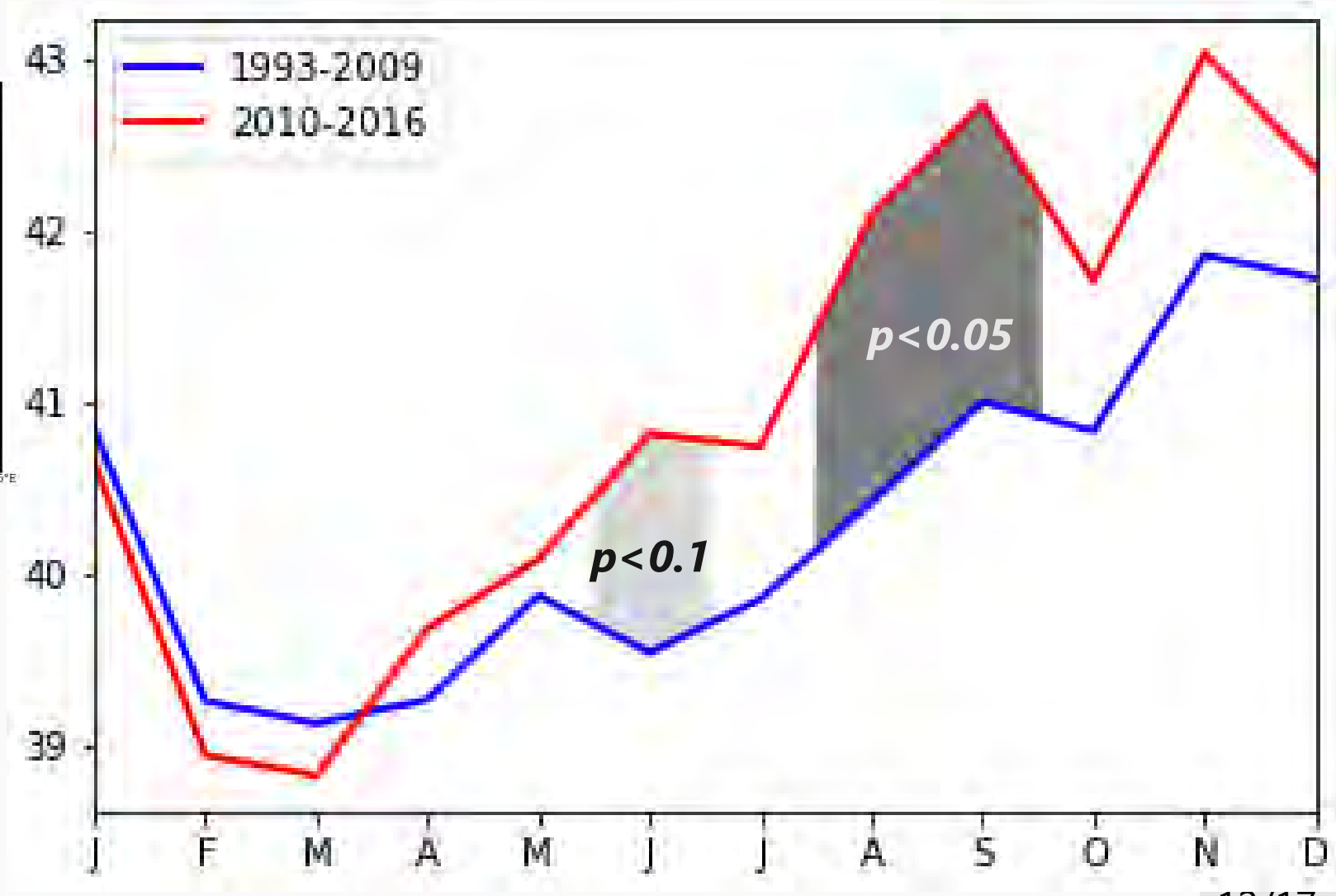
Summer



Data source: Reanalysis of JCOPE2M prediction system (1/12° horizontal resolution)

Seasonal variation of the southernmost latitude of the Oyashio 1st intrusion

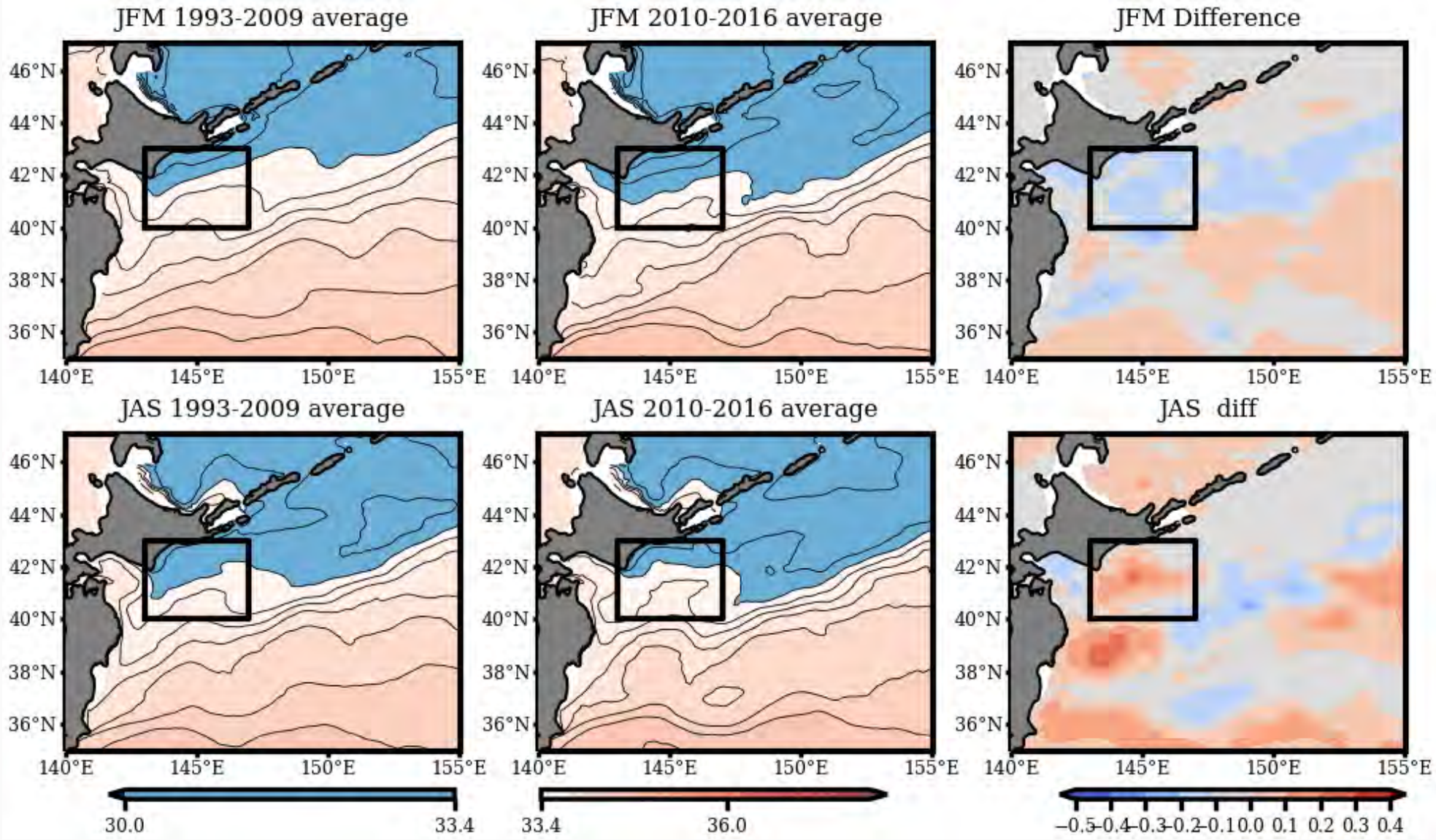




Subsurface salinity (100m)

Winter

Summer

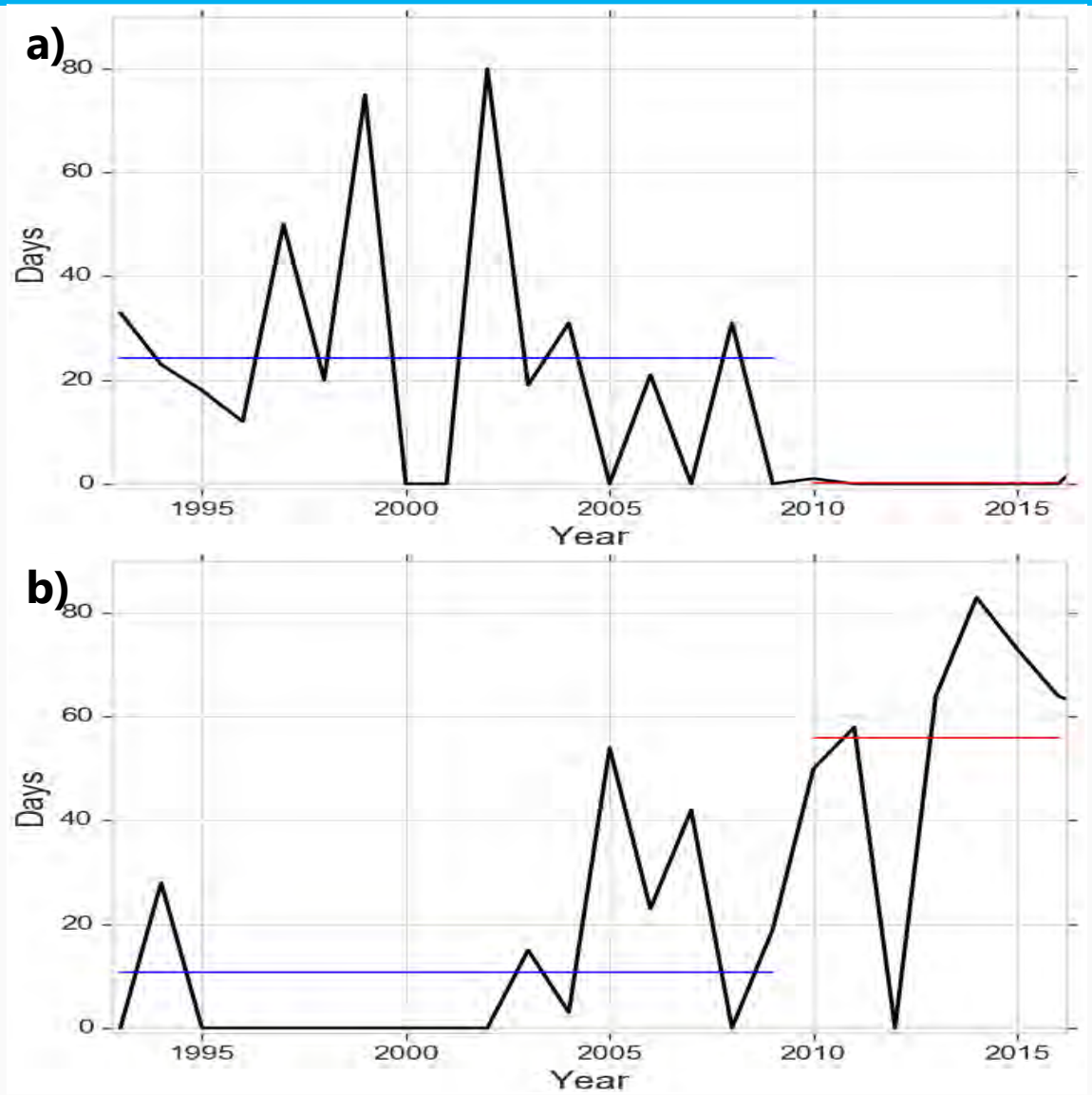


Data source: Reanalysis of JCOPE2M prediction system (1/12° horizontal resolution)

Accumulative arrival days of eddies in summer season (JAS)

Cyclonic (cold) eddies

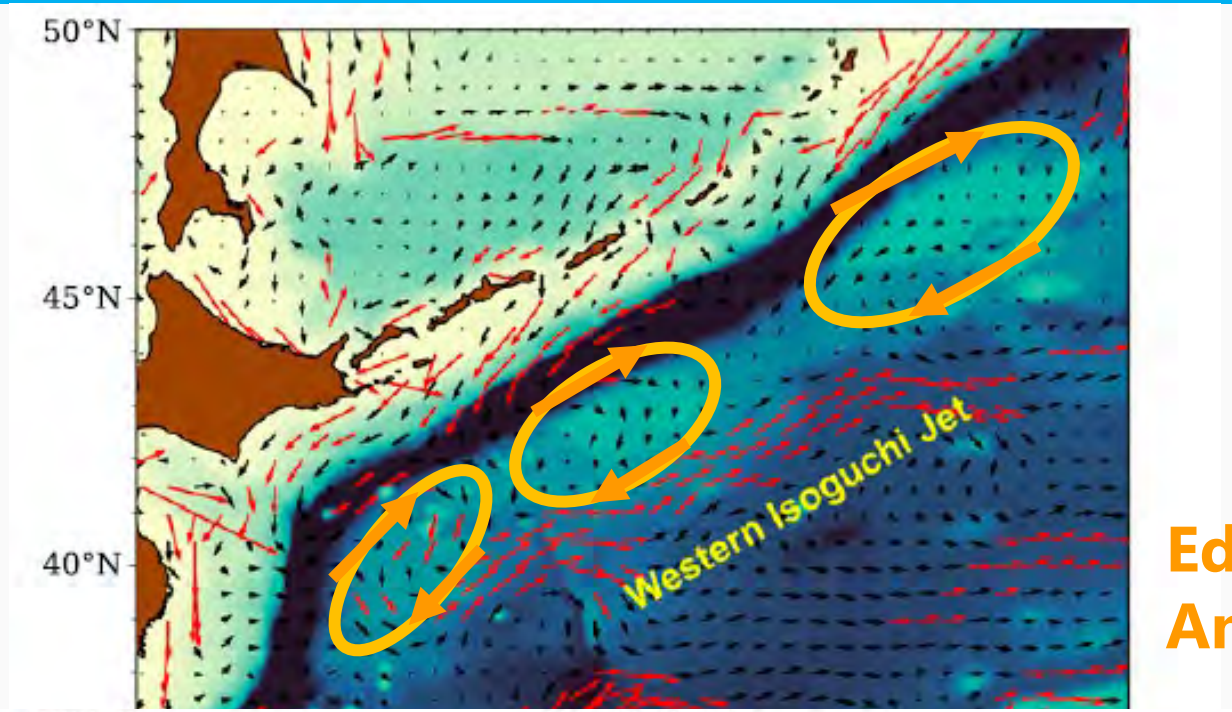
Anticyclonic (warm) eddies

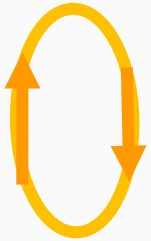


Calculated from eddy tracking product from altimeter data by AVISO

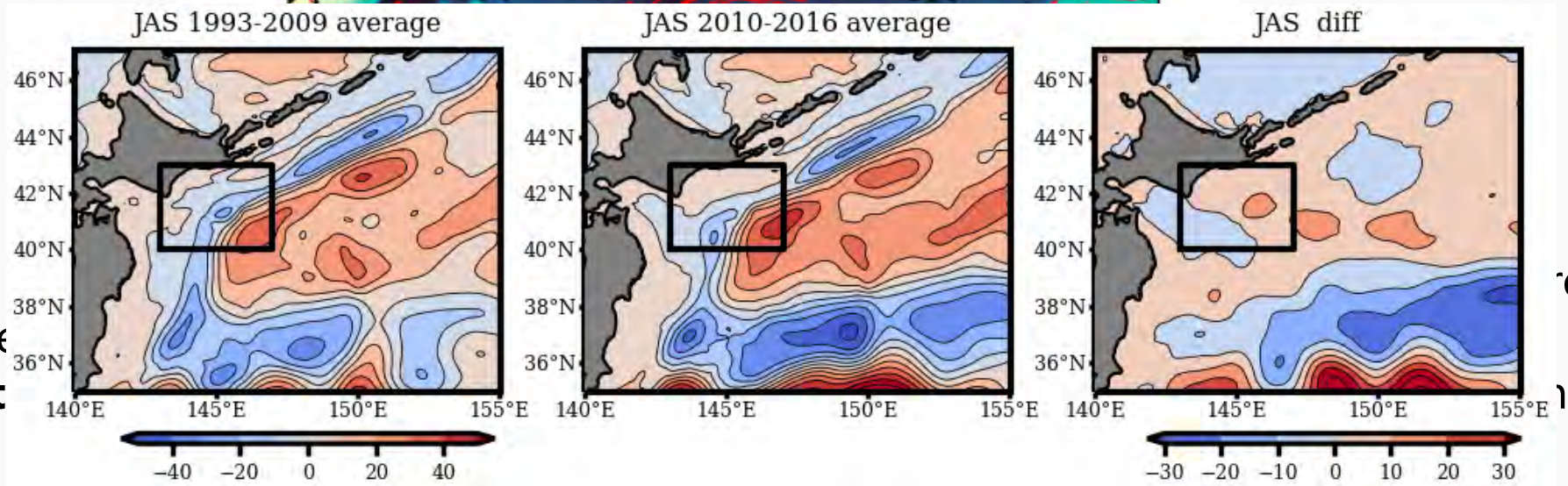
Role of eddies in the Oyashio current system

Shade: topography





Eddy-Topography induced Anticyclonic circulation



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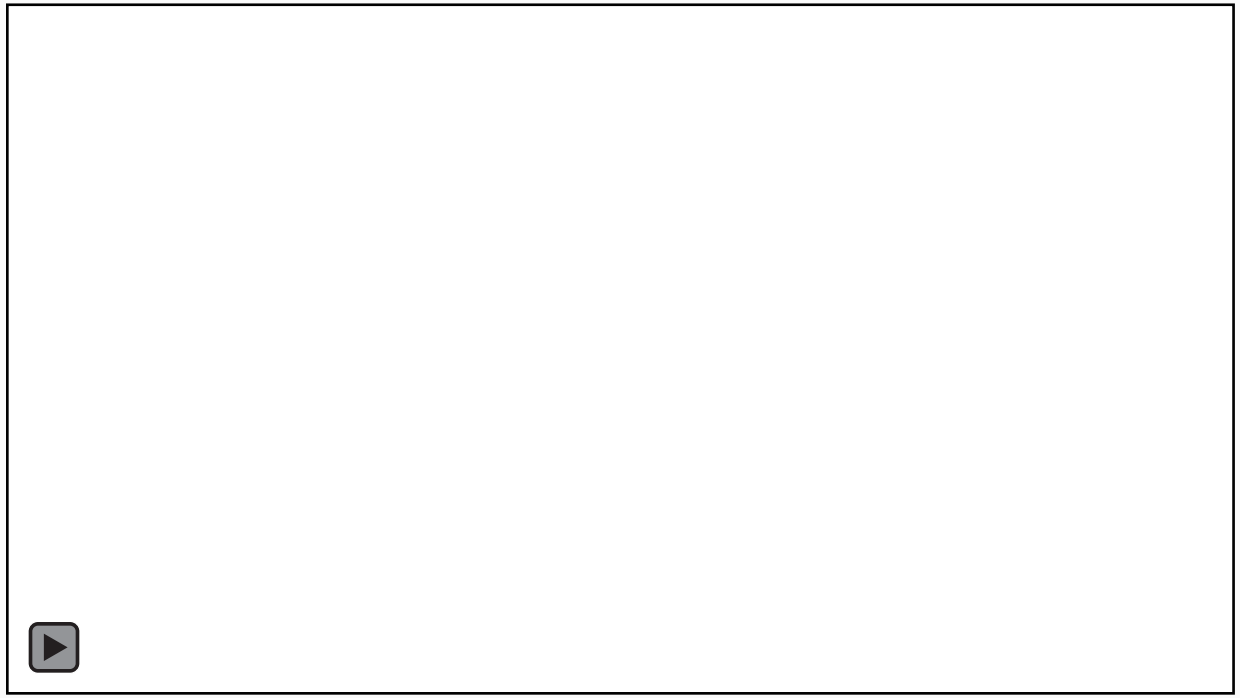
Miyama et he North Pacific Ocean (the

Oyashio forecast



http://www.jamstec.go.jp/aplinfo/kowatch/

Summary

- Application Laboratory (APL) of JAMSTEC provides multiple **ocean forecasts around Japan**.
- The **recent warming in the Oyashio** region affected fisheries.
- The warming in 2010-2016 occurred in the **first Oyashio intrusion** of the **summer season** accompanied by the enhanced **anticyclonic eddies** between the first and second intrusion of the Oyashio. The reason remains to be identified.