

KOOS-OPEM Reanalysis (K-ORA22)

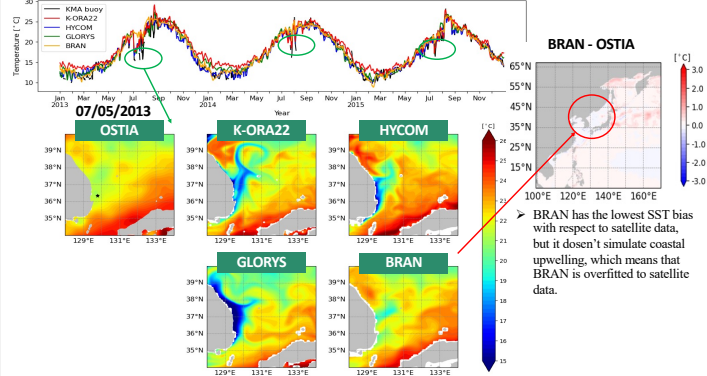
- Ocean prediction model : KOOS-OPEM
- Based model : GFDL-MOM5
- Domain : 5-63°N, 99-170°E
- Resolution : 1/24°x1/24° & 51 layers
- Data assimilation method : Ensemble Optimal Interpolation (Kim et al., 2015)
- Altimetry assimilation method : Cooper and Haines (1996)

	Data	Variables	Temporal resolution
Open boundary condition	GLORYS12V1	Temperature, Salinity	Daily
		Sea Surface Height (SSH)	
		Velocity (Zonal, Meridional)	
		Air temperature	
Atmospheric forcing field	ERAS	Wind velocity	6-Hourly
		Air pressure	
		Total cloud cover	
		Specific Humidity	
		Net solar radiation	Hourly
		Net thermal radiation	
		Net precipitation	

• Model domain and Bottom Relief

Coastal upwelling in the Southwest of East/Japan Sea

❖ Validation dataset : in situ SST measured by KMA (Korea Meteorological Administration) buoy.

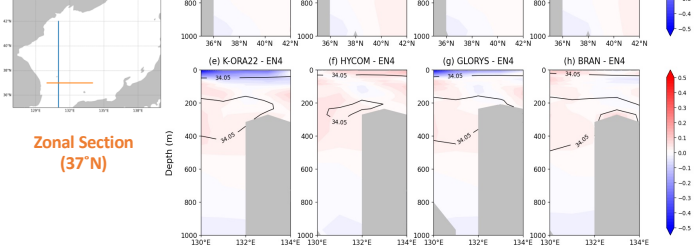


✓ K-ORA22, HYCOM and GLORYS successfully capture coastal upwelling that occurs every summer.

East/Japan Sea intermediate water

❖ Period:
K-ORA22 (2011–2019)
GLORYS (2011–2019)
BRAN (2011–2019)
HYCOM (2011–2015)

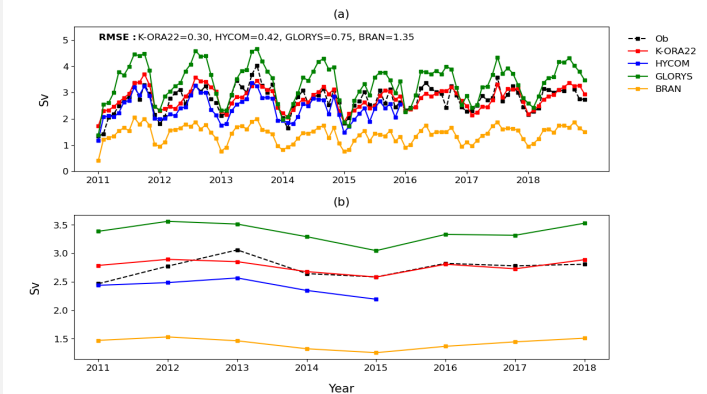
Meridional Section (131°E)



- ✓ K-ORA22 and GLORYS reproduce ESIW well with near-zero salinity biases at subsurface.
- ✓ HYCOM exhibits a shallower ESIW with high salinity biases compared to other reanalyses, and its extent only reaches as far south as 39°N.

Volume transport through Korea Strait

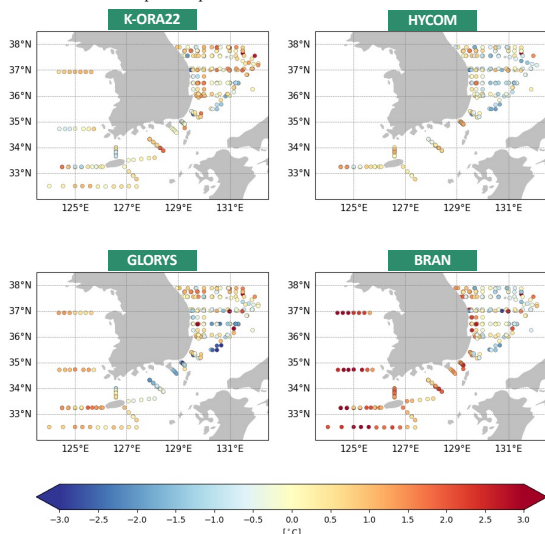
❖ Validation dataset : volume transport estimated from sea level differences (Shin et al., 2022)



✓ K-ORA22 stands out with the lowest RMSE at 0.30 Sv, indicating that K-ORA22 reproduces the seasonal and interannual variability most closely to the observation.

Temperature bias around Korea peninsula

❖ Validation dataset : in situ temperature profile obtained from KHOA

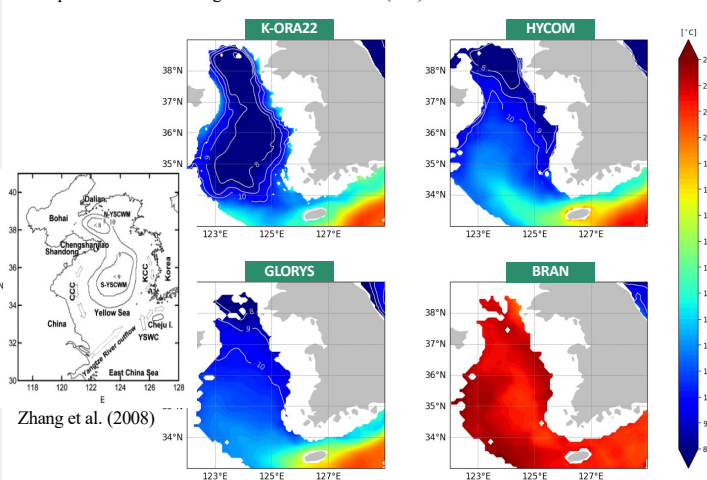


Region	K-ORA22	HYCOM	GLORYS	BRAN
East Sea	1.08	0.89	1.14	1.10
South sea of Korea	0.70	0.68	1.09	1.73
Yellow Sea	0.76	-	1.04	2.75

- ✓ K-ORA22 has low biases and RMSEs in most regions, particularly excelling in the Yellow Sea.
- ✓ HYCOM also shows impressive performance with the lowest RMSEs, whereas BRAN has significant warm biases in Yellow Sea.

Reproducibility of Yellow Sea Cold Water Mass

❖ Temperature at 50m averaged in boreal a summer (JJA) season from 2011 to 2015



- ✓ The typical distribution of Yellow Sea Cold Water Mass (YSCWM) in summer is bordered by the bottom 10°C isotherm in the form of a round water mass
- ✓ The isotherm in K-ORA22 closely resembles the typical distribution of the YSCWM.
- ✓ Other reanalyses exhibit warm biases and do not reproduce this distribution.

Conculsion

- K-ORA22 exhibits notable strengths in reproducing the unique characteristics and physical properties of marginal seas.
- Due to these advantages, which surpass global reanalyses, K-ORA22 will be useful for many research studies.