S3.16-069 Final GODAE Symposium, 12–15 November 2008, Nice, France

VALIDATION OF THE JMA'S OPERATIONAL OCEAN DATA ASSIMILATION SYSTEM MOVE/MRI.COM-WNP
- Comparison of former and new operational systems -

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1. Introduction

An ocean data assimilation system, MOVE/MRI.COM-WNP, has been operated in Japan Meteorological Agency (JMA) from March, 2008. The purposes of the system are understanding ocean variability in the western North pacific as a local response to a global climate change with assimilated four-dimensional data sets, nowcasting and forecasting of ocean states, and a contribution to the GODAE project. Before starting the operation, JMA headquarters, four Marine Observatories and Meteorological Research Institute have cooperated to promote a project of validation of the products of assimilation and prediction of MOVE/MRI.COM-WNP for two years.

Aim : New system (MOVE/MRI.COM-WNP, hereafter **MOVE-WNP**) is compared to the former operational system (**COMPASS-K**).
Comparison : Indices that represents typical ocean feature are adopted for the comparison.

2. Data and indices

Data: see the table

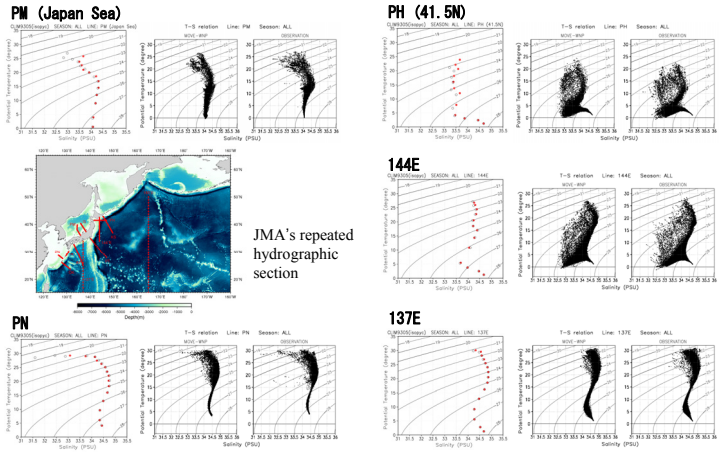
Indices :

Oyashio:
(east of Tohoku)
T<5℃ at 100m depth
Kuroshio path:
T=15℃ at 200m depth
Tsugaru warm current:
(east of Tsugaru)
T>10℃ at 100m depth
Tsushima warm current:
(Japan Sea)
T>10℃ at 100m depth

Period :2002-2005

	MOVE-WNP (new operational & reanalysis)	COMPASS-K (former operational)	Objective analysis (no-model)
resolution	0.1x0.1 50L	0.25x0.25 21 L	0.25x0.25 21L
Obs.	In situ T/S (WOD01), SSH, SST	In situ T/S(GTS), SSH,SST	In situ T/S (GTS)
Method	3DVAR (T-S EOF), IAU	4D-OI, nudging	OI
Atm. forcing	NCEP2	JMA-oper.	----
window	10days	5days	5days
Operation	2008-	2001 – 2008	1971- now

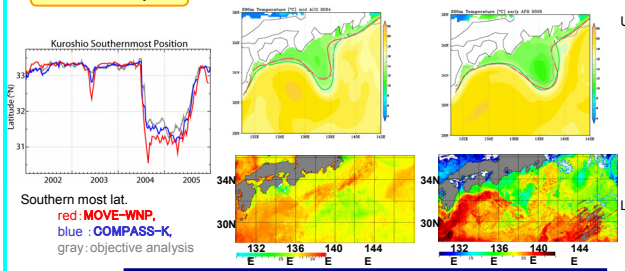
3. Validation of MOVE: T-S relation (see Ishizaki et al. S2.8-036 for other examples



Mean value (1993–2005) (●:MOVE-WNP, ○:Obs., and scatter diagram (Left: MOVE, Right: Obs,). Mean value is calculated on each isopycnal surfaces..

MOVE-WNP recovered well almost all water masses except for low salinity near surface along PM & PN. Along PH lsection MOVE has a bias. Correcting scheme is now developing.,

4.1 Kuroshio path



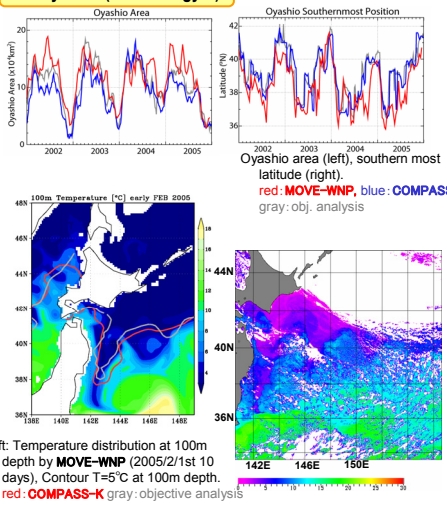
Southern most lat.
red: **MOVE-WNP,**
blue : **COMPASS-K,**
gray: objective analysis

Upper: Temp at 200m depth by **MOVE-WNP**(left: 2004/8/mid-10days, Right: 2005/4/1st 10 days). Contour: T=15℃ at 200m depth, green: **MOVE-WNP**, **red: COMPASS-K** , gray: 客観解析.

Lower: **NOAA/AVHRR** SST (left: 2004/8/6, right: 2005/4/5).

MOVE-WNP: transition to large meander is faster.

4.2 Oyashio (subarctic gyre)



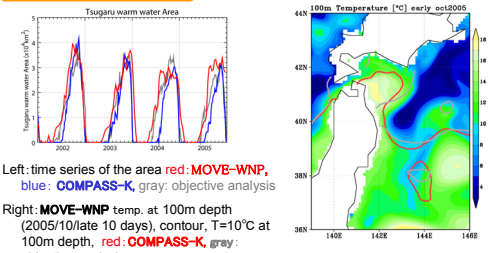
Oyashio area (left), southern most latitude (right).
red: **MOVE-WNP,** blue: **COMPASS-K,** gray: obj. analysis

Left: Temperature distribution at 100m depth by **MOVE-WNP** (2005/2/1st 10 days), Contour T=5℃ at 100m depth. red: **COMPASS-K** gray: objective analysis

Right: **NOAA/AVHRR** SST (2005/2/3)

MOVE-WNP: larger area of Oyashio in winter,

4.3 Tsugaru warm area

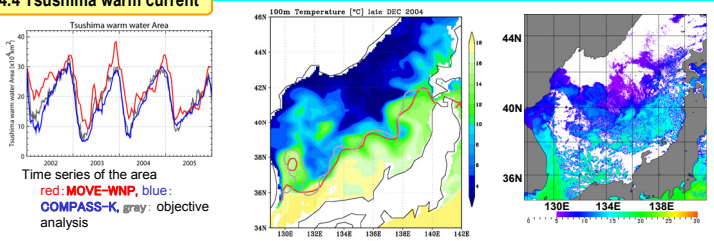


Left: time series of the area red: **MOVE-WNP,** blue: **COMPASS-K,** gray: objective analysis

Right: **MOVE-WNP** temp. at 100m depth (2005/10/late 10 days), contour, T=10℃ at 100m depth, red: **COMPASS-K,** gray: objective analysis

COMPASS-K : evolution of the area is slow.

4.4 Tsushima warm current



Time series of the area
red: **MOVE-WNP,** blue: **COMPASS-K,** gray: objective analysis

MOVE-WNP: slower evolution of the area of the Tsushima current

Left: **MOVE-WNP** temp at 100m depth (2004/12/late 10 days). Contour: T=10℃ at 100m depth. red: **COMPASS-K,** gray: objective analysis

Right: **NOAA/AVHRR** SST (2004/12/26)

5.results

- Different evolution of the Kuroshio large meander <= model physics
  - »Example: baroclinic instability
- Difference of the areas of Oyashio, Tsugaru, Tsushima: **MOVE-WNP** depicts mesoscale phenomena
  - »Resolution, model scheme, analysis method Example: importance of salinity representation

6. Future Direction

- Causes of the difference of the systems
- Impacts of observation system
- Representativeness of the indices

=> better indices should be adopted in the operational system