TRANSPORT OF *TODARODES PACIFICUS* WINTER COHORT INTO THE YELLOW SEA IN THE EARLY LIFE STAGES

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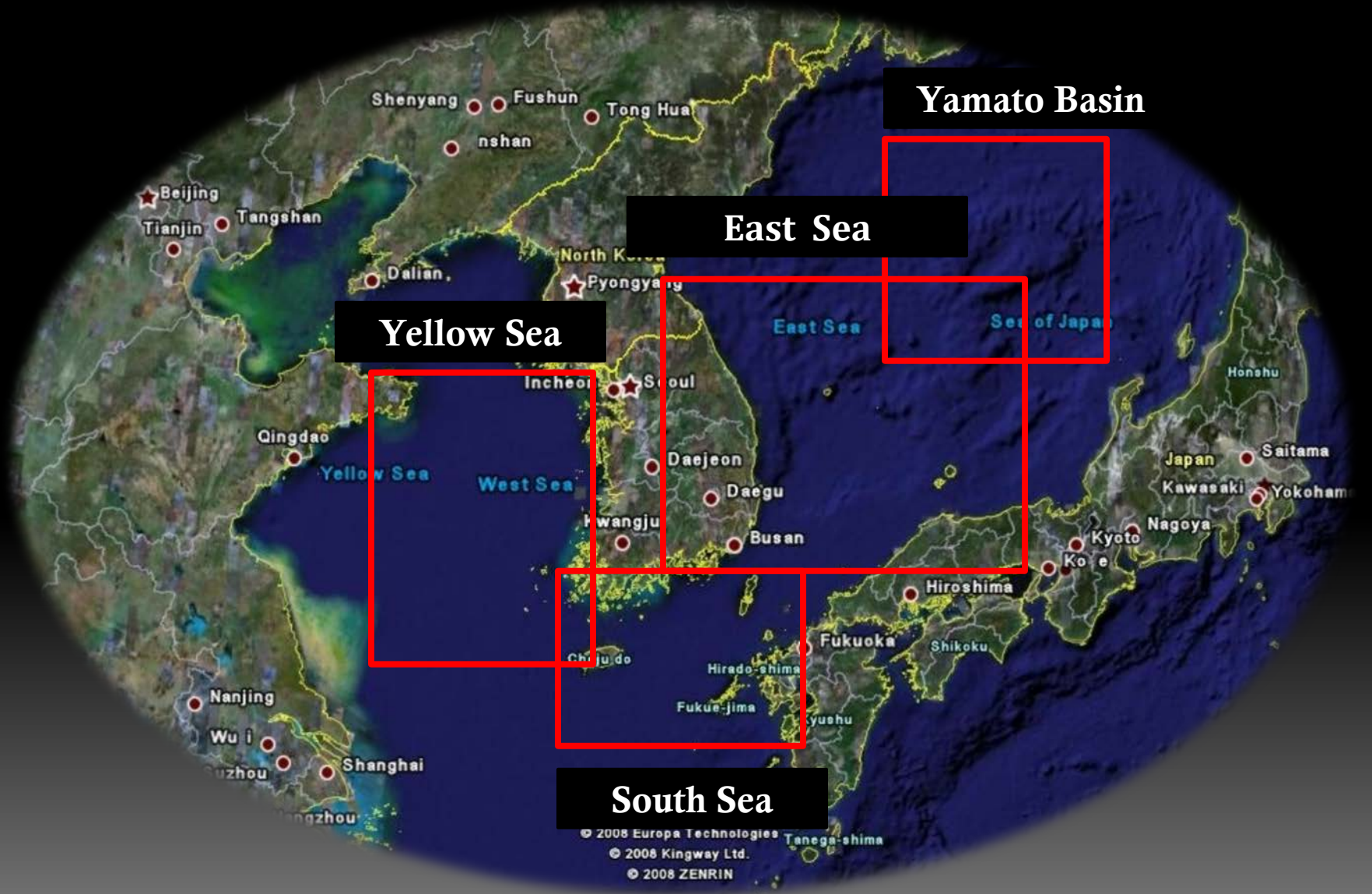
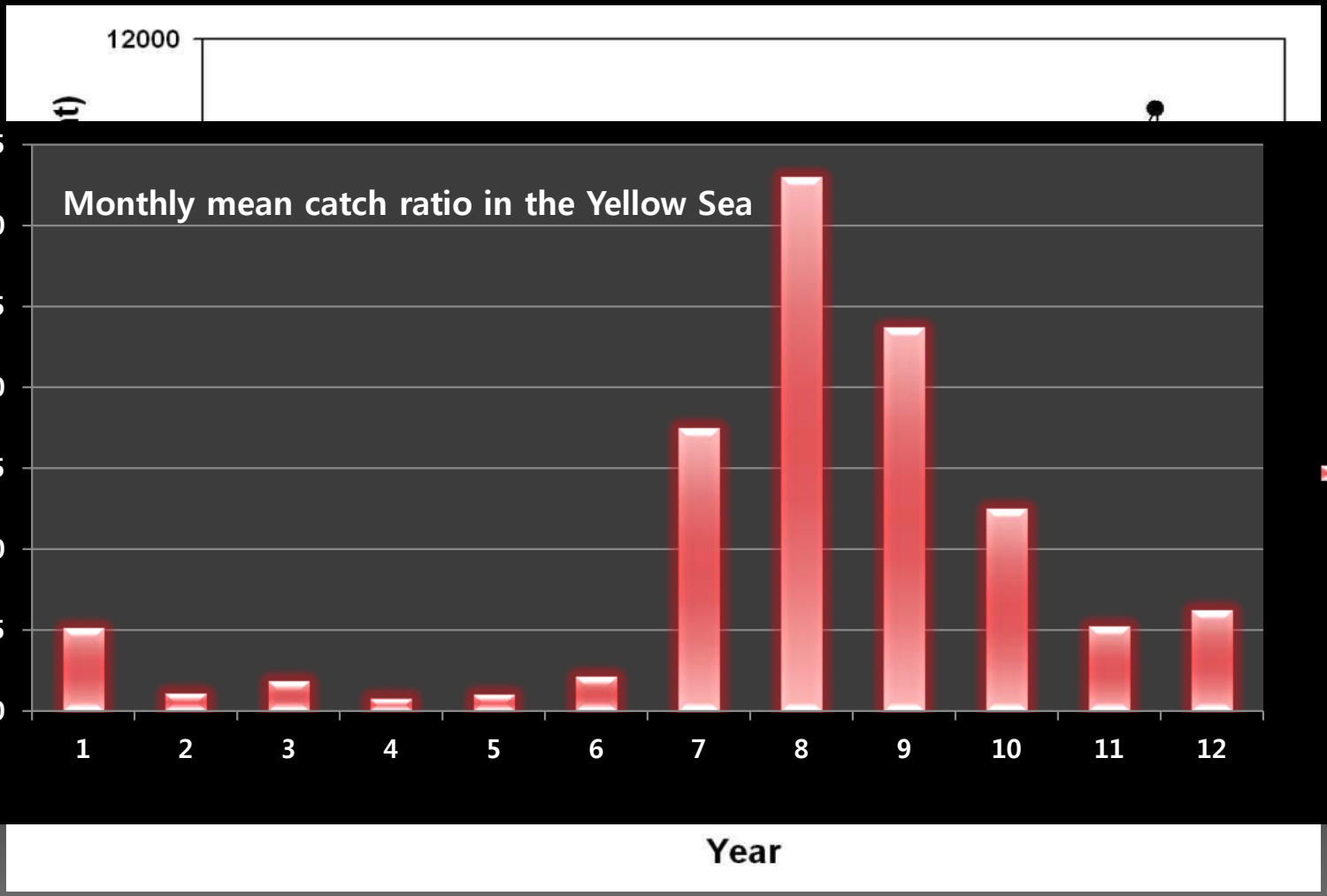
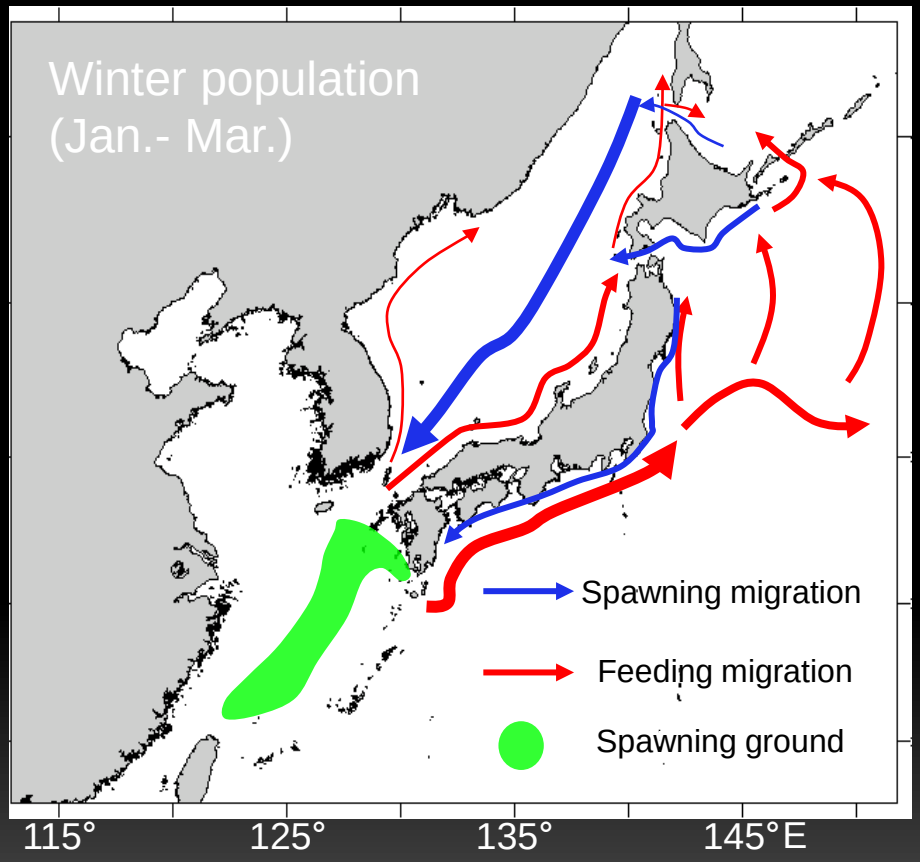
Fishing ground around Korean waters



Catch

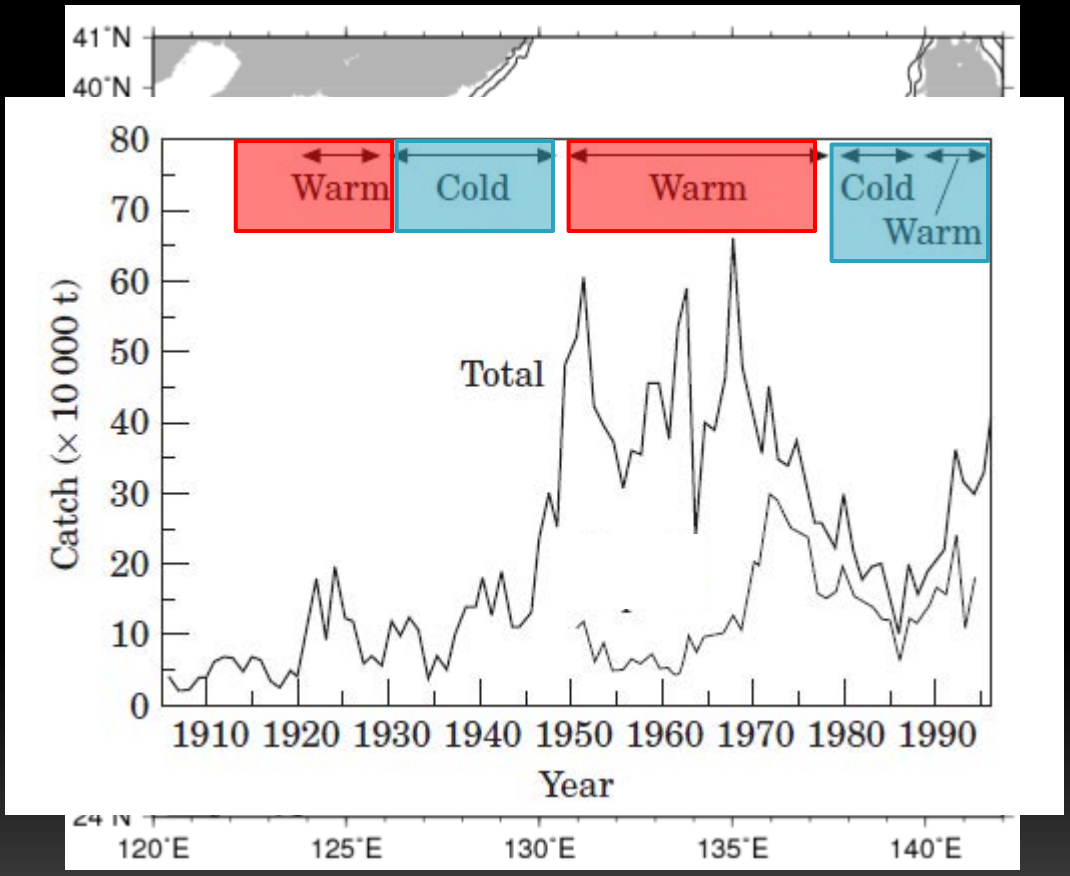

12000
35
30
25
20
15
10
5
0
Monthly mean catch ratio in the Yellow Sea
(%)
1
2
3
4
5
6
7
8
9
10
11
12
Year

Migration pattern and spawning ground of *T.pacificus*



Schematic figure was restructured based on Murata (1989), Nasu et al. (1991) and Sakurai et al. (2000)

Rosa et al.,(2011)



Y. Sakurai et al., (2000)

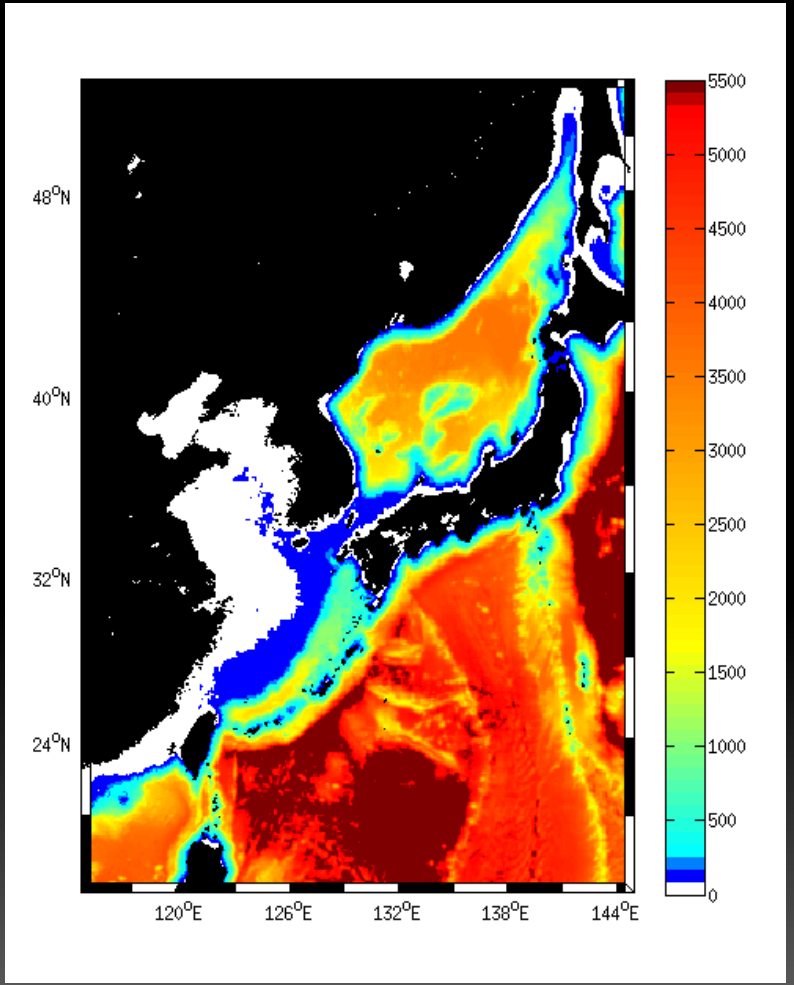
Rosa et al.,(2011)

In this study

To understand transport process for the early life stages of *Todarodes pacificus* winter cohort into the Yellow Sea.

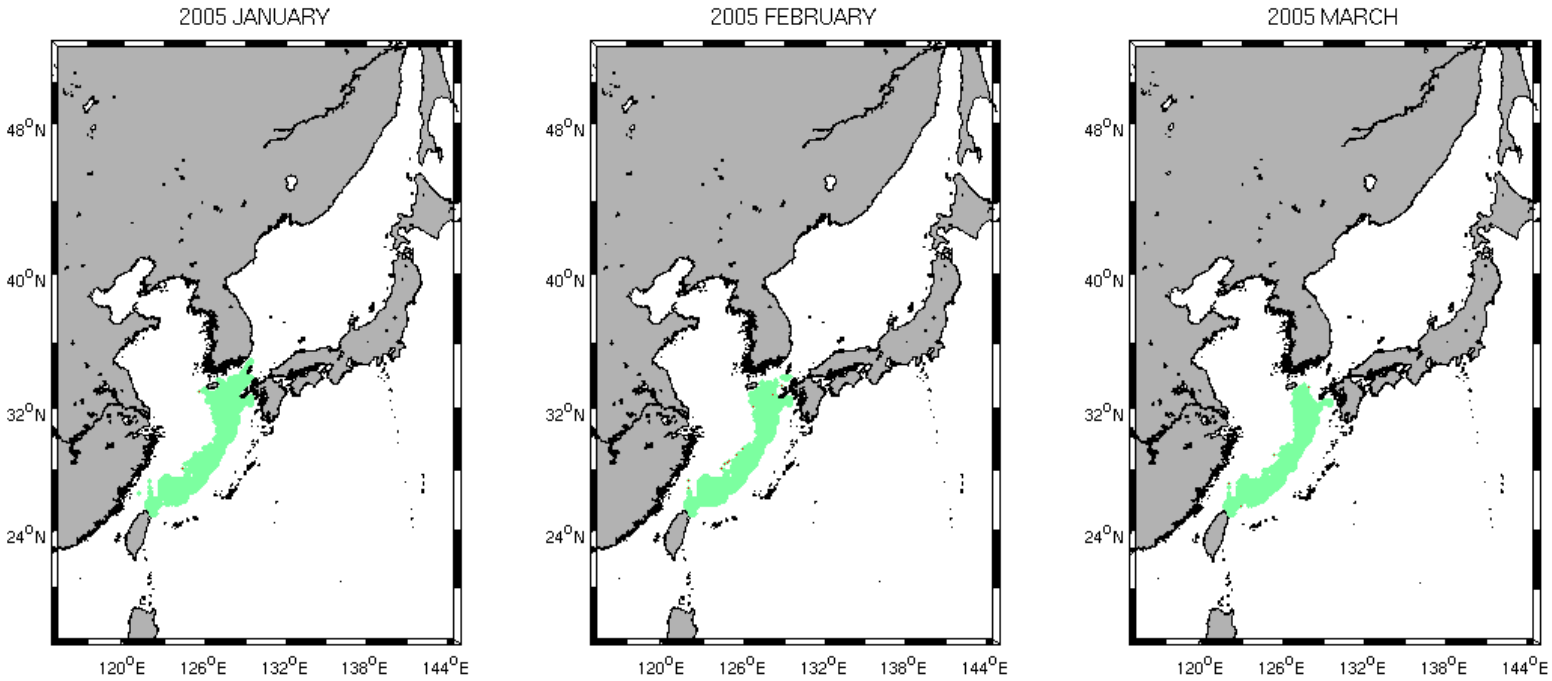
Regional Ocean Modeling System(ROMS) 3.6 version

Model domain	114.5°E~145°E, 16.05°N ~51.95°N ETOPO1(NGDC, National Geophysical Data Center)
Resolution	0.1°×0.1°(10km)
The number of horizontal grid	360× 305
The number of vertical grid	30 Sigma layer Minimum depth 8m, Maximum 5500m



Input Data

Atmospheric Forcing Data	The European Centre for Medium-Range Weather Forecasts (ECMWF) 0.75 degree * 0.75 degree 12-times daily reanalysis/analysis data. [Air temp , pressure, specific humidity, Downward longwave, Net shortwave, precipitation rate.]
Boundary Data	Simple Ocean Data Assimilation (SODA) 3-D , 0.5 degree assimilation data. [temperature, salinity, u, v, ssh]
River Data	The Global River Discharge Database (RivDIS v1.1) [Teadon, Amnokgang] Global Runoff Data Centre (GRDC) [Huang He, Laun He, Yonding] http:// www.hrfco.go.kr (Yeong san, Han, Geum) www.cjh.com.cn (Yangtze)



The inferred winter cohort spawning area from Jan. to Mar. 2005.

◎ Particle-tracking experiments

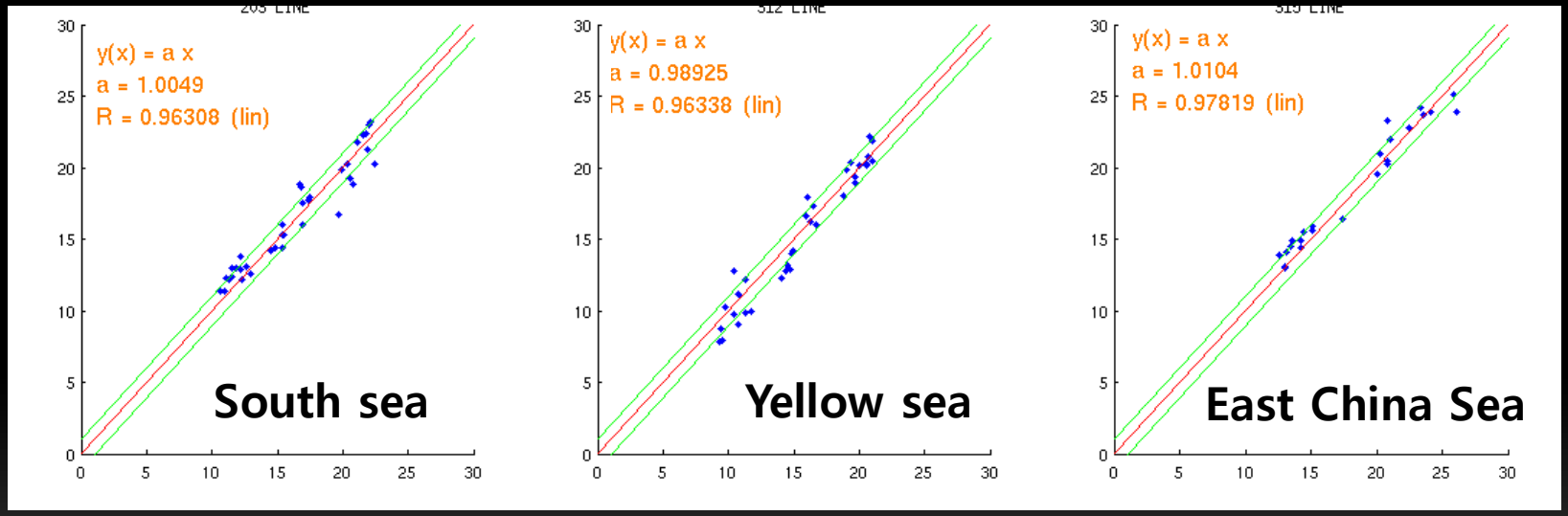
- Released particle depth : 25m, 50m, 75m
- Releasing particle from Jan – Mar one day interval (2005-2010)
- 15 ˚C (0 -5 days), 14 ˚C (6-55 days) , 13 ˚C (After 56 days)
- 3.6 mm/s (0~3 days), 10mm/s (After 4days)
- The particles were tracked for 90days

◎ Particle-tracking experiments

- No random walk
- Horizontal random walk
- Vertical random walk
- Horizontal and Vertical random walk

Temperature

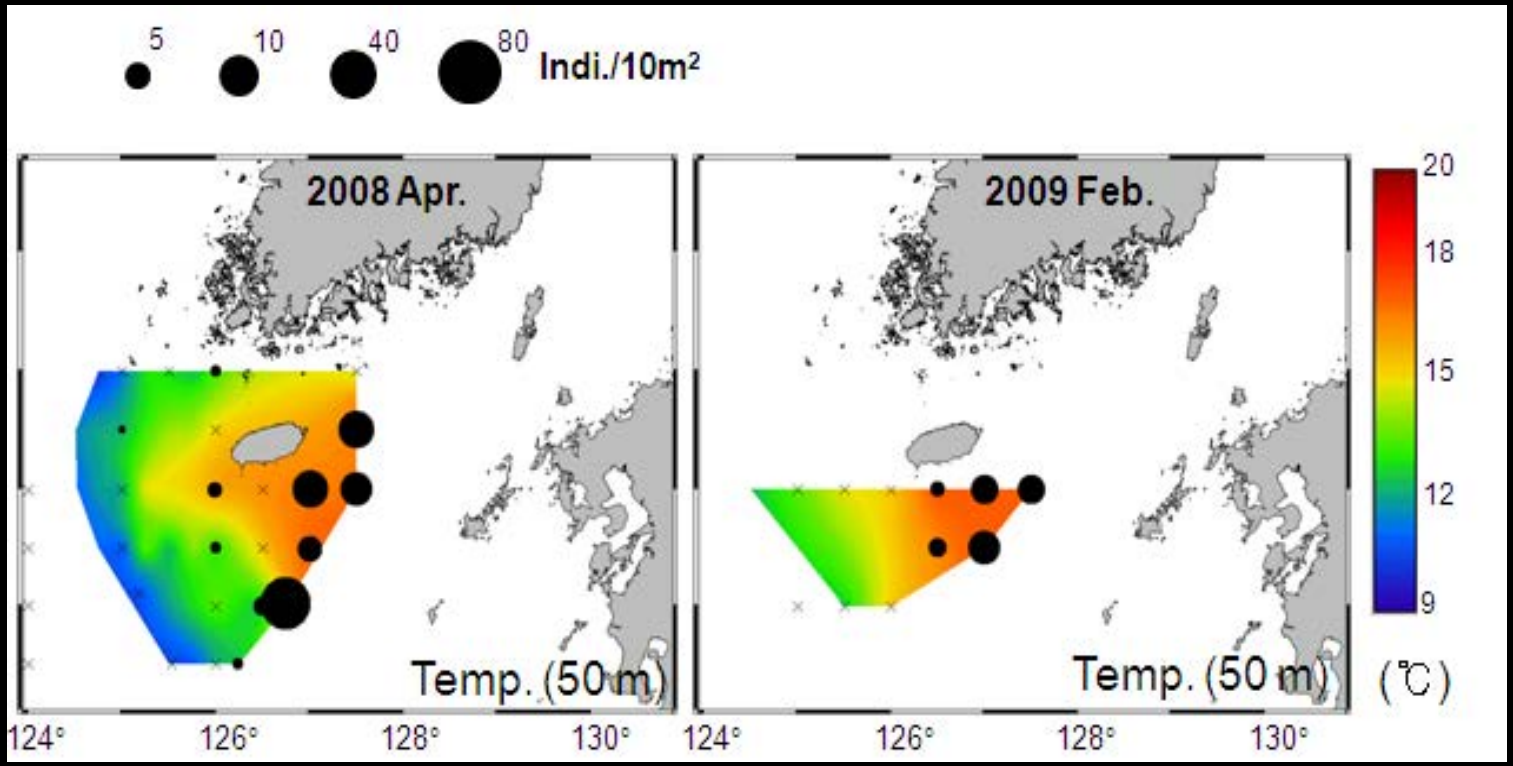
Model



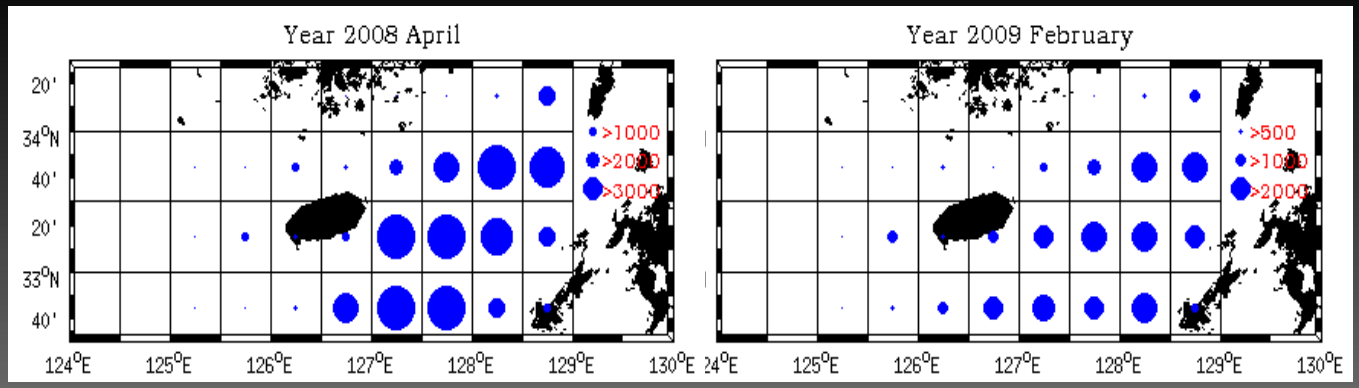
Observation

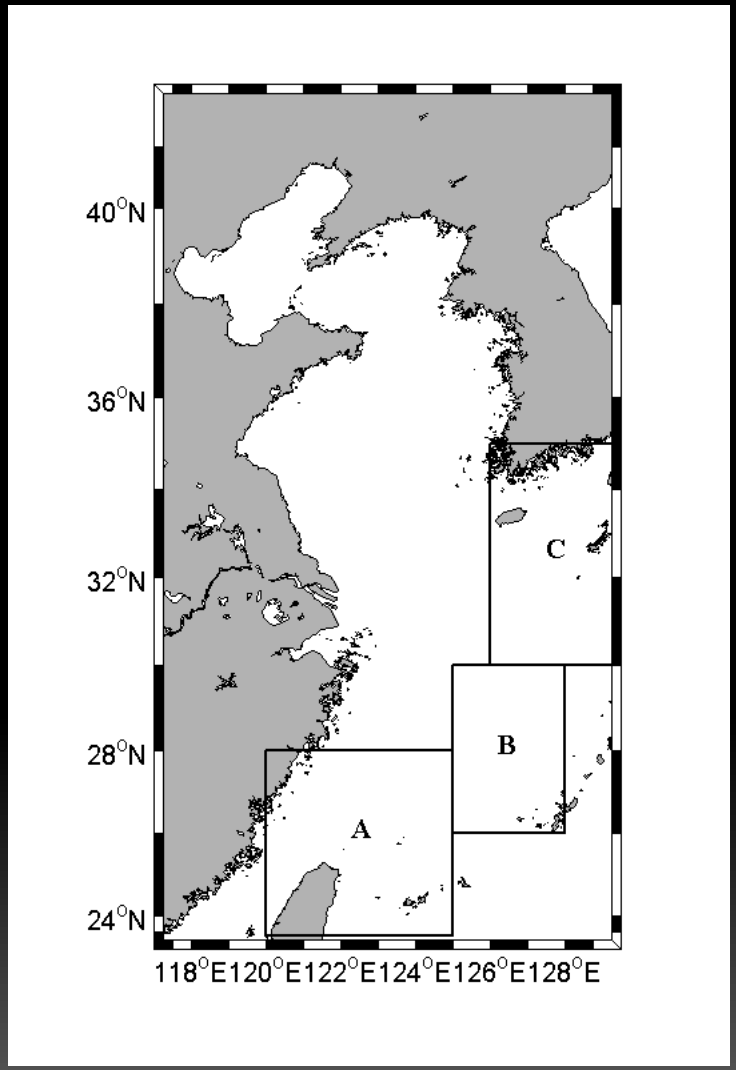
Model results are highly correlated with the observations.

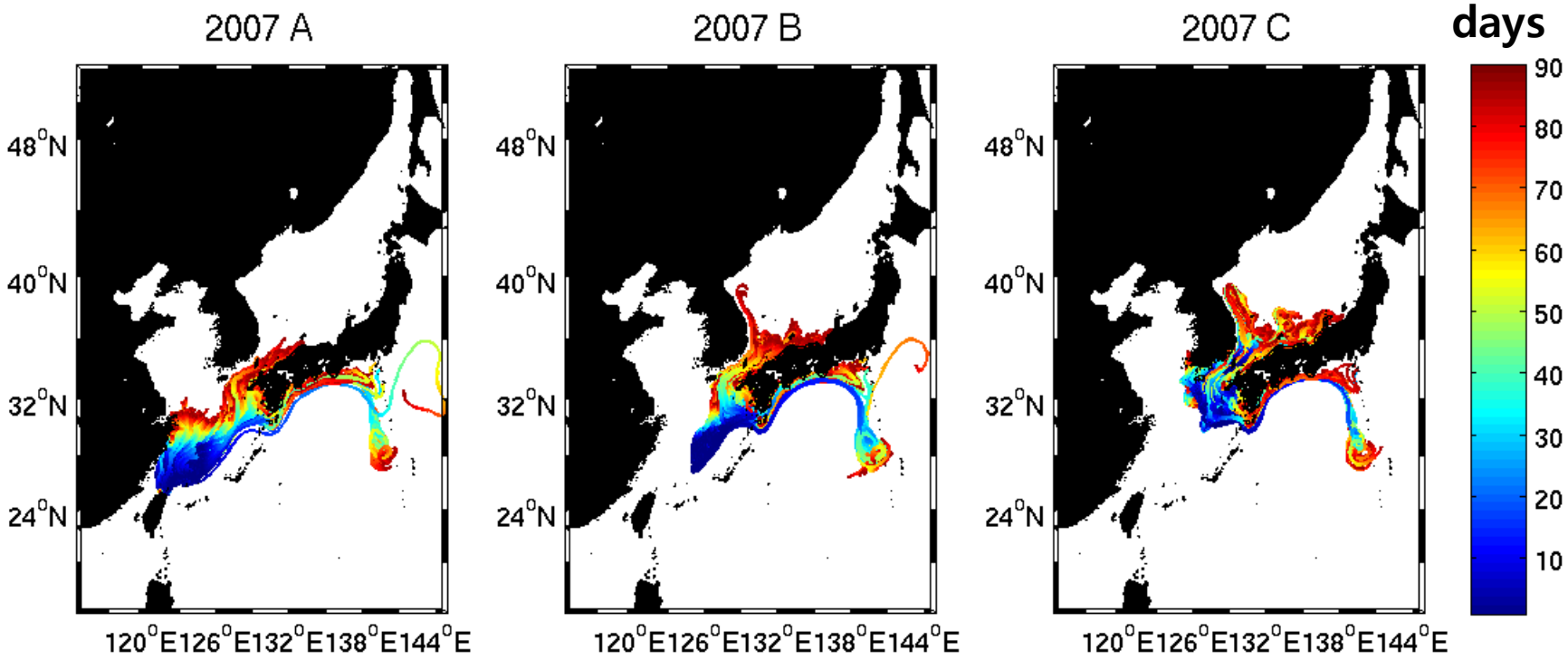
Observation

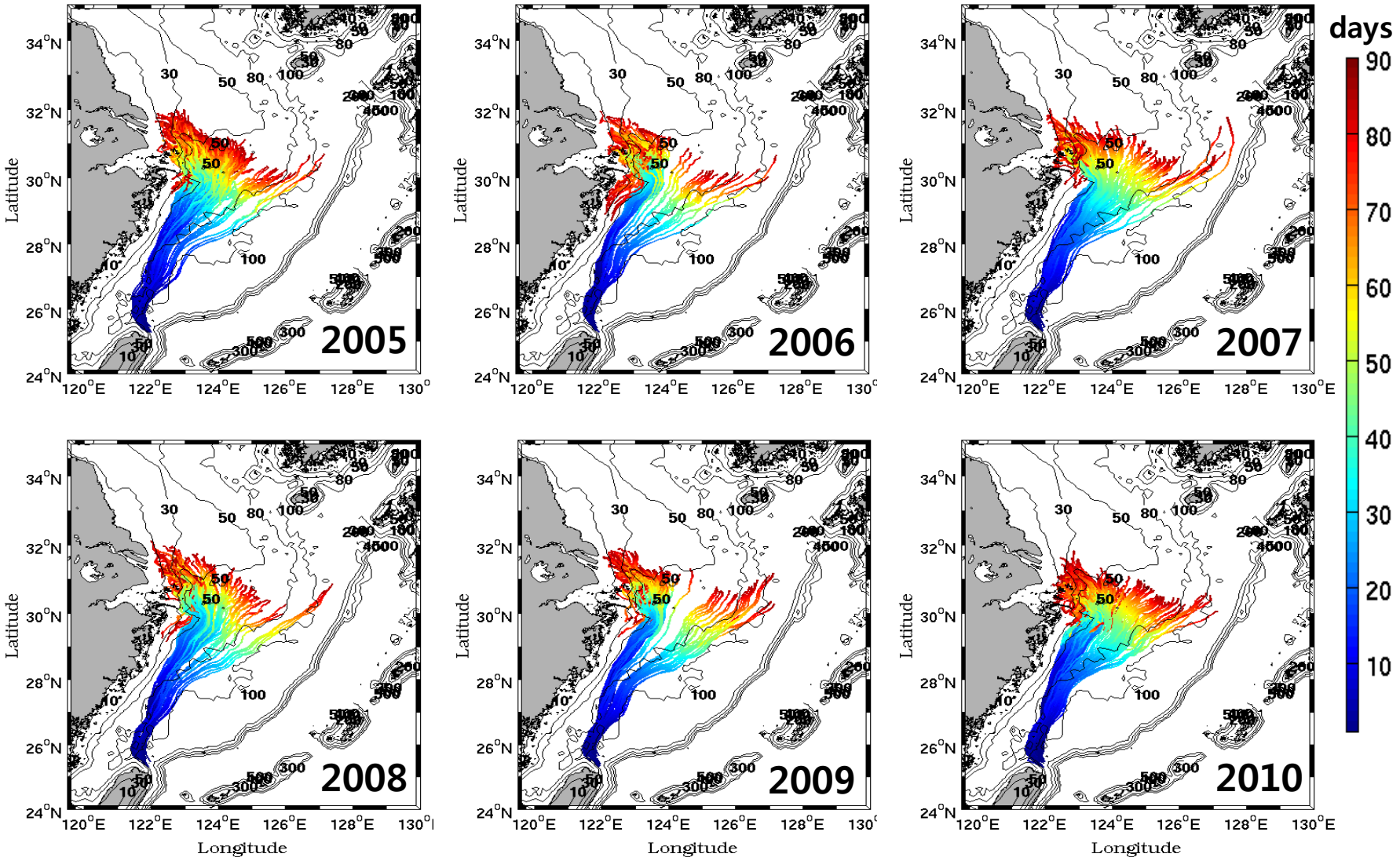


Model result

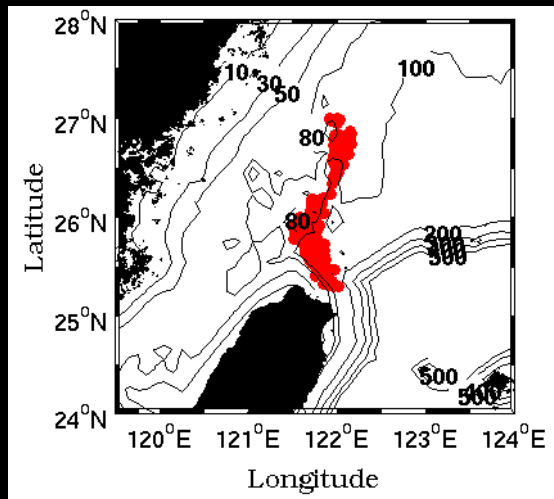



40°N
36°N
32°N
28°N
24°N
118°E120°E122°E124°E126°E128°E
A
B
C

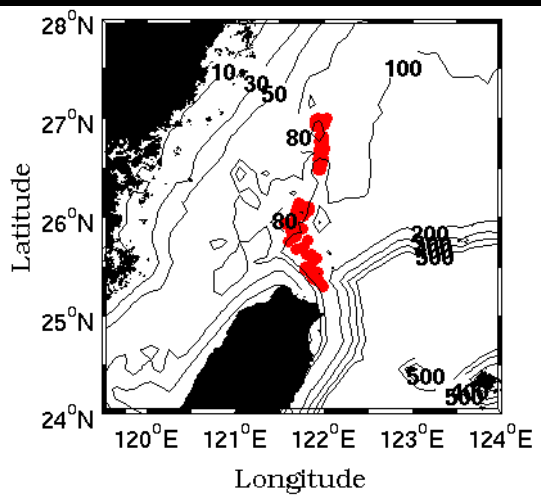

2007 A
2007 B
2007 C
days
90
80
70
60
50
40
30
20
10
48°N
40°N
32°N
24°N
120°E126°E132°E138°E144°E


2005
2006
2007
2008
2009
2010
Latitude
Longitude
34°N
32°N
30°N
28°N
26°N
24°N
120°E
122°E
124°E
126°E
128°E
130°E
days
90
80
70
60
50
40
30
20
10

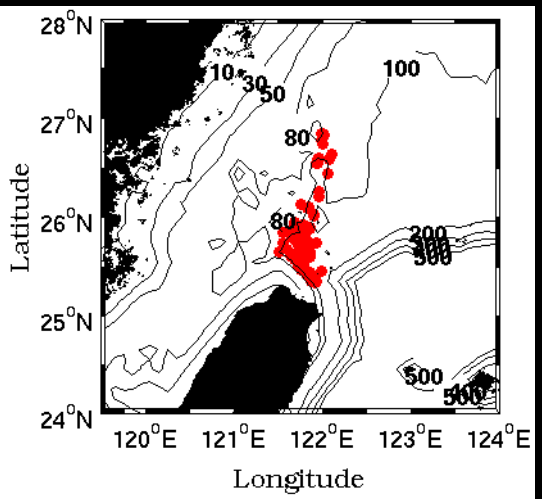
2005



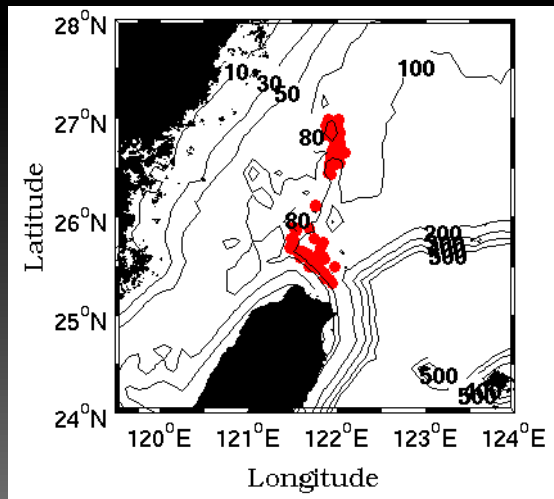
2006



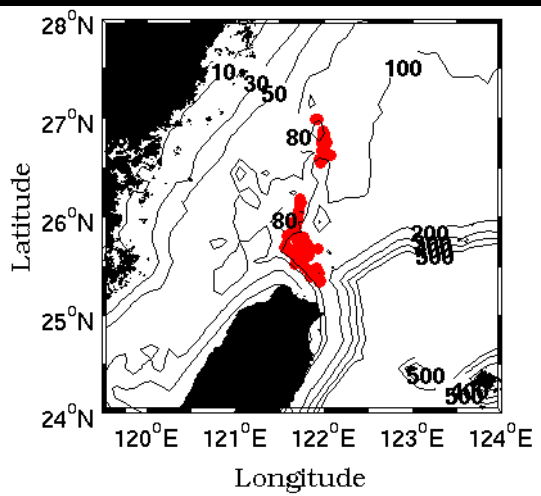
2007



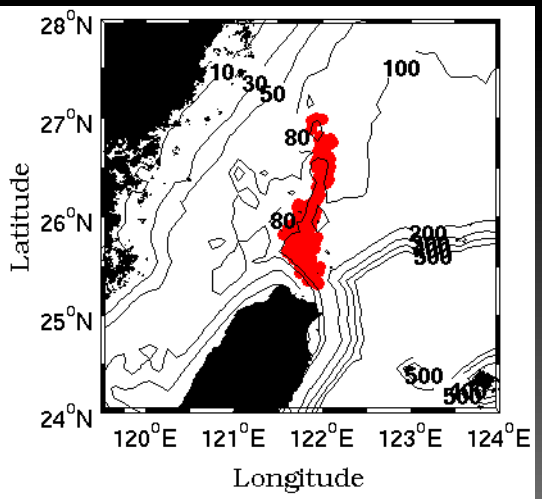
2008



2009



2010

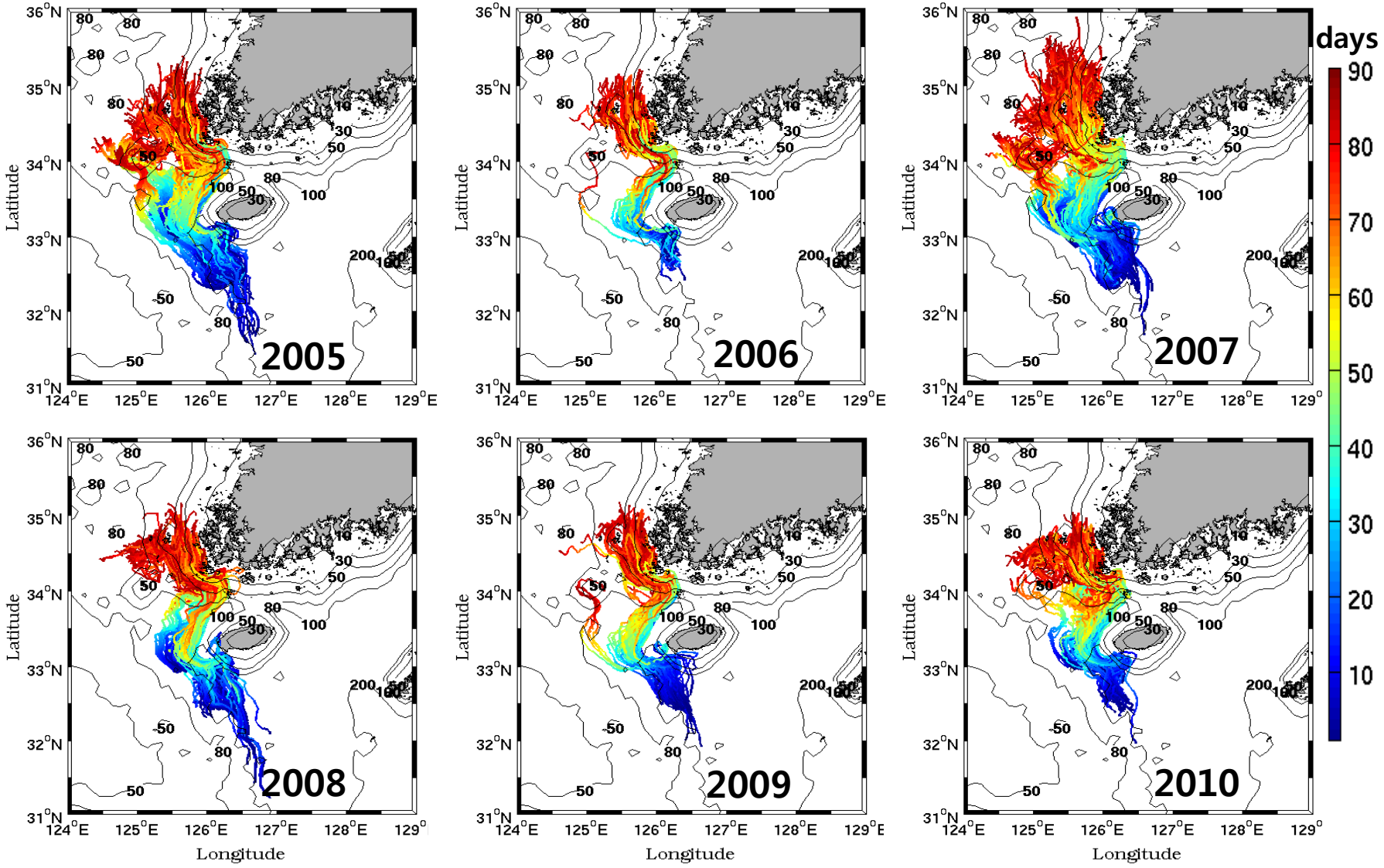


Annual change of the number of entrainment particles per depth in Subarea A

Year	25m	50m	75m
2005	0	46	212
2006	0	17	87
2007	0	8	104
2008	0	22	81
2009	0	27	76
2010	0	47	206

Annual change of the number of entrainment particles monthly in Subarea A

Year	Jan	Feb	Mar
2005	239	1	18
2006	85	3	16
2007	59	0	53
2008	88	0	15
2009	77	4	22
2010	201	13	39


2005
2006
2007
2008
2009
2010
Latitude
Longitude
days
90
80
70
60
50
40
30
20
10

Annual change of the number of entrainment particles per depth in Subarea C

Year	25m	50m	75m
2005	164	157	191
2006	13	20	60
2007	81	134	470
2008	61	34	137
2009	15	46	96
2010	103	133	0

Annual change of the number of entrainment particles monthly in Subarea C

Year	Jan	Feb	Mar
2005	490	22	0
2006	93	0	0
2007	393	282	10
2008	191	30	11
2009	151	5	1
2010	236	0	0

Summary

- ✓ The indirect entrained particles in subarea A are affected by the Kuroshio intrusion, when the particles of northeast Taiwan moved northward across the continental shelf.
- ✓ The released particles from 75m in subarea A generally appear to entrained pattern into the Yellow Sea.
- ✓ The Subarea C also has entrained pattern into Yellow Sea. But it isn’t affected by regular current
- ✓ The circumstances during the January have a significant effect on the early life stages of the winter cohort .

THANK YOU

FOR YOUR ATTENTION!