Landmark for the spawning of Japanese eel

Shingo KIMURA and Katsumi TSUKAMOTO
Ocean Research Institute, Univ. of Tokyo

Key words
Salinity front in the North Equatorial Current
Trade wind/Ekman transport
El Niño/Southern Oscillation Index
Physical factors ↔ larval transport
2002 Hakuho-maru research cruise
Water circulation and distribution of water masses

Trade wind

Northward larval Ekman transport

North Equatorial Current

Salinity front

Kuroshio

Spawning ground

Mindanao Current

Low-salinity region

Adult migration

10°N

120°E 140°E 160°E

30°N

Taiwan

Japan

Korea

120°E 140°E 160°E

10°N

North Equatorial Current

Spawning ground

Salinity front

Kuroshio

NORTHWARD LARVAL EKMAN TRANSPORT

TRADE WIND
North Equatorial Countercurrent

27 year averaged temperature and salinity sections
Mean and standard deviation
Location of the salinity front depending on ENSO
Usual years

Strong current velocity south of the salinity front
Good condition for appropriate larval transport

Difference of water mass property

Landmark for detection of the spawning ground

El Niño years

Southward movement of the salinity front
Bad condition for the larval transport
Decrease of the glass eel catch in Japan

Next task
Confirmation of this phenomenon during El Niño
Difference of the salinity front location
Southward movement of the salinity front and leptocephali distribution associated with El Niño

Salinity section and leptocephali distribution in research cruise
Tracks of Argos buoys

Current velocity
Carbon stable isotope ratio of leptocephali and POM
$\delta^{15}N$-%

$\delta^{13}C$-%

$\delta^{13}C$-$\delta^{15}N$ map of the Japanese eel leptocephali
Results of numerical simulation of larval transport

Trajectories of 100 particles from the spawning ground

Wind-driven transport to west coast of Taiwan

Delay of arrival in Korean coasts

Entrainment into gyre
Current velocity field around the spawning ground

Particle tracking by numerical simulation

After 10 days
Conclusion

• Large southward displacement of salinity front associated with El Niño
• Narrow highway between 10°N and 15°N for appropriate larval transport
• Distribution of smaller leptocephali in south of the salinity front which moved southward associated with 2002 El Niño
• High possibility that leptocephali ingest food south of the salinity front
• Large difference of diet between small and large leptocephali

Confirmation of roles of the salinity front for spawning behavior