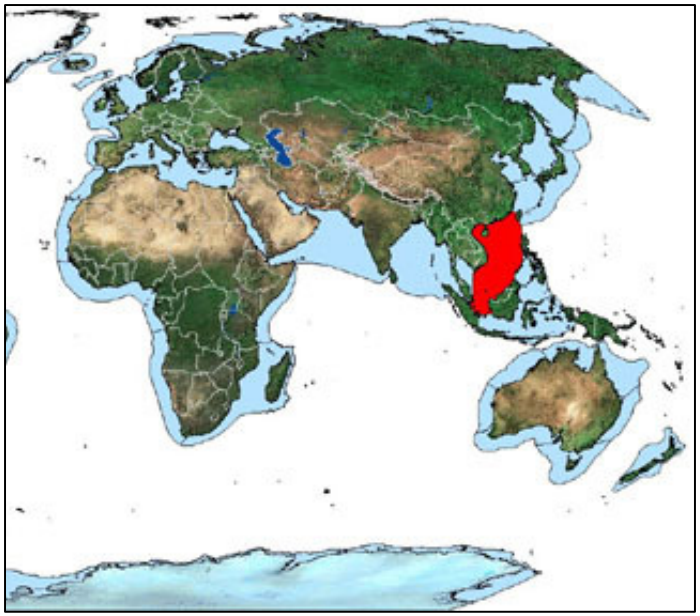
Biogeochemical response of the South China Sea to the Mekong River Plume, mesoscale ocean turbulence, and upwelling



Goal: To study the biogeochemical impacts of riverine inputs, wind-driven circulation, ocean turbulence and upwelling processes in the South China Sea

Research Team:

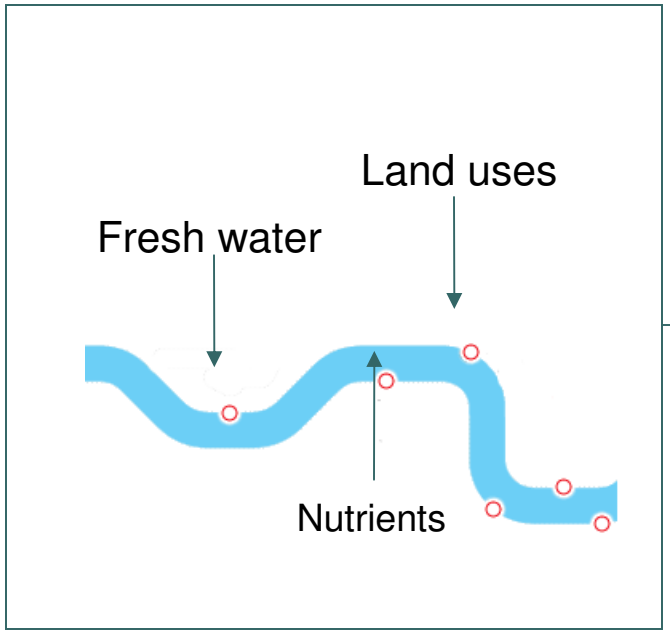
J. Montoya and A. Bracco and Y. Cardona

South China Sea - SCS

- Marginal seas like the SCS play a critical role in the global carbon cycle by coupling terrestrial processes to the ocean productivity because the nutrient variability in the ocean depends of the river discharge.
- The project team will carry out nutrients, metal N2- and CO2-fixation measures to evaluate the response of the marine ecosystem to upwelling, mesoscale dynamics and riverine input, through field surveys, shipboard experiments and modeling.

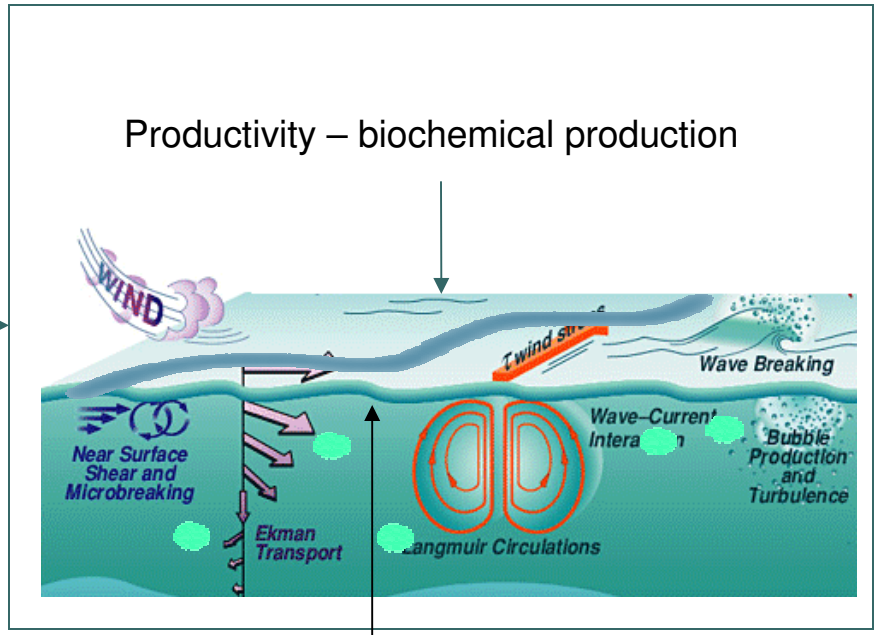
- The Mekong is the 9th largest river in the world and the largest draining into the SCS.
- Anthropogenic changes in land and water use can propagate through the river system and have an impact on oceanic properties on short time scales.
- Current dam construction, increased fertilizer use, increased sewage loading, and mangrove destruction all are likely to affect the riverine nutrient flux into the SCS over the next few years.
- Economic Impact

N_2 Fixation (↓ Salinity - ↑ N_2Fx)



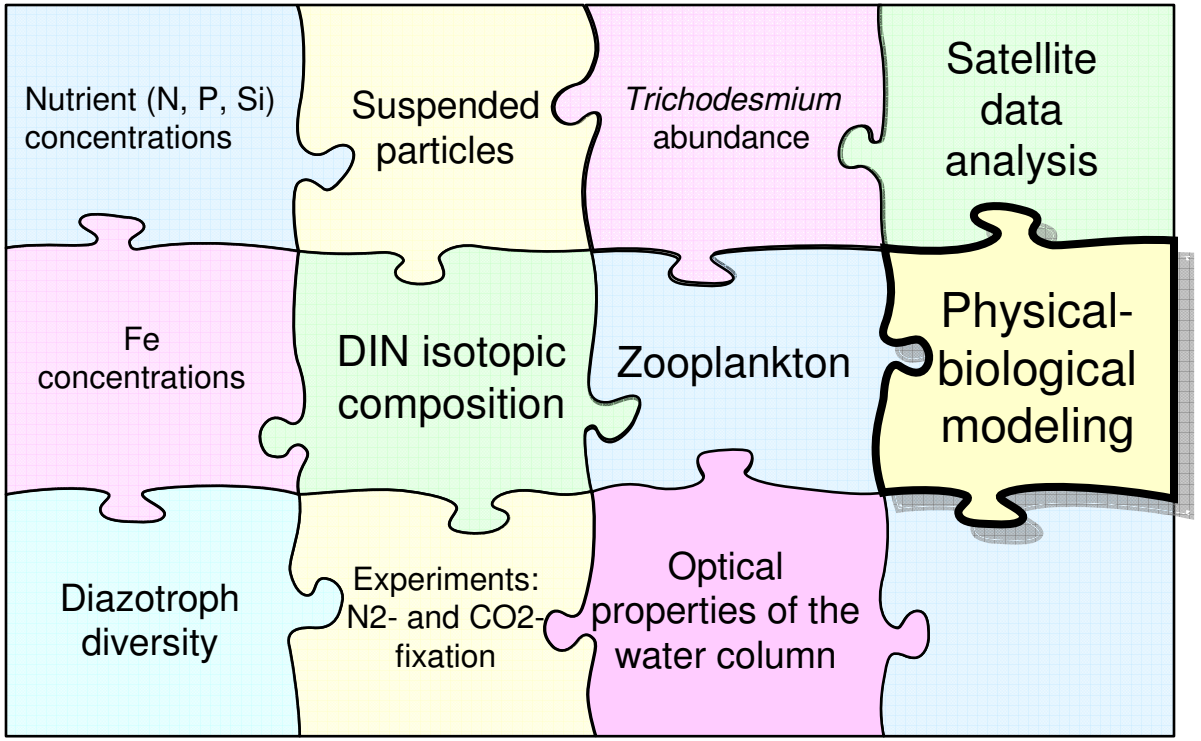
River discharge
(N and P)

Plume



Distribution and activity of phytoplankton

Experimental and Analytical Methods

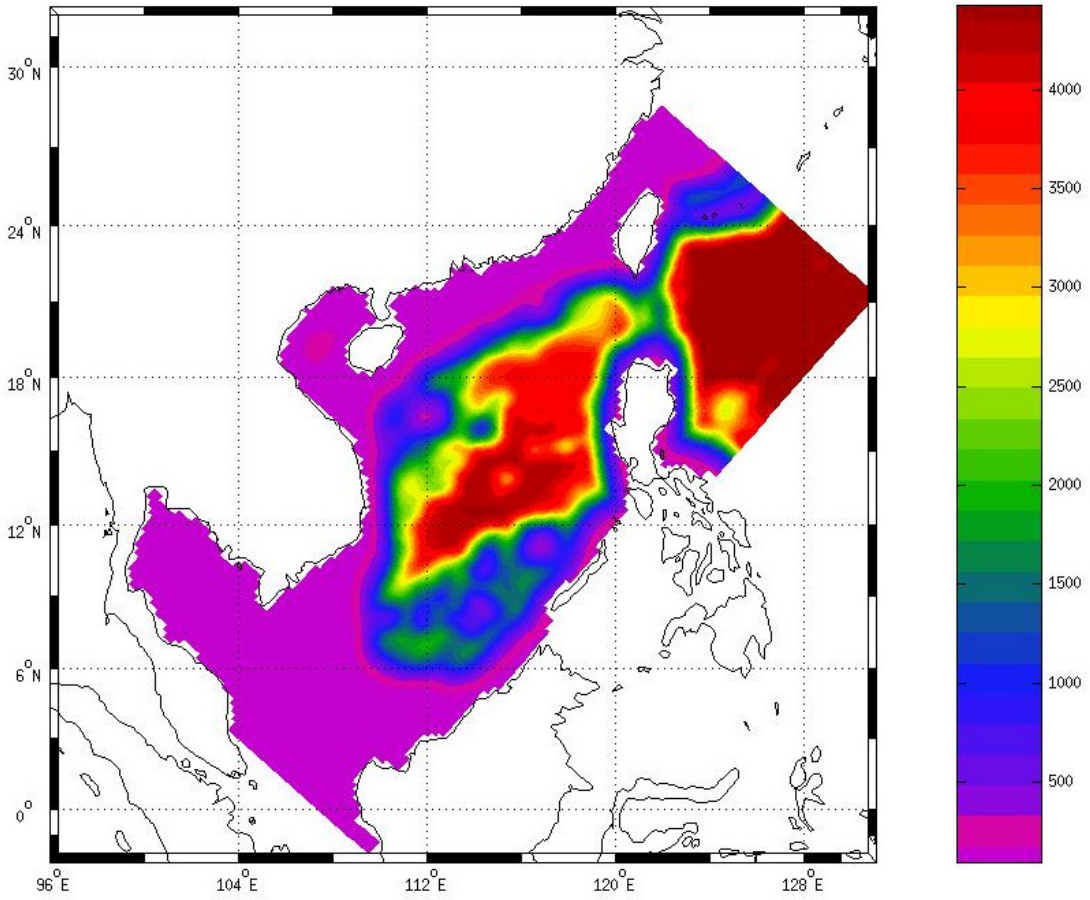


Physical-biological modeling

- The Regional Ocean Modeling System (ROMS) is used to investigate the feedbacks between circulation in the SCS, the Mekong runoff and biological responses.

- ROMS solves the incompressible hydrostatic primitive equations on a C-grid, has a free surface with time splitting for barotropic and baroclinic modes, a terrain-following vertical coordinate (s-coordinate), and boundary layer parameterization

Grid - 10 km.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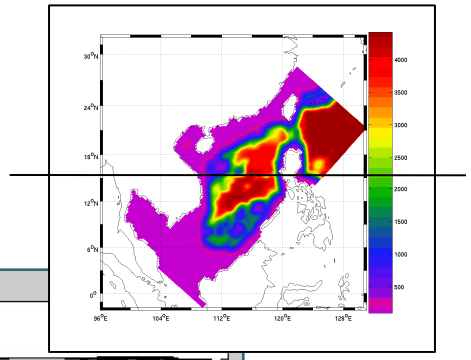
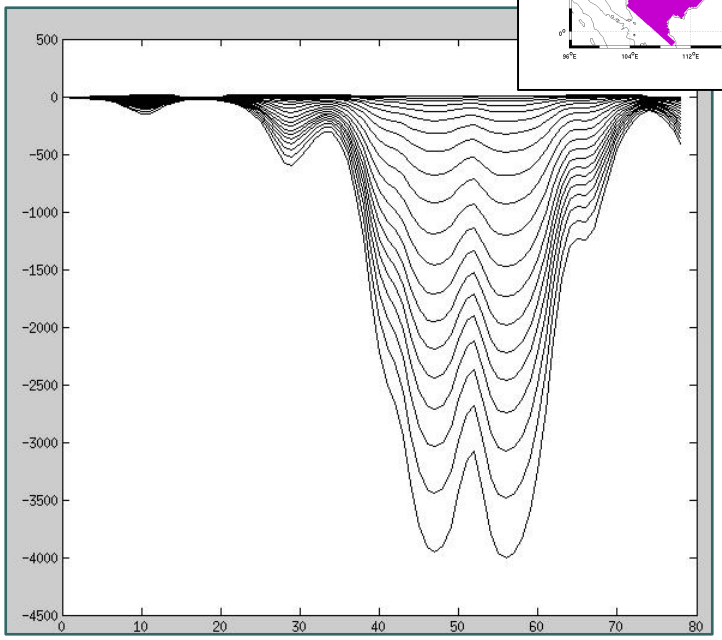
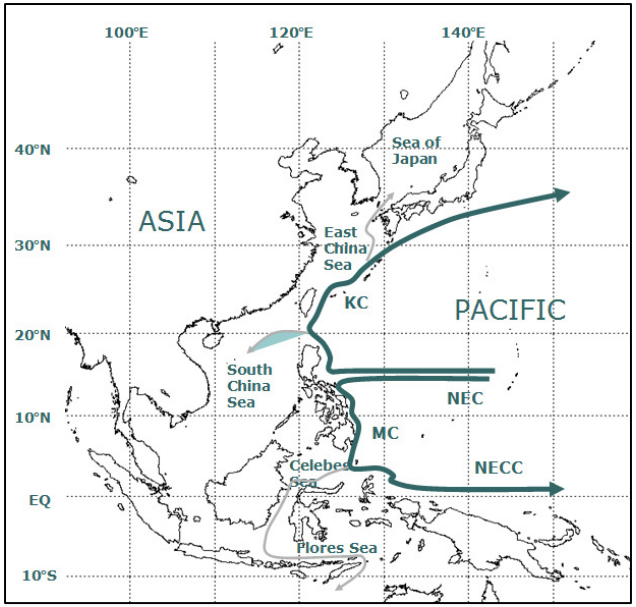
18°N
12°N
6°N
0°
96°E
104°E
112°E
120°E
128°E
4000
3500
3000
2500
2000
1500
1000
500

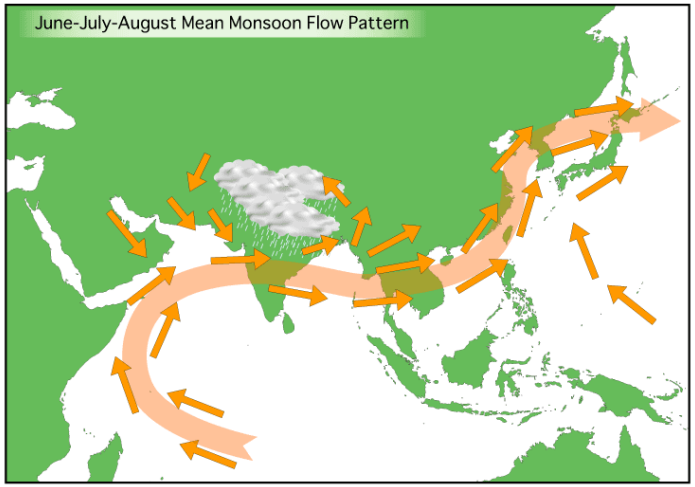
Characteristics:

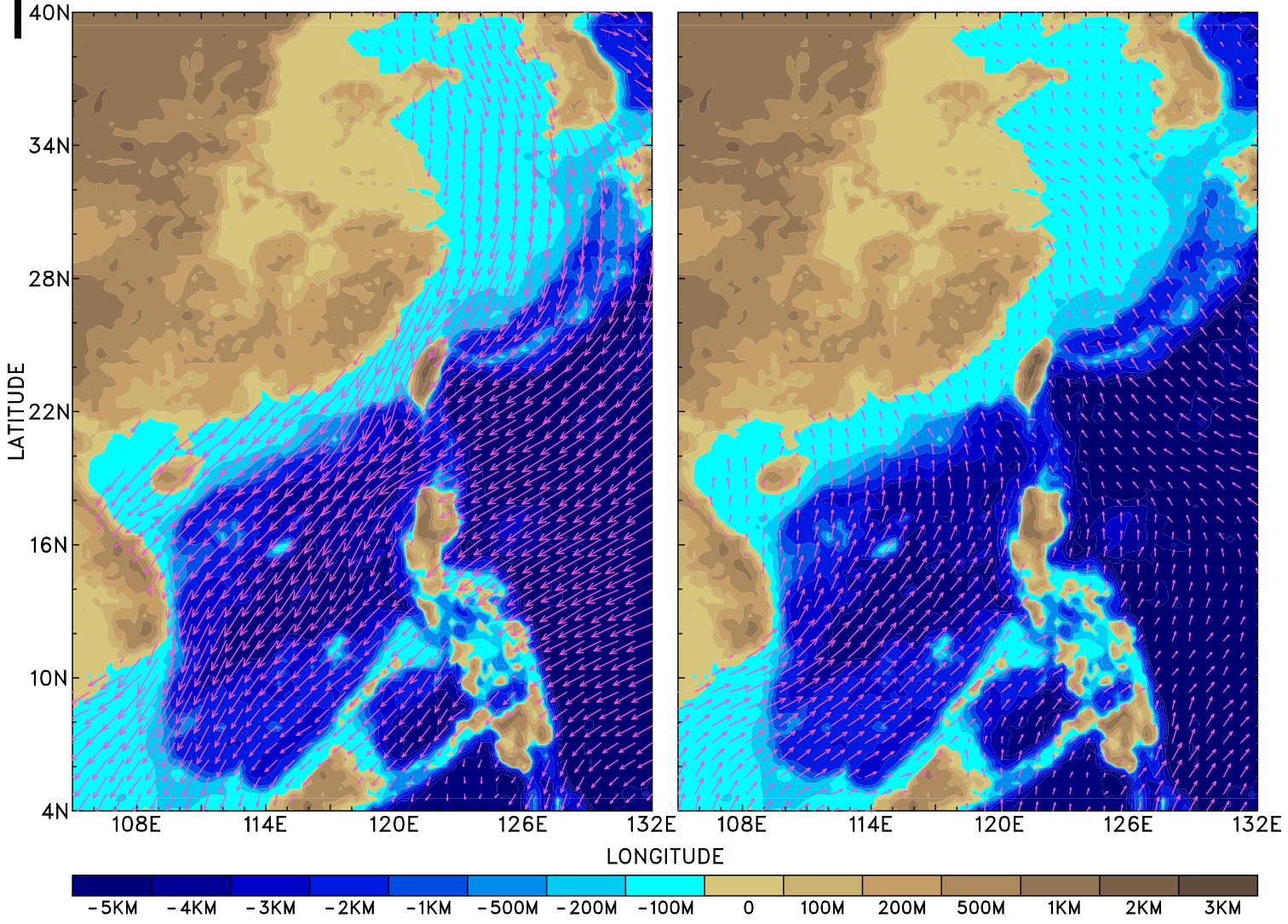
- Complex geometry
- Complex topography
- Monsoon winds
- Strong currents
- Water Exchange










40N
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28N
22N
16N
10N
4N
LATITUDE
108E
114E
120E
126E
132E
LONGITUDE
-5KM
-4KM
-3KM
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-500M
-200M
-100M
0
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