A one-dimensional turbulence-ecosystem model investigation of spring bloom initiation associated with mesoscale eddies

*Eligio de Raus Maure[1], Joji Ishizaka[2], Hidenori AIKI[2], Yoshihisa Mino[2], Hiroyuki Tomita[2]

1. Graduate School of Envrionmental Studies, Nagoya University, 2. Institute for Space-Earth Environmental Research, Nagoya University

A lower trophic ecosystem model driven by a one-dimensional physical turbulence closure model was used to study phytoplankton dynamics and spring bloom initiation in mesoscale anticyclonic eddies (AEs) and cyclonic eddies (CEs), which are known to play an important role in the variability of ocean primary production and biogeochemical processes. The study is motivated by earlier work based on satellite data in which the timing of spring bloom initiation differed between AEs and CEs, and it was attributed to the difference in mixed-layer in eddies, shallower in CEs than in AEs. The nitrogen-phytoplankton-zooplankton-detritus (NPZD) model was used to simulate phytoplankton spring bloom associated with AEs and CEs. The physical model driving the biological one was forced by net heat flux, shortwave radiation and wind stress averaged within eddies. An initial annual integration was repeated for 4 years using annual composite (2002-2010) forcing in eddies in the Japan Sea. The last year of this integration was compared with satellite and *in situ* observations. The model was found to reproduce reasonably well the pattern of satellite and *in situ* chlorophyll *a* concentration associated with eddies. Based on these results, a new experiment was performed to investigate the spring bloom initiation following each eddy track. In the presentation, we expect to reveal the mechanism by which eddies influence the dynamics of phytoplankton spring blooms.

Keywords: modelling, mesoscale eddies, phytoplankton spring bloom

