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Phytoplankton Blooms in the Bay of Bengal : Observations, Modeling and Implications

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The North Indian Ocean consists of two tropical basins namely the Arabian Sea to the west of India and Bay of Bengal to the east. The Arabian Sea is a highly productive basin during both southwest and northeast monsoons. On the other hand, it is believed, based on limited shipboard observations, that the productivity of the Bay of Bengal is low. Maps of chlorophyll *a* concentration derived from satellite sensors of ocean color show that a phytoplankton bloom occurs over a large part of the western Bay of Bengal during the northeast monsoon[1]. Simulation using an ocean circulation model coupled to an ecosystem model shows that there is a subsurface maximum in the phytoplankton consistent with available shipboard observations. The circulation in the western Bay of Bengal during this period consists of a cyclonic gyre associated with a doming of the thermocline as suggested by sea level anomalies from TOPEX/Poseidon and results from ocean general circulation models. This gyre is driven primarily by Ekman pumping suggesting that the upwelling of nutrients in the open ocean trigger the phytoplankton bloom. Numerical experiments also show that vertical fluxes from seasonal thermocline plays an important role in triggering the phytoplankton bloom in the euphotic zone. The cyclones that are common in the Bay of Bengal during this season lead to localized intense phytoplankton blooms that last for 1-2 weeks. The Bay of Bengal also receives large quantity of freshwater from rivers and the nutrient input by rivers lead to high chlorophyll concentration near the river mouths. Satellite data show that this chlorophyll rich water is advected offshore by ocean currents. The phytoplankton bloom in the Bay of Bengal during northeast monsoon occupies a large area and lasts for 2-3 months. Therefore, theses blooms are likely to have a considerable impact on the quantity of particle fluxes into the deep ocean.

Keywords : Bay of Bengal, Phytoplankton Blooms, Ocean Modeling

References

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