Oceanic Flow Field in the South China Sea

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More than 70 percent of the earth surface is covered by the ocean. Understanding of the world ocean is of great importance in many aspects, e.g. environmental change, global warming, nature resource, national security and etc. The water movement, or ocean current, which is the key element to determine oceanic condition, is mainly driven by the winds in the atmosphere, by the tide due to gravitational force between earth-moon-sun system and by the rotation of the earth. The oceanic flows vary greatly from one location to another governed by the local topography. In the South China Sea (SCS), water movement is mainly driven by the Asia monsoonal winds and has a counter-clockwise and clockwise flow pattern in the winter and summer, respectively. Embedded within this basin wide circulation, there exist many oceanic eddies with size of hundred of kilometer around the SCS. In addition, a distinguished strong northward warm current, called Kuroshio, extended from the east coast of Philippine to Japan can penetrate into the SCS through Luzon Strait, bring warm and salty waters into the SCS and drive the water westward along the continental shelf of the north SCS. Oceanic tide propagates from Pacific Ocean through the Luzon Strait into the SCS and generates internal waves of huge amplitude. These oceanic processes are important for marine environmental conditions in the SCS and thus for the sustainable development in the Southeast Asia. The oceanic flow field governs the general state of the ocean and plays a vital role in ecosystem processes, fisheries, navigation, pollutant transport and formation of severe weather (e.g. typhoon and coastal storm surges). The nutrient transport by the current determines the marine biological productivity and therefore the ecosystem conditions in different regions of the SCS. The storm surge formed by the severe weather and Tsunami generated by the earthquake post great risk for the population around the SCS. The formation of typhoon also largely relies on the energy supply from the ocean. Yet, our understanding of oceanic condition in the SCS is still very limited. Currently, scientists use variable techniques to study the ocean condition in the SCS. Besides using survey vessel to measure various parameters in the ocean,
satellite remote-sensing technology is widely used to constantly monitor oceanic condition and to retrieve data for scientific research. Mathematical model based on fluid dynamics and numerically implemented into the modern super-computer is also utilized to simulate and to forecast oceanic conditions. In this talk, basic knowledge about the ocean and an overview of oceanic circulation in the South China Sea will be presented. Many illustrations and movies obtained from satellite observations, field measurement and from computer simulation will be shown.