

Satellite observation of seasonal phytoplankton plume off the Yangtze River associated with river discharge, wind, and tide

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The present study analyzes the large phytoplankton plume off the Yangtze River, one of the largest rivers in the world, using satellite derived ocean color /Chlorophyll a data, SST data, wind data and other oceanographic data. A three-dimensional numerical model POM (the Princeton Ocean Model) was applied to understand the seasonal variation of the plume related with oceanic conditions in the East China Sea.

The phytoplankton plumes show seasonal variation in terms of Chl-a concentration, shape, and dispersion direction. Intensive blooms occur in late spring, coincided with an increasing Yangtze River discharge and the rising of water temperature. In winter and autumn, the plume tends southward along the west coast of the East China Sea, while the northerly wind is the dominant factor that disperse the Chl-a plume. In spring and summer, the plume extended southeastward 200 km and then turned northeastward to reach Cheju Island. The southerly wind is one of factors that push the plume northeastward. Energetic tidal mixing is plentiful in the area near the Yangtze River mouth. Both the southerly wind and the strong tidal currents play significant roles in the plume dispersion in summer.

Generally, while the wind tended to express the plume dispersion southward in winter and eastward in summer, the tidal effect tended to disturb the plume dispersion by vertical mixing processes throughout the year.

Keywords: Yangtze River, Phytoplankton plume, Satellite remote sensing, Princeton Ocean Model (POM), China.

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