



Linking the river plume dynamics to the spring algal blooming off the Changjiang River Estuary

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The Changjiang River discharges huge amounts of nutrients, which cause frequent harmful algal blooms off its estuary. By analyzing historical and in-situ observational data, this study aimed to determine the distribution and physical controls of these blooms. The results showed that phytoplankton bloom in a long band along the 30–50 m isobaths south of the Changjiang River mouth, with several high value centers. South of the river mouth the river plume front propagated along the coast; it reached the bottom along the 25-30 m isobaths. The algae bloomed between the locations of the bottom and surface fronts. The surface front determined the seaward limit of the nutrient-rich river-influenced water and set the outer boundary of algal blooming; the latter separated the stratified (hence less turbid) offshore surface water from the well-mixed thus turbid near-shore surface water, forming the shoreward limit of the algal blooming due to high turbidity. The surface plume front was relatively unstable compared with the bottom. The surface plume front relaxes around the bathymetric bends, which enlarges the distance between the plume's surface and bottom fronts, thus provided more room for algal blooming. Consequently, several high chlorophyll-a centers develop. In addition, subsurface chlorophyll-a maximum was observed above the pycnocline in the far-field plume area, which descended gradually to ~10 m in the offshore direction. The associated dynamical mechanism was also discussed.