

# **Hydrodynamic structures and SPM transport in a typical coastal mariculture area of China**

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Sea food produced from mariculture is more and more important in China. Healthy model of mariculture is needed to establish for sustainable production. Two cruises were carried out in Sanggou Bay, a typical mariculture area of northern China coastal water, during spring and summer of 2006 in order to study on the nutrient supply. The cruises included two tidal gauge stations at the north and south coast of the bay with Andraa Water Level Meters, for one month each season. Two seabed mounted frame were deployed to measure the current profiles by ADCP near the mouth both north and south side for about 10 days. One 25hour anchor station, both spring and neap tide, were carried out in the middle of the bay to observe the temperature, salinity, current, SPM concentration, meteorological components by CTD, ADCP, LISST-100 and auto meteorological station. Two current meter chains were installed in the middle part of both mouth and top of the bay at the same time of anchor stations. Many interesting phenomena were observed comparing with normal coastal water of China due to the high density of aquaculture establishments. Kelp and oyster is breed here. About 80000tons dry kelp and 40000tons shell fish are produced every year. The kelp got its maxima length about 4m in spring and almost be harvested in summer. Tidal system is irregular semidiurnal since there is an amphidromic point near this bay while the tidal current is regular semidiurnal mainly back-and-forth. The tidal gauge is about 2m here. Tidal current flow in from north, run along the coast and out from south during flooding. The outflow is much weaker than the inflow due to the drag of mariculture organisms and establishments. From mouth to top of the bay, data from current meter chains show that the phase was delay by 1hour. So the wave speed is 5.2km/hour, less than 1/5 of the normal wave speed at this depth. The maxima speed decreased by 71% at these two sites which 5.2km apart. The current at the surface layer is half of that of the bottom layer at the middle of mouth but the phase of peak is 2hours earlier than the bottom. This large time lag within 10m water column is also caused by the long kelp in water. There form another boundary layer at the surface due to the frames and buoys which may have stronger friction than the seabed. The current profile has the maximum value the middle or lower layer and phase lag propagate from upper to lower depth. The energy damped by these frictions make the current inside is very weak and the nutrients supply from outside is much more less than normal bays. SPM resuspension with nutrients mixing upward should be another important supply to kelp and shell fish in this area. SPM concentration reproduced by ADCP's acoustic back scatter intensity show that it's mainly transported from the outside. Tidal mixing, wind and swell will influent the resuspension. No wind wave break hear but swell could restart the sediments and mixing nutrients in the whole column. Wind in spring is larger than 10m/s while swell is strong in summer as Typhoon passing by. Swell may take great role for the nutrients supply than wind. Tidal current is

stronger in summer and bottom boundary almost disappears.