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Decadal variations of thermohaline structure and fish catch in the East China Sea

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The East China Sea (ECS) is the one of the largest marginal seas in the western Pacific, with many fishing grounds. Both the Kuroshio and the Changjiang River runoff are the major circulation elements affecting the distributions of temperature and salinity as well as nutrients, hence fishery production in the ECS. However, their relationships have not been sufficiently understood so far. Based on historic data from 1950's through 1990's, the present study attempts to explore decadal variations of temperature, salinity and fish catch in the ECS, and their relationship and responses to global climate change and human activities. Some results are obtained as follows.

1. Decadal variations of temperature and salinity are found in the northern ECS. In summer, mean increase of SST after 1976 was 0.457ºC with large increment mainly south of 31ºN, and the Taiwan Warm Current (TWC) got stronger; in winter, mean increase of SST was 0.244ºC, but temperature adjacent to the Changjiang River Estuary decreased dramatically.
2. The decadal increase of temperature in the northern ECS and the TWC in summer are primarily influenced by the variability of the Kuroshio; while the temperature increment in winter is primarily induced by variability of the climate system, and the decrease of temperature adjacent to the Changjiang River Estuary is probably influenced by the Changjiang River run-off.
3. Catch of hairtail in the ECS reveals obvious interannual and interdecadal variability with about 7.3a, 9.7a and 22a periods. Catch of hairtail in Zhoushan fishing ground near the Changjiang River Estuary is positively correlated with the Changjiang River runoff in summer, while that on the outer shelf is significantly negative correlated with the Kuroshio volume transport in autumn and winter due to upwelling west of the Kuroshio.
4. Notable positive correlation areas between catch of hairtail and SST, e.g. near the Changjiang River Estuary in spring and summer, on the outer shelf in autumn and in Dasha area in winter, coincide with fishing grounds, respectively.