

Sea surface temperature and chlorophyll a variations in the Sanriku Coastal area and their influence on the environment of Otsuchi Bay

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Otsuchi bay is a typical Ria-type bay in the mid Sanriku Coast, and its high productivity and the bay topography are utilized to set net fisheries and aquacultures. Being semi-open to the offshore, the biological productivity of Otsuchi bay depends not only on the river discharge but also on the waters from the Tsugaru Warm Current, the Oyashio, and the Kuroshio (warm-core rings) outside the bay. A recent study conducting continuous observations at the bay mouth and inner bay revealed prominent seasonal variability in temperature and salinity in the bay, which was apparently corresponding to the seasonal fluctuations of the offshore currents. However, relationship between water mass and low-trophic productivity outside the bay and the environment inside the bay has yet to be investigated. Therefore, this study aims at capturing characteristics of water mass and chlorophyll a variability outside the bay, and clarifying their linkage to the environment inside the bay. Sea surface temperature (SST) and chlorophyll a concentration data from Himawari 8 and MODIS Aqua were analyzed and compared with the temperature time series from the Akahama monitoring station of Otsuchi Bay. According to the monthly long-term mean of MODIS Aqua from 2003 to 2018, a prominent boundary of the sea surface temperature was formed around 39–39.5°N during summer and fall. At the same time, the chlorophyll a concentration increased from the southeast to the northwest. These features in the SST and the chlorophyll a concentration likely reflected the contrast between the Tsugaru Warm Current flowing southward from summer to fall and the Oyashio at the northwest. In winter, the SST was high and the chlorophyll a concentration was low in the coastal areas, consistent with the occurrence of the coastal mode of the Tsugaru Warm Current. The SST and subsurface temperature in the bay showed marked difference at a seasonal scale, suggesting the injection of the offshore water to the subsurface layer of the bay.

Keywords: Sanriku Coastal, Otsuchi Bay, Data analysis