

The cold water intrusion related to the exceptional fishery disaster during the ENSO events around the Penghu Islands

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Abstract

From the long-term (1995-2008) observation of wintertime sea surface temperature fields of satellite-derived data, it is interesting that an exceptional cold water intrusion into the southern Taiwan Strait happened in February 2008. The warm Kuroshio Branch Current, which dominates the water around Chang-Yuen Ridge year round, was restricted to the southern Strait. Comparing the wind speed and SST, it is found that in January to February of 2008, the SST decreased from 20.2 to 12.6°C (a drop about 7.6°C) which resulted in a great damage of marine ecology and fisheries economics. This rare low SST event caused the death of more than 130 tons of resident, coral reef and cage aquaculture fishes. To compare the catch of fish in 2008 with the average of 1998-2007, we found 50-80% decrease in the catch of pole and lines boat, gill net and lonline fisheries but 193% increase in the catch of set net fishery.

It is found that SST was warmer in the El Niño winters (1998, 2003, 2007) than in the La Niña winters (1996, 2000, 2008). Wind field also shows a significant variation associated with the climate change, the wind speed was more intensive in the La Niña winters than in the El Niño winters. It is suggested that in the winter of 2008, the strong and continuous northeasterly wind caused by La Niña event probably drove the cold Mainland China Coastal Current more southward to penetrate into the southern Taiwan Strait north of the Chang-Yuen Ridge and a portion of this current intruded eastward south of the Peng-Hu Islands. We suggested that the exceptional intrusion of cold water may decrease the feeding activity of warm water and resident species of fishes, which were dead by losing body temperature and lacking energy as a result of reducing nutrient. But the intrusion of cold current may also brought some schools of cold water and migratory species from East China Sea to southern Taiwan Strait.

Keyword: Sea surface temperature, Cold water intrusion, El Niño, Taiwan Strait