The State of the Western North Pacific in the First Half of 2010

by Shiro Ishizaki

Sea surface temperature

Figure 1 shows the monthly mean sea surface temperature (SST) anomalies in the western North Pacific from January to June 2010, computed with respect to JMA's (Japan Meteorological Agency) 1971–2000 climatology. Monthly mean SSTs are calculated from JMA's MGDSST (**M**erged satellite and *in-situ* data **G**lobal **D**aily **SST**), which is based on NOAA/AVHRR data, MetOp/AVHRR data, microwave sensor (AQUA/AMSR-E) data and *in-situ* observations. Time series of 10-day mean SST anomalies are presented in Figure 2 for the 9 regions indicated in the bottom panel.

In February and March, SSTs were above normal from 35°N, 170°E to 20°N, 125°E. In May, negative SST anomalies were found in the wide area between 20°N and 40°N, and positive SST anomalies prevailed in the seas south of 20°N. In the South China Sea, positive SST anomalies exceeding +1°C appeared during the entire period, except in April. Negative SST anomalies exceeding –1°C prevailed in the seas east of Japan around 40°N, 140°E (regions 2 and 4 in Fig. 2) by June. In February and March SSTs were above normal in the seas south of Japan (regions 6, 7 and 9 in Fig. 2), where SST anomalies turned negative in May. From March to May SSTs were below normal in the Japan Sea and the East China Sea.

Kuroshio and Oyashio

Figure 3 shows a time series outlining the location of the Kuroshio path from January to June of 2010, at intervals of 10 days. After April, the Kuroshio took a nearshore non-large-meander path off the coast to the south of Honshu Island (between 135°E and 140°E). East of 135°E, several small perturbations propagated eastward along the Kuroshio from February to April. Corresponding to the passage of each perturbation, the latitude of Kuroshio axis over the Izu Ridge moved north and south.

Figure 4 presents the subsurface temperature at a depth of 100 m in the seas east of Japan for March 2010. This chart is based on the numerical ocean data assimilation system (JMA's Ocean Comprehensive Analysis System).

The Oyashio cold water (defined as areas with temperatures of less than 5°C in Fig. 4) is known to extend southward in spring and return northward from summer until autumn (indicated by the green line in Fig. 5). From January to March of 2010, the coastal branch of the Oyashio cold water was located south of its normal position (Fig. 5). The southernmost point in March was at 37.5°N, 142°E, or 100 km south of the normal location.

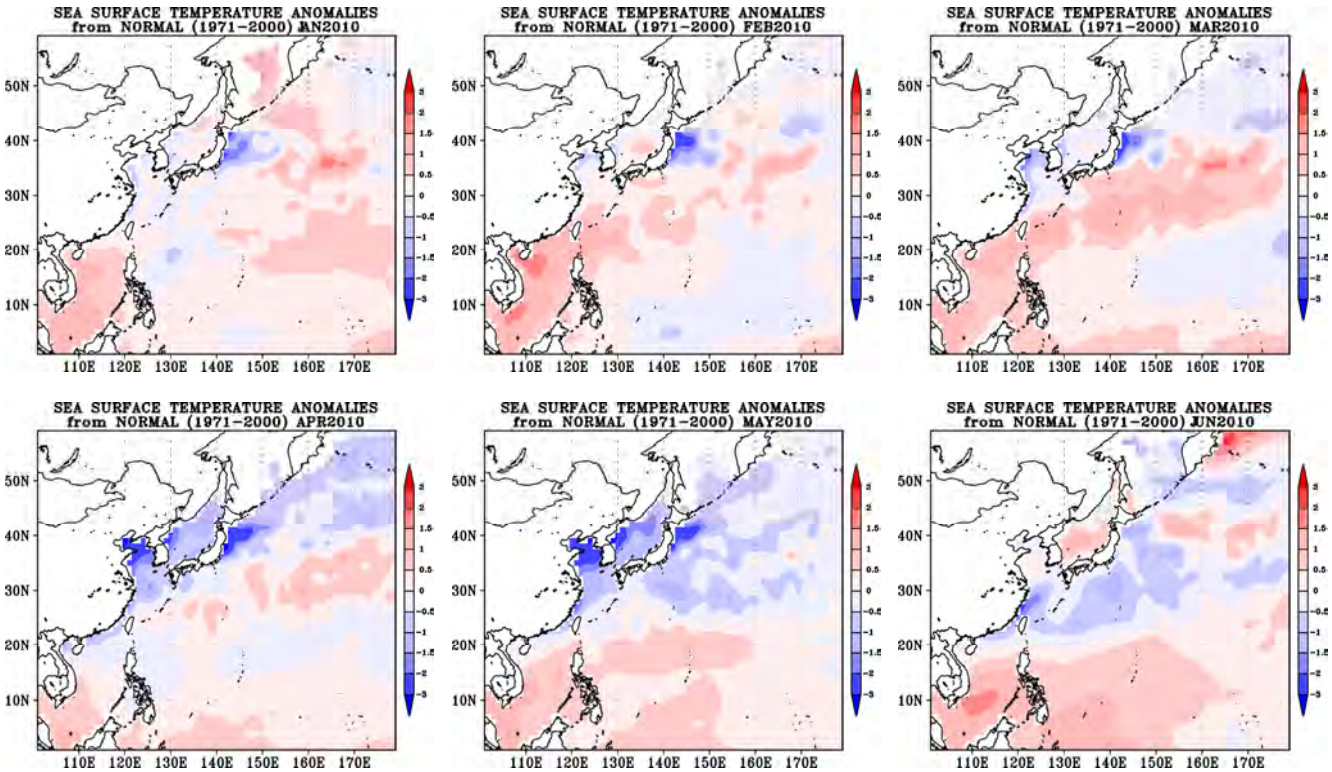


Fig. 1 Monthly mean sea surface temperature anomalies (°C) from January to June 2010. Anomalies are deviations from JMA's 1971–2000 climatology.

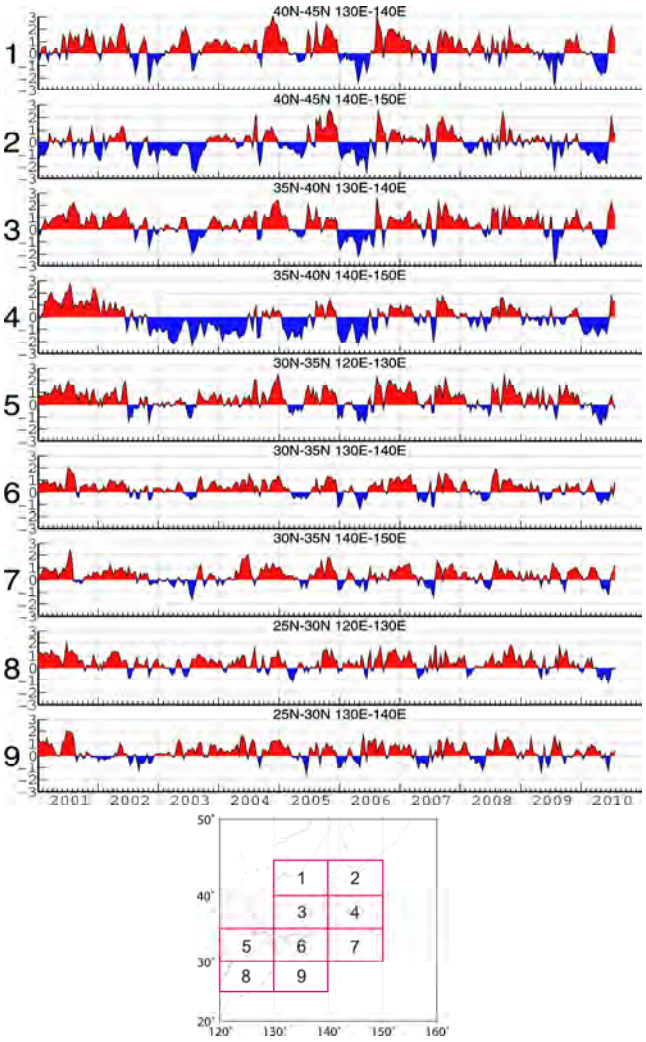


Fig. 2 Time series of 10-day mean sea surface temperature anomalies (°C) averaged for the sub-areas shown in the bottom panel. Anomalies are deviations from JMA's 1971–2000 climatology.

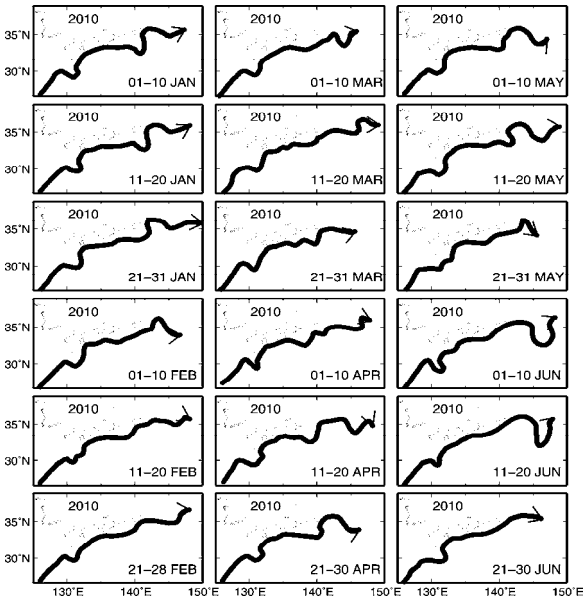


Fig. 3 Location of the Kuroshio path from January to June 2010.

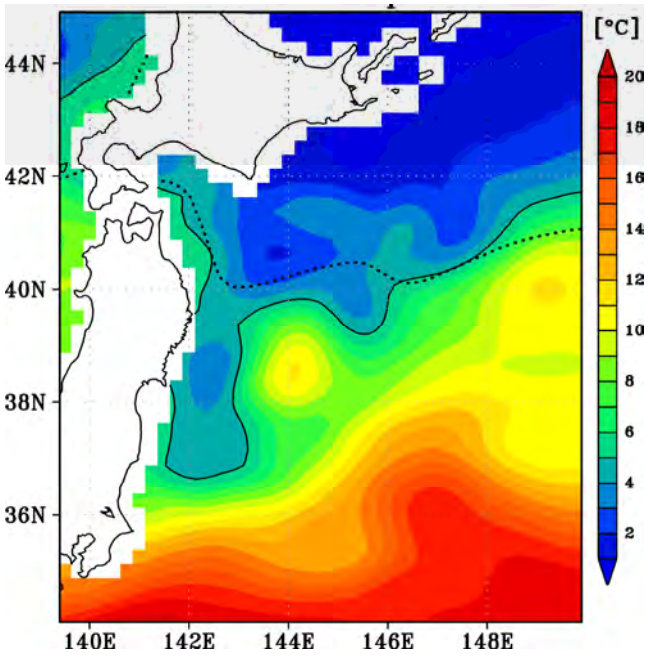


Fig. 4 Subsurface temperatures (°C) at a depth of 100 m east of Japan for March 2010. The solid line denotes the 5°C isotherm, while the dotted line is its climatology (30-year average values from 1971 to 2000).

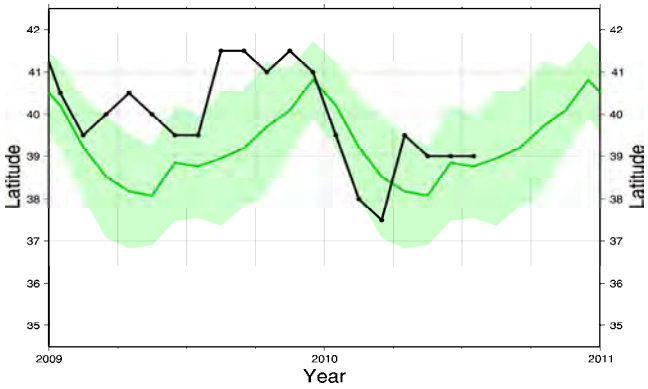


Fig. 5 The southernmost position of the coastal branch of the Oyashio cold water from January 2009 to July 2010 (black line), and the 30-year average values (green line), with a range of one standard deviation (green shading) from 1971 to 2000.

Sea ice in the Sea of Okhotsk

The sea ice extent in the Sea of Okhotsk was below normal from December 2009 to February 2010, and turned above normal in April 2010 (Fig. 6). It reached its seasonal maximum of 111.41 × 10^4 km^2 on March 10, which was less than that of the normal season (122.83 × 10^4 km^2).

Figure 7 presents interannual variations in the maximum sea ice extent (red lines) and accumulated sea ice extent (green lines) in the Sea of Okhotsk from 1971 to 2010. Although the sea ice extent in the Sea of Okhotsk shows large interannual variations, there is a slight decreasing trend of 174[55–294] × 10^4 km^2 per decade (the numbers in

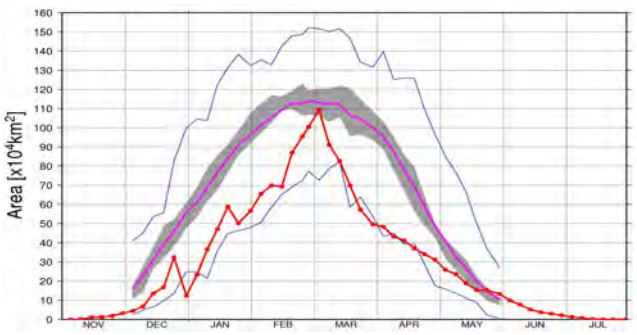


Fig. 6 Time series of sea ice extent in the Sea of Okhotsk from November to July (red line: 2009–2010 analysis; pink line: JMA's 1971–2000 climatology; blue lines: maximum/minimum sea ice extent since 1971; gray area: normal range).

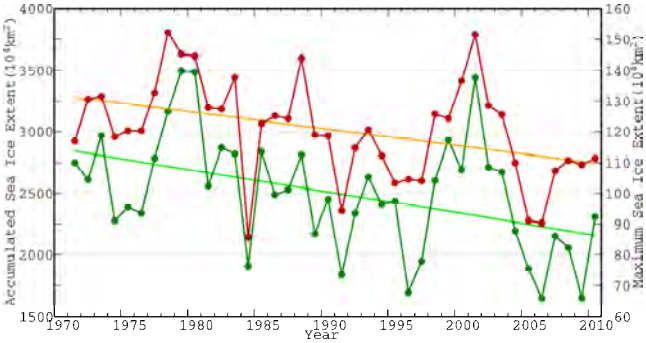
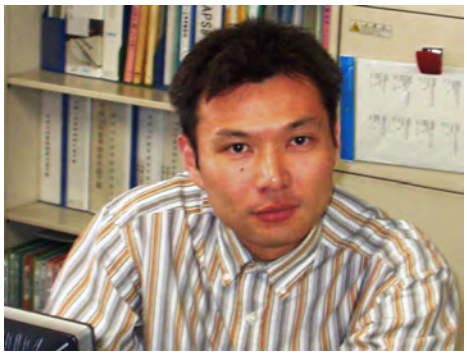


Fig. 7 Interannual variations in the maximum sea ice extent (red lines) and accumulated sea ice extent (green lines) in the Sea of Okhotsk from 1971 to 2010. The accumulated sea ice extent is defined as the sum of 5-day sea ice extents from December to May.

square brackets indicate the two-sided 95% confidence interval) in the accumulated sea ice extent and another slight decreasing trend of 5.5[1.3–9.7] × 10^4 km^2 (equivalent to 3.5% of the area of the Sea of Okhotsk) per decade in the maximum extent.



Shiro Ishizaki (s_ishizaki@met.kishou.go.jp) is a Scientific Officer of the Office of Marine Prediction at the Japan Meteorological Agency (JMA). He works as a member of a group in charge of oceanic information in the western North Pacific. Using the data assimilation system named "Ocean Comprehensive Analysis System", this group provides an operational surface current prognosis (for the upcoming month) as well as seawater temperature and an analysis of currents with a 0.25 × 0.25 degree resolution for waters adjacent to Japan. Shiro is now involved in developing a new analysis system for temperature, salinity and currents that will be altered with the Ocean Comprehensive Analysis System.

PICES Interns

We offer sincere thanks to Ms. Tatiana Semenova (left), the 2010 PICES intern, who will soon complete her term at the PICES Secretariat and return to her home institution, TINRO-Centre, in Vladivostok, Russia. Many of you had an opportunity to meet and enjoy communicating with Tatiana at PICES-2010 in Portland (Oregon, U.S.A.), or at the PICES Secretariat office. It was a true pleasure working with Tatiana, and we appreciate her dedicated efforts during this past year and wish her a very successful career. We are sure that those of you, who are going to attend PICES-2011, will see Tatiana again in Khabarovsk, as she is already heavily involved in preparing this Annual Meeting.

We are pleased to announce that Ms. Jeongim Mok (right) will join the Secretariat in May as the 2011 PICES Intern. She has a Master's Degree in Environmental Engineering from the Korea University in Seoul. Jeongim worked in the private sector, in the Department of Marine Conservation at the Ministry of Maritime Affairs and Fisheries (MOMAF), and is now with the Department of Marine Policy at the Ministry of Land, Transport and Maritime Affairs (MLTM) providing administrative support for Ocean Expo-2012 which will be held in Yeosu, Korea. Besides her passion for marine conservation, Jeongim loves bicycling along the Yangjae and Han riverside, which has beautiful scenery and convenient bike-only lanes, and spending spare time in coffee shops, reading books. We look forward to Jeongim's involvement in PICES activities.