The State of the Western North Pacific in the Second Half of 2008

by Shiro Ishizaki

Sea surface temperature

Figure 1 shows the monthly mean sea surface temperature (SST) anomalies in the western North Pacific from July to December 2008, 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, AQUA/AMSR-E data, and *in-situ* observations. Time series of 10-day mean SST anomalies are presented in Figure 2 for 9 regions indicated in the bottom panel.

In August and September, positive SST anomalies exceeding +2ºC prevailed south of the Kamchatka Peninsula. In October and November, SSTs were above normal between 20ºN and 30ºN. Positive SST anomalies dominated in the western equatorial Pacific (west of 150ºE), while negative values prevailed east of 160ºE along the equator. This contrasting distribution of SST anomalies corresponds to the pattern often found during La Niña events.

SSTs were generally above normal around Japan during the period (Fig. 2). Positive SST anomalies exceeding +1ºC in particular were found south of Japan and in the East China Sea. SSTs were below normal southeast of Hokkaido Island, except in September.

Kuroshio path

Figure 3 shows a time series of the location of the Kuroshio path for this period. The Kuroshio took an offshore non-large-meander path far off the coast to the south of Honshu Island (between 135ºE and 140ºE). Its southernmost position in relation to Honshu Island was generally east of the Izu Ridge (about 140ºE) throughout the period.

Carbon dioxide

JMA has been conducting observations for carbon dioxide (CO_2) in the surface ocean and atmosphere in the western North Pacific, on board the R/V *Ryofu Maru* and the R/V *Keifu Maru*. Figure 4 illustrates the distribution of the difference in CO_2 partial pressure (pCO_2) between the surface seawater and the overlying air (denoted as ΔpCO_2) observed in the western North Pacific for each season of 2007. The sign of ΔpCO_2 determines the direction of CO_2 gas exchange across the air–sea interface, indicating that the ocean is a source (or sink) for atmospheric CO_2 in the case of positive (or negative) values of ΔpCO_2.

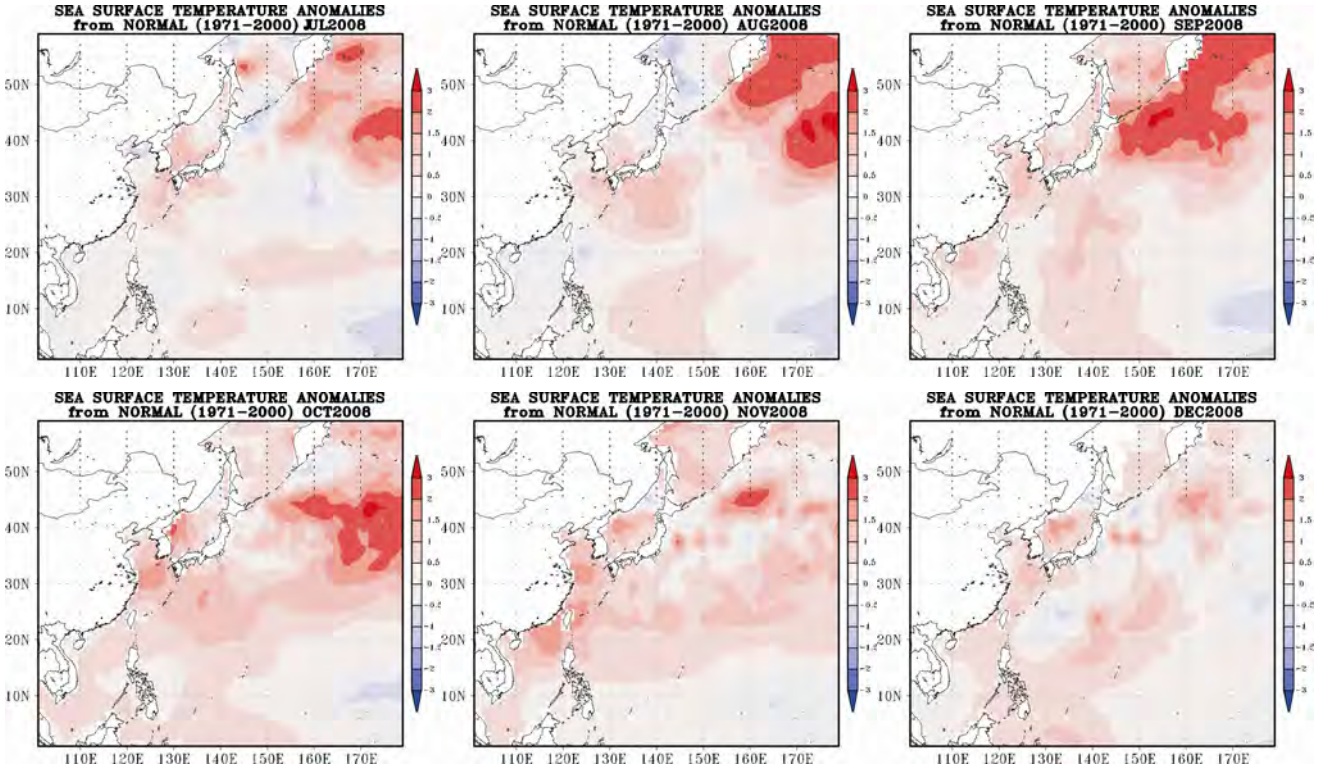
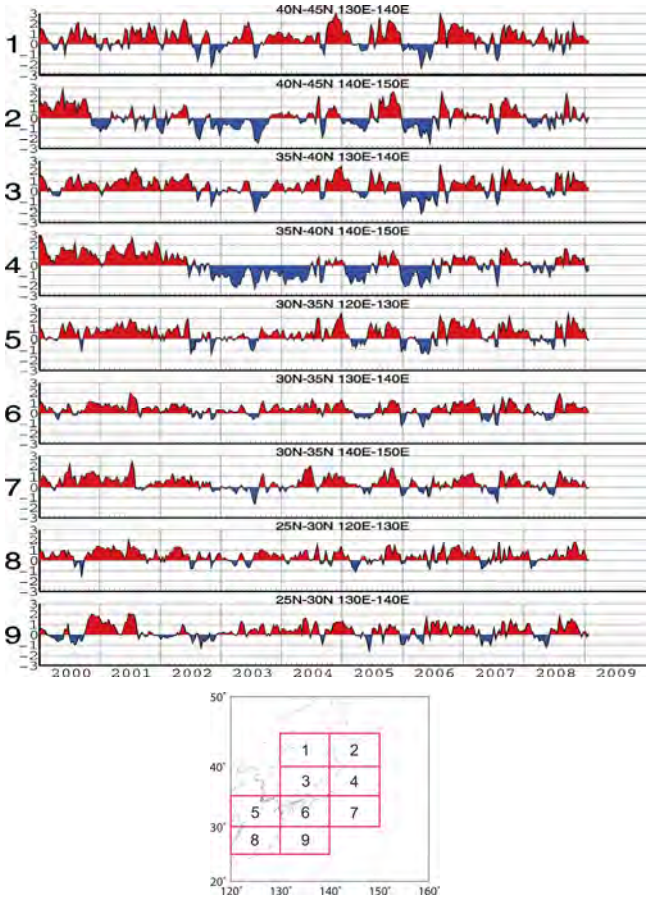
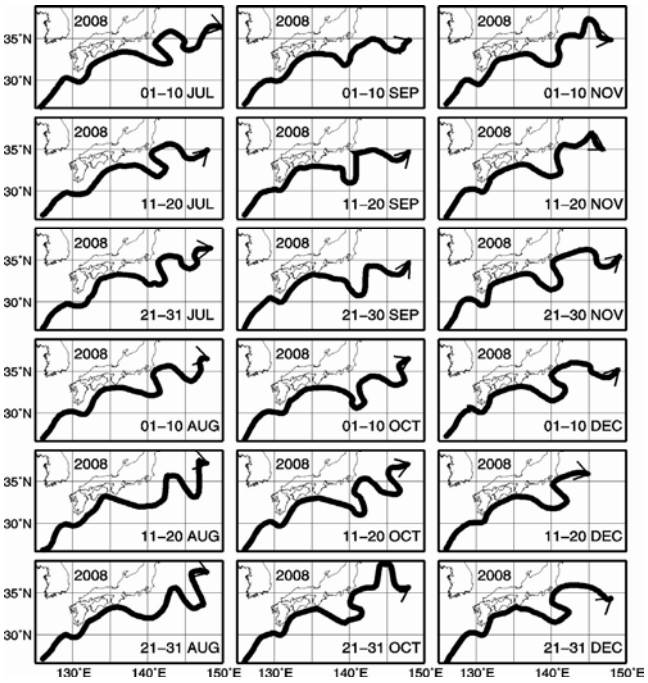


Fig. 1 Monthly mean SST anomalies (°C) from July to December 2008. Anomalies are deviations from JMA's 1971–2000 climatology.





Left column:

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

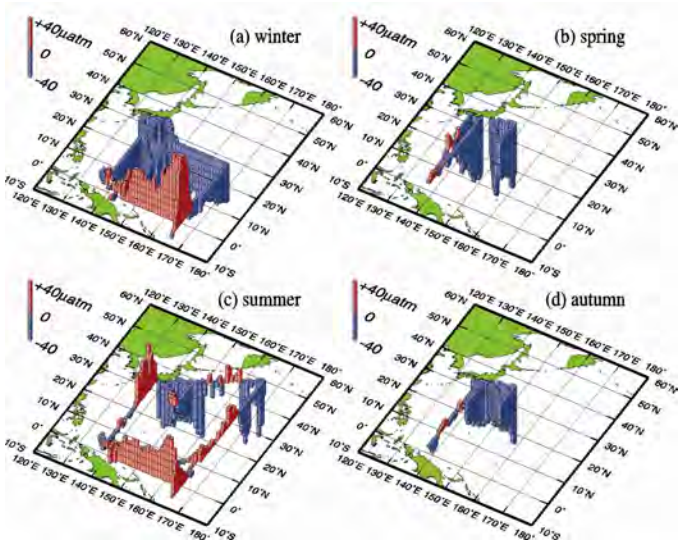
Right column:

Fig. 3 Location of the Kuroshio path from July to December 2008.

In the subtropical region, typically between 10–35ºN, the ocean widely acted as a CO_2 sink in 2008, except for summer in which CO_2 source regions were found.

In the equatorial region, the ocean acted as a CO_2 source both in winter and summer of 2008. A La Niña event lasted from spring 2007 to spring 2008, and eastern CO_2-rich surface water may have moved westward and covered this region in response to changes in zonal winds. The boundary between the western CO_2-poor surface water and the eastern CO_2-rich surface water was at 147ºE in winter 2008 during the La Niña event, and was still at 145ºE in summer 2008 after the event.

Fig. 4 Difference in CO_2 partial pressure between the ocean and the atmosphere in the western North Pacific in 2008. Red/blue pillars show that oceanic pCO_2 is higher/lower than atmospheric pCO_2. Seasons are for the Northern Hemisphere.



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.