The state of the western North Pacific in the second half of 1998

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Mr. Satoshi Sugimoto is Scientific Officer of the Oceanographical Division of the Climate and Marine Department at the Japan Meteorological Agency (JMA). He is working as a member of a group in charge of monitoring and forecasting sea surface temperature and sea surface current in the western North Pacific. Based on in situ *and satellite data, this group provides various oceanographical products. One of the main products is the "Monthly Ocean Report", which is published and distributed by JMA every month. Mr. Sugimoto is now involved in developing a new analysis system for sea surface and subsurface temperature to improve sea surface temperature forecasts in the western North Pacific.*

Sea surface temperature

Figure 1 shows monthly mean sea surface temperature (SST) anomalies in the western North Pacific from January to June 1999, computed with respect to JMA's 1961-90 climatology. Satellite-derived SSTs (NOAA/AVHRR) and *in situ* observations are used for the area between 20˚N and 50˚N from 110˚E to 160˚E, and only *in situ* observations are used in the other region.

It is noteworthy that positive SST anomalies exceeding +1˚C prevailed zonally along 30˚N throughout the first half of the year, and anomalies exceeding +2˚C were found primarily from 140˚E eastward in March and April (Fig. 1). The time series of regional ten-day mean SST anomalies for region C (Fig. 2) have been positive since the end of 1997.

Positive SST anomalies exceeding +0.5˚C prevailed around the Philippines from January to May, and the anomalies reduced to near normal in June. The time series for region D shows that the positive SST anomaly around +1˚C, which had continued since the beginning of 1998, came to an end in the first half of 1999. Negative SST anomalies exceeding -1˚C had prevailed around the Kuril Islands and in the northern part of the Japan Sea until April, and these anomalies became positive west of 150˚E in June.

Oyashio and Kuroshio

Figure 3 shows temperature distributions at a depth of 100 m east of Japan in February and June 1999. These charts are based on JMA's objective 100 m water temperature analysis for 0.25x0.25 degree grid point values in seas adjacent to Japan. Waters colder than 5˚C at 100 m are recognized as the Oyashio cold water. It is known that the Oyashio cold water east of Japan extends southward at its southernmost position in spring, and returns northward from summer to autumn. This spring, the coastal southward intrusion of the Oyashio cold water was restricted because of the existence of a warm eddy east of Japan from February that stayed near 39˚N (February) or 40˚N (June). Off shore intrusion of the Oyashio cold water extended southward east of the warm eddy.

The Kuroshio has maintained a non-large-meander path south of Japan since the summer of 1991.

Sea ice in the Sea of Okhotsk

The first and last dates of drift ice in sight at the meteorological stations along the coast of Hokkaido are shown in Table 1, with the location of the stations in Figure 4. The first dates of drift ice on shore and the first dates of shore lead appearance are also included. This winter, the drift ice appearance around Hokkaido is characterized by a delayed arrival and delayed retreat.

The sea ice extent in the Sea of Okhotsk was above normal (20-year averaged values from 1971 to 1990) from early December to mid-December and after mid-March. Accumulated daily sea ice extent was above normal after remaining below normal for 11 years (Fig. 5).

Drift ice in the Sea of Okhotsk flowed out into the Pacific from early February to late April (especially apparent in March), and was observed at Kushiro after 12 years' absence. Part of the drift ice flowed out into the Japan Sea from early February to mid-February, and was observed at Wakkanai after 4 years' absence.

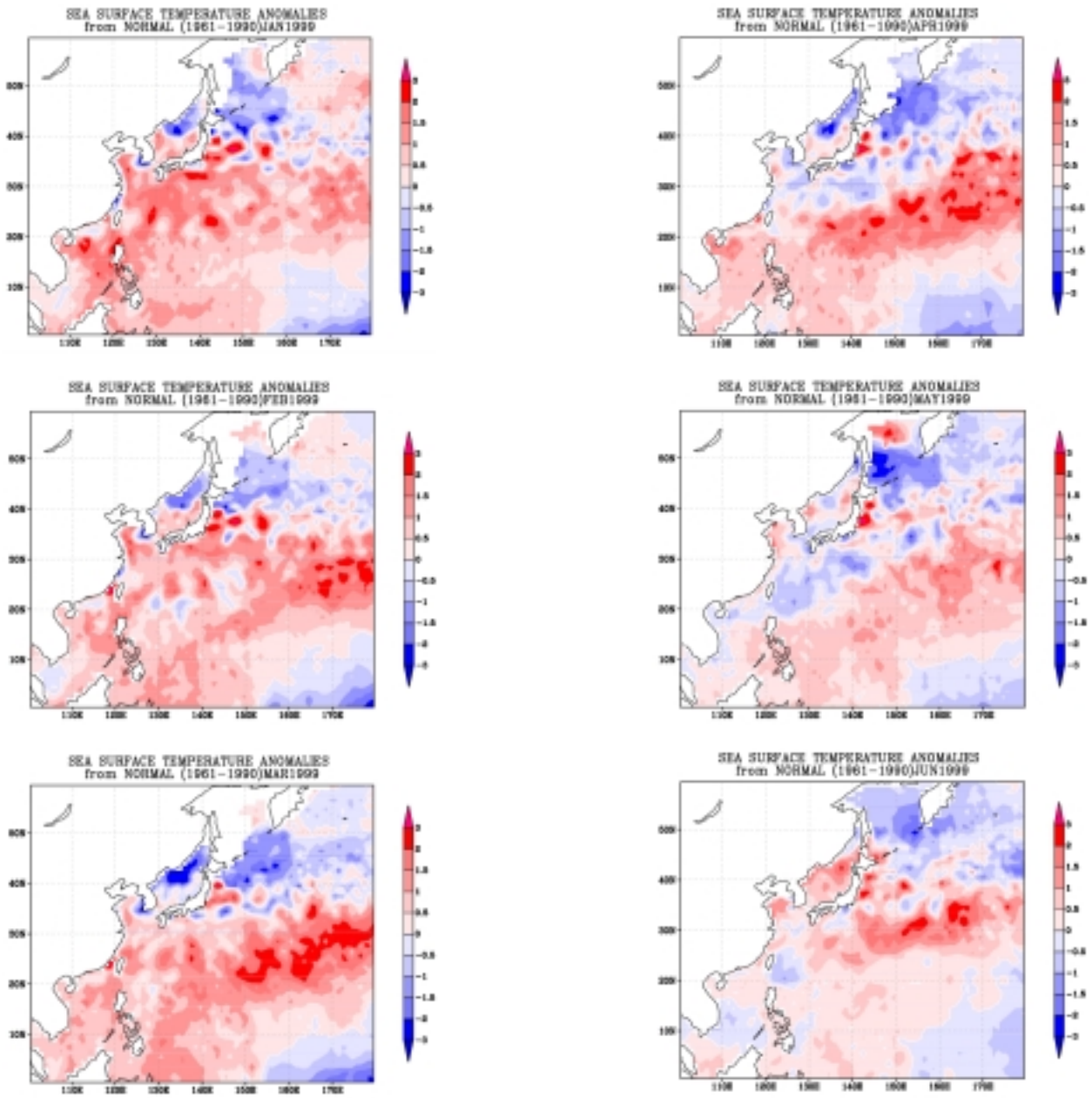
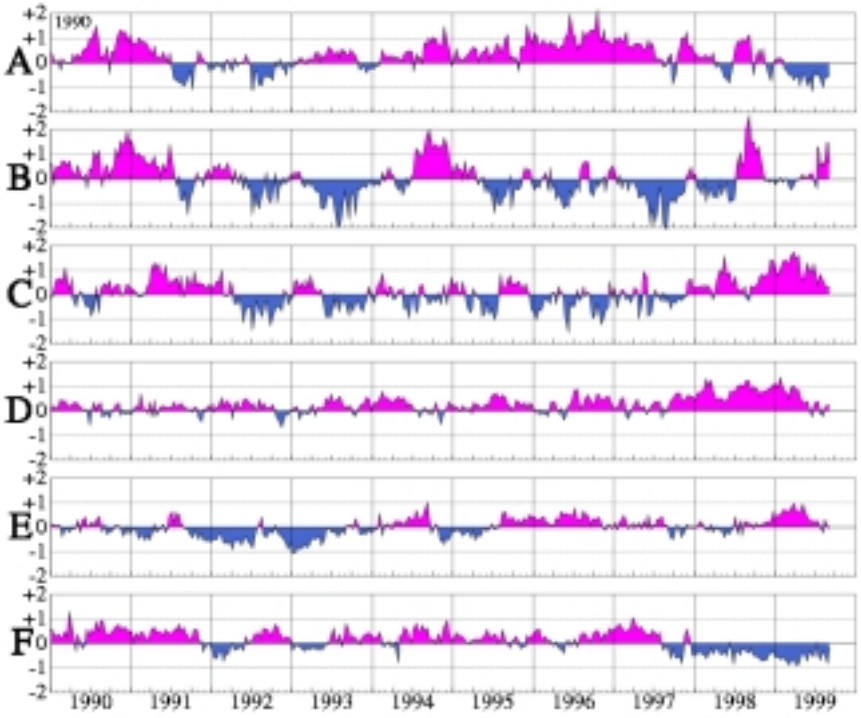


Fig. 1 Monthly mean sea surface temperature anomalies (˚C). Anomalies are departures from JMA's 1961-1990 climatology.

Table 1 The first and last dates of drift ice in sight at coastal stations in the winter of 1998/99

Station	Drift Ice				First date of drift ice on shore	First date of shore lead appearance
	First date	Last date	Period	Days		
WAKKANAI	Feb. 11 (+4)	Feb 11 (-28)	1 (-32)	1 (-14)	#	*
KITAMIESASHI	Feb. 5 (+16)	Apr. 18 (+18)	73 (+2)	33 (-19)	Feb. 10 (+14)	Feb. 21 (-20)
OMU	Feb. 3 (+15)	Apr. 18 (+12)	75 (-3)	45 (-16)	Feb. 12 (+15)	Mar. 24 (+10)
MOMBETSU	Feb. 4 (+17)	Apr. 19 (+12)	75 (-5)	63(-1)	Feb. 12 (+13)	Apr. 9 (+23)
ABASHIRI	Jan. 13 (-4)	Apr. 18 (0)	96 (+4)	85 (+2)	Feb. 12 (+15)	Apr. 10 (+16)
NEMURO	Feb. 14 (+5)	Apr. 23 (+21)	69 (+16)	52 (+18)	Feb. 16 (+2)	*
KUSHIRO	Mar. 16 (+16)	Mar. 20 (+3)	5 (-13)	3 (*)	#	*

( ) : deviation from normal for the period from 1961 to 1990;
* : no observations or normal date is not available; # : no observations;
+ : earlier or more than normal; - : later or less than normal



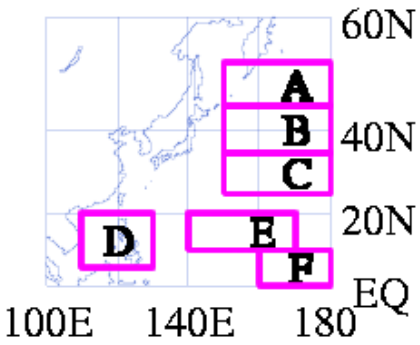


Fig. 2 Time series of the ten-day mean sea surface temperature anomalies (˚C), computed from JMA's 1961-1990 climatology for the areas shown in the bottom panel.

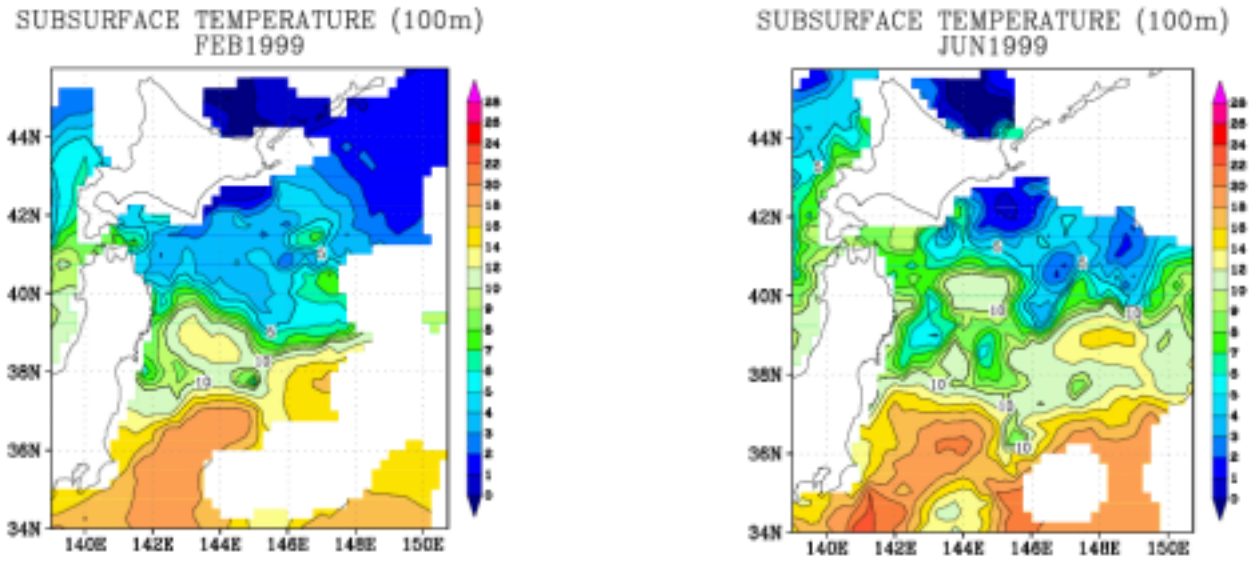


Fig. 3 Temperature (˚C) at a depth of 100 m east of Japan in February (left) and June (right) 1999.

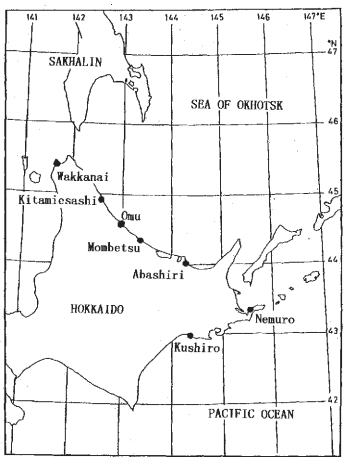


Fig. 4 Location of the sea ice stations along the coast of Hokkaido, Japan.

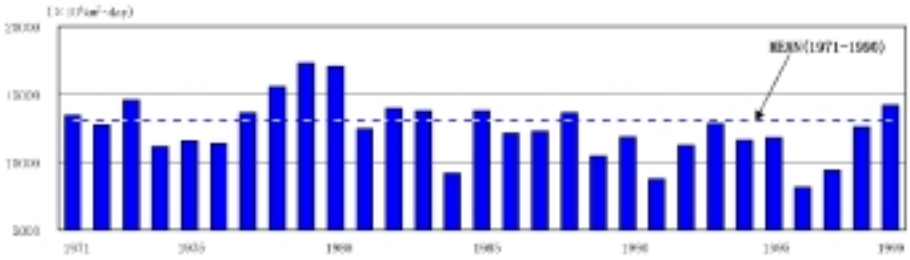


Fig. 5 Annual accumulation of 5-days sea ice extent in the Sea of Okhotsk.