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Meteorological and Oceanographic Observations at Marine Towers on the Okhotsk Sea Coast of Hokkaido, December 1998 – December 1999^{*,}**

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Abstract: Measurements of wind speed and direction, humidity, air and water temperature, solar radiation, salinity and chlorophyll a were carried out through all the year round at marine towers on the Okhotsk Sea coast of Hokkaido. Daily sea-ice distributions and ice concentrations observed by the sea-ice radar were also reported in this paper.

要旨: 北海道オホーツク海沿岸域のほぼ中央に位置する紋別に設置されたタワーにて風速・風向、湿度、気温、日射、水温、塩分、クロロフィル a 量の連続観測を行った。また、流水レーダーにて結氷期の沿岸域の流水分布、密接度の観測を行った。ここでは、これらの時系列観測データを報告する。

Key words: Meteorological and Oceanographic Variables, Air-Sea-Ice Observation System (ASIOS), Okhotsk Tower, Sea-Ice Radar, Okhotsk Sea Coast of Hokkaido

キーワード: 気象・海洋要素、大気—海洋—海水観測システム、オホーツク・タワー、流水レーダー、北海道オホーツク海沿岸

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第 156 号

I. Introduction

The Air-Sea-Ice Observation System (ASIOS) of Hokkaido University was established near Mombetsu Harbor, Hokkaido in 1986, in order to measure the atmospheric boundary layer over sea ice in the near shore region covered with unstable pack ice (e.g., Aota et al., 1988; Shirasawa and Aota, 1991). The ASIOS consisted of the marine tower, on which various measuring instruments could be set, and a data acquisition system in a coastal cabin. After some years' operation the tower had to be taken out due to constructing the new harbor at the place of the tower. Therefore, the tower was moved to another place and reconstructed on a breakwater at the west end of the Mombetsu Harbor (Fig. 1). The new ASIOS has been operated at the new tower since April 1997. Another marine tower, so called the Okhotsk Tower was constructed at the east end of the Mombetsu Harbor in February 1996 (Fig. 1). It has been mainly used for oceanographic observations and as an under-ice aquarium. Measurements of meteorological and oceanographic variables have been carried out through all the year round by the ASIOS and Okhotsk Tower since April 1997. Time series of those variables during the period from April 1997 to November 1998 were reported by Shirasawa et al. (1998).

II. Observation

The new ASIOS tower stands on a breakwater at the west end of Mombetsu Harbor, where is located free to sea breeze (Fig. 1). Meteorological sensors were installed on a mast on the observation capsule of 3m in diameter and of 2.7m in height with a dome, and at the height of about 15m from the sea level. The Okhotsk Tower is located at the east end of Mombetsu Harbor (Fig. 1) and has been used mainly for oceanographic observations. Sea-ice distributions and ice concentrations on the Okhotsk Sea coast near Mombetsu within about 50 km from the coast have been observed daily by the sea-ice radar network of Hokkaido University. Time series of wind speed and direction, humidity, air temperature and solar radiation obtained from the ASIOS tower during the period from December 1998 to December 1999 are shown in Fig. 2. The water temperature, salinity and chlorophyll a values obtained from the Okhotsk Tower and daily ice concentrations observed by the sea-ice radar are also shown in Fig. 2. The air temperatures below -15°C were observed in February and those over 30°C were observed in July and

August. The salinity values increased from 31.8 to 32.6 at mid-December 1998 and then decreased to 31.8 till the end of January 1999, just before the ice appeared in the coastal region. In February 1999 the salinity increased slightly and continued till late March at around 32.3. Since then the values continued till the end of October at about 33-34, then abruptly decreased to 31-32, and continued till the end of December 1999 at about 31-32. The chlorophyl a values were at about 2-5 mgm^{-3} in December 1998, increased slightly in January 1999, just before the ice appeared in the coastal area, and then decreased to 2-3 mgm^{-3} during the period from late January to mid-March. The values then increased gradually to reach to the peak of about 20 mgm^{-3} at late April, right after the ice disappeared from the coastal area. The other higher peaks appeared at mid- and late September. Wind roses are shown monthly in Fig. 3. The SW to NW winds were predominant from the fall through the winter.

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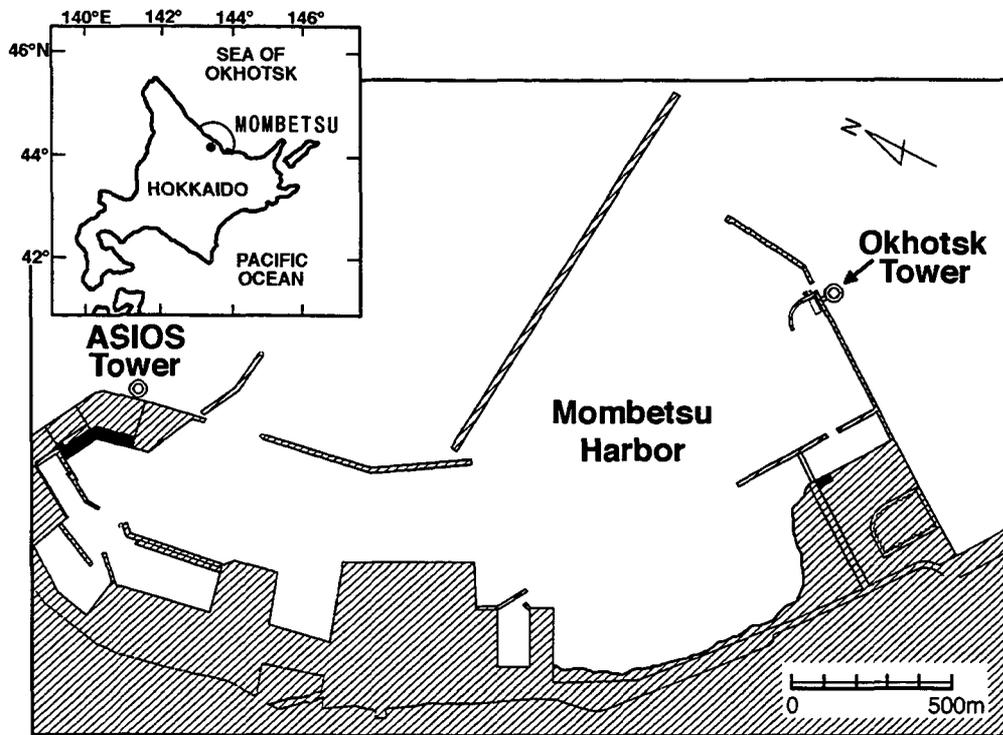


Fig. 1 The sites of the Air-Sea-Ice Observation (ASIOS) tower and the Okhotsk Tower, Mombetsu, Hokkaido. The coverage of the sea-ice radar network in Mombetsu is shown as a half circle on the map.

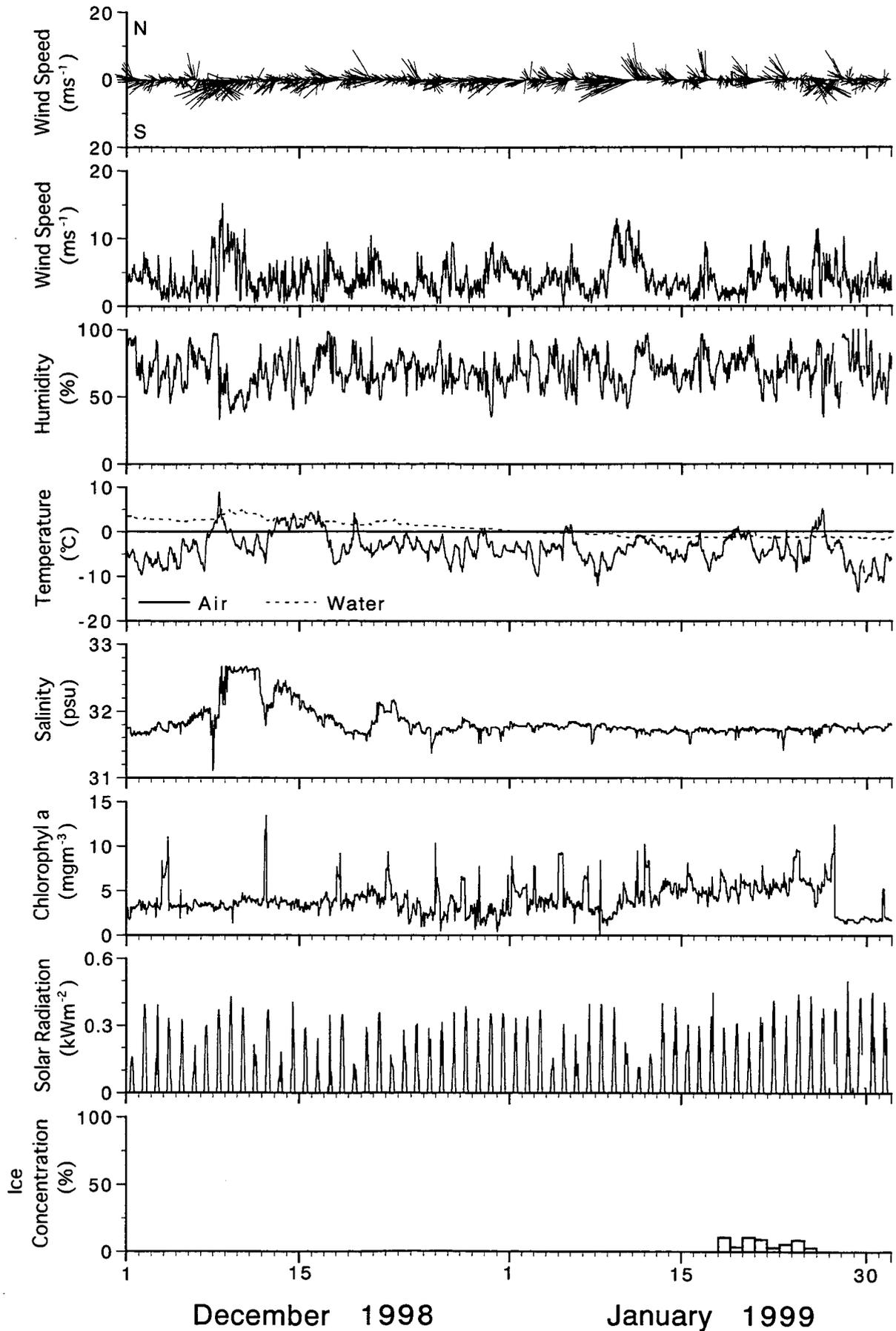
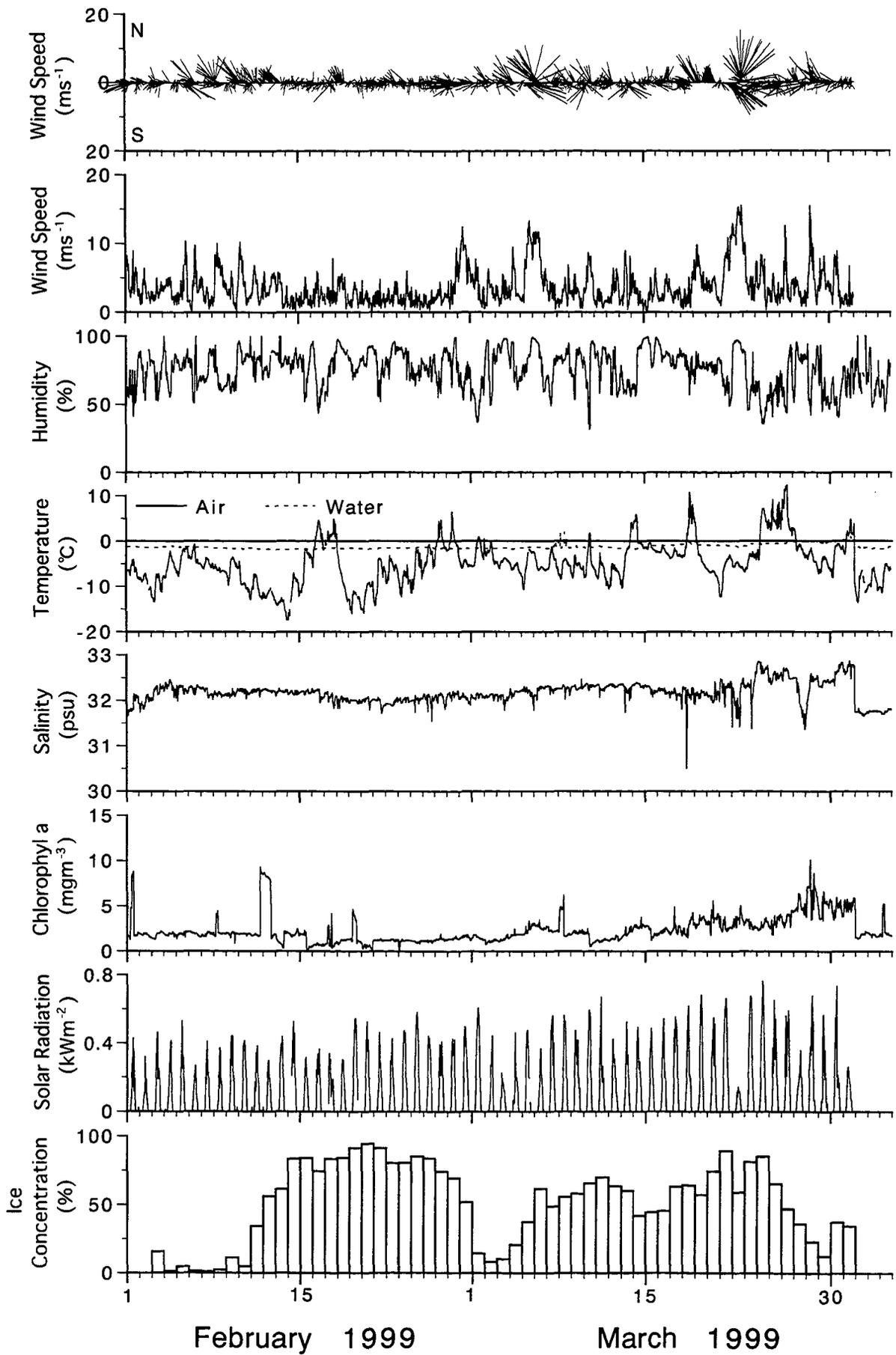
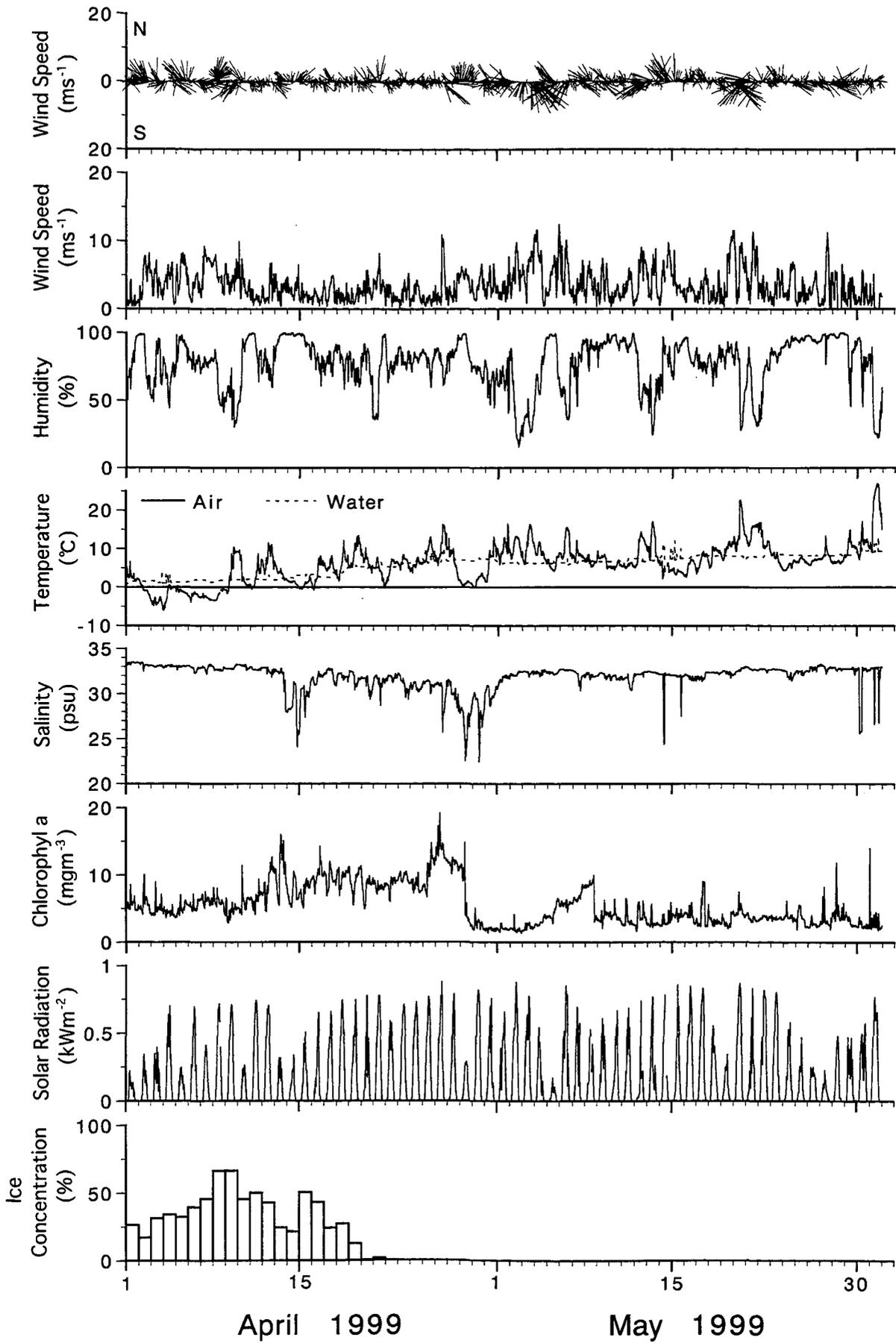
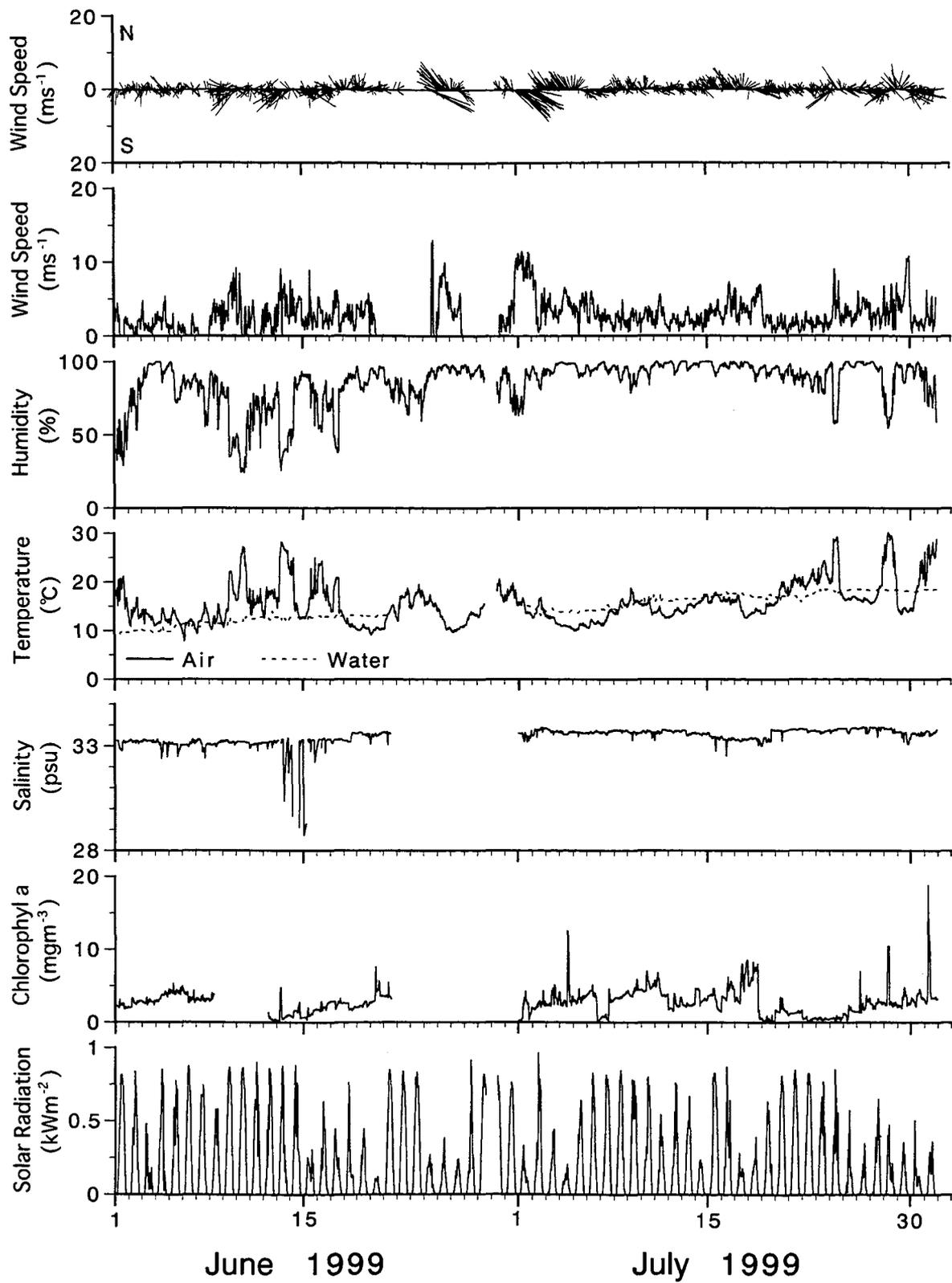
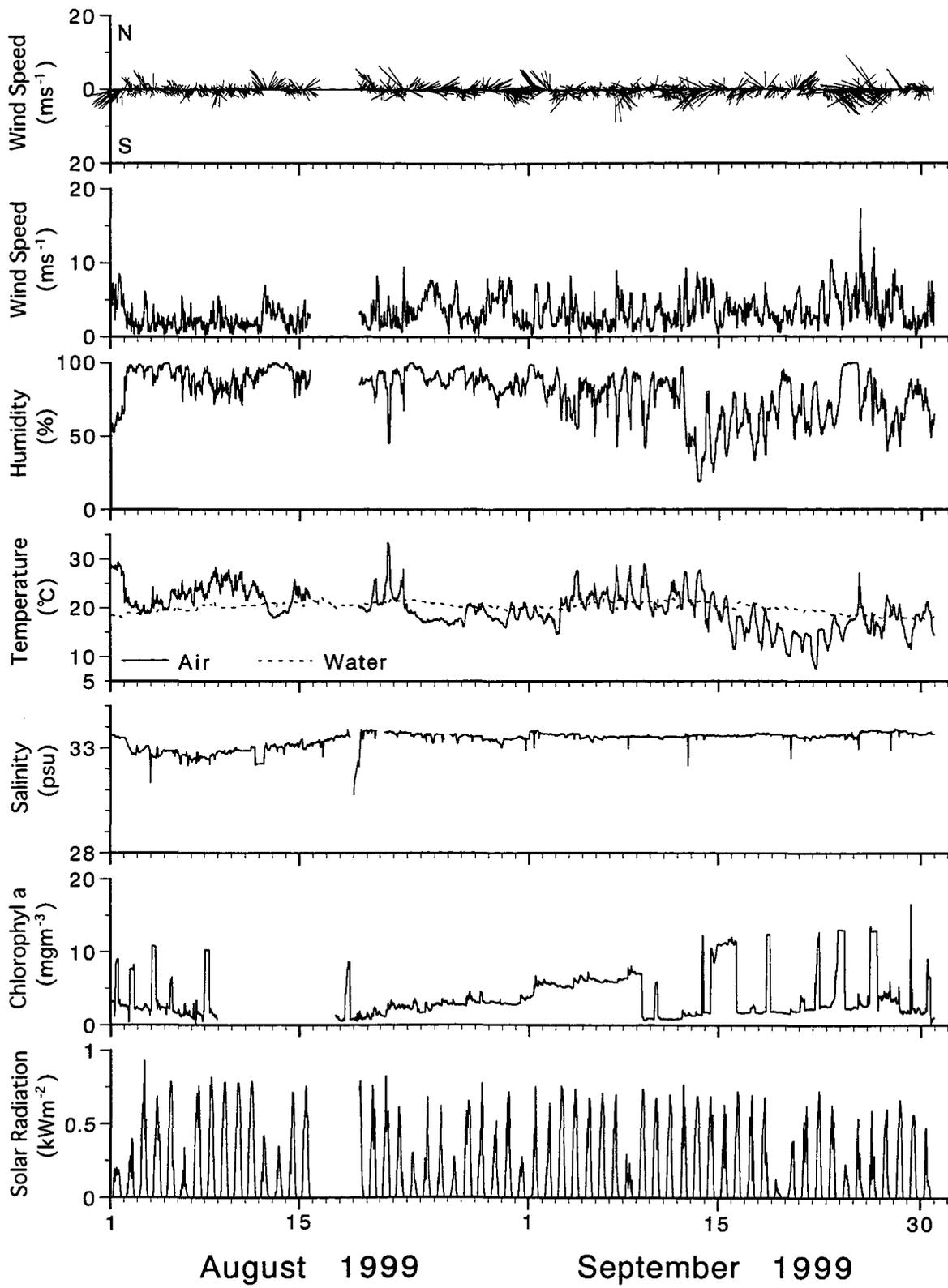


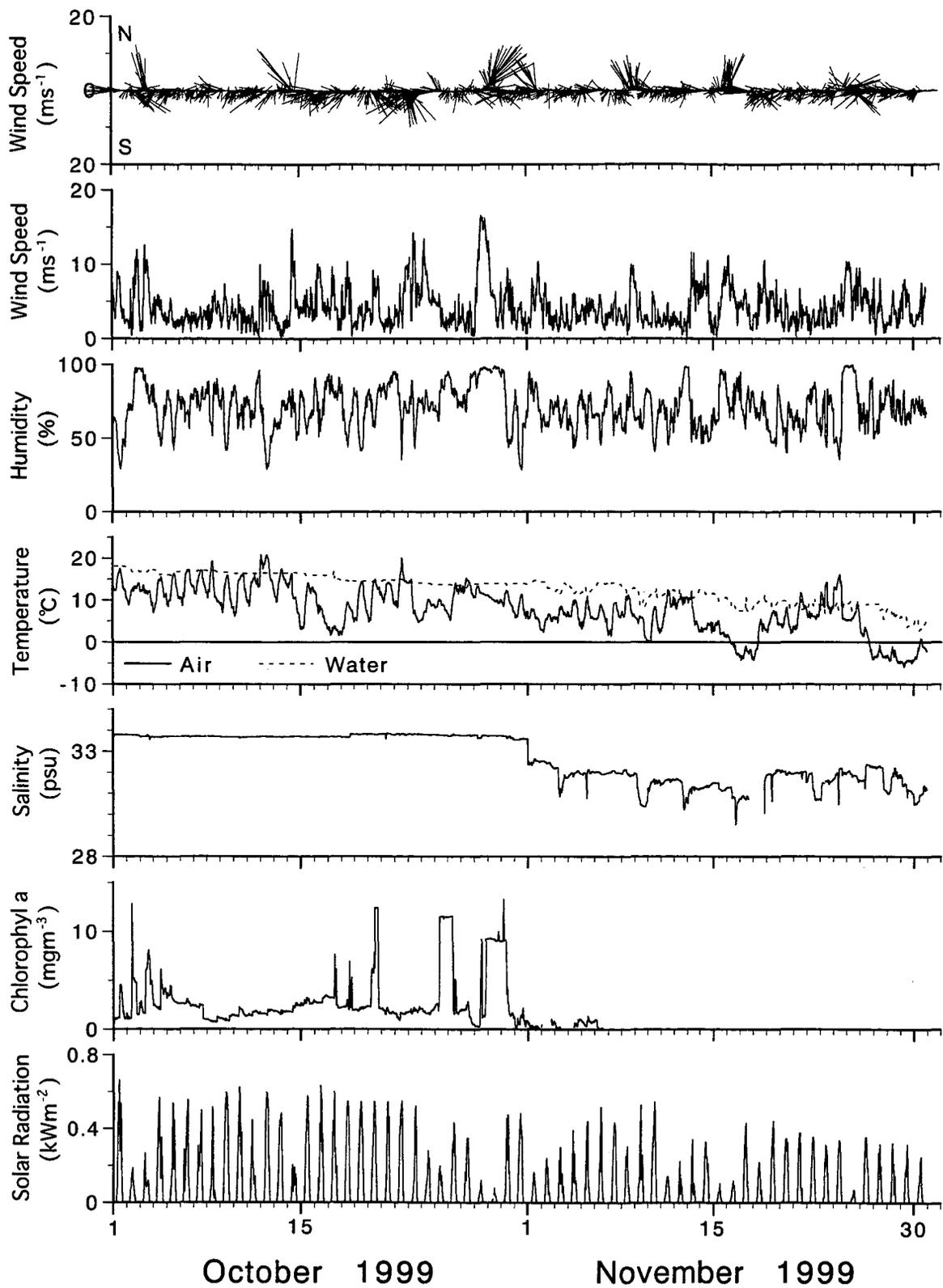
Fig. 2 Time series of wind speed and direction, humidity, air temperature and solar radiation obtained from the ASIOS tower and of water temperature, salinity and chlorophyll a obtained from the Okhotsk Tower during the period from December 1998 to December 1999, together with ice concentration observed by sea-ice radar in Mombetsu.

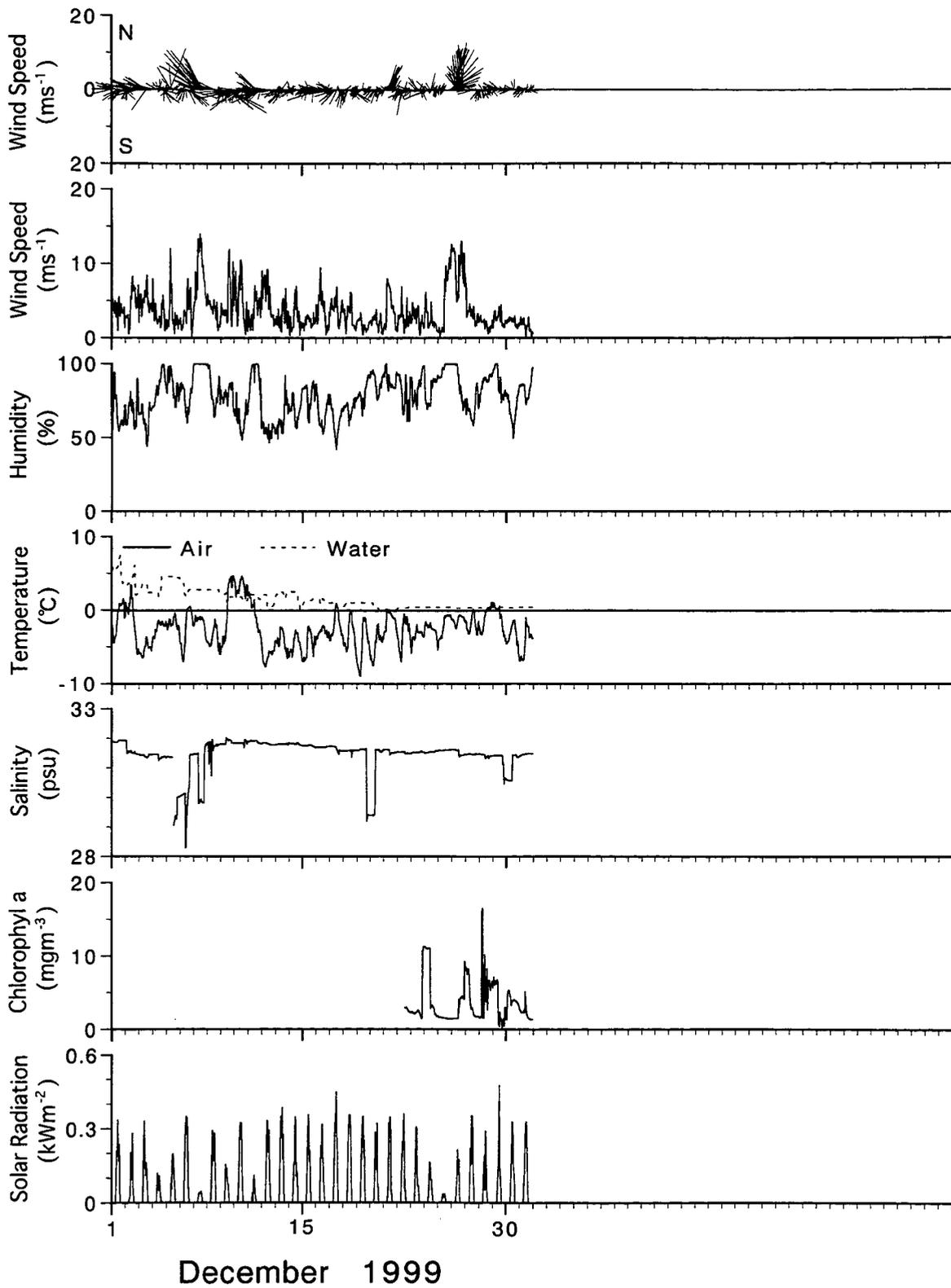












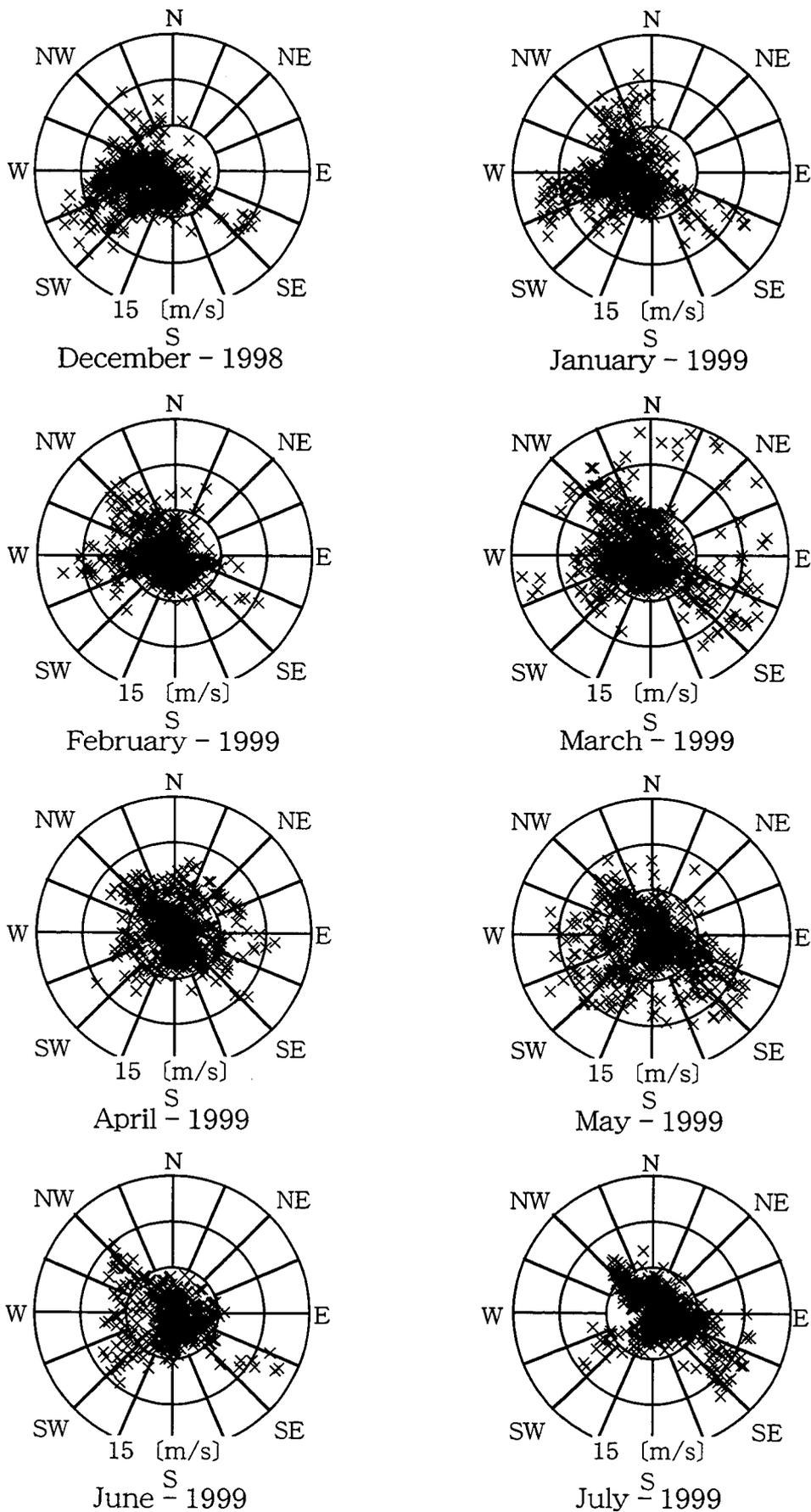


Fig. 3 Monthly wind roses obtained from the ASIOS tower during the period from December 1998 to December 1999.

