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Meteorological and Oceanographic Observations at Marine Towers on the Okhotsk Sea Coast of Hokkaido, January – December 2003* **

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Abstract: Measurements of wind speed and direction, humidity, air and water temperatures, solar radiation and salinity were carried out through all the year round at marine towers on the Okhotsk Sea coast of Mombetsu, Hokkaido. Shown in this report are time series of those meteorological and oceanographic variables and also daily sea-ice distributions and ice concentrations observed by the sea-ice radar.

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-海氷観測システム、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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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). After some years' operation the tower of the ASIOS was removed to be reconstructed on a breakwater at the west end of the Mombetsu Harbor (Figs. 1 and 2), and it has been operated since April 1997. Another marine tower, so called the Okhotsk Tower was constructed at the east end of the Mombetsu Harbor in February 1996 (Figs. 1 and 2). 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 on the Okhotsk Sea coast since April 1997. Time series of those variables during the period from January through December 2003 are reported in this data report. The time series data for the periods from April 1997 to November 1998, from December 1998 to December 1999, from January to December 2000, from January to December 2001 and from January to December 2002 were reported by Shirasawa *et al.* (1998), Shirasawa *et al.* (1999), Shirasawa *et al.* (2000), Shirasawa *et al.* (2001) and Shirasawa *et al.* (2002), respectively.

II. Observation

The 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 2.7 m in height with a dome, and at the height of about 15 m from the sea level. The Okhotsk Tower located at the east end of Mombetsu Harbor (Fig. 1) 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 shoreline 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 January to December 2003 are shown in Fig. 3. The water temperature and salinity obtained from the Okhotsk Tower and daily ice concentrations observed by the sea-ice radar are also shown in Fig. 3. The air temperature was -10°C at the beginning of January and about -16°C at mid-January. The water temperature has almost reached the freezing point at the beginning of January, while sea ice appeared within the radar coverage at the Mombetsu radar station on 11 January. The air and water temperatures started increasing from late March, while sea ice disappeared from the radar coverage at late April. The salinity was almost 32 in January through February, 32.5 to 33 in March through May, 33.5 to 34 in June through October. There was no data of water

temperature and salinity after November due to malfunctioning of the sensors. Wind roses shown monthly in Fig. 4 indicate that westerly to northwesterly winds are predominant from the fall through the beginning of the spring.

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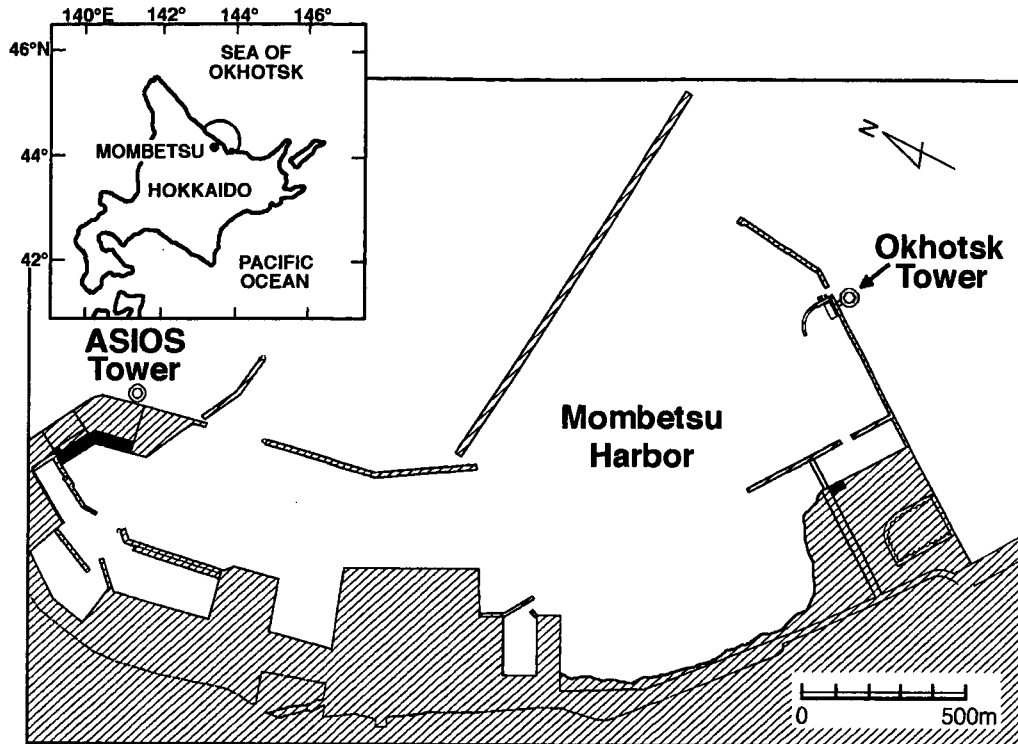


Fig. 1 The sites of the Air-Sea-Ice Observation System (ASIOS) tower and the Okhotsk Tower, Mombetsu, Hokkaido. The sea-ice radar coverage at Mombetsu radar station is shown as a half circle on the map.

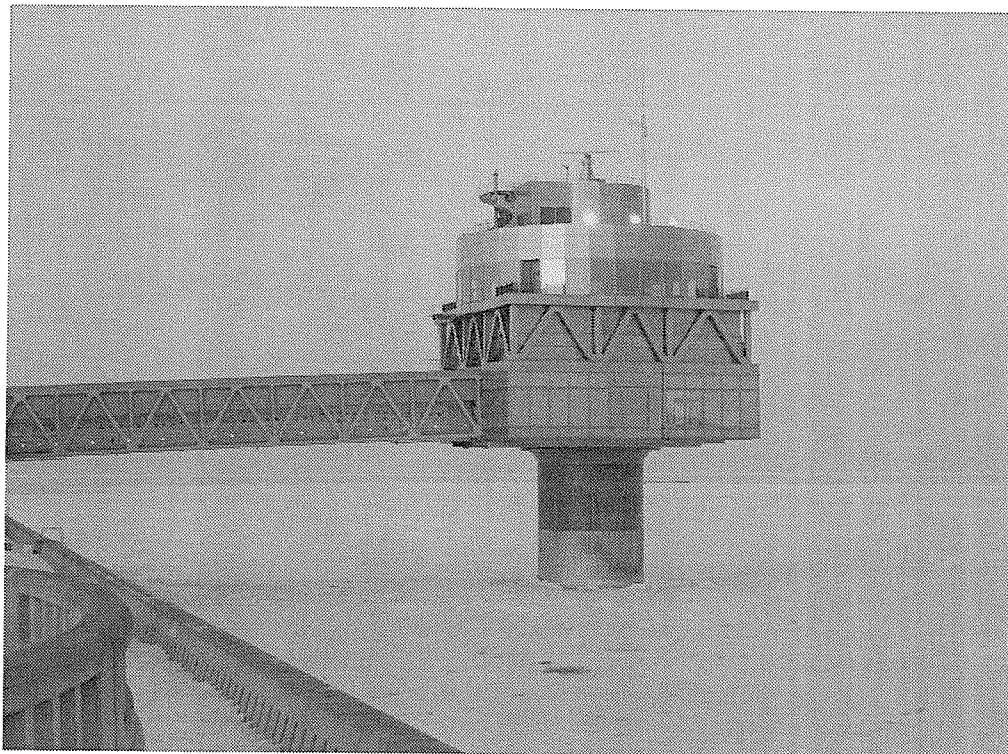
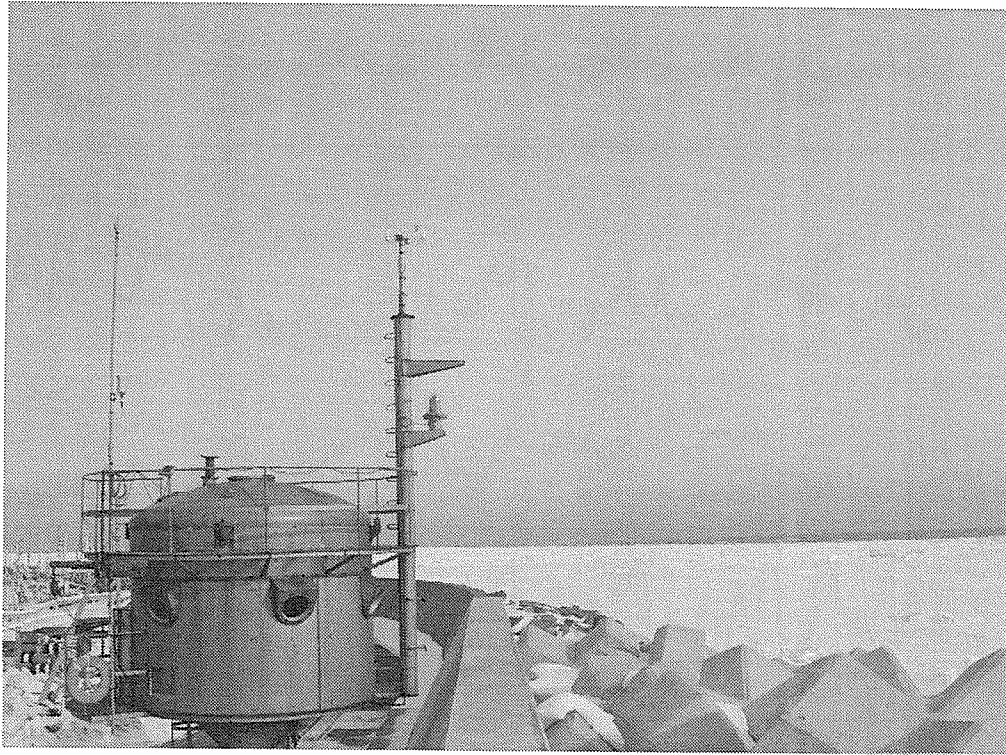


Fig. 2 The Air-Sea-Ice Observation System (ASIOS) tower (top) and the Okhotsk Tower (bottom).

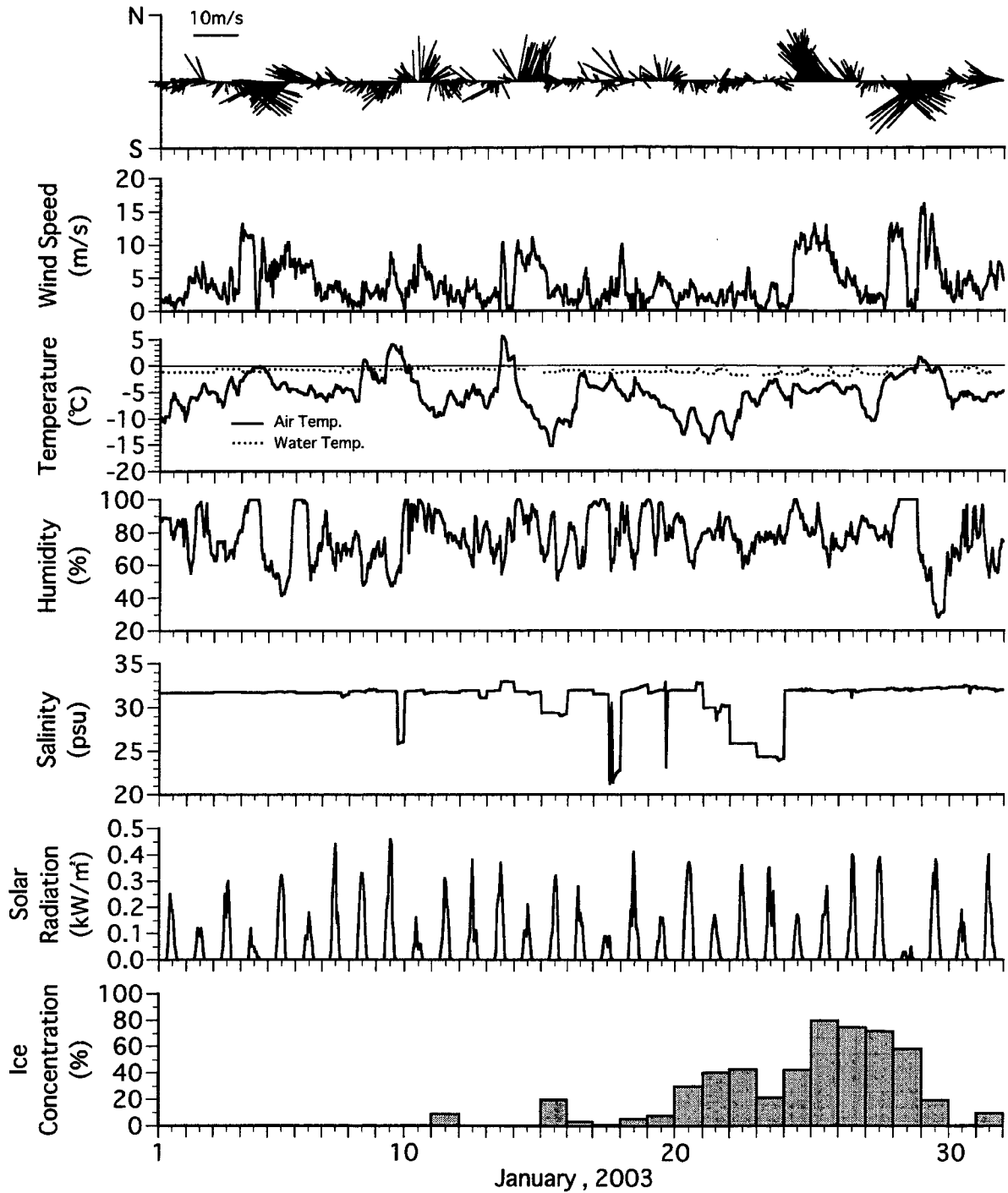
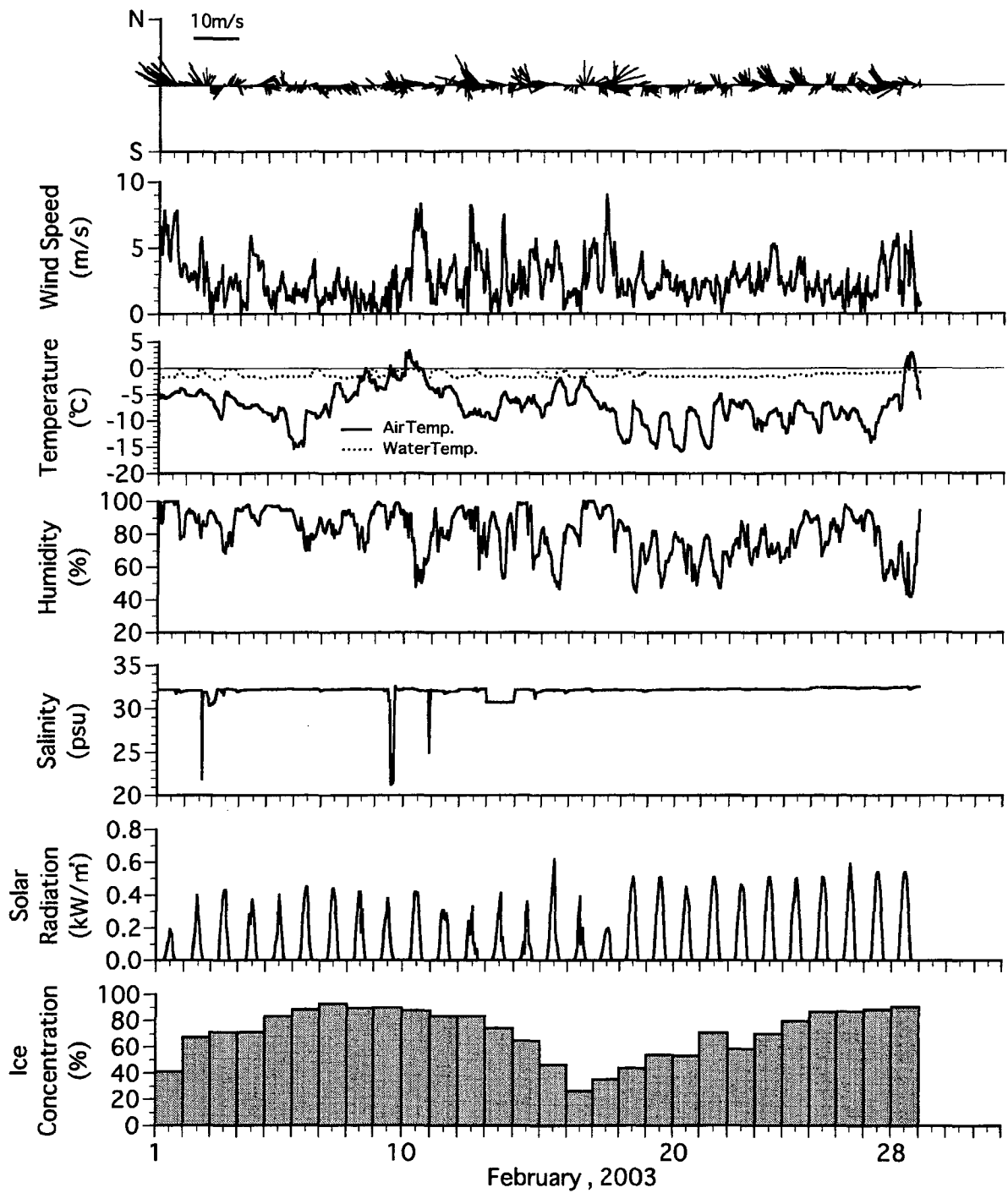
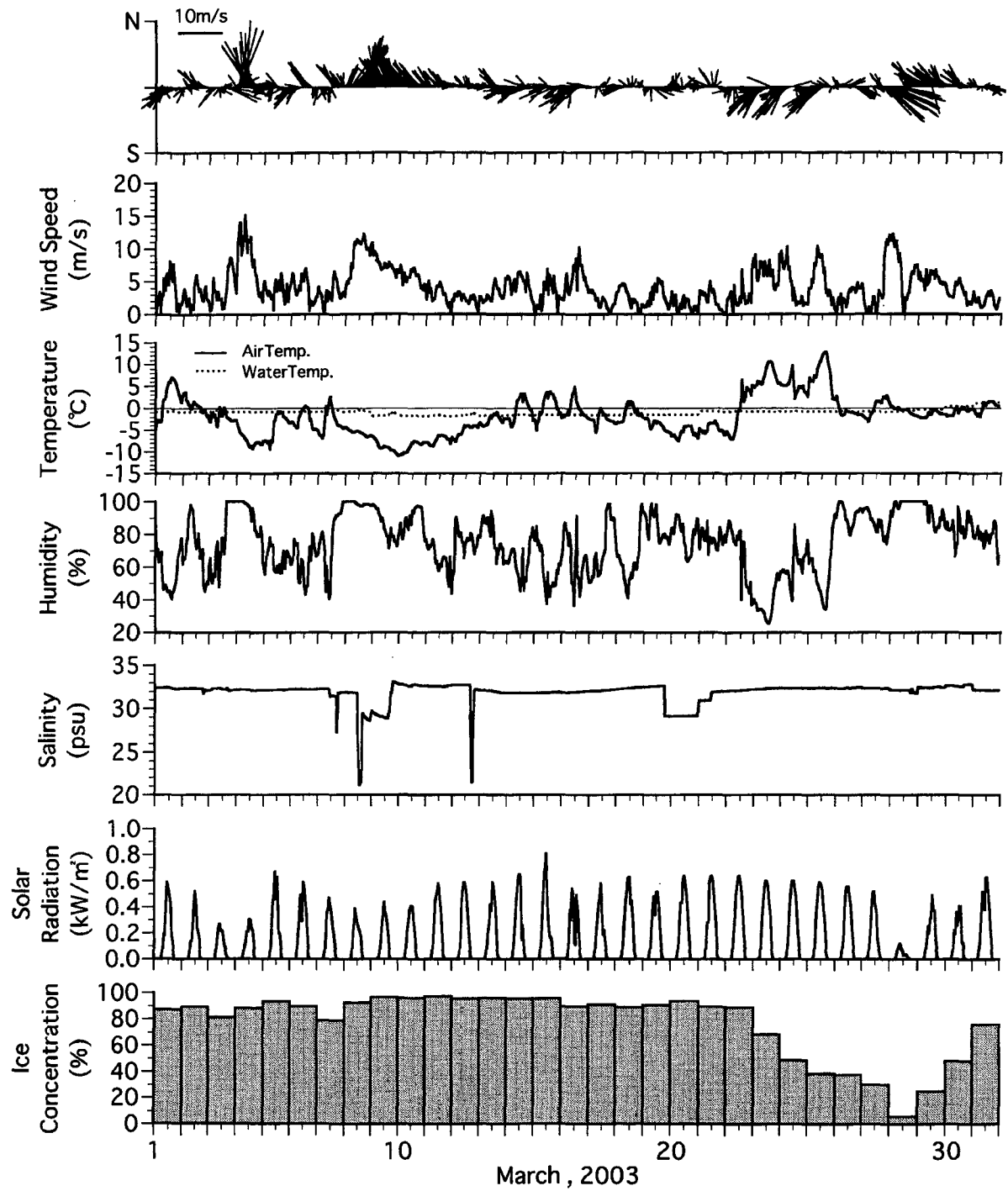
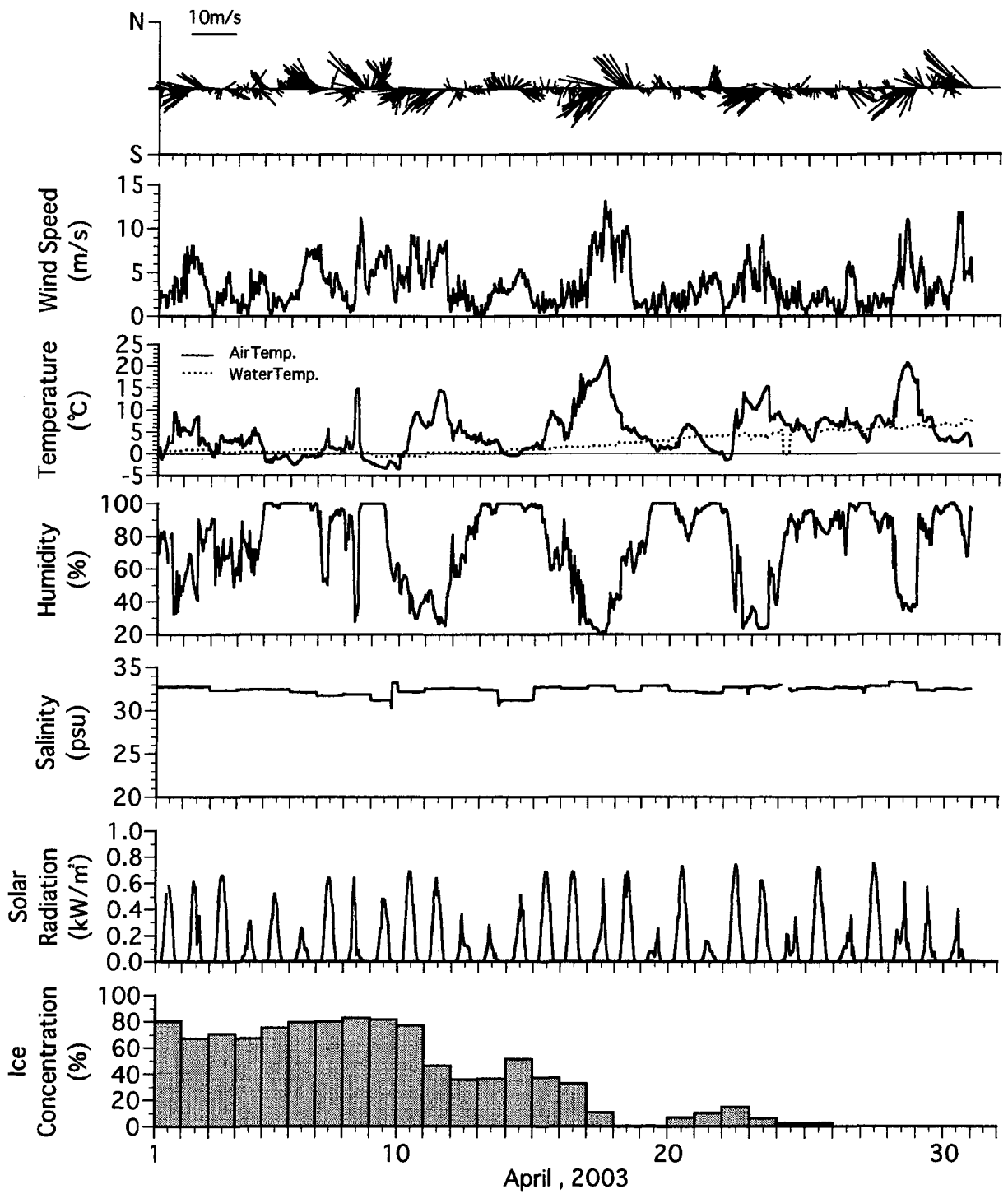
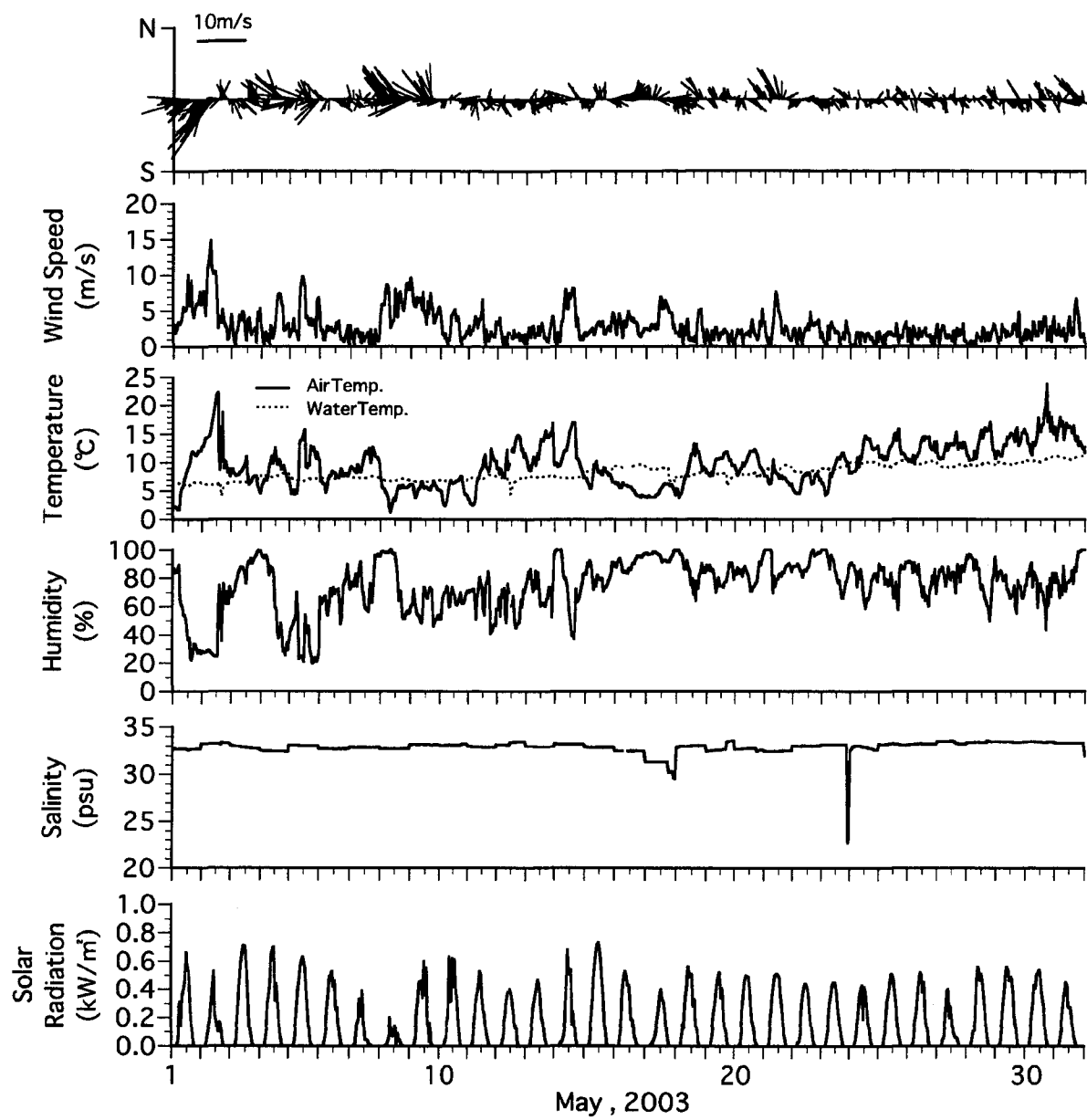


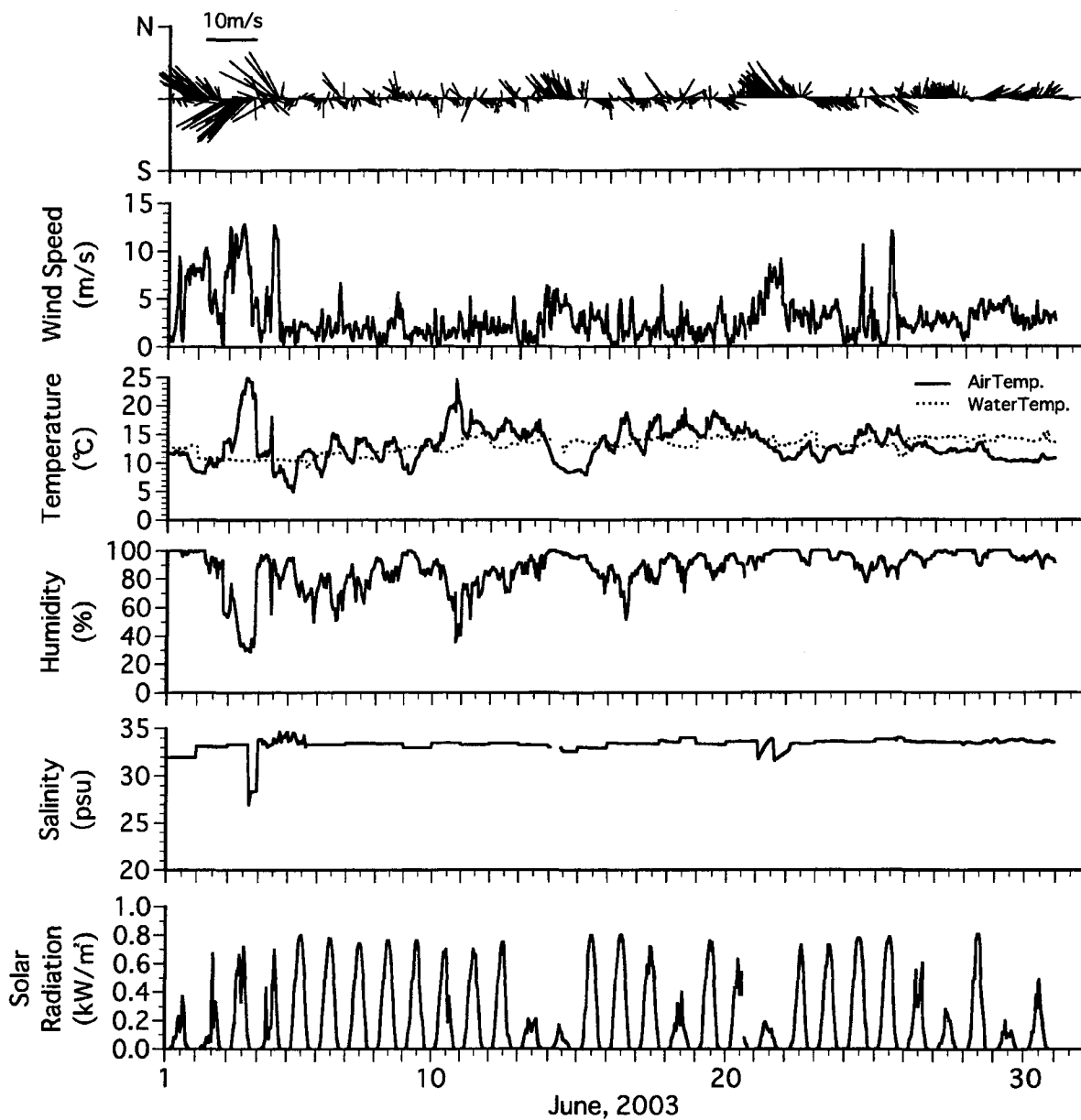
Fig. 3 Time series of wind speed and direction, humidity, air temperature and solar radiation obtained from the ASIOS tower and of water temperature and salinity obtained from the Okhotsk Tower during the period from January to December 2003, together with the ice concentration observed by the sea-ice radar.

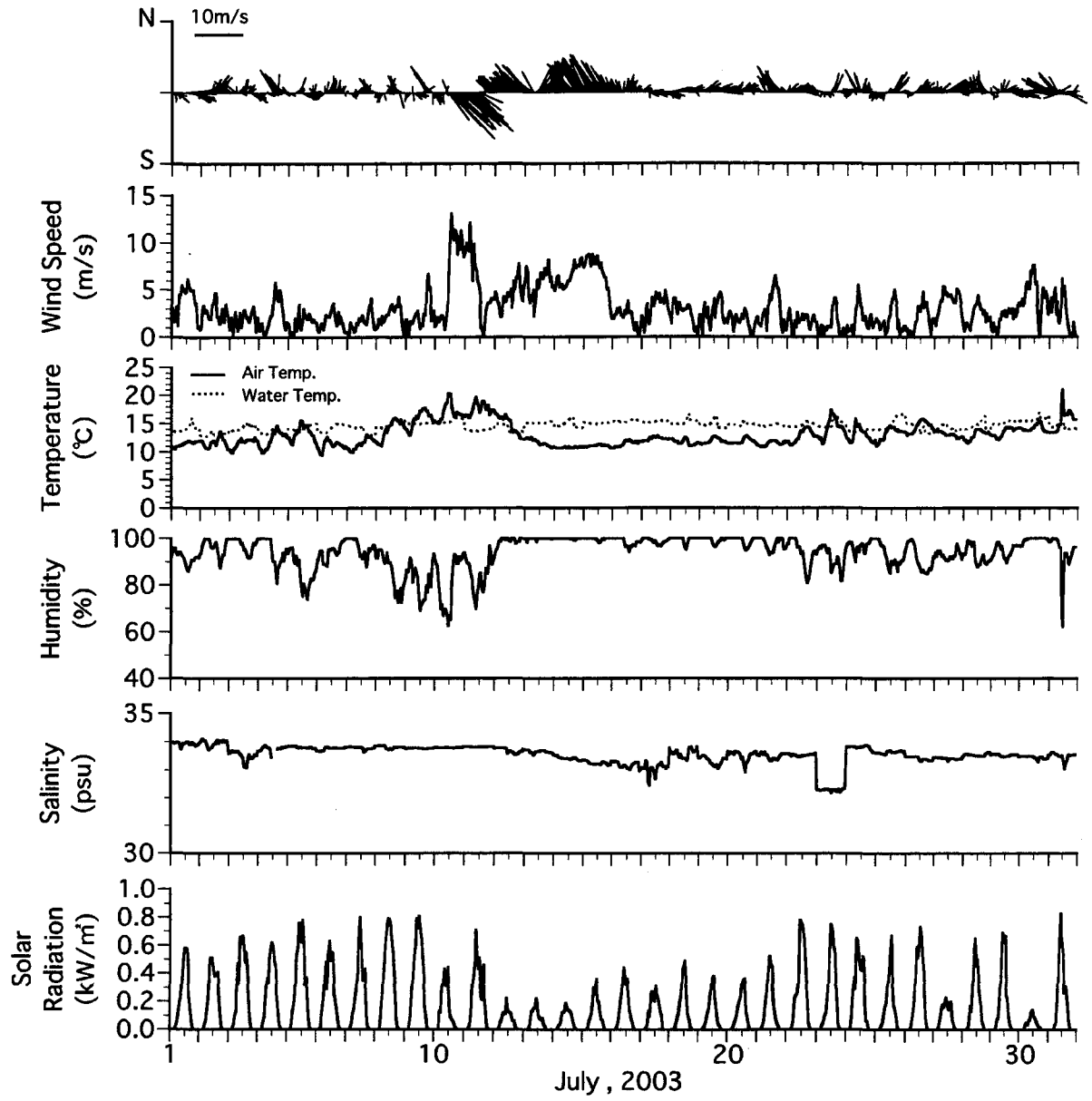


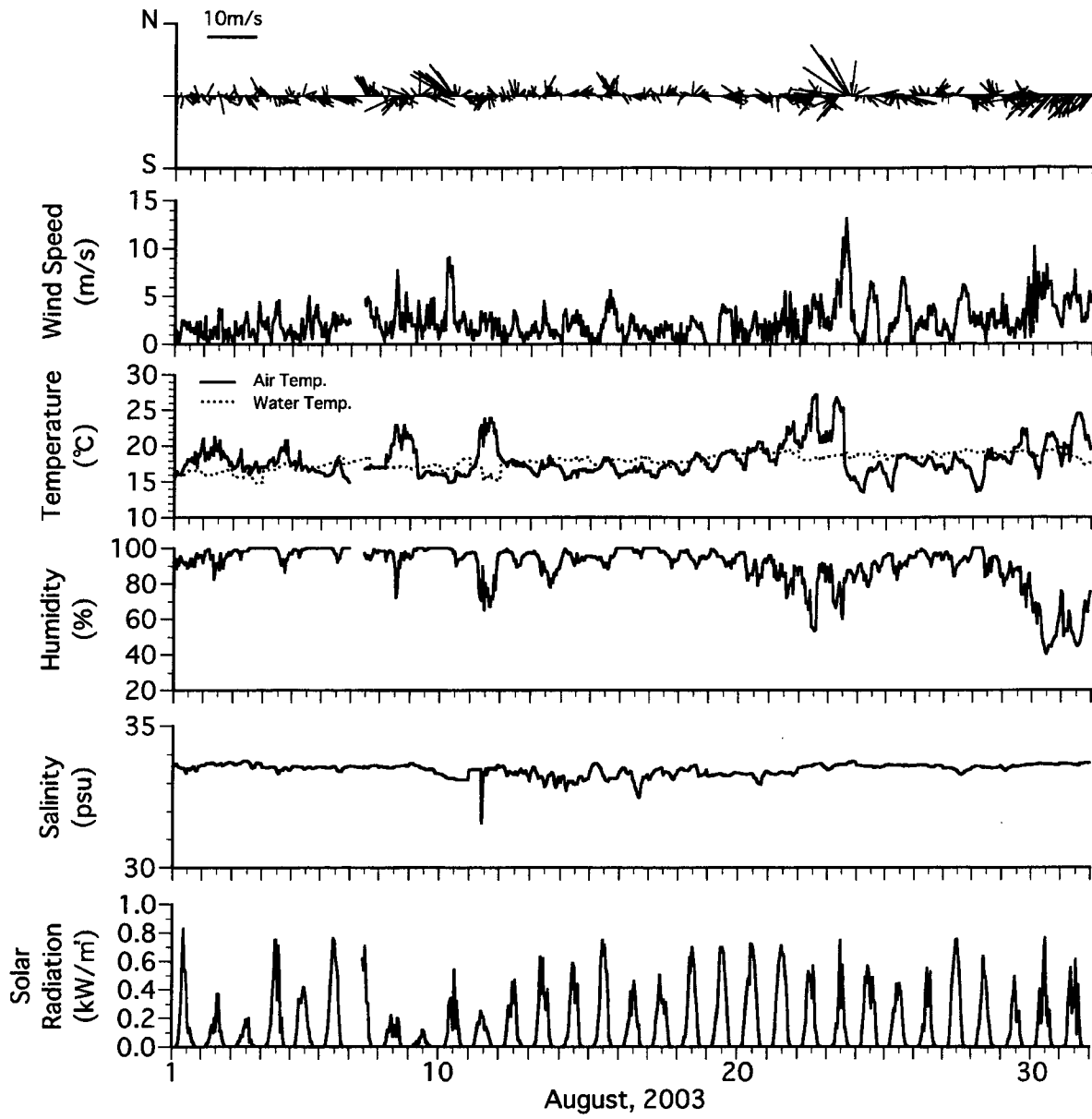


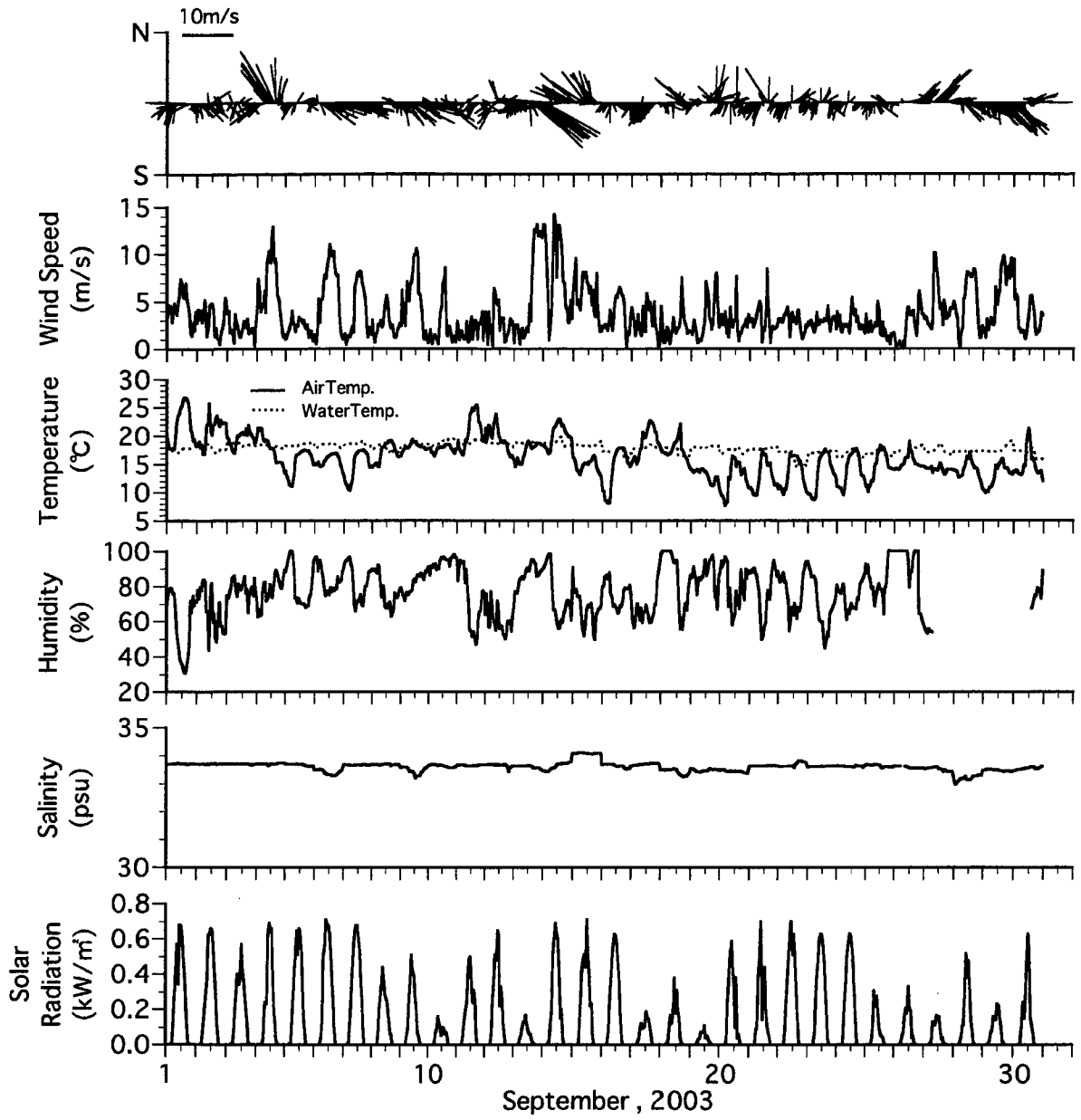


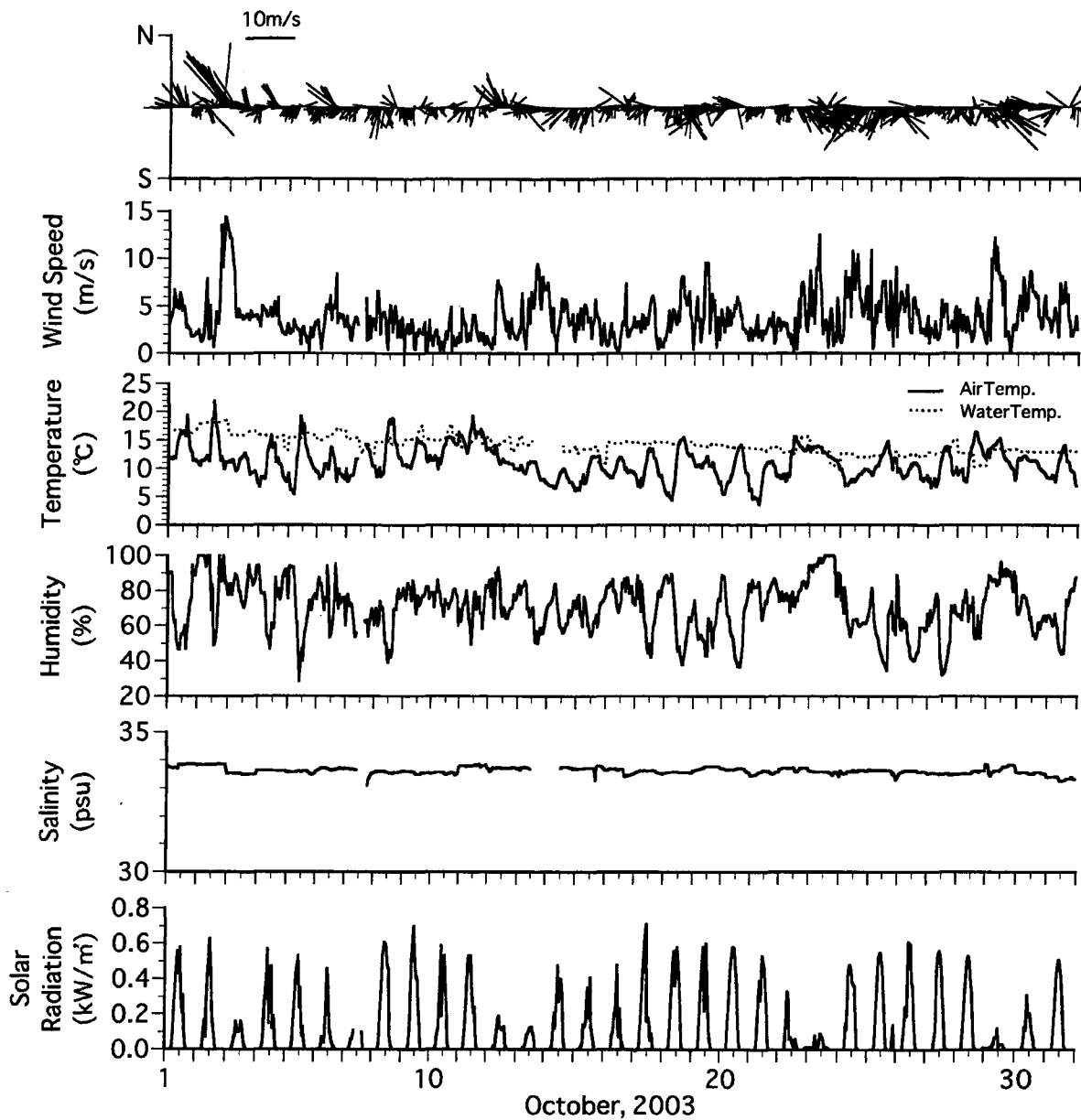


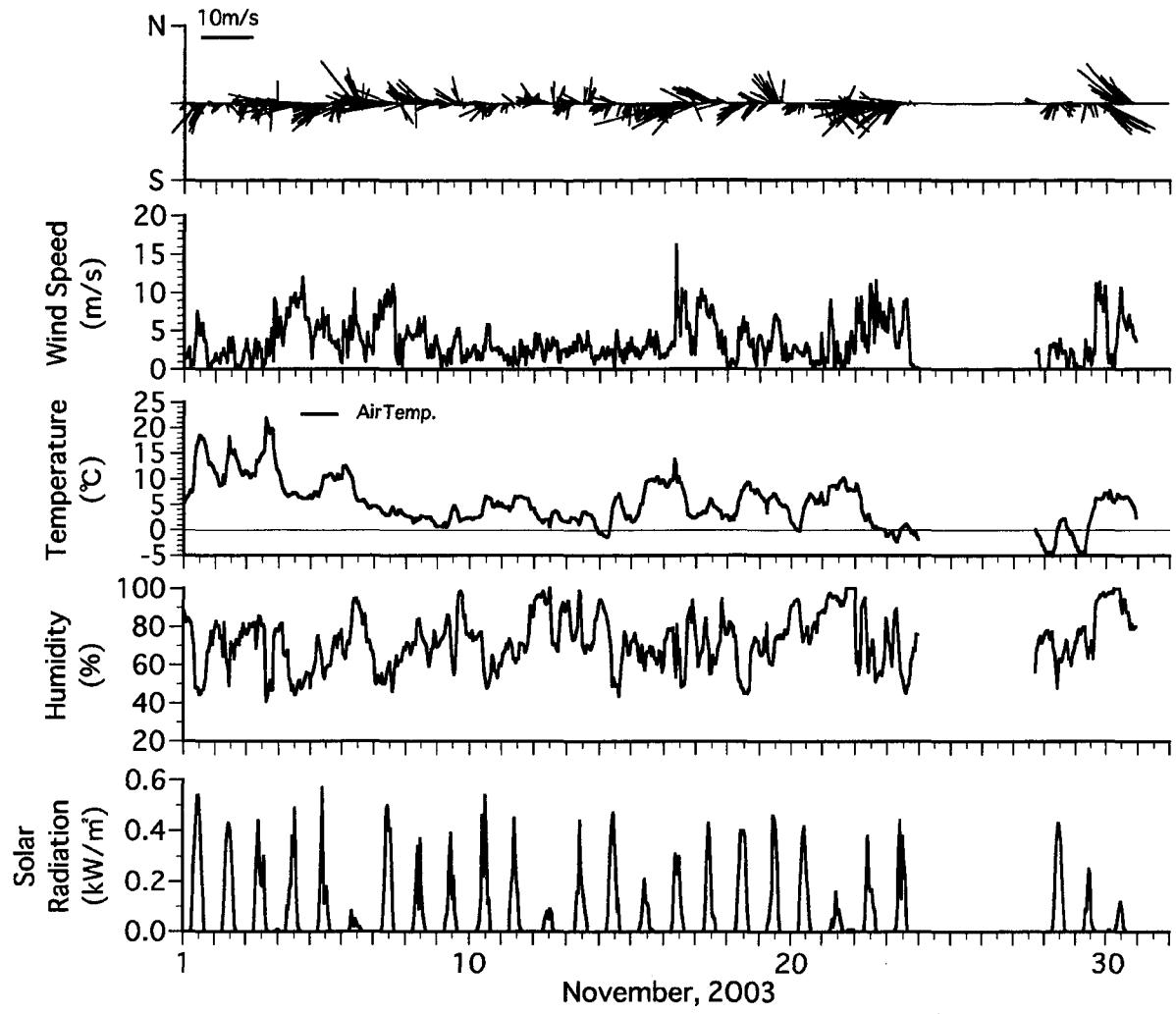


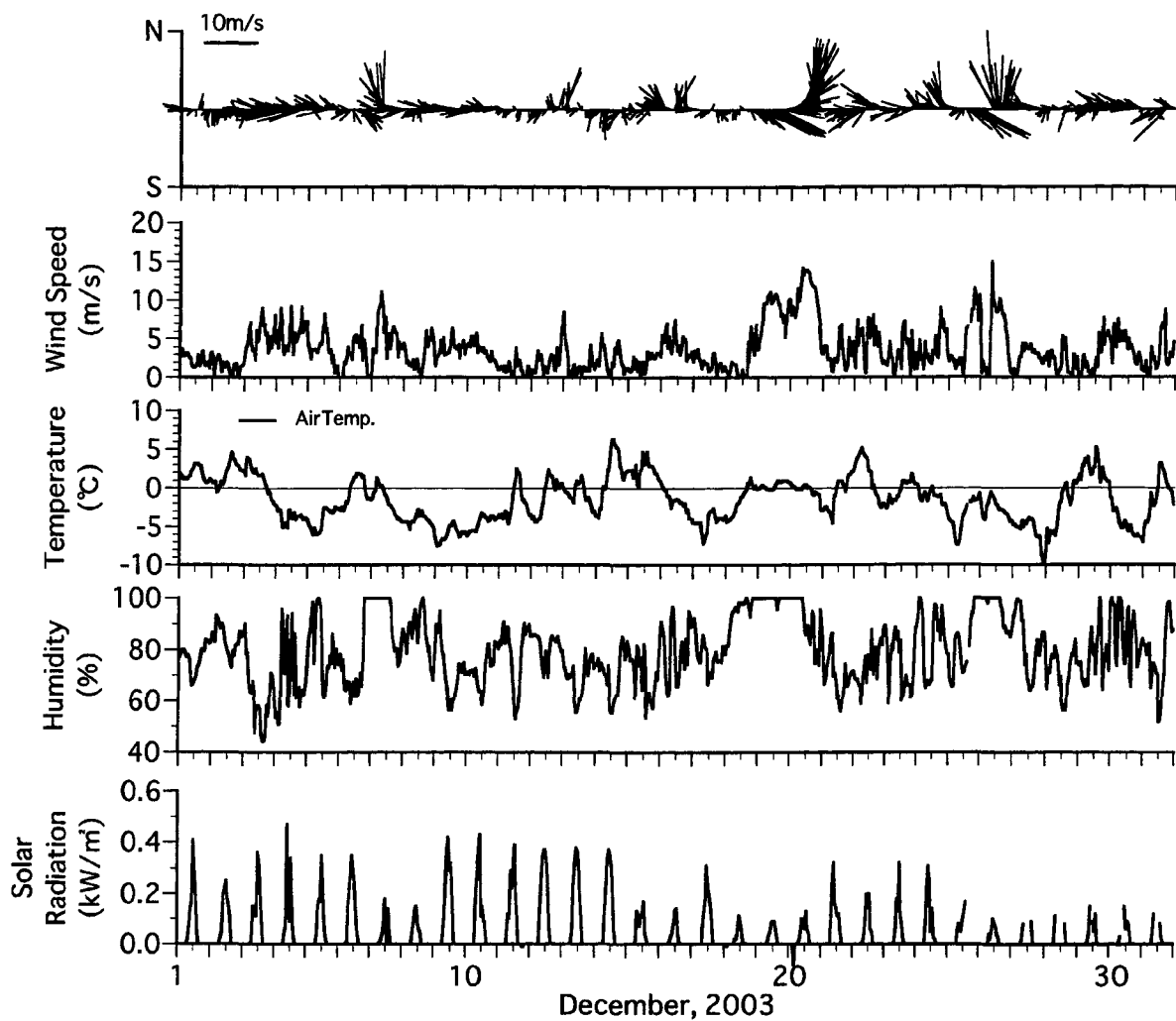












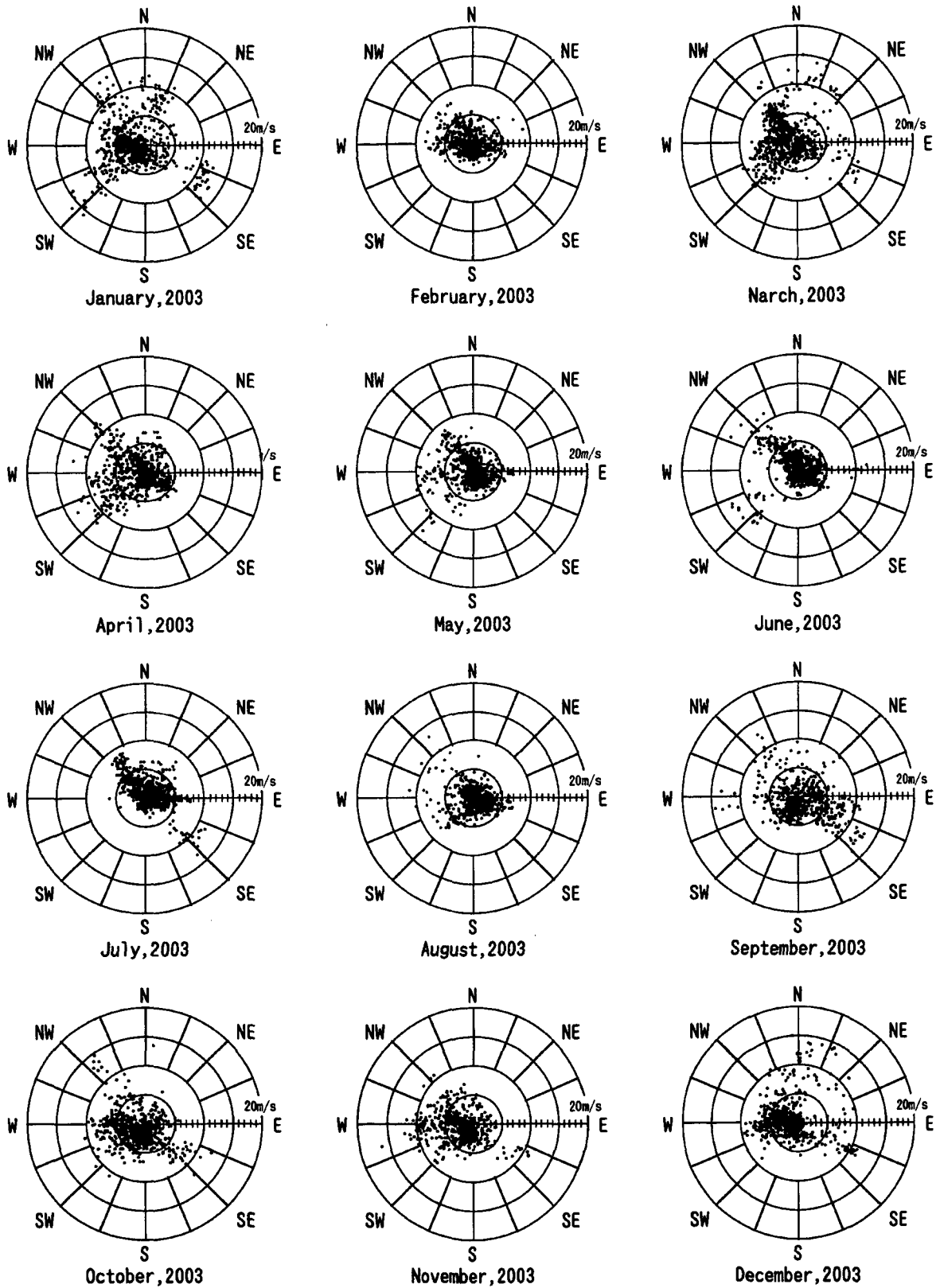


Fig. 4 Monthly wind roses obtained from the ASIOS tower during the period from January to December 2003.