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Meteorological Observations at Marine Towers in Mombetsu, Hokkaido, April 1997 – November 1998 *

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Abstract: Measurements of wind speed and direction, humidity, air temperature and solar radiation were carried out through all the year round by the Air-Sea-Ice Observation System (ASIOS) tower near Mombetsu Harbor, on the Okhotsk Sea coast of Hokkaido. In addition, time series of water temperature were obtained at another marine tower, the Okhotsk Tower. Time series of those variables were reported in this paper.

Key words: Meteorological variables, Air-Sea-Ice Observation System (ASIOS), Mombetsu, Sea of Okhotsk
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. Then, the tower was moved to another place and reconstructed on a breakwater of Mombetsu Harbor (Fig. 1). The new ASIOS has been operated at the new tower since April 1997. Measurements of wind speed and direction, humidity, air temperature and solar radiation carried out through all the year round by the ASIOS were reported in this paper. In addition, reported also here is the water temperature obtained at the Okhotsk Tower, which is located at the other side of Mombetsu Harbor (Fig. 1).

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. Another marine tower, the Okhotsk Tower is located at the east end of Mombetsu Harbor (Fig. 1) and mainly used for oceanographic observations and tourism to see the water under sea ice. Time series of wind speed and direction, humidity, air temperature and solar radiation obtained from the ASIOS tower are shown in Fig. 2, along with the water temperature obtained from the Okhotsk Tower during the period from April 1997 through November 1998. The relatively stronger winds over 20 m/s were observed at mid-September 1998, and air temperatures as cold as \(-15^\circ\text{C}\) were observed in February 1998 during the sampling period. Wind roses are shown monthly in Fig. 3. The SW to NW winds were predominant from November to May, and the NW wind was predominant in June and July.

Acknowledgements. We wish to thank the Hokkaido Development Bureau and Municipal Office of Mombetsu for their supply of reconstructing the new ASIOS tower.
References


Fig. 1  The sites of the Air-Sea-Ice Observation (ASIOS) tower and the Okhotsk Tower, Mombetsu, Hokkaido.
Fig. 2  Time series of wind speed and direction, humidity, air temperature and solar radiation obtained from the ASIOS tower and of water temperature obtained from the Okhotsk Tower during the period from April 1997 through November 1998.
Meteorological Observations at Marine Towers

Wind Speed (m/s) at ASIOS Tower, Mombetsu

Humidity (%)

Air Temp. (deg.C)

Water Temp. (deg.C)

Solar Radiation (kW/m²)

May, 1997
Wind Speed (m/s)  ASIOS Tower, Mombetsu

Humidity (%)

Air Temp. (deg.C)

Water Temp. (deg.C)

Solar Radiation (kW/m²)

June, 1997
Meteorological Observations at Marine Towers

ASIOS Tower, Mombetsu

Wind Speed (m/s)

Humidity (%)

Air Temp. (deg. C)

Water Temp. (deg. C)

Solar Radiation (kW/m²)

July, 1997
August, 1997
Meteorological Observations at Marine Towers

Wind Speed (m/s)

Humidity (%)

Air Temp. (deg.C)

Water Temp. (deg.C)

Solar Radiation (kW/m²)

September, 1997
Wind Speed (m/s)

Humidity (%)

Air Temp. (deg.C)

Water Temp. (deg.C)

Solar Radiation (kW/m²)

October, 1997
Wind Speed (m/s)

Humidity (%)

Air Temp. (deg.C)

Water Temp. (deg.C)

Solar Radiation (kW/m²)

December, 1997
Meteorological Observations at Marine Towers

ASIOS Tower, Mombetsu

Wind Speed (m/s)

Humidity (%)

Air Temp. (deg. C)

Water Temp. (deg. C)

Solar Radiation (kW/m²)

January, 1998
March, 1998
Meteorological Observations at Marine Towers

Wind Speed (m/s)

Humidity (%)

Air Temp. (deg.C)

Water Temp. (deg.C)

Solar Radiation (kW/m²)

ASIOS Tower, Mombetsu

May, 1998
ASMOS Tower, Mombetsu

June, 1998
Meteorological Observations at Marine Towers

Wind Speed (m/s)

Humidity (%)

Air Temp. (deg. C)

Water Temp. (deg. C)

Solar Radiation (kW/m²)

July, 1998
Wind Speed (m/s)

Humidity (%)

Air Temp. (deg.C)

Water Temp. (deg.C)

Solar Radiation (kW/m²)

August, 1998
Meteorological Observations at Marine Towers

ASIOS Tower, Mombetsu

Wind Speed (m/s)

Air Temp. (deg.C)

Water Temp. (deg.C)

Humidity (%)

Solar Radiation (kW/m²)

September, 1998
Wind Speed (m/s)

Humidity (%)

Air Temp. (deg. C)

Water Temp. (deg. C)

Solar Radiation (kW/m²)

October, 1998
Meteorological Observations at Marine Towers

Wind Speed (m/s)

Humidity (%)

Air Temp. (deg. C)

Water Temp. (deg. C)

Solar Radiation (kW/m²)

November, 1998
Fig. 3  Monthly wind roses obtained from the ASIOS tower during the period from April 1997 through November 1998.