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MICROCLIMATE STUDIES IN THE YUKIDORI VALLEY, LANGHOVDE, ANTARCTICA IN 1988–1989 (EXTENDED ABSTRACT)

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A survey of biological meteorology was undertaken by the members of the Japanese Antarctic Research Expedition (JARE-27–29) during the periods from 1986 to 1989. The survey was carried out along the stream in the Yukidori Valley, Langhovde, Antarctica as part of the research project "Studies on the mechanism of the Antarctic terrestrial ecosystems" (KANDA *et al.*, 1990). One of the purposes of the research project was to measure microclimatic elements surrounding the vegetation along the valley, *i.e.*, wind direction, wind speed, radiation, air temperature, relative humidity and temperature at the moss level.

In the present study, we analyzed the microclimate data measured by the members of JARE-29 in the Yukidori Valley for six months from January 1988 to April 1988 and from November 1988 to January 1989.

The stations for the microclimate study are shown in Fig. 1. The valley is about 2.5 km long. A stream runs almost straight from the continental ice sheet at the east end and flows into Lützow-Holm Bay. Steep cliffs develop in the upper course and low hills develop from the middle to lower courses of the valley. Three microclimate stations (MCS-1 to MSC-3) were set up along the valley from the upper to lower courses. The altitude of MCS-1, 2 and 3 is about 180 m, 60 m and 10 m, respectively. The microclimate data at these stations were automatically recorded with a data logger at intervals of 15 minutes (occasionally 30 minutes) during the present study. These data were already published in the series of JARE Data Report (OHTANI *et al.*, 1990) with the detailed methods and specifications of instruments for measurement.

The preliminary results of the analysis of the relationships between the microlcimate data and topographic condition of the studied stations are given below.

1) Wind direction and wind speed at 3 m above the ground

On stormy days with snowfall, the prevailing wind direction was E to ENE. Then, snowdrifts were often formed on the leeward of stones and rocks. Monthly mean values of wind speed ranged from 0.9 (April at MCS-3) to 4.3 m/s (March at MCS-1). Maximum wind speed (27.7 m/s) was recorded on 21 March at MCS-1 where a V-shaped valley develops.

2) Radiation

Maximum radiation was *ca.* 1600 μmol m^{-2} s^{-1} in late December and *ca.* 200 μmol m^{-2} s^{-1} in late April. Among three stations, the lowest total radiation was recorded

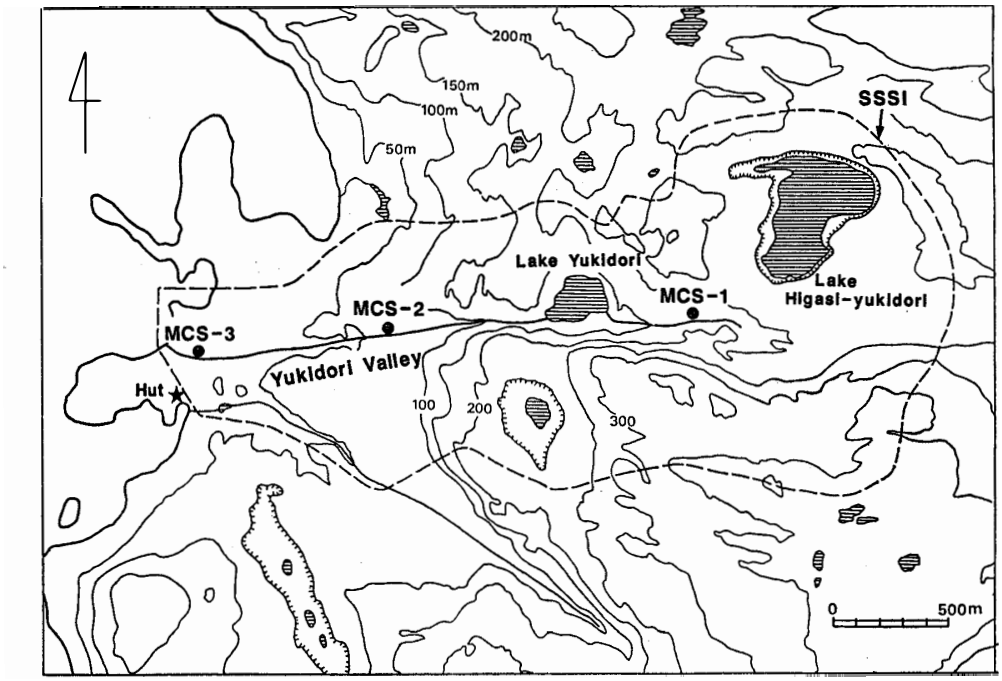

Fig. 1. Map showing the microclimate stations in the Yukidori Valley, Langhovde, Antarctica.

at MCS-1 where a V-shaped valley develops and the highest was recorded at MCS-3 where the slope is gentle.

3) Relative humidity at 1.5 m above the ground

Daily mean values of relative humidity ranged from 24% (February at MCS-2) to 88% (January at MCS-2, March at MCS-1). Monthly mean values of relative humidity ranged from 41% (February at MCS-2) to 59% (April at MCS-3). No marked seasonal change of relative humidity was observed. Mixing ratio of water (weight g) in 1 kg air was usually lower than 3 g/kg owing to low air temperature.

4) Air temperature at 1.5 m above the ground

Daily mean values of air temperature ranged from −17.9°C (April at MCS-3) to 5.2°C (January 1988 at MCS-3). Monthly mean values of air temperature ranged from −11.4°C (April at MCS-2) to 1.5°C (January 1988 at MCS-3). Maximum air temperature (9°C) was recorded on 13 January of 1988 at MCS-3. Temperature at MCS-1 was usually lowest among three stations. MCS-1 is close to the continental ice sheet and is highest in altitude (180 m) among three stations. Variation of daily mean values of air temperatures at three stations was usually restricted in the range of 2°C.

5) Temperature at the moss level

Daily mean values of the temperature at the moss level ranged from −15.2°C (April at MCS-1) to 14.8°C (January 1989 at MCS-3). Monthly mean values of the temperature ranged from −10.7°C (April at MCS-1) to 11.2°C (January 1989 at MCS-3). In midsummer, the temperature usually rose to 10–20°C, sometimes rising to 30°C in the daytime, and fell to around 0°C in the nighttime. The daytime temperature was mostly higher than air temperature and was higher in the dry moss colony than in the wet moss colony. For example, the highest temperature of moss colonies at MCS-2 was 14.7°C in January 1988 when wet, but 29.2°C in January 1989 when dry.

References

KANDA, H., INOUE, M., MOCHIDA, Y., SUGAWARA, H., INO, Y., OHTANI, S. and OHYAMA, Y. (1990): Biological studies on ecosystems in the Yukidori Valley, Langhovde, East Antarctica. Nankyoku Shiryô (Antarct. Rec.), **34**, 76–93.

OHTANI, S., KANDA, H. and INO, Y. (1990): Microclimate data measured at the Yukidori Valley, Langhovde, Antarctica in 1988–1989. JARE Data Rep., **152** (Terr. Biol. 1), 216 p.

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