

ある南極湖沼の結氷下で観測された内部波

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Internal waves observed under an ice-covered Antarctic lake

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Abstract: In ice-covered Antarctic lakes, almost no movement of water have been believed to occur during winter because supply of water from surrounding catchments was stopped, direct effect of wind-induced disturbance was screened by the ice cover and the inverse thermal stratification developed under the ice. We tried to obtain the time-serial data of lacustrine environment, such as weather, water temperature profiles and time-lapse video camera images of the benthic microbes on lakes in Syowa Oasis, east Antarctica. Water temperature profiles indicated the lake water was well vertically mixed and gradually cooled in February until the start of ice formation. Immediately after the ice covered the surface, water temperature was re-warmed by solar radiation penetrating into the lake and inverse thermal stratification was developed. In May, the stratified layers (beneath the ice cover and bottom-sediment interface) suddenly weakened several times during strong storm conditions (wind speed: >40 m/s). The time-lapse video recorded the scenes of 'swinging moss pillars' when the storm came, and showed the occurrence of internal waves under an ice covered lake.

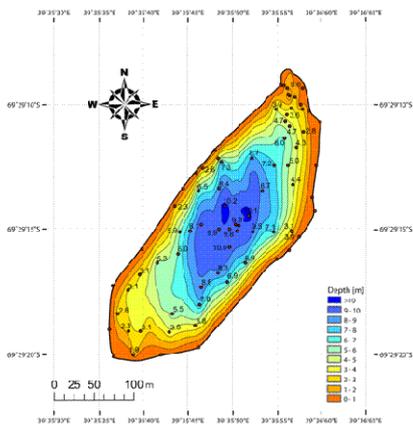
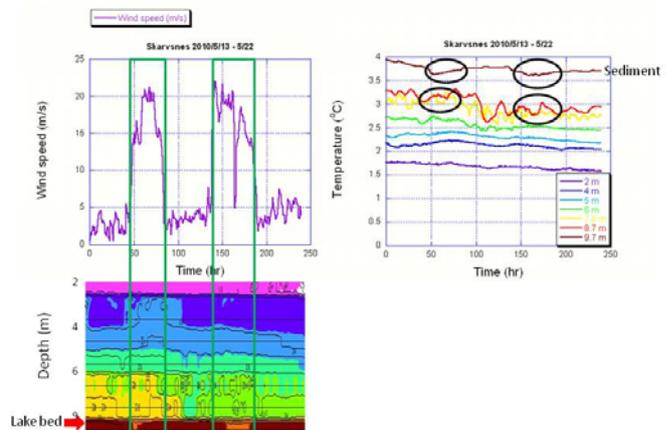


Figure 1. Bathymetric map of Lake Naga Ike.

体である「コケボウズ」が、この暴風時に約1秒周期でコケボウズがゆっくりと揺れている様子を捉えていた。3月から結氷した湖水は5月にはこの地域では約50cm以上まで厚さを増す。しかし、40m/sを越えるような暴風時、その氷がたわみ振動した結果、内部波が発生し、氷下の温度成層した水や湖底に伝わって水の動きを生じさせたのであろう。この水の動きは水温躍層や堆積物中の温度変化を生じさせていたことから、結氷期間において停滞しがちの湖水や湖底の堆積物と湖水との混合を促進し、湖内の物質循環に影響を及ぼすものと考えられる。

Figure 2. Wind speed (upper-left), water temperature contour and temporal changes of temperature at 7 depths of Lake Naga Ike.



References

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2. Kudoh, S., Tanabe, Y., Uchida, M. and Hori, K., Development and setting of a time-lapse video camera system for the Antarctic lake observation. *Antarct. Rec.*,54, 226-235, 2010.