ACG031-12   Room: 301B   Time: May 28 11:56-12:09

Accuracy of the snow cover in the Lena River basin, Siberia

Konosuke Sugiura[1*], Tetsuo Ohata[1]

[1]JAMSTEC

The amount of snow is an essential part of the hydrological cycle over cold regions. It is generally recognized that the snow water equivalent of mountains is much than that of plains.
We investigate the altitude dependence on snow depth in the Lena River basin, Siberia, using the data of weather stations and intensive snow surveys.
The snow depth data of 30 weather stations in the Lena River basin for 1986-2004 in Baseline Meteorological Data in Siberia (BMDS) Version 4.1 (Suzuki et al., 2007) were analyzed. The weather stations in the Lena River basin were located between 8 m a.s.l. and 1762 m a.s.l.
The snow depth data of 9 points between Yakutsk and Verkhoyansk on March 1999 and 18 points between Yakutsk and Irkutsk on March 2000 (Snow Cover Survey in East Siberian Region -Data Book (1998-2000)- by NIPR) were also analyzed. The altitude of the snow survey points was ranging from 135 m a.s.l. to 770 m a.s.l. in 1999 and from 40 m a.s.l. to 535 m a.s.l. in 2000.
In addition, we carried out the intensive snow survey on March 2007, and the 40 snow depth data between Yakutsk and Neriungri were obtained. The altitude of the snow survey points was ranging from 129 m a.s.l. to 1394 m a.s.l. The snow depth in the intensive snow survey was measured using a snow stick. The total snowpack weight was measured using a cylindrical snow sampler with 0.005-m2 area. The total snow density was calculated from the measured snow depth and the measured total snowpack weight. The snow water equivalent was estimated from the measured snow depth and the calculated total snow density. The altitude was measured using a handy-type GPS.
To investigate the altitude dependence on snow depth in the Lena River basin, a linear equation as a function of altitude was fitted as $SD = aH + b$, where SD is the snow depth [mm], a is the increase ratio of snow depth due to altitude [mm/m], H is the altitude [m], and b is a constant [mm].
It was found that the snow depth of weather stations in the Lena River basin decreases slightly with an increase in altitude. This negative dependence of altitude on snow depth changes with seasonal progress, ranging from -0.1[mm/m] at the beginning of winter to -0.3 [mm/m] at the end of winter.
On the other hands, all results of the snow survey in the Lena River basin showed that the snow depth increases slightly with an increase in altitude. This positive dependence of altitude on snow depth is 0.6[mm/m] between Yakutsk and Verkhoyansk in 1999, 0.4[mm/m] between Yakutsk and Irkutsk in 2000, and 0.7[mm/m] between Yakutsk and Neriungri in 2007.
Although the increase ratio of snow depth due to altitude varies according to the place, there are field researches in plenty to generally show positive dependence of altitude on snow depth. One possible interpretation is that there are fewer weather stations at high altitudes and thick snow area in the Lena River basin. This different dependence may have a misunderstanding of the hydrological cycle in this basin. It is important to continue to carry out the snow survey in order to better understand snow cover change and to reduce the uncertainty in snow amount estimates.
The results of the present study will be useful for validation of global and regional climate models conducted in the Rena Liver basin, particularly for interpretation of snow cover in the Rena Liver basin.