Snow cover properties observed in Indigirka lowland near Chokurdakh, Northeastern Siberia

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Quantifying the spatial and temporal variations in snow depth, density, and snow water equivalent (SWE) is essential for many applications in hydrology and ecology. Snow survey including observation on the water isotope ratios of snow was conducted in Indigirka lowland near Chokurdakh (70.62 N, 147.90 E), Northeastern Siberia. Isotopic composition of water is powerful tool for investigation of hydrological processes such as discerning of source water for river discharge, ground ice, etc. The purposes of this study are (1) to know the spatial variations in snow depth, density, SWE and stable isotopic composition in this area, and (2) to estimate SWE in areal or reginal scale, by scaling-up based on topographic and vegetative controls on SWE.

Snow survey was conducted in April 2014 and April 2015. Two transects from Chokurdakh to south and southwest, which are approximately 40 km and 20 km in length respectively, were set, and observation and sampling were made at 7 points and 4 points in 2014, respectively, and 12 points on the 40 km transect in 2015. In addition, snow survey was conducted at 25 points in 2014 (24 points in 2015) in total in the area measured approximately 1.2 km east to west at site K where various observations are conducted for taiga-tundra boundary ecosystem. The ranges of snow depth, density, SWE and $\delta^{18}O$ in this area observed in 2014 were 30 to 90 cm, 0.137 to 0.318 g/cm^3, 70 to 200 mm and -36.5 to -22.9‰, respectively, whereas those observed in 2015 were 12 to 83 cm, 0.131 to 0.325 g/cm^3, 20 to 160 mm and -31.2 to -22.8‰, respectively. Although the values and the ranges were slightly different between 2014 and 2015, observed snow cover properties depended on vegetation type and showed consistencies: snow cover was the deepest at the site covered by dense and tall shrub, while snow density was the highest on ice over a lake. The SWE was the highest at shrub site, whereas that was the lowest at the site of sedge and/or sphagnum wetland. Spatial variation in delta-values of snow was observed, however there was no correlation with vegetation type, snow depth and snow density. Since clear relationship between SWE and vegetation type, SWE was estimated using a data on fraction of each vegetation obtained from a vegetation map drawn with high resolution satellite data (world view 2) and in situ observation (Morozumi et al., in preparation). The local average SWE values in observation area (10 ×10 km) were estimated to be 100 mm in 2014 and 78 mm in 2015.

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