



A large scale snow model for mountainous terrain in Hokkaido

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Snowfall and snowmelt are key processes in hydrological model of mountainous terrain. In Hokkaido, observed flow shows significantly high flow during spring time (April and May) due to snowmelt and during rainy period (July-September) due to seasonal weather and typhoons. For this region, the simplified snow model could not properly capture the complex hydrological process as peak discharge during melting period is always underestimated. In this study, we attempt to improve the snow routine by integrating elevation bands to distribute temperature and precipitation and extending the snowmelt process to be a function of radiation and albedo, not only temperature.

RMS rainfall runoff model combines the snow model with a semi-distributed hydrological model (TOP-MODEL) and it uses to simulate a hydrological process of several river basins in Hokkaido. We separated each river basin into several catchments of about 500 km². Each catchment is divided into several elevation bands (when running snow model) and grouped into several bins (when running TOPMODEL). The RMS model is performed over large part of Hokkaido and the model results are compared with observed flow of over 30 stations which have upstream area ranging from 150 km² to over 10,000 km². Overall model performance is improved from 0.4 to 0.6 (for R²) and 0.3 to 0.5 (for Nash-Sutcliffe coefficient) when comparing the results of simplified snow model with the more complex snow model.