Assessment of climate change impact on river discharge in cold and mountainous region in Japan

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Abstract To evaluate the impacts of climate change on river discharge, we applied a hydrological simulation to one of the major river basins in Japan, located in a cold and mountainous region. A super-high-resolution atmospheric general circulation model (AGCM) with a horizontal resolution of about 20 km, developed by the Meteorological Research Institute of Japan Meteorological Agency (JMA-MRI), was used for the future projection with a simple bias correction. River discharge was estimated using a distributed hydrological model that was calibrated in advance using long-term observation data. The results showed that even if the amount of precipitation does not change greatly in the future, river discharge will change significantly with air temperature rise, owing to increased rainfall, decreased snowfall in winter and decreased snowmelt in early spring. These changes will become more serious in northern cold mountainous regions because the water resources of these regions are currently dominated by the snowmelt.

Key words climate change; AGCM; river discharge; snow melt; distributed hydrological model; bias correction