

Recent increase of rain-on-snow events and rain proportion in north-eastern Japan

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Winter precipitation along the Japan Sea depends on cold winter monsoons from Siberia. These winds bring cold air and heavy snowfall to north-eastern Japan and Hokkaido. With more than 1000 mm of precipitation within the winter period deep snow covers are the result. Snow cover is not only important for tourism (Toyama snow corridor, e.g.) but even more important for forest ecosystems and agriculture, since snowmelt is the main supply for plants in the relatively dry spring. However, recently snow cover decreases due to less snowfall and more rainfall during winter. Rain-to-snow proportion changed from 1:2 to almost 1:1 within the last decade in the Shonai plains in Yamagata prefecture. As consequence, snow cover (in a mild winter 2019/2020) was in January 80% smaller than in the years before. Results of the last decade show that the total amount of precipitation, especially between December and March does not significantly change. In contrast, because of significantly more rain, Snow Water Equivalent (SWE) will decrease.

Comparing different meteorological stations and the shifting snow-to-rain transition more recurrent mild and rainy winters can be expected for future. Those winters may result in water shortage in April and May, because snowmelt finishes early and precipitation is low in these months. Simultaneously forest plants start transpiration and agricultural lands are prepared, a significant decrease in snow due to climate change could therefore have negative impact on forest and agriculture. Climate change models already predicted weakening of Siberian winter monsoons, which will result in warmer winters with less snow. In order to characterize changes along the Japan sea we compared precipitation data of different meteorological stations and analyzed the change of rain proportion within the last decade.

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