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REVIEW

For the dissertation (PhD) on the topic
Study of dynamics of changes in snow cover moisture content in the Esil and Nura-Sarysu basins under climate change conditions

Candidate's Name: Tillakarim, Tursyn
Specialty: 8D05204 - Meteorology

Short description of the dissertation and achieved results

The study conducted by Ms Tursyn Tillakarim focuses on the dynamics of snow cover moisture (also called snow water equivalent) in the river basins of Esil and Nura-Sarysu in Kazakshtan. Considering the importance of snow regime in the hydrology of north Kazakhstan, the study delivers valuable results related to climate change and potential impacts in the future. Ms. Tillakarim has conducted the research study with a high quality. Achieved results are important for water resources planning as well as disaster risk reduction where snow can play an important role.

Ms. Tillakarim conducted a comprehensive literature review followed by a methodological conceptualization of the study. The simple methodology implemented in the MODSNOW-Tool was used to simulate the impact of climate change on snow cover moisture content. The calibration of the snowmelt methodology was done at first to tune model parameters, followed by simulation of snow evolution in times of temperature warming. Different performance measures such as NSE, RSR or PBIAS were used to evaluate the calibration and validation of the results.

In the second of the study, the climate projections were used to understand the impact of climate change on snow regime in the future. For this different modeling realizations were used and expected changes on snow cover was calculated for each climate projection. Finally, expected changes on water formation due to snowmelt was estimated for the future period and statistically analyzed.

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Positive sides of conducted research

The study answers questions highly relevant for the hydrology and economy of Kazakhstan as water resources being formed due to snowmelt is important for Kazakhstan and its ecology as well as economy. The study uses simple but robust methodology that is applicable in data limited regions such as Kazakhstan and delivers good picture of potential changes on snow regime in the future in selected river basins.

Comments and suggestions

Only minor modifications, which is communicated with the candidate.

Reviewer: Dr. Abror Gafurov, GFZ Potsdam, Germany

27 November 2023. Signature A. Gafs

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