EGU21-16147, updated on 24 Sep 2021
https://doi.org/10.5194/egusphere-egu21-16147
EGU General Assembly 2021


# Seasonal to sub-seasonal hydrological forecast in Central Asia to improve water management and mitigate hydrometeorological risks

**Abror Gafurov**[1], Olga Kalashnikova[2], Uktam Adkhamov[1], Akmal Gafurov[3], Adkham Mamaraimov[3], and Djafar Niyazov[4]

[1]GFZ German Research Centre for Geosciences, Potsdam, Hydrology, Potsdam, Germany (gafurov@gfz-potsdam.de)
[2]Central Asian Institute of Applied Geosciences (CAIAG), Bishkek, Kyrgyzstan
[3]Uzbek National Hydrometeorological Service (Uzhydromet), Tashkent, Uzbekistan
[4]Institute of Water Problems, Hydroenergy and Ecology under National Academy of Science, Dushanbe, Tajikistan

Central Asia is facing a water shortage due to the negative impacts of climate change and demographic development. Water resources in this region originate mainly in the mountains of Pamir and Tian-Shan due to snow-and glacier melt. However, a limited observation network is available in these mountain systems and many are malfunctioning. Thus, the region needs new innovative methods to forecast seasonal and sub-seasonal water availability to ensure better water resources management and mitigate hydro-meteorological risks.

In this study, we present the results of our efforts for many years to develop a forecasting tool and implementation in the region. Since the region has limited observed meteorological data, we use primarily remote sensing data on snow cover for this purpose. We apply the MODIS snow cover data that is processed, including cloud removal, using the MODSNOW-Tool. We have applied this tool, which can be used to monitor snow cover in an operational mode and forecast water availability for the vegetation period but also for the monthly scale using the multiple linear regression method.

Our results show that snow is important in most of the river basins and can also be used as a single predictor to forecast seasonal water availability. Especially, in remote areas with limited observations, this approach gives a possibility of forecasting water availability for different time period. Besides seasonal hydrological forecast, the MODSNOW-Tool was also used to forecast water availability for upcoming months. The validity of forecasts were tested against observed discharge for the last 20 years and mostly above 70 % verification was achieved. Additionally to remote sensing based snow cover data, observed meteorological information was also used as predictors and improved the validity of forecast models in some river basins.

The implementation of the MODSNOW-Tool to improve the hydrological forecast was done for 28 river basins in Central Asia that are located in the territories of five post-Soviet countries Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan. The MODSNOW-Tool was also

implemented at the National Hydrometeorological Services (NHMS) of each post-Soviet country.