

Climate-Hydrology group

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- **Key Science Questions**

1. How did climate and hydrological regimes change in the past during the period of instrumental records and earlier (within approximately last 500 years) in the mountainous regions of Northern Eurasia at the background of global change?
 - a. What are the spatial patterns of the past climatic and hydrological changes?
 - b. How do climatic and hydrological changes vary with elevation?
2. How will climate change in the future?
3. What are the impacts of observed and potential impacts of projected climatic changes on natural and managed systems, particularly the water resources in the mountain regions?

- **What results are available? (Current knowledge)**

1. Air temperatures have been increasing in the cold season (and in the last two decades in the warm season) over most of the region. Changes in annual precipitation are spatially inconsistent also positive trends are observed in mountains of Central Asia. An increase in annual runoff in some catchments and redistribution of seasonal runoff (e.g., earlier freshet) has been observed over past few decades. Increase in snow line elevation and decrease on snow cover extent have been observed.
2. Climatic and hydrological monitoring networks have declined in the region (especially at higher elevations) during the past two decades. In many regions, these have become insufficient for the evaluation of climatic and hydrological changes. International data exchange still requires improvement. Remote sensing products have become widely available.

- **What should be done?**

1. Detailed characterization of climate and hydrology of mountainous regions is required using *in situ* observations, remote sensing products, and high resolution models suitable for these regions.
2. A much wider network of high altitude meteorological and hydrological stations is required. A special-observatory network should be developed in mountainous regions including energy balance, water balance, air quality, and other specialized observations.
3. WMO Resolution 40 recommending governments to supply hydrometeorological data free of charge (other than cost of data recovery) for non-commercial use should be implemented.
4. Multi-model climate projections should be developed for mountainous regions with high (not less than 25 km) spatial resolution using a selection of numerical regional climate models. High resolution hydrological models should be improved and tested for mountainous regions.
5. Training and educational programs involving the leading experts should be developed internationally and implemented locally with an objective of preparing a new generation of highly skilled professionals working in mountainous regions.
6. Accessible channels of information dissemination should be implemented to provide stakeholders (including general public) with climatic and hydrological information for further academic, practical, and educational use.

- **Message to decision makers**

Global climate is changing rapidly and mountain regions are particular susceptible to observed and projected changes. Urgent actions are required to prevent dangerous impacts on ecosystems and societies and develop viable adaptation strategies.