

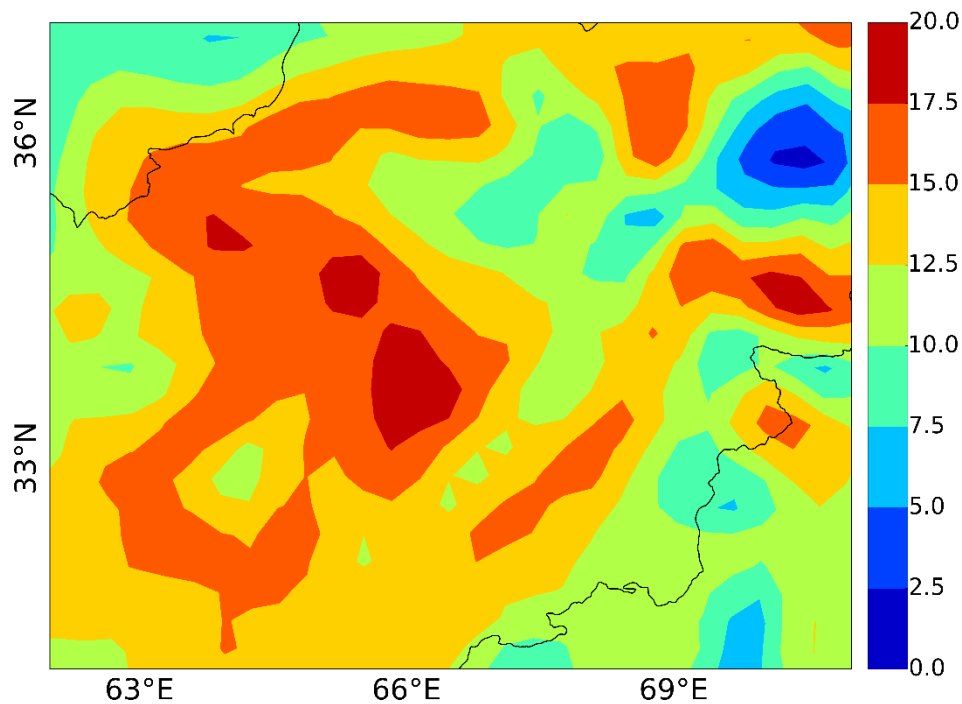
Report
on the “Satellite enhanced snowmelt flood and drought predictions for Kabul River basin
with surface and groundwater modeling” project

Dauren Zhumabayev

Afghanistan Meteorology modeling was done using Weather Research and Forecasting (WRF) model. Center of the domain is located at 34.19N and 66.48E. The resolution is 30km, with grid containing 39 grids from East to West and 29 grids from South to North, thus there are 1131 grids. Time period of simulations starts from 1 May 2008 till 12 August 2008 with time step of 6 hours.

Validation of WRF model outputs was done for temperature, precipitation and evaporation against Era Interim [1] gridded observations from EMCWF (The European Centre for Medium-Range Weather Forecasts)

For convenience WRF will mean outputs of Weather Research and Forecasting model, Era Interim will mean gridded observation of EMCWF, sign “-“ means minus sign.

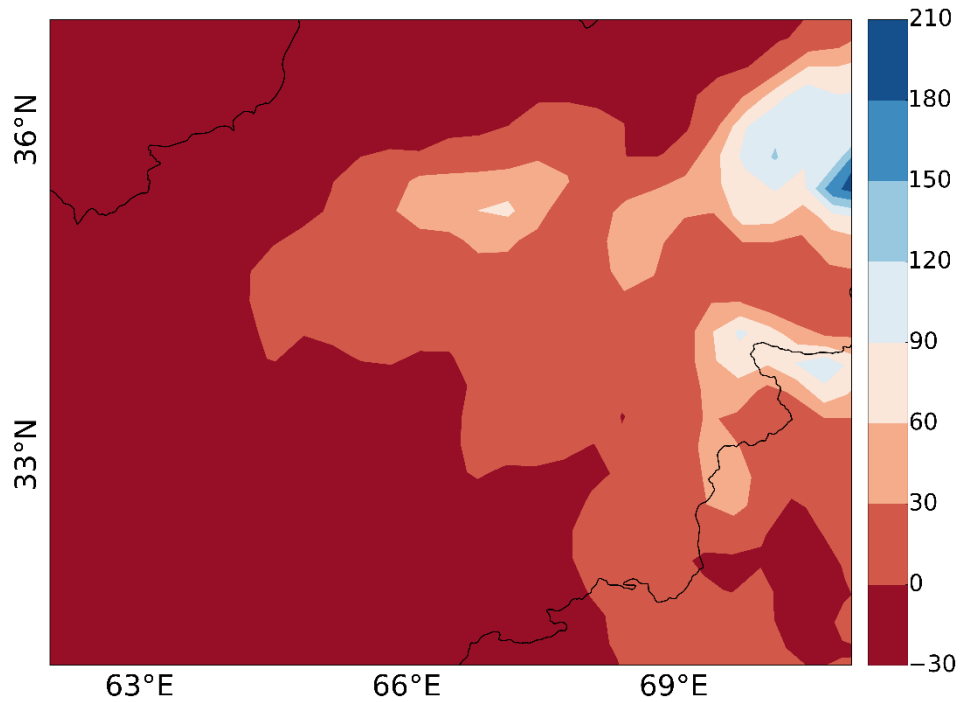


Picture 1. WRF-Era Interim. Difference in temperature distribution, May-August 2008, Degrees Celsius.

As it can be seen from Picture 1, there is significant difference between WRF output and Era Interim gridded observation in temperature. Further investigation is needed, in particular, comparison with local meteorological stations records to validate the model.

Whether WRF model overestimate temperature in Afghanistan or Era Interim underestimate temperature increase in Central Afghanistan.

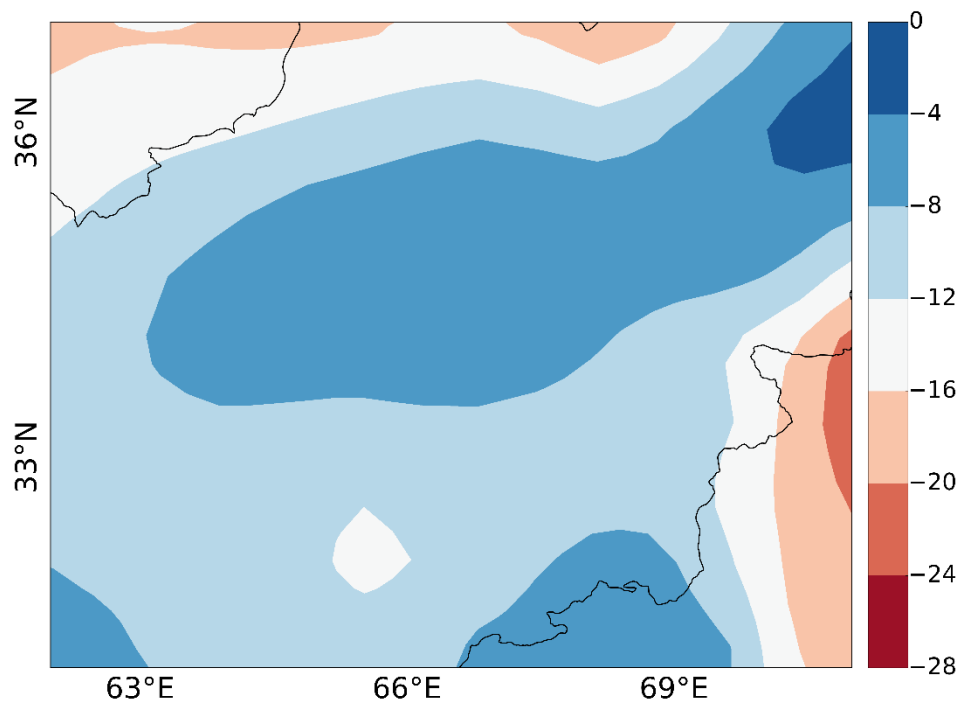
Next Picture 2, presents difference in summer precipitation between WRF and Era Interim.



Picture 2. WRF-Era Interim. Difference in precipitation distribution, May-August 2008, mm

As it can be seen from picture notable differences are only over mountains region. WRF precipitation is higher than gridded observation over mountains and less over plain part of Afghanistan.

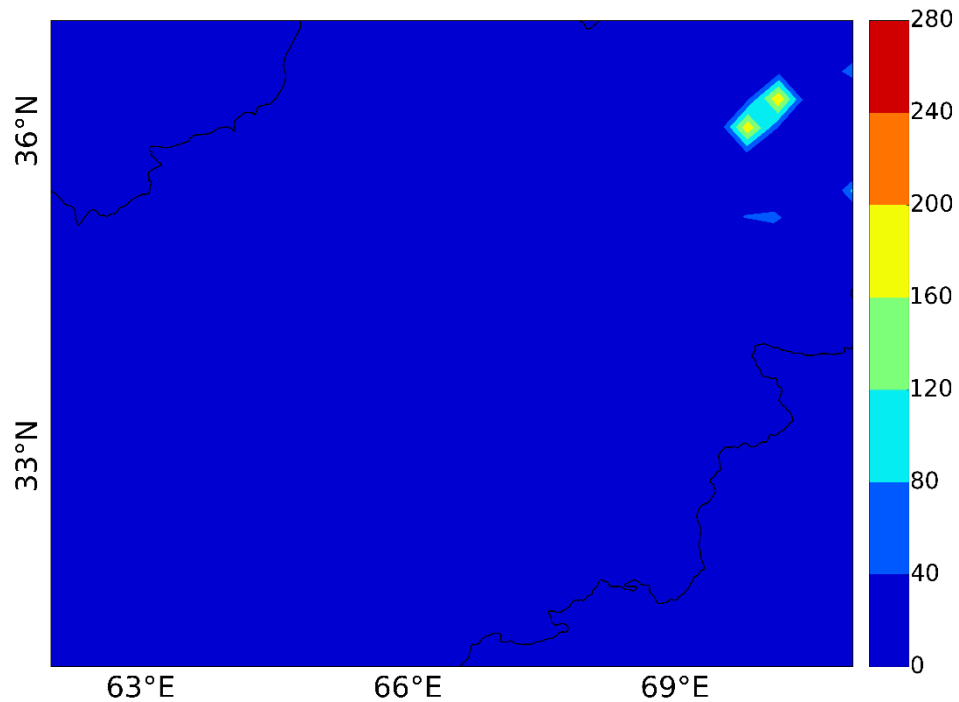
Picture 3 presents similar plot for evaporations.



Picture 3. WRF-Era Interim. Difference in evaporation distribution, May-August 2008, mm

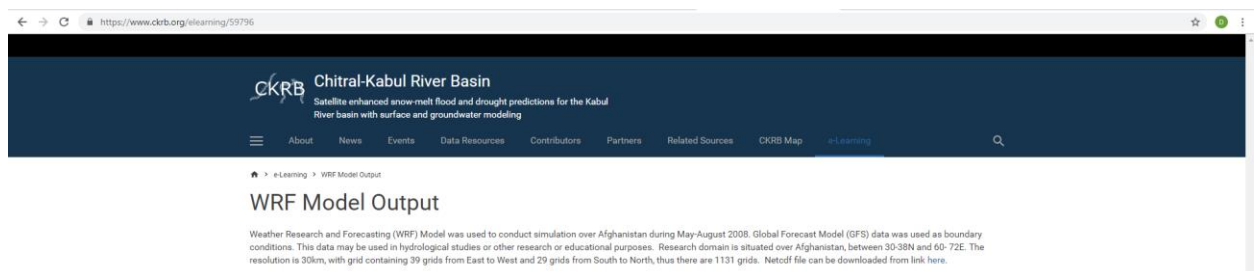
In general model underestimates evaporation compare to Era Interim. Mountains region can be discerned on the picture 3.

Next figure 4 shows underground runoff of WRF. According to this picture some mountains districts have significantly higher underground runoff than other parts of Afghanistan.



Picture 4. WRF's underground daily runoff, May-August 2008, mm

This simulation contains 176 meteorological parameters and it is available on ckrb.org website. This data may be further used in hydrological, educational and other types of research.



Picture 5. Screenshot of Website

References

- [1] European Centre for Medium-Range Weather Forecasts. 2009, updated monthly. *ERA-Interim Project*. Research Data Archive at the National Center for Atmospheric Research, Computational and Information Systems Laboratory. <https://doi.org/10.5065/D6CR5RD9>