

Hydrological Response to Changes in Climate and Glacier in a Glacierized Region in Nepal Himalaya

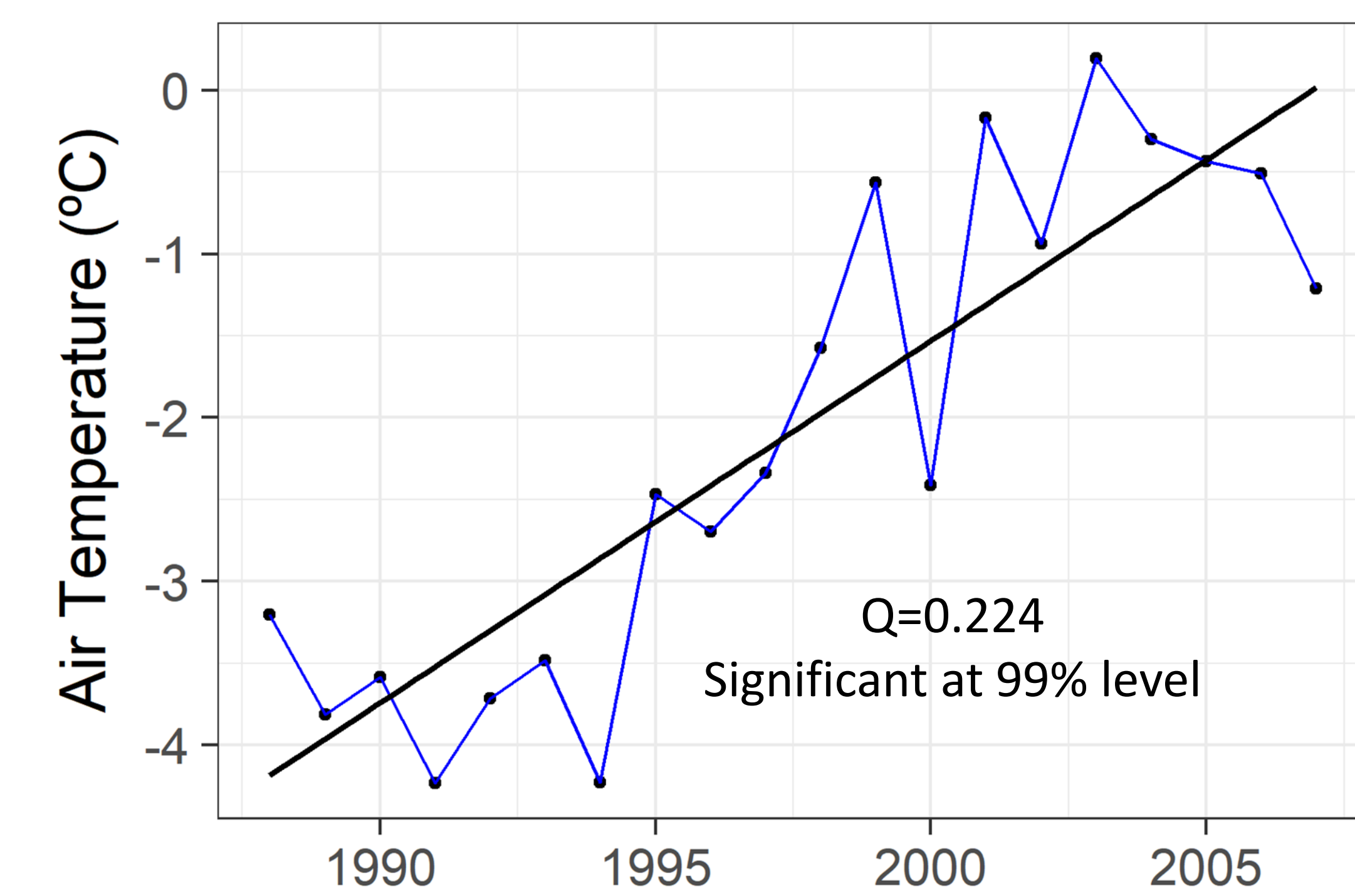
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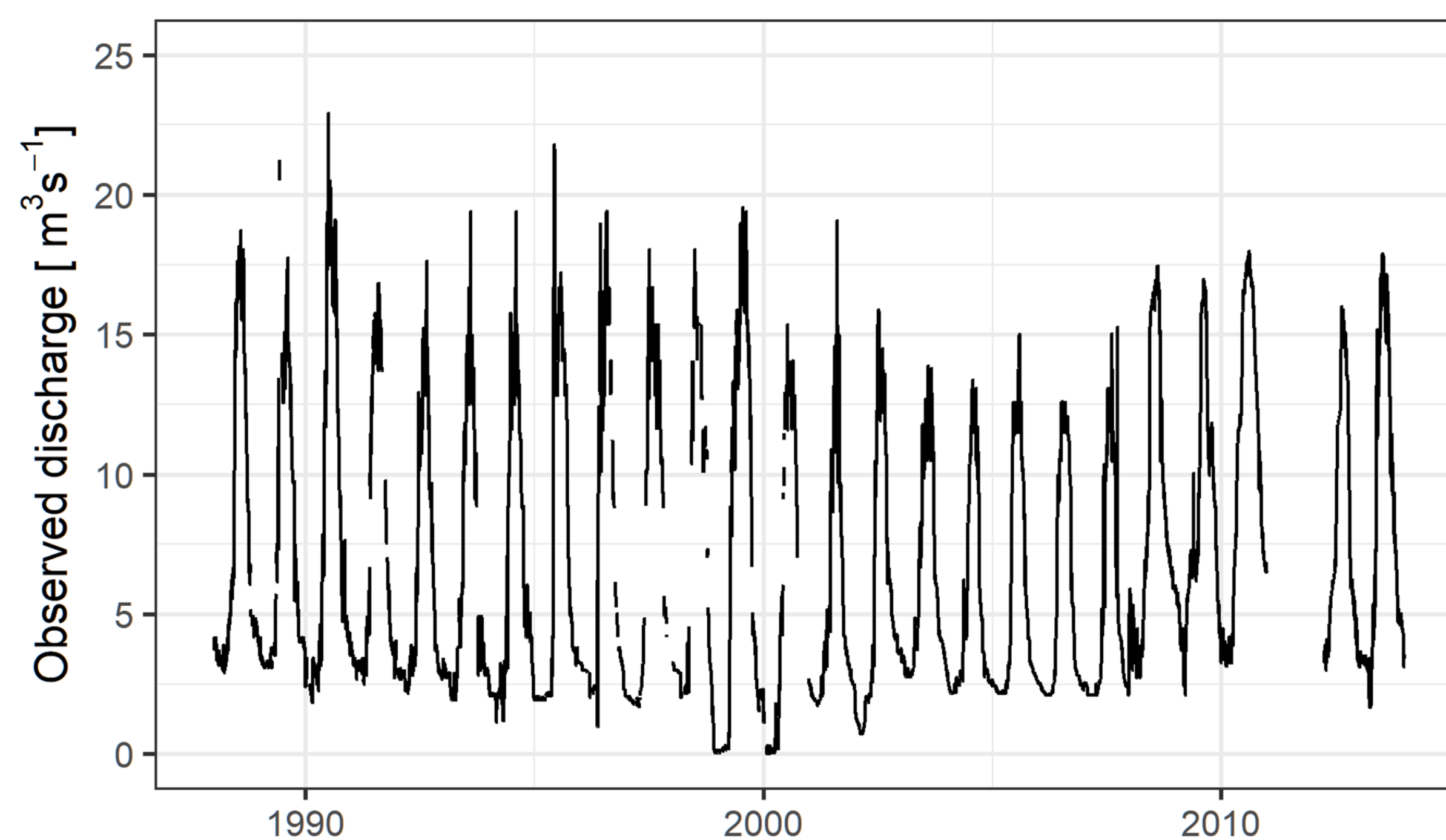
The climate change impact on the glacierized Himalayan region is still unresolved due to the scarcity of ground station data especially at high altitude.

Observation

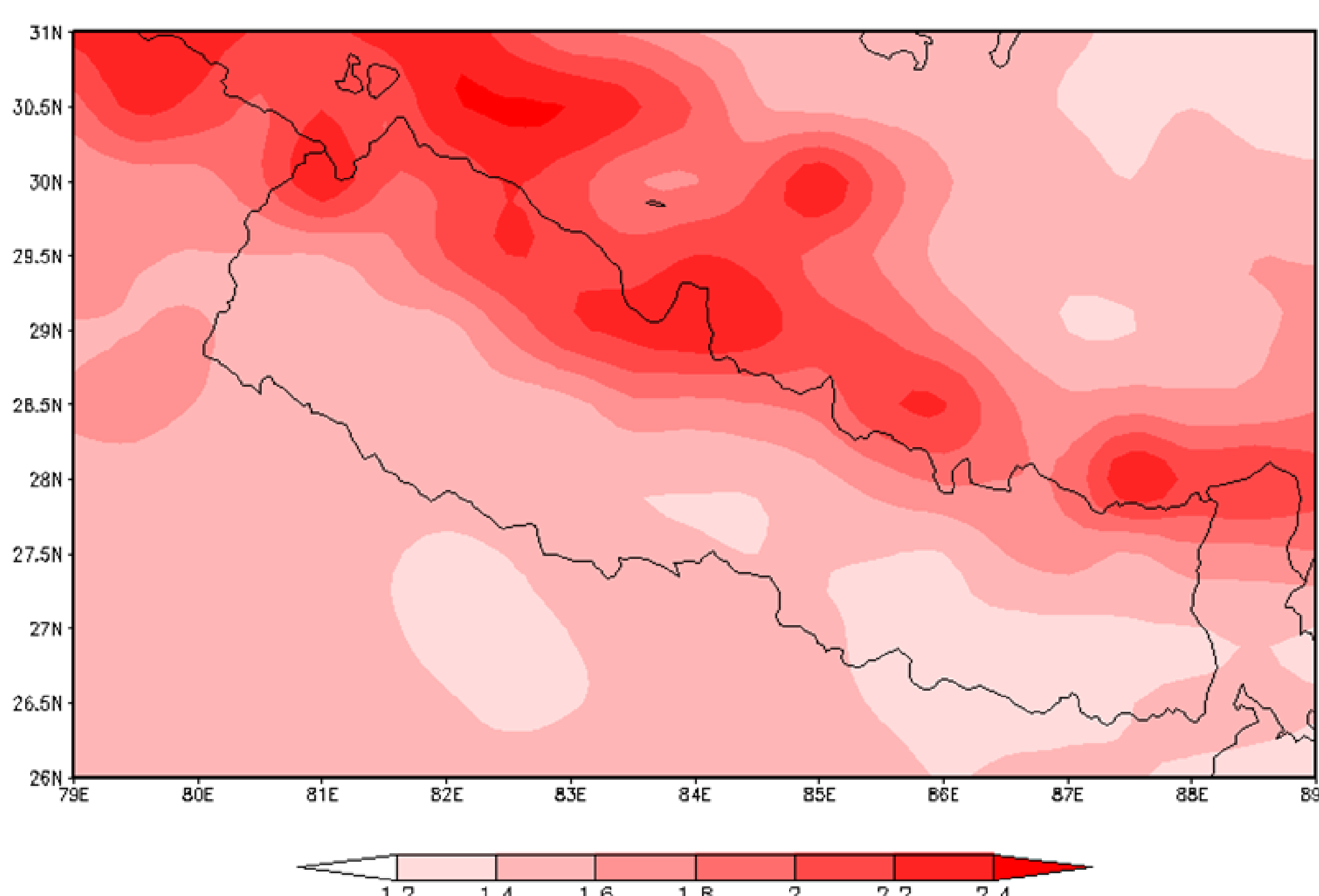
- Temperature is increasing, at a higher rate over higher elevation.
- Winter temperature is increasing at an alarming rate.
- Snow and ice cover area is decreasing



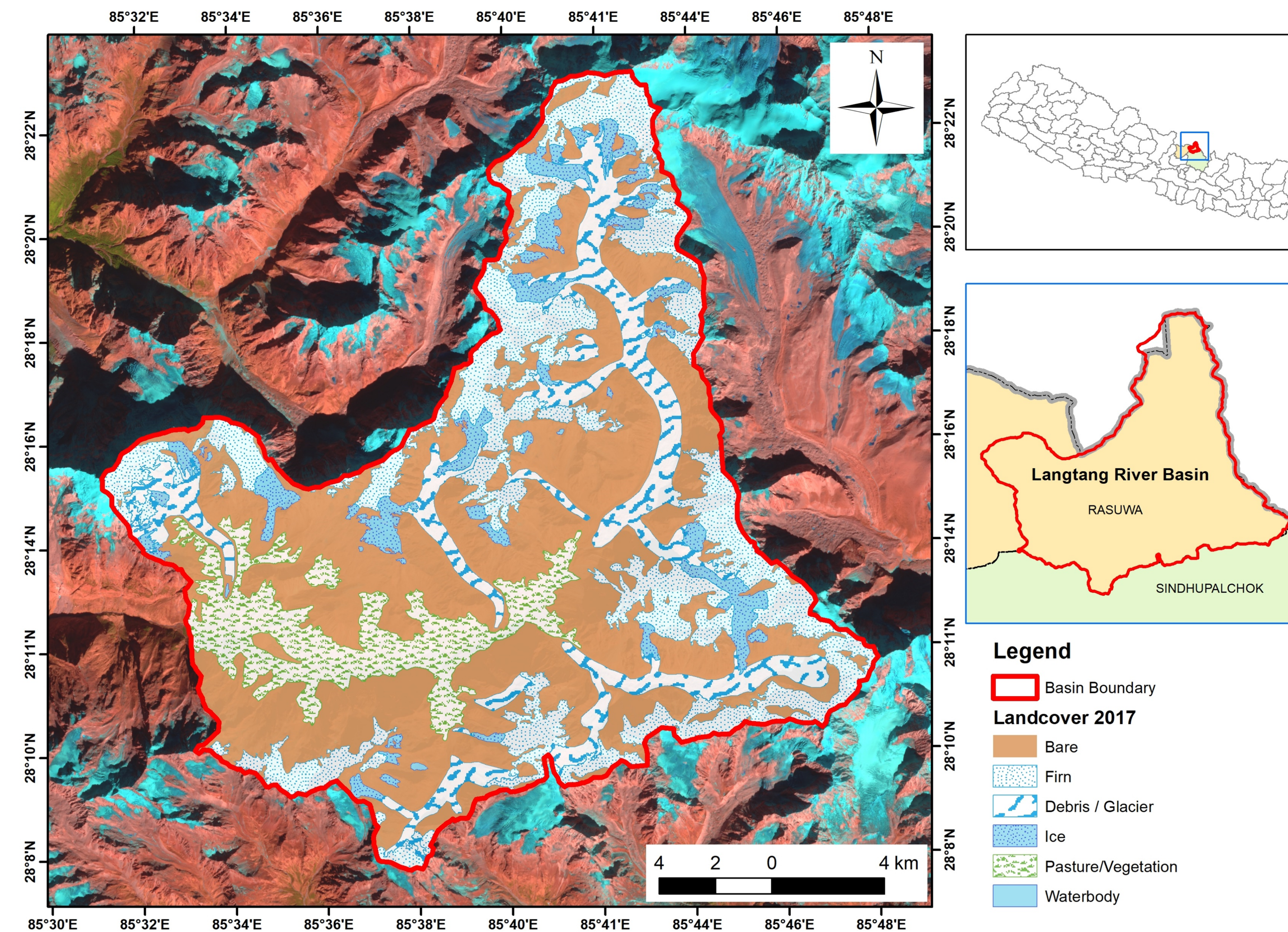
Trend of Winter Average Temperature (Source: SEN)



Streamflow recorded at Langtang River (Source: DHM)



Projected change in temp in 2040-2070 relative to the baseline period of 1971-2000 (CODEX RCM, Ensemble)



Langtang Glacier Research Basin (LGRB)

Objectives

Study of the response of hydrological dynamics to change in climate and glacier in the glacierized river basin of the Nepal Himalaya.

- Provide an assessment of the potential use of reanalysis data.
- Evaluate the performance of fully physical hydrological modeling
- Assessment of the effect of climate change on future runoff generation based on future climate scenarios
- Analyze impact of precipitation phase change on cold region hydrology in Nepal

This study will assess reanalysis datasets for their application in physically based hydrological models that are capable to capture the characteristics of glacierized river basin and impact of climate change on headwater hydrology.

Reanalysis Data:

ERA5, WATCH-WFDEI, MERRA 2, JRA-55

Observed Data:

DHM and APHRODITE

Future climate:

CMIP6

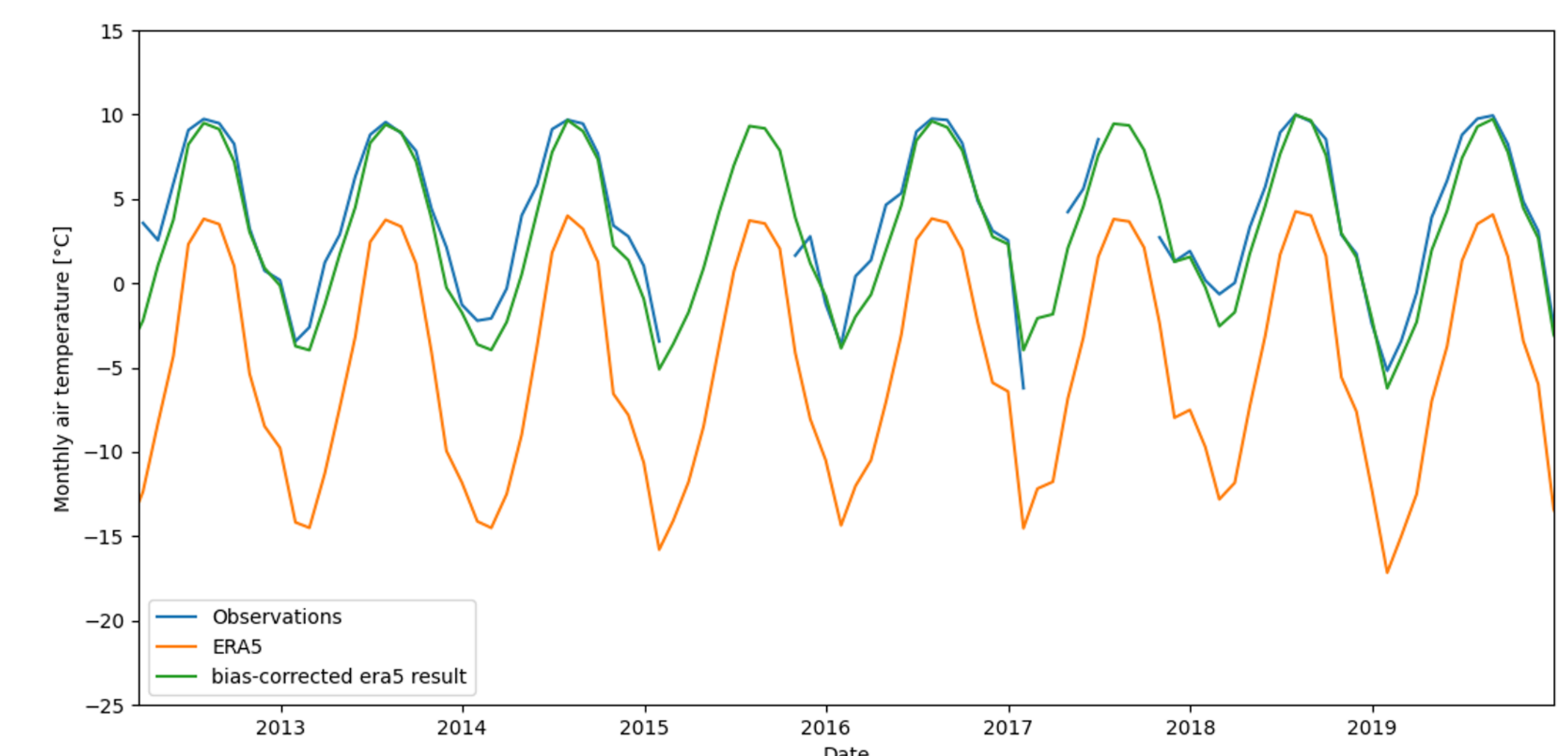
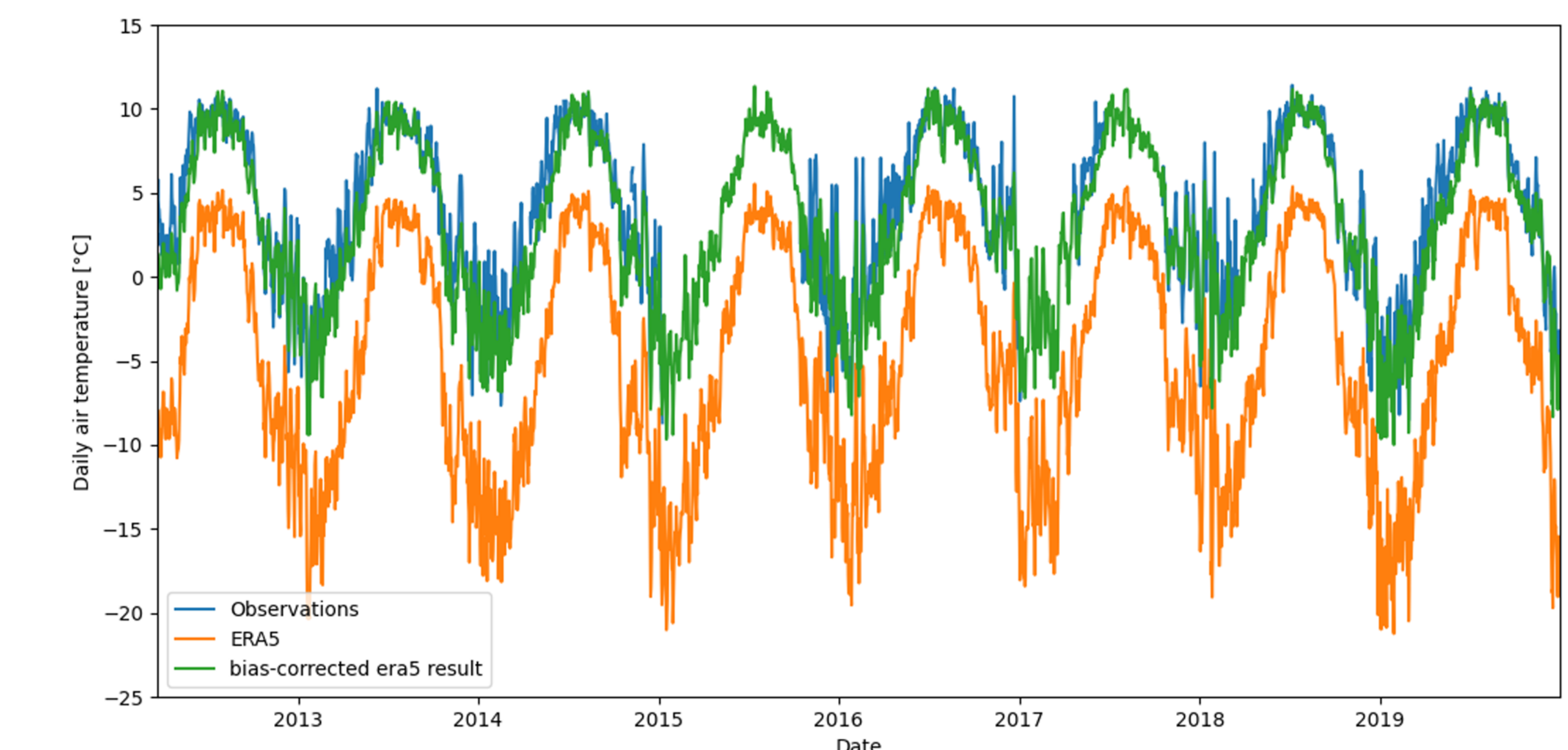
Hydrological Models:

Canadian Hydrological Model (CHM)

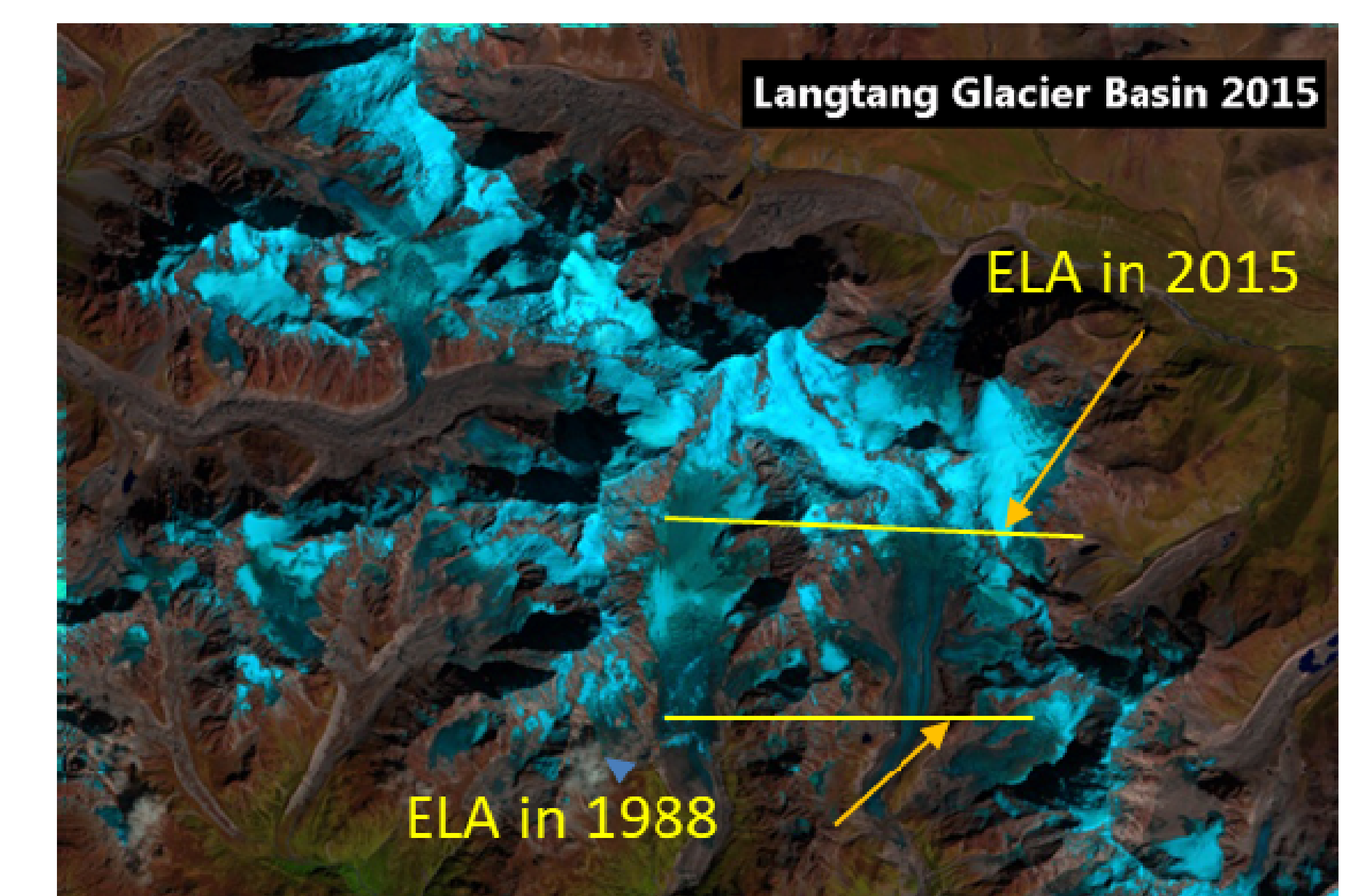
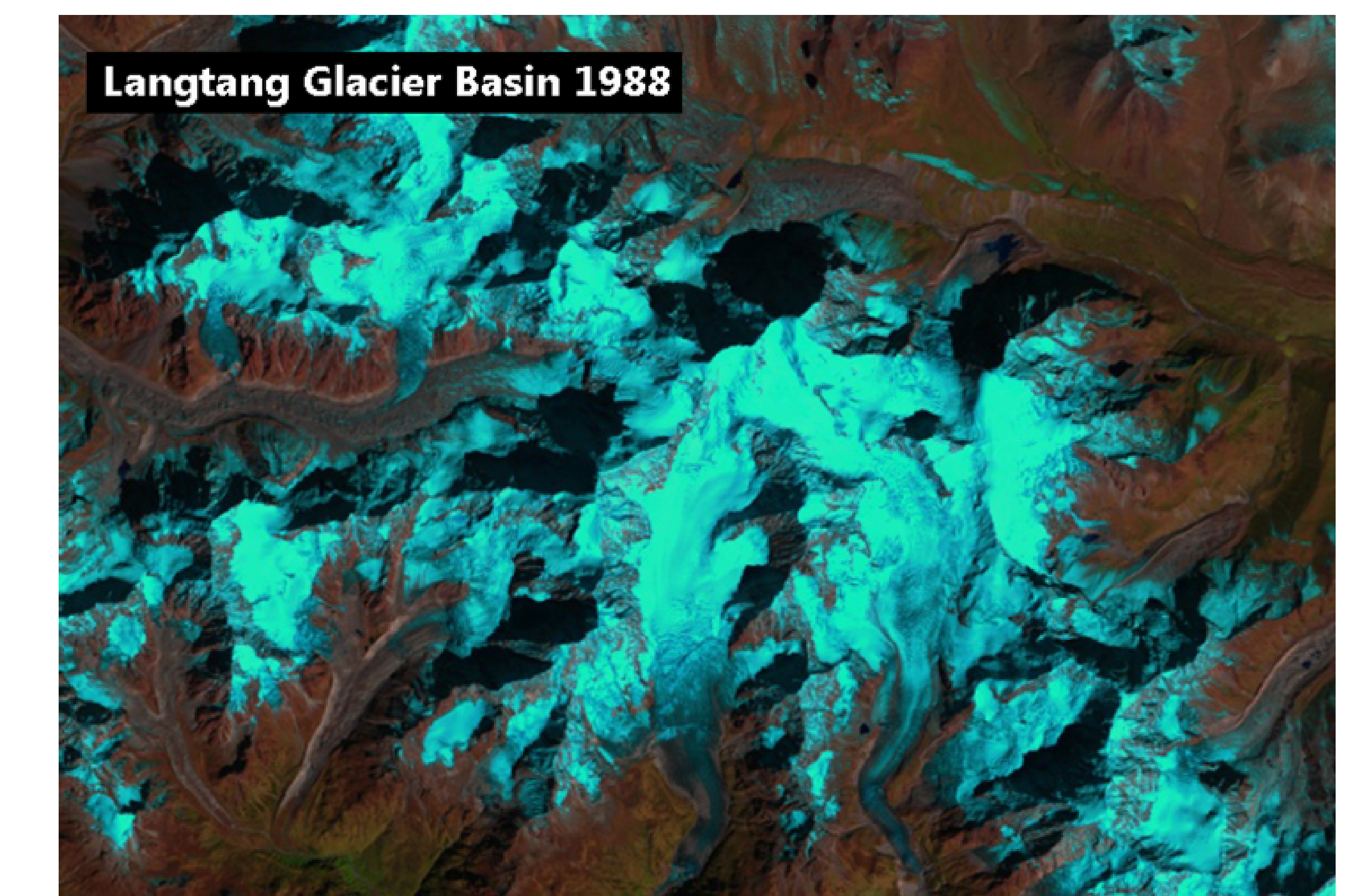
Cold Regions Hydrological Modelling (CRHM)

MEC-Surface & Hydrology System (MESH)

Soil & Water Assessment Tool (SWAT)



(Top panel) observed daily air temperature at the Kyanjin station (blue) and the ERA5 (orange) from the nearest grid and the bias-corrected ERA5 results (green). (Bottom panel) Same as the top panel but for monthly averaged air temperature.



Snow & Ice cover area change between 1988 and 2015