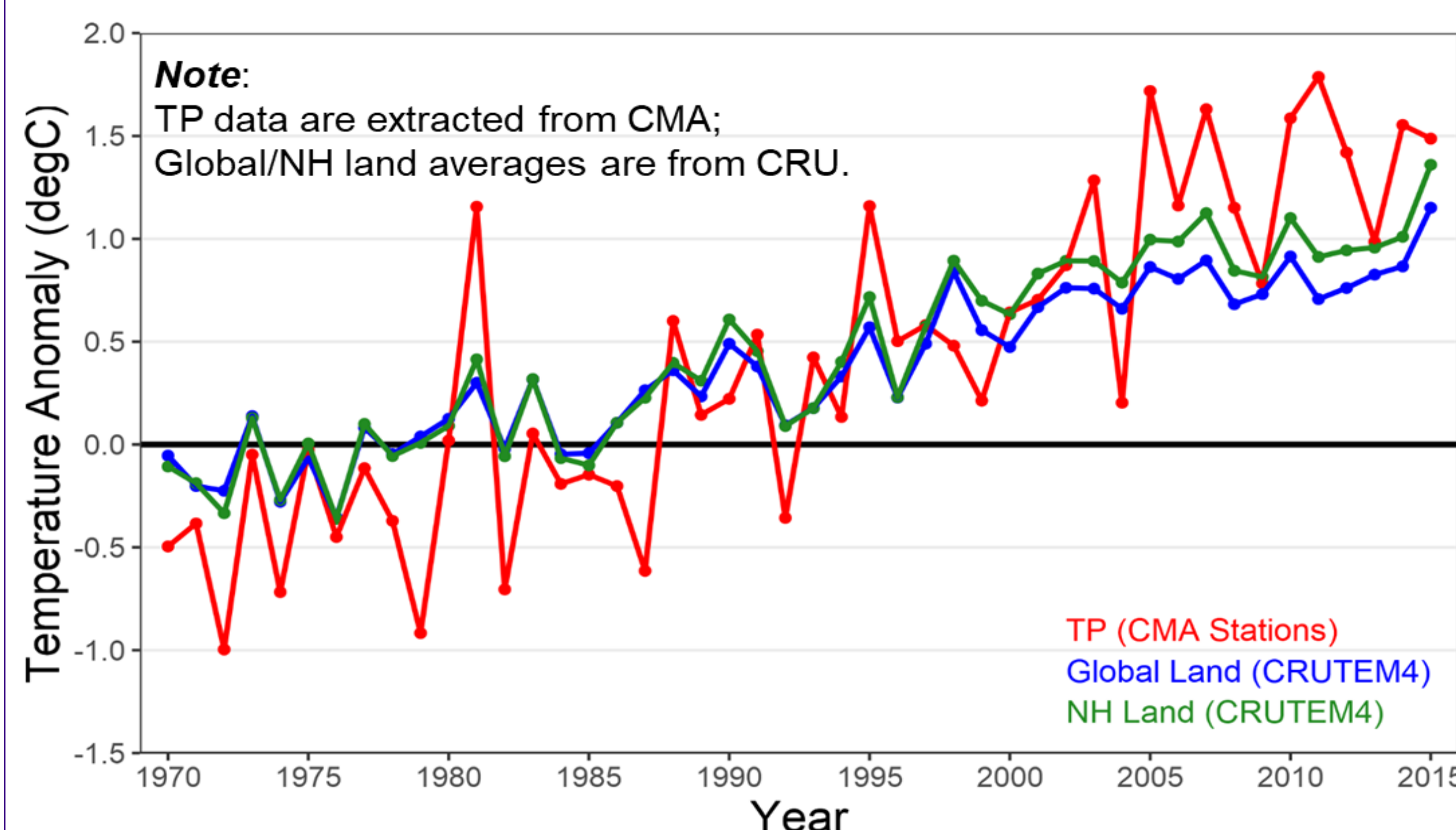


How Fast Is Tibetan Plateau (TP) Warming?



The Tibetan Plateau (TP) is experiencing significantly rapid warming in recent decades;

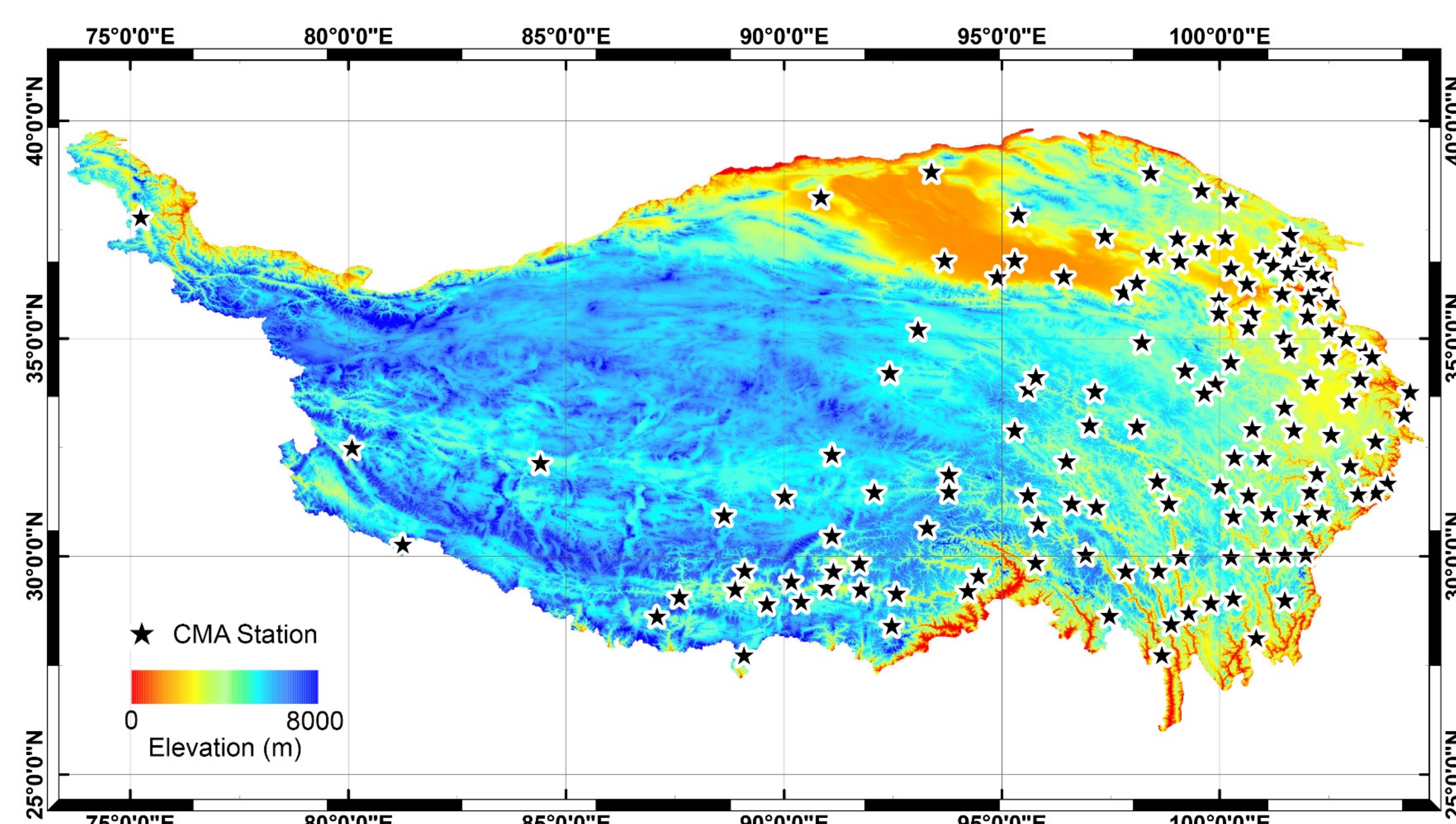
The warming rate of TP is reported higher than global and northern hemisphere land area;

Both rates are estimated based on station data.

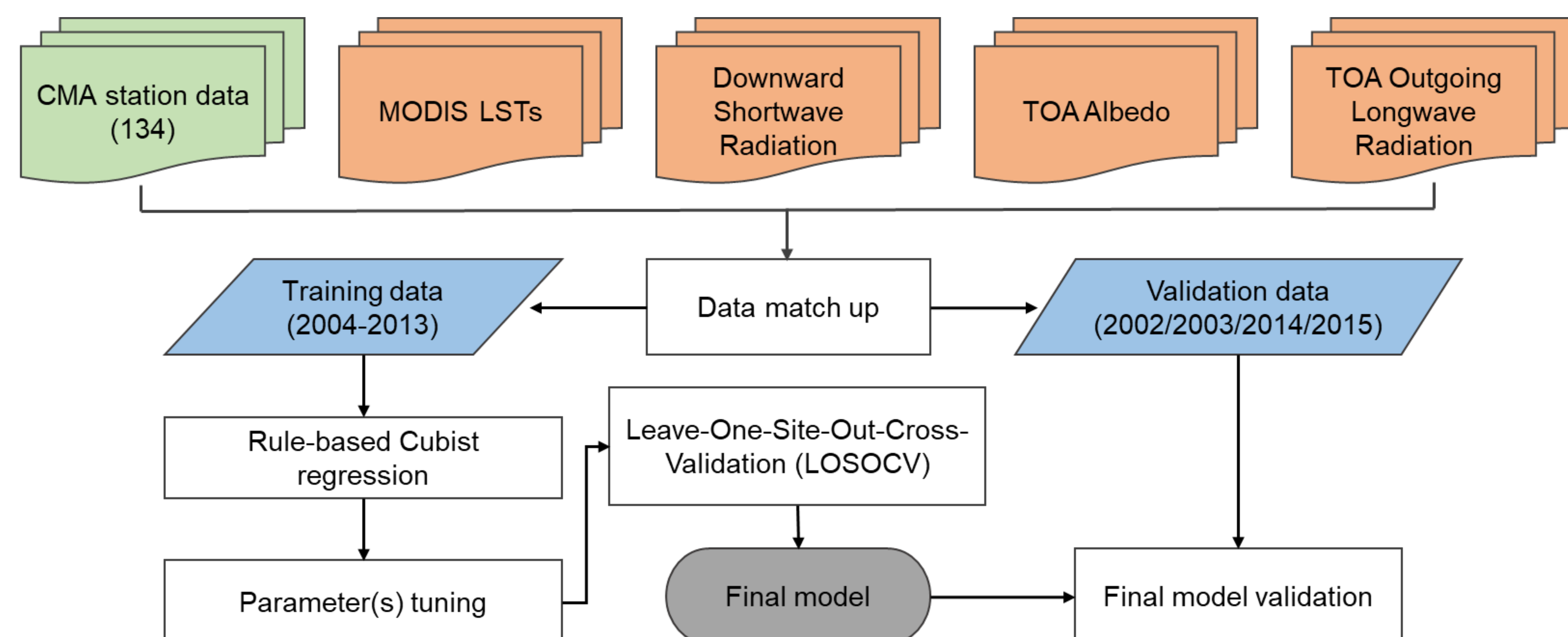
How Well Do We Know About TP Warming?

The spatial distribution of Chinese Meteorological Administration's (CMA) network shows notable spatial bias to lower altitudes;

The uneven nature of *in situ* data may create undesirable uncertainty or bias during climate change analysis.



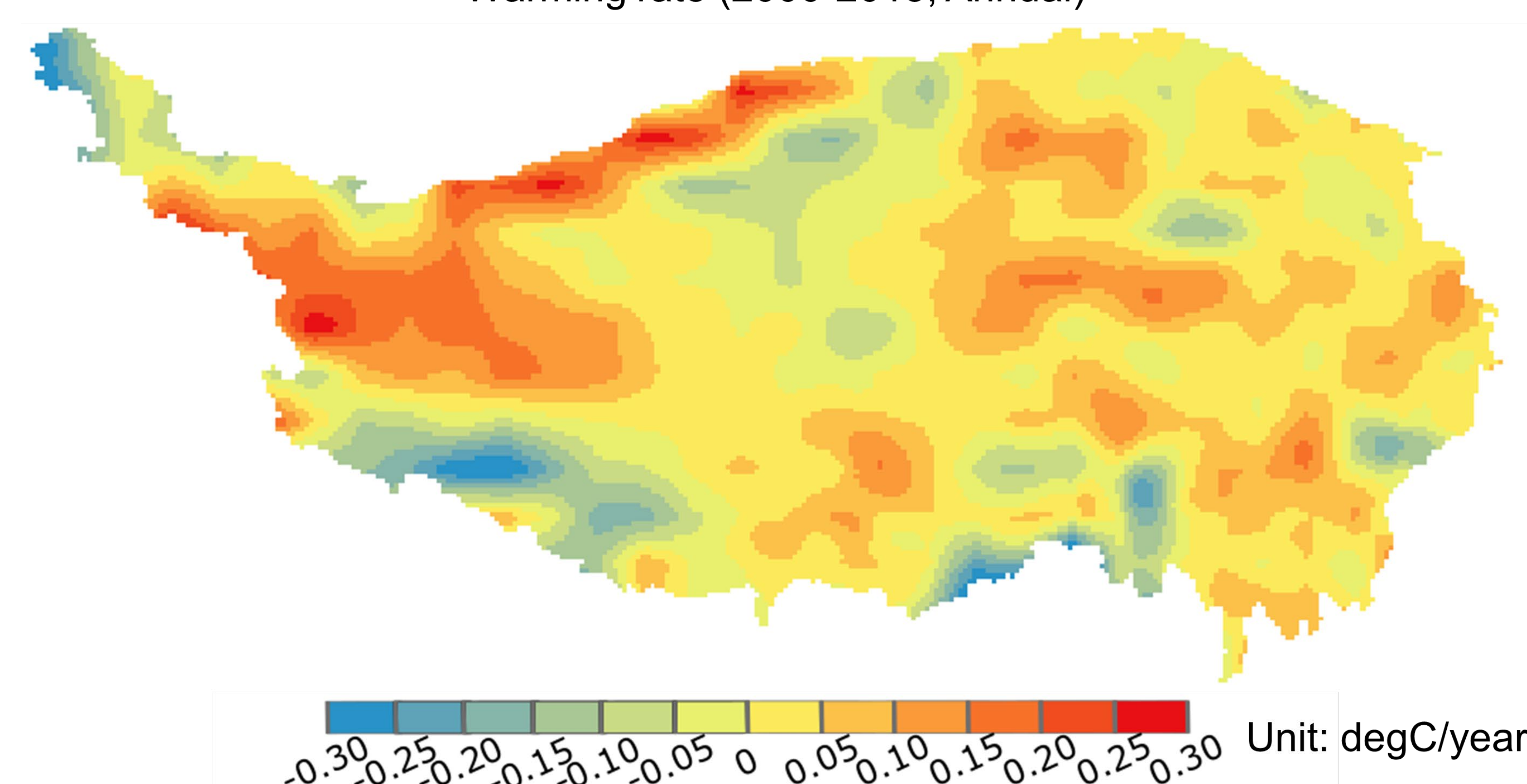
A Cubist-regression Based Framework



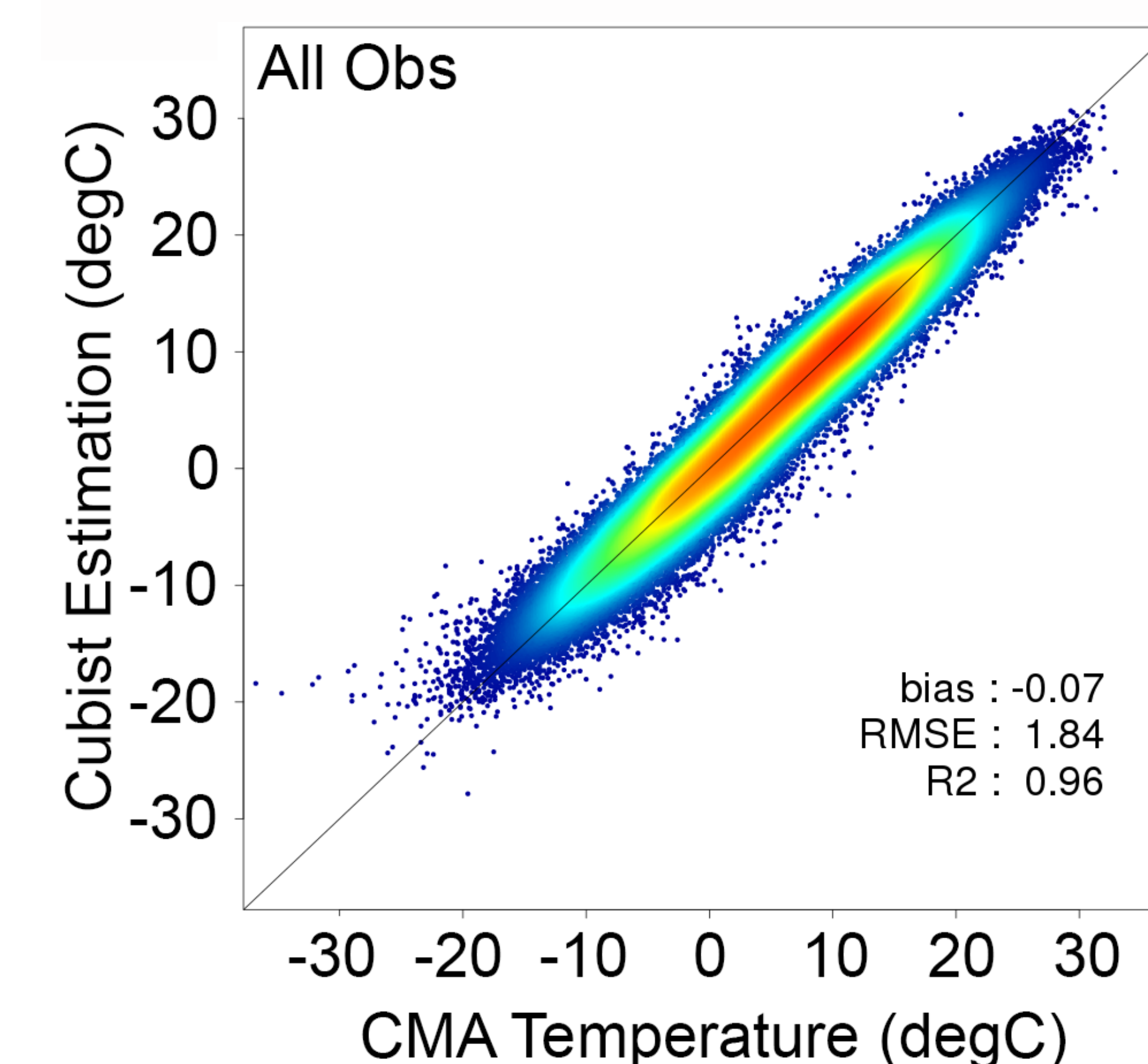
This machine learning (Cubist) model can produce daily surface air temperature data with high accuracy at the spatial resolution of MODIS grids (5 km in this study).

Satellite based analysis

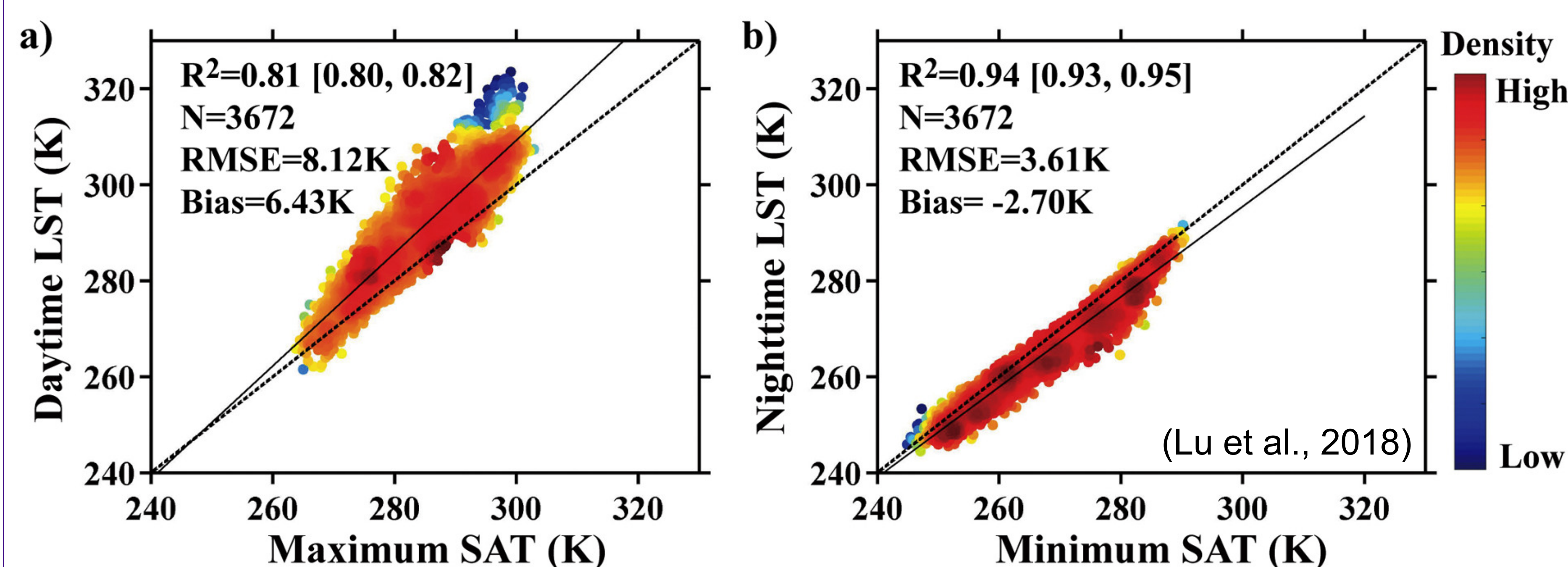
Warming rate (2000-2015, Annual)



Station based validation



How Can Satellite Observations Help?



Satellite-based data, particularly thermal infrared land surface temperature (LST), provides unique alternatives to study the surface temperature change with great spatial details; however, (thermal based) LST is limited to clear sky condition only.

Summary

- The Tibetan Plateau experienced rapid surface warming in recent decades; however, the unevenly distributed station data might cause large uncertainty in the analysis;
- Leveraging machine learning model, i.e., rule-based Cubist regression tree, and MODIS LST products, we have generated a daily surface air temperature data with 5 km grid size over the Tibetan Plateau;
- The MODIS based data show higher surface warming rate for high altitude region in the northwest part of the TP, which is not represented by CMA station network.

References

- Lu et al. (2018). Hierarchical Bayesian space-time estimation of monthly maximum and minimum surface air temperature. *Remote Sensing of Environment*.
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