Estimating surface temperature change over Tibetan Plateau using satellite land surface temperature and top of atmosphere radiation

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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.

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


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