

Introduction

- The Arctic-Boreal region has experienced substantial warming at a rate four times faster than the global [1].
- Significant land cover change (LCC) has been observed because of climate change and wildfires [2].
- Climate feedbacks to real-world LCC is rarely explored in the ABoVE domain, which might amplify or diminish climate change.

Methods

| CESM Experiment | Land Cover [3] | Component | Years of Running |
|-----------------|----------------|-----------------|------------------|
| CAL84 | 1984 | CAM-CLM coupled | 40 |
| CAL14 | 2014 | CAM-CLM coupled | 40 |

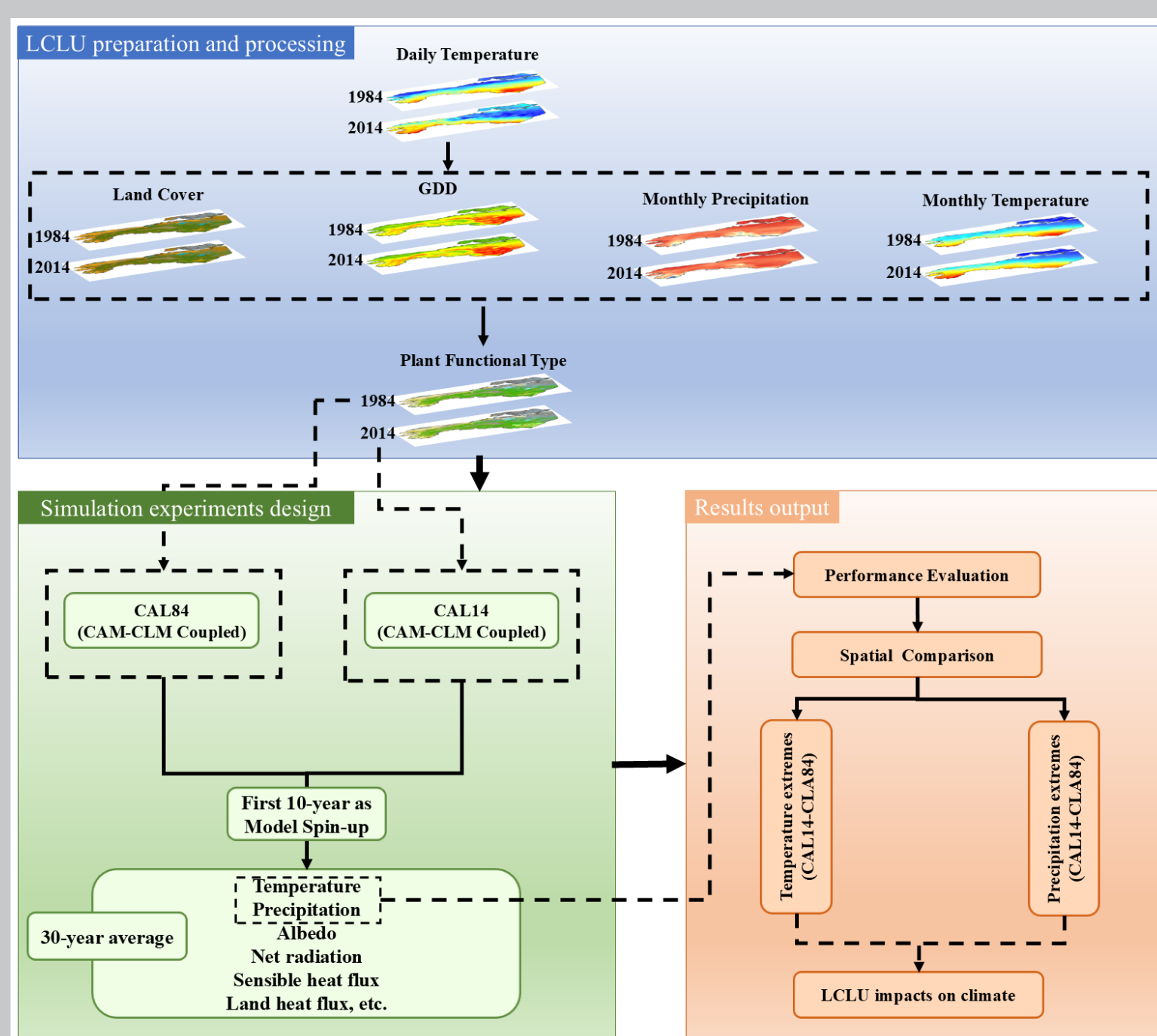


Figure 1. Flowchart

Results

- Land cover change in the ABoVE domain

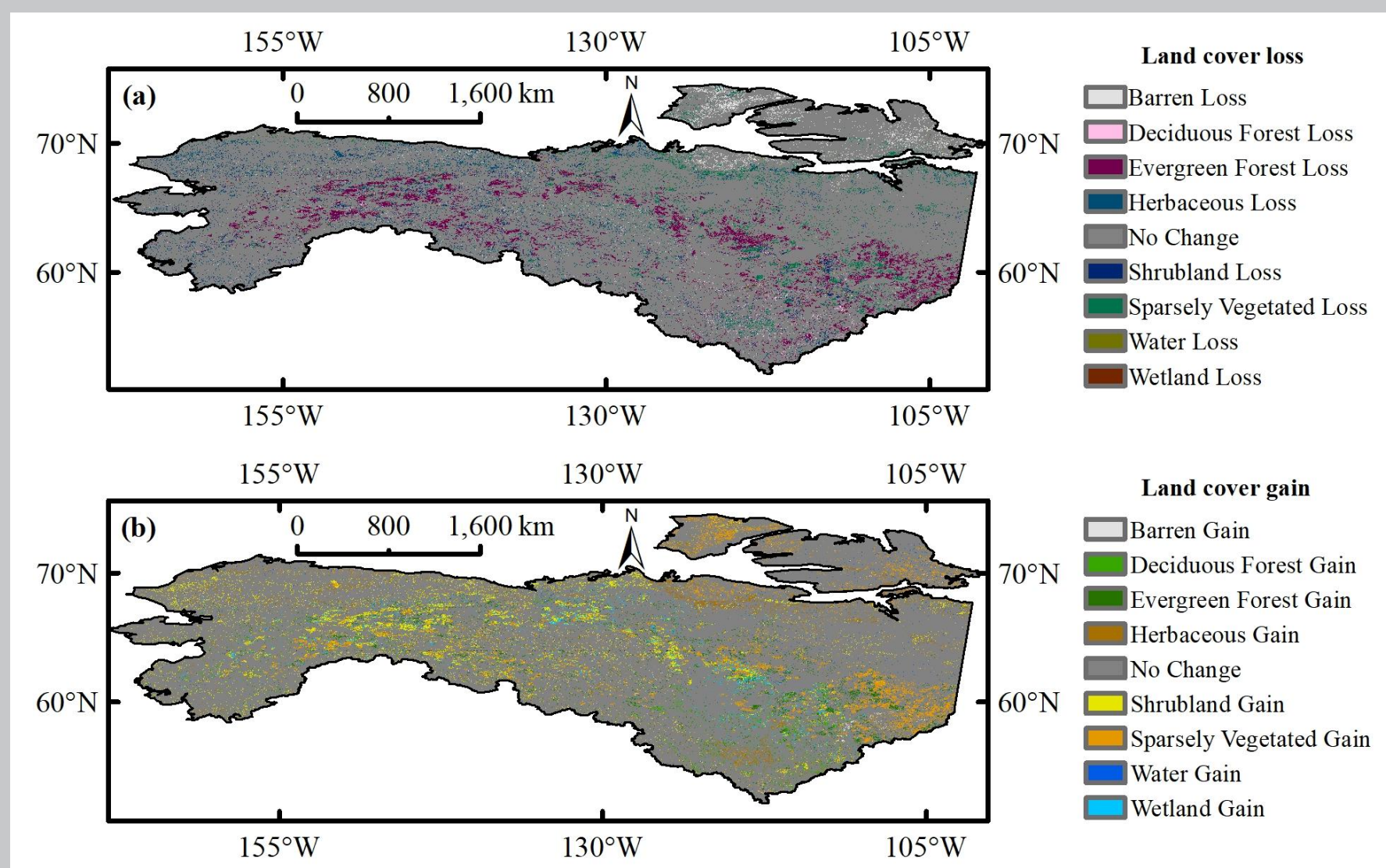


Figure 2. Land cover loss and gain from 1984 to 2014

Acknowledgments

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Results

- Impacts on temperature and precipitation extremes

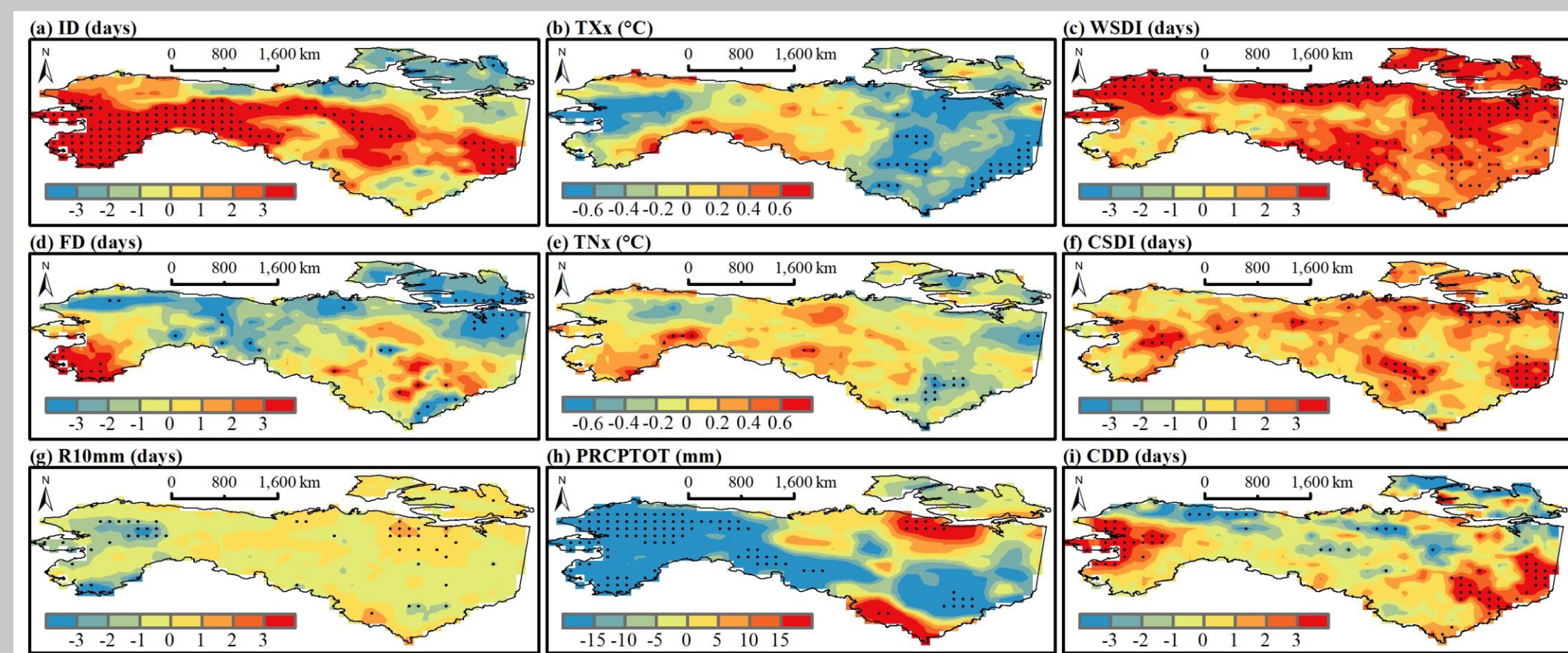


Figure 3. LCC impacts on temperature and precipitation extreme variables.

- Potential physical processes

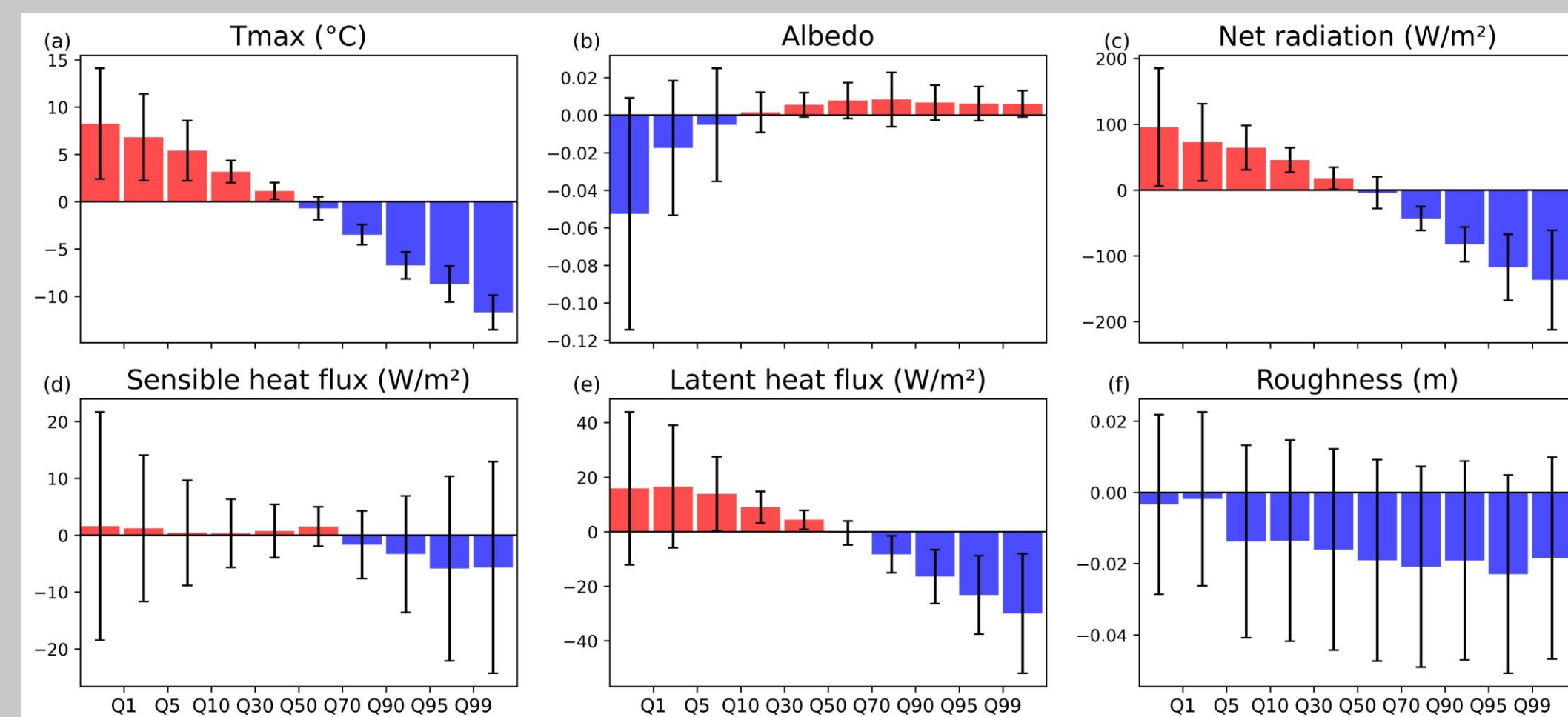


Figure 4. Physical process related to LCC impacts on temperature extremes.

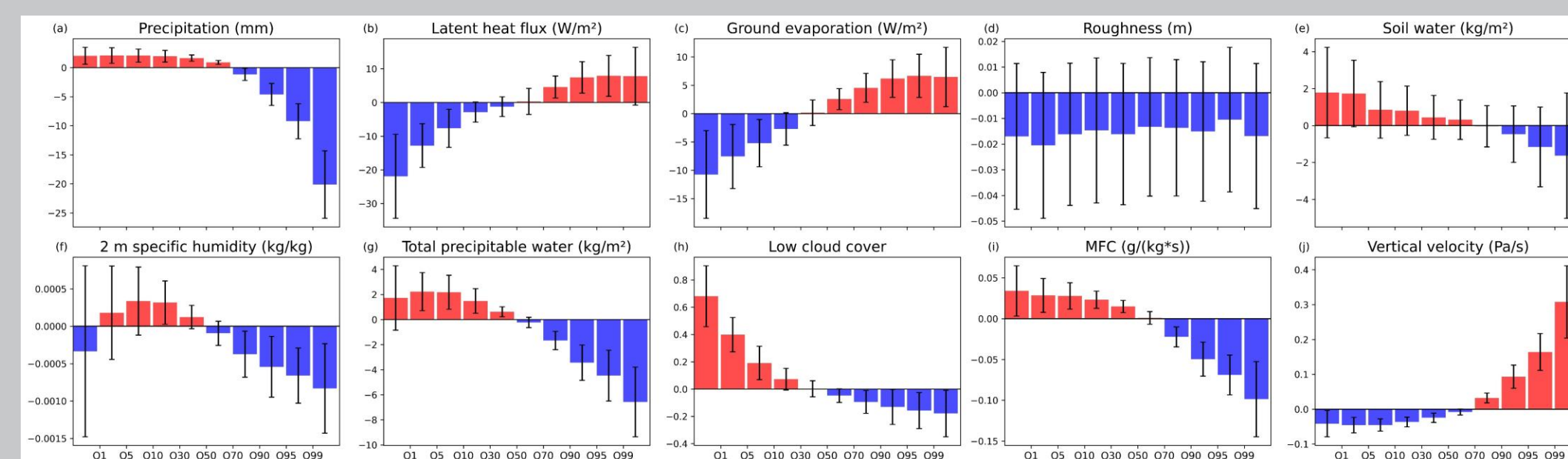


Figure 5. Physical process related to LCC impacts on precipitation extremes.

Conclusion

- Compared to the minimum temperature (Tmin), the maximum temperature (Tmax) changed more significantly.
- The intensity, frequency, and duration of extreme precipitation were affected to varying degrees, with reduced precipitation being the main characteristic.
- The radiative forcing determined by albedo narrowed the distribution range of Tmax by decreasing it at the upper tail and increasing it at the lower tail, while the combined effects of water vapor supply and atmospheric dynamics altered precipitation magnitude..

Reference

- [1] Rantanen et al., (2022). The Arctic has warmed nearly four times faster than the globe since 1979. Communications earth & environment, 3(1), p.168.
- [2] Wang et al., (2020). Extensive land cover change across Arctic-Boreal Northwestern North America from disturbance and climate forcing. Glob Chang Biol, 26(2), 807-822.
- [3] Wang et al., (2019). ABoVE: Landsat-derived Annual Dominant Land Cover Across ABoVE Core Domain, 1984-2014. ORNL DAAC, Oak Ridge, Tennessee, USA..