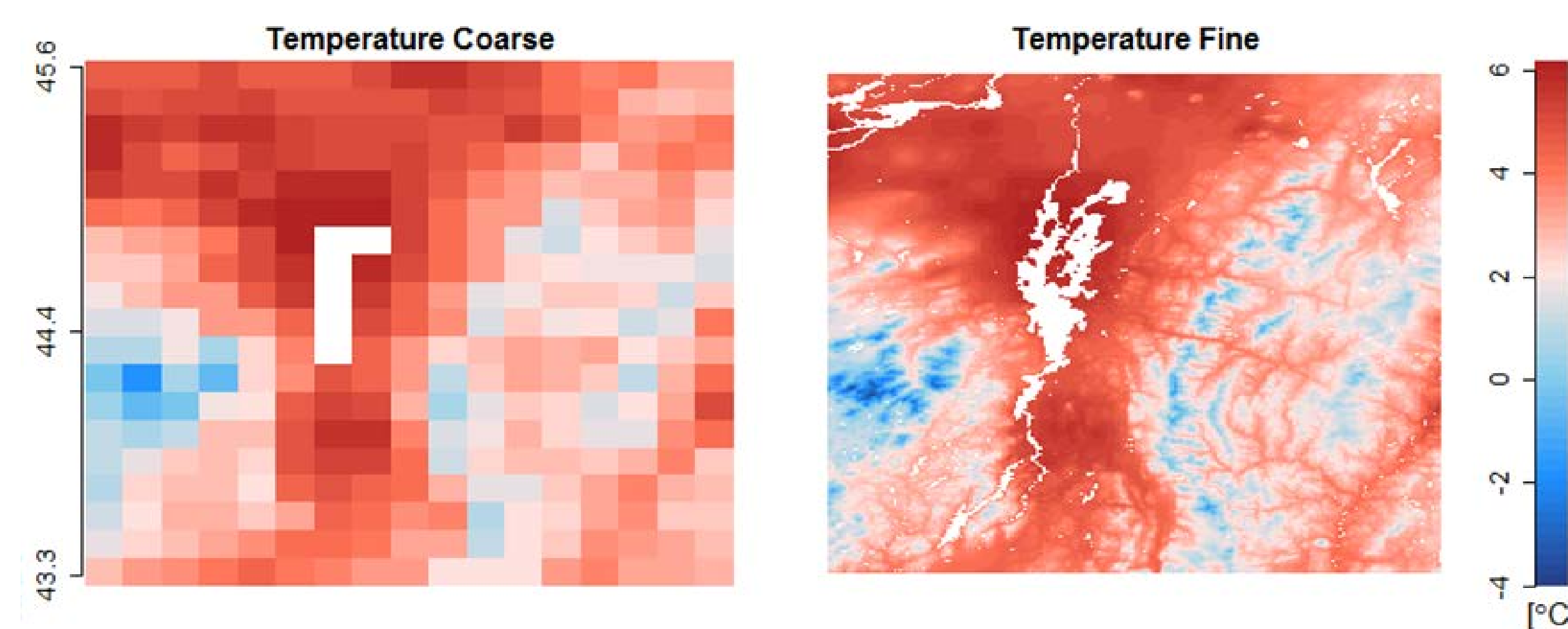


Introduction

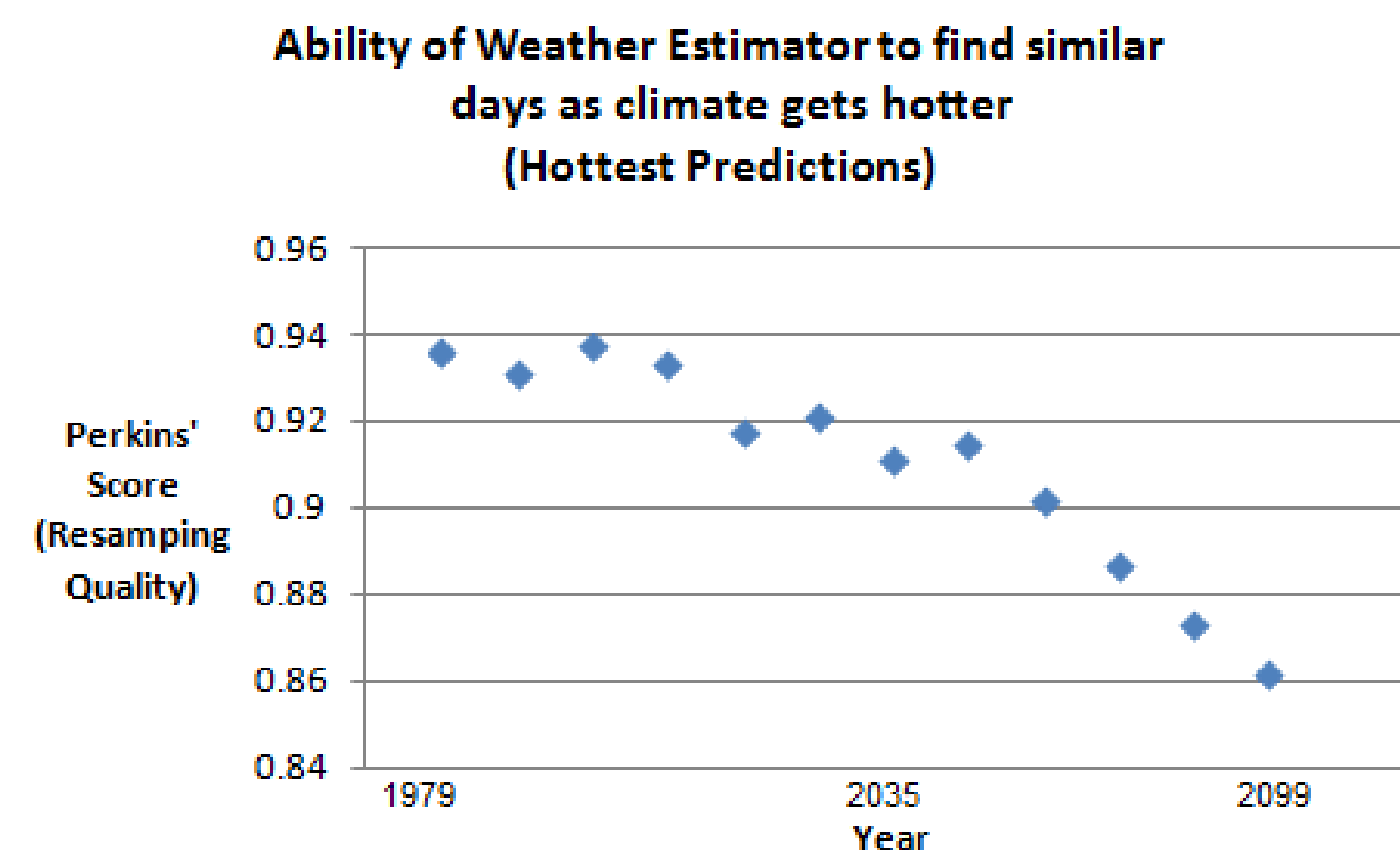
- A wide variety of weather factors influence algal blooms in the Lake Champlain, including temperature (T), precipitation (P), relative humidity, cloud cover, atmospheric pressure, evaporation, and solar radiation.
- Global Climate Models (GCMs) can project temperature and precipitation into the future, but not other weather variables.
- To project the other variables, our team built a weather estimator based on a resampling method (described in methods and data).
- This study tests to see if the resampling appears to be producing reliable and consistent data.

Downscaling and Weather Estimator



- The original Coupled Model Intercomparison Project Phase 5 (CMIP5) data for our region generalizes weather patterns across 100x100 kilometer squares (ex: left image)
- Our downscaling model uses local topographic information and the predictive effects of elevation on weather variation to refine CMIP5's temperature and precipitation.
- New T and P projections are made for squares of land that are just 0.8 x 0.8 kilometers (right image)
- The goal of the weather estimator is to generate projections for the remaining weather variables

Temp/precip verification

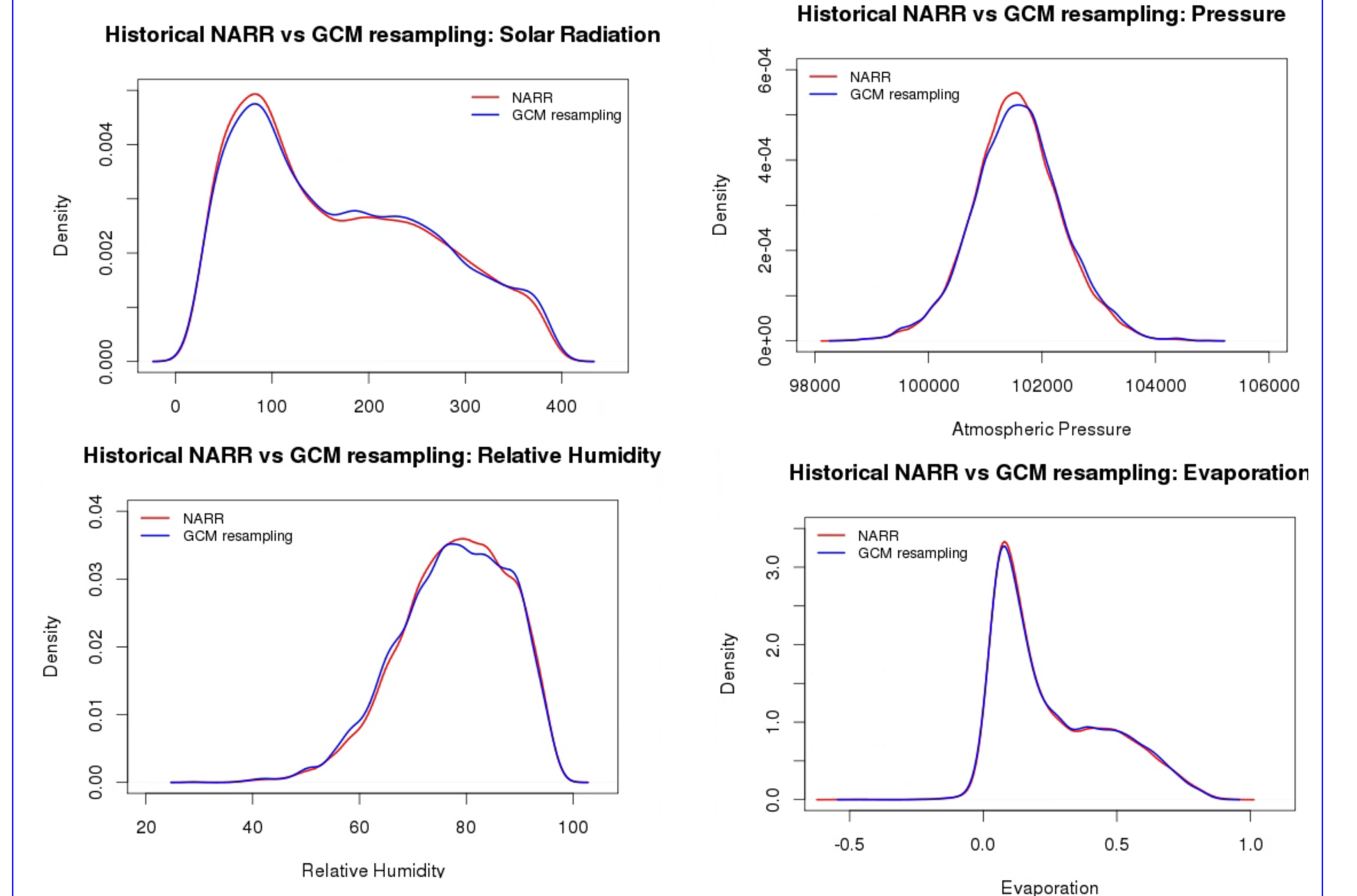


In general, the weather estimator was able to find historical seasonable days that closely matched projected weather conditions. In our hottest projections of the future for the climate, however, the weather estimator could only find similar historical days to sample from if it was allowed to expand its time-of-year comparison to encompass an entire third of all historical years.

Methods and Data

- The weather estimator searches for an historical day from the same time of year within real-world data with similar-as-possible T and P to the projected future day.
- Other climate values like humidity etc. are copied from the real historical day to the projected day.
- A Perkins' Skill Score assessment is used to determine if the method is successful at matching the distribution of values for projected weather parameters to historical distributions of those weather parameters.

Resampled weather factor verification



The resampling was very successful: our method generated distributions of weather patterns extremely similar to actual historical weather. In the graphs, the red line represents frequencies of historical weather events, and the blue line represents our resample-generated weather patterns.

Conclusions

Our resampling method is able to create realistic and reasonable weather projections. Though in our hottest models of the future, temperature levels become so unprecedented that weather projections using our method lose their reliability after about 50 years.