

Average Summer Surface Temperatures in New England



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Acknowledgements

Support for the NH EPSCoR Program is provided by the National Science Foundation's Research Infrastructure Improvement Award # EPS 1101245.

Citations

- Taylor, K., R. Stouffer, and G. Meehl (2012). An overview of CMIP5 and the experiment design, Bulletin of the American Meteorological Society, 93(4), 485-498.
- Oleson et al. (2013). Technical Description of version 4.5 of the Community Land Model (CLM), 1-435, doi:DOI: 10.5065/D6RR1W7M.
- Dunne, John P. & Stouffer, Ronald J. (2013). Reductions in Labour Capacity from Heat Stress under Climate Warming. Nature, 563-566

Abstract

There is great debate on how much the global surface temperatures will rise in the next century, due to anthropogenic climate change. We focus on New England in order to examine the regional effect of climate change. We use the Community Earth System Model (CESM 1.2.0), a global climate model that is maintained by the National Center for Atmospheric Research (NCAR), which is supported by the NSF. We focus on the summer months, when surface temperatures are typically at their highest, and we are interested in heat stress. We present average summer surface temperatures in the New England region for the early and late 21st Century. Our results indicate that in the New England Region summer temperatures increase by about 4 °C. Furthermore, in New Hampshire the summer temperatures increase by 3 °C.

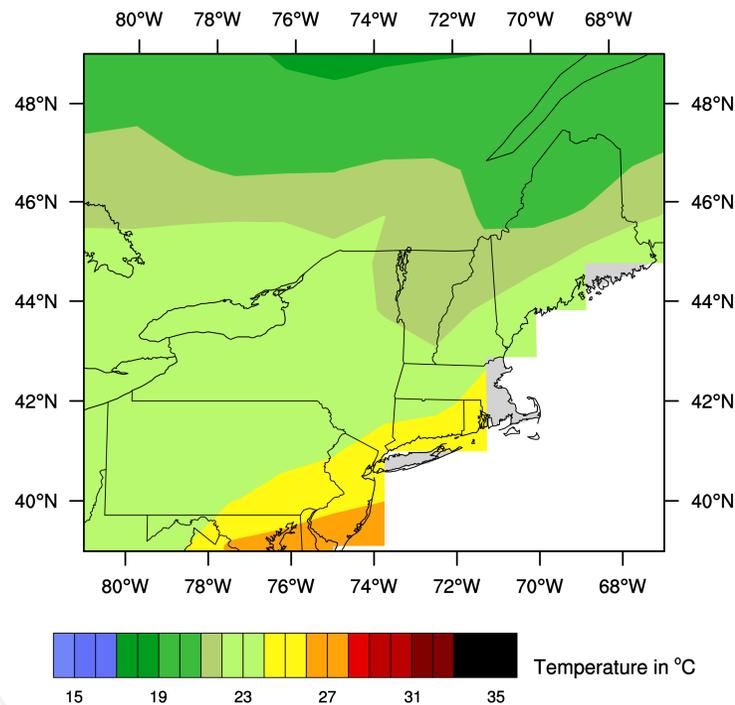
Methods

- We used the Community Land Model version 4.5 (Oleson et al., 2013) to map our projections.
- We used representation concentration pathway 8.5. (Taylor et al., 2012). This is a combination of greenhouse gases that create a radiative forcing of 8.5 W/m² by the end of the 21st Century.
- The atmospheric forcing dataset is from Community Atmospheric Model (CAM4).
- A 1° x 1° resolution finite volume grid was used.
- The simulation was from 2005 to 2100. We mapped 2005-2024 and 2081-2100.

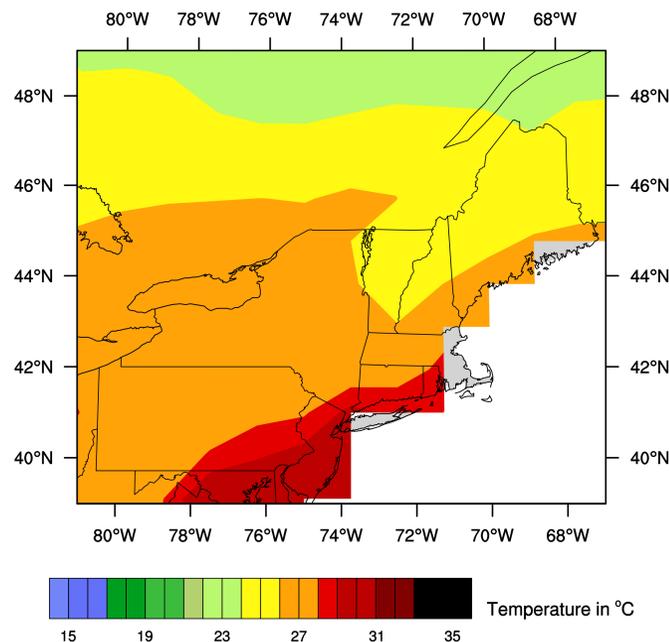
Discussion

- In the late 21st Century for New England the temperature increases by ~4°C.
- It is suggested in Dunne et al. (2013) that an increase in warming will likely reduce labour capacity due to heat stress's negative impact on human activity.

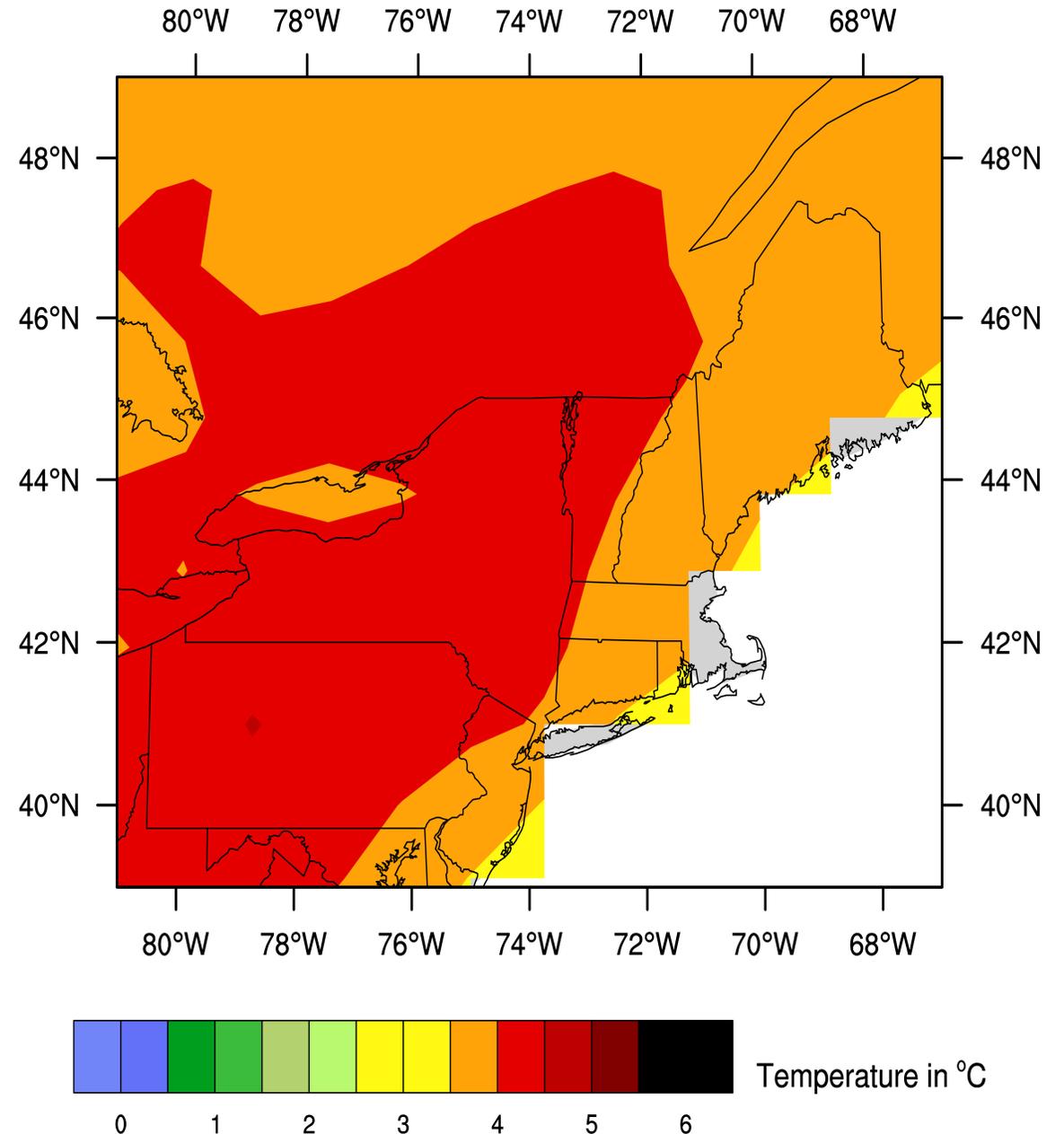
Mean JJA Surface Temperatures (2005-2024)



Mean JJA Surface Temperatures (2081-2100)



Mean JJA Surface Anomaly between Late and Early 21st Century



Future Work

- Implement additional heat metrics such as wet bulb temperatures
- Higher resolution using Weather Research Forecast models
- Calculate Labour capacity for New England (Dunne, et al., 2013)
- Calculate winter mean surface temperatures