Stochastic modeling of temperature extremes over continental US and Canada
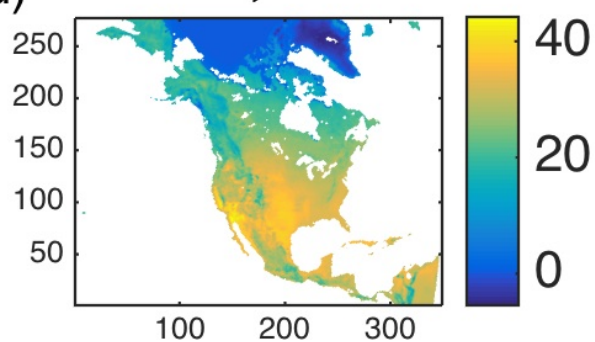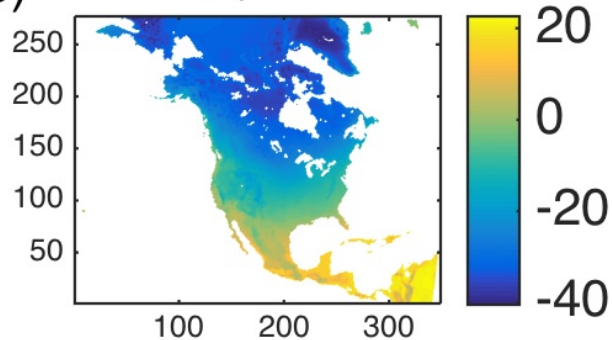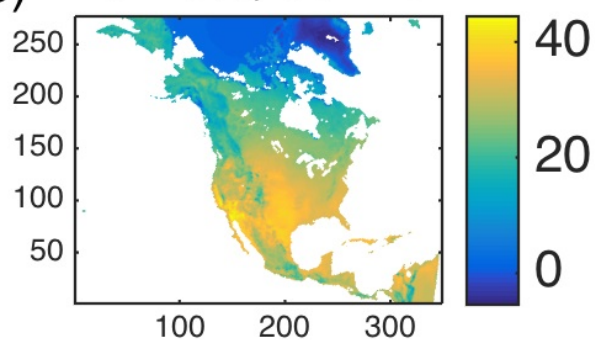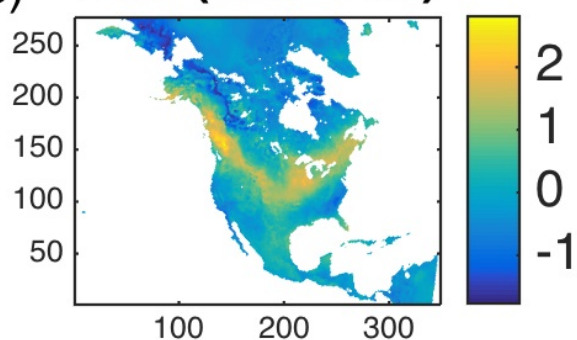
*Sergey Kravtsov[1], Paul Roebber[1], Vytaras Brazauskas[1]

1. University of Wisconsin Milwaukee

An extremely statistically accurate, essentially bias-free empirical emulator of atmospheric surface temperature is applied for meteorological risk assessment over the domain of continental US and Canada. The resulting prediction scheme achieves an order-of-magnitude or larger gain of numerical efficiency compared with the schemes based on high-resolution dynamical atmospheric models, leading to unprecedented accuracy of the estimated risk distributions. The empirical model construction methodology is based on our earlier work, but is further modified to account for the influence of large-scale, global climate change on regional US weather and climate. The resulting estimates of the time-dependent, spatially extended probability of temperature extremes over the simulation period can be used as a risk management tool by insurance companies and regulatory governmental agencies.

Keywords: Stochastic modeling, Temperature extremes, Risk assessment

(a) T2 2.5%, DJF Obs
(b) T2 2.5%, DJF Sim
(c) Diff. (Sim-Obs)
(d) T2 97.5%, JJA Obs
(e) T2 97.5%, JJA Sim
(f) Diff. (Sim-Obs)