

Exploiting Structure in Spatio-Temporal sELM Predictions

October 16, 2018

1 Model Formulation

Show sELM schematic

Show sample drivers at several sites

Show sample drivers correlations

We use the following notation for the sELM model

$$g(t, \lambda; \Theta) \quad (1)$$

where t is the time, and λ is the set of parameters that control the sELM sub-processes. Θ is the vector of time-dependent drivers, $\Theta = \{\theta_1(t), \dots, \theta_4(t)\}$, where θ_1 is the transpiration beta factor (BTRAN), θ_2 is the atmospheric incident solar radiation (FSDS), and θ_3 and θ_4 are the maximum and minimum daily temperatures, respectively

2 Model Drivers

Figures 1-4 show monthly averages for θ_1 through θ_4 across eastern half of US. The averages correspond to a 30 year period from 1980 to 2009.

3 Monthly averages

4 Correlations

Figures 9-12 show the Pearson's correlation coefficient between two Fluxnet sites, US-HA1 and US-Oho and the rest of the land cells simulated in this study. These correlations were numerically computed using a set of 2000 random samples for the model parameters λ .

5 Low-rank formulation

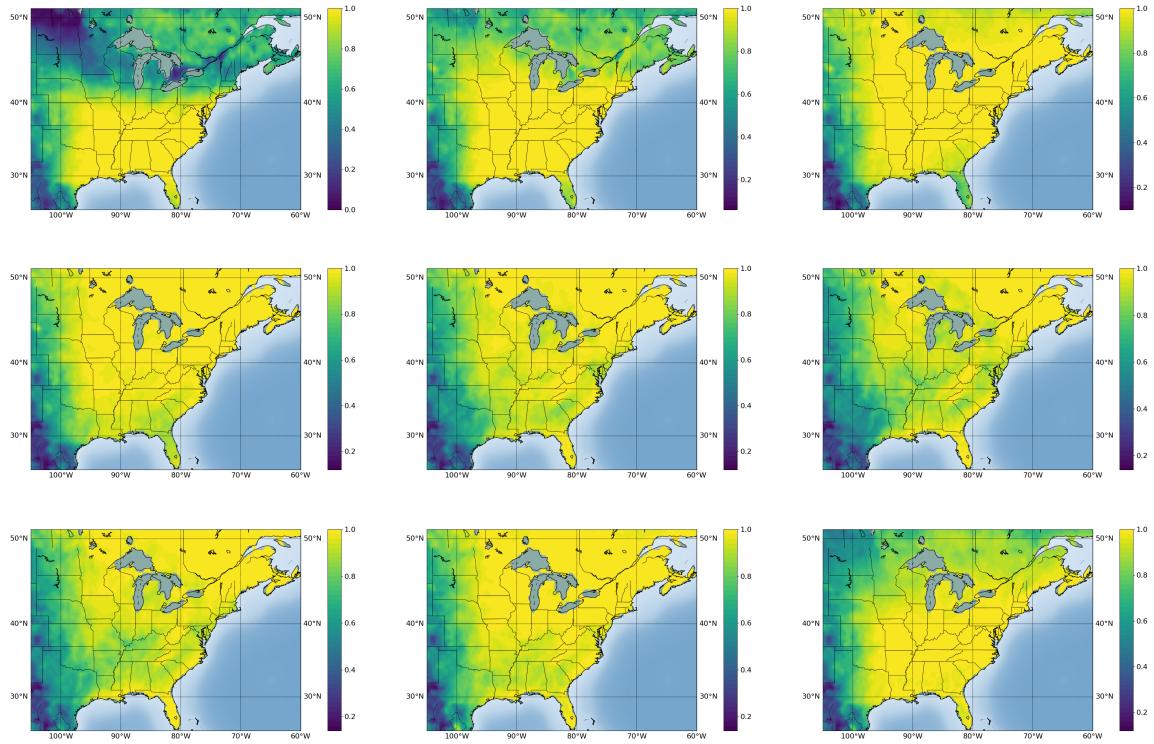


Figure 1: Monthly averages for transpiration beta factor (BTRAN). Contour plots correspond to the months of March through November (left to right and top to bottom).

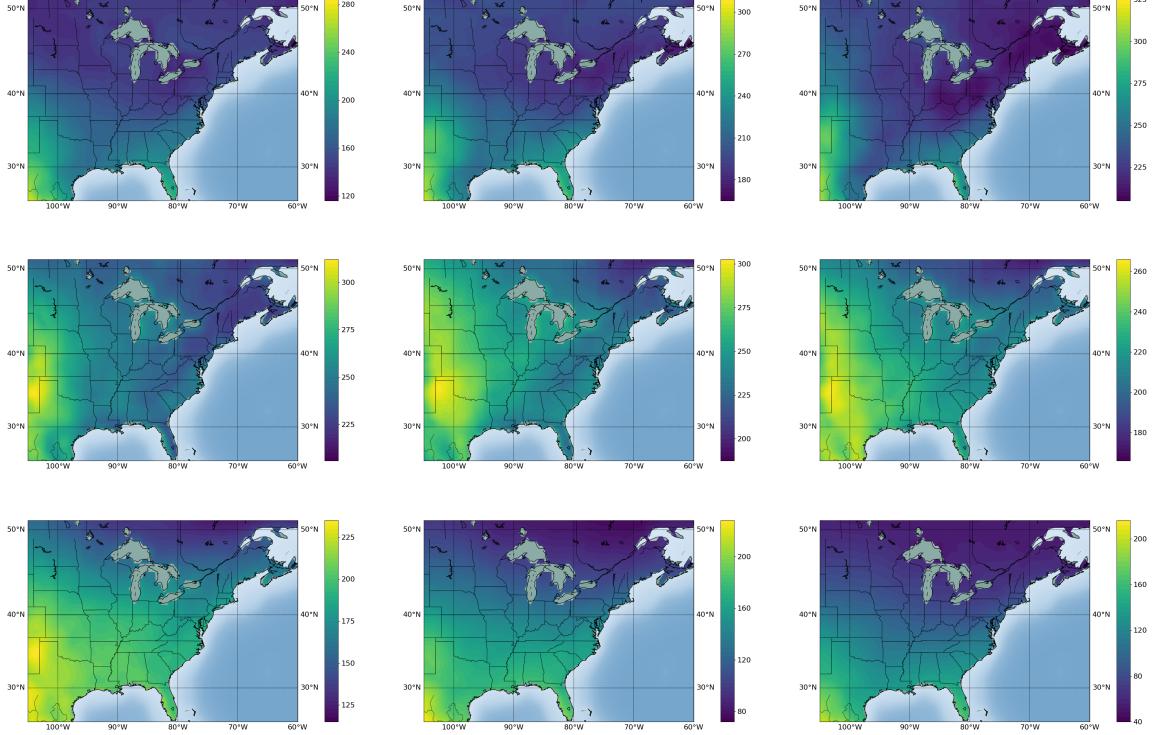


Figure 2: Monthly averages for atmospheric incident solar radiation (FSDS, W/m^2). Contour plots correspond to the months of March through November (left to right and top to bottom).

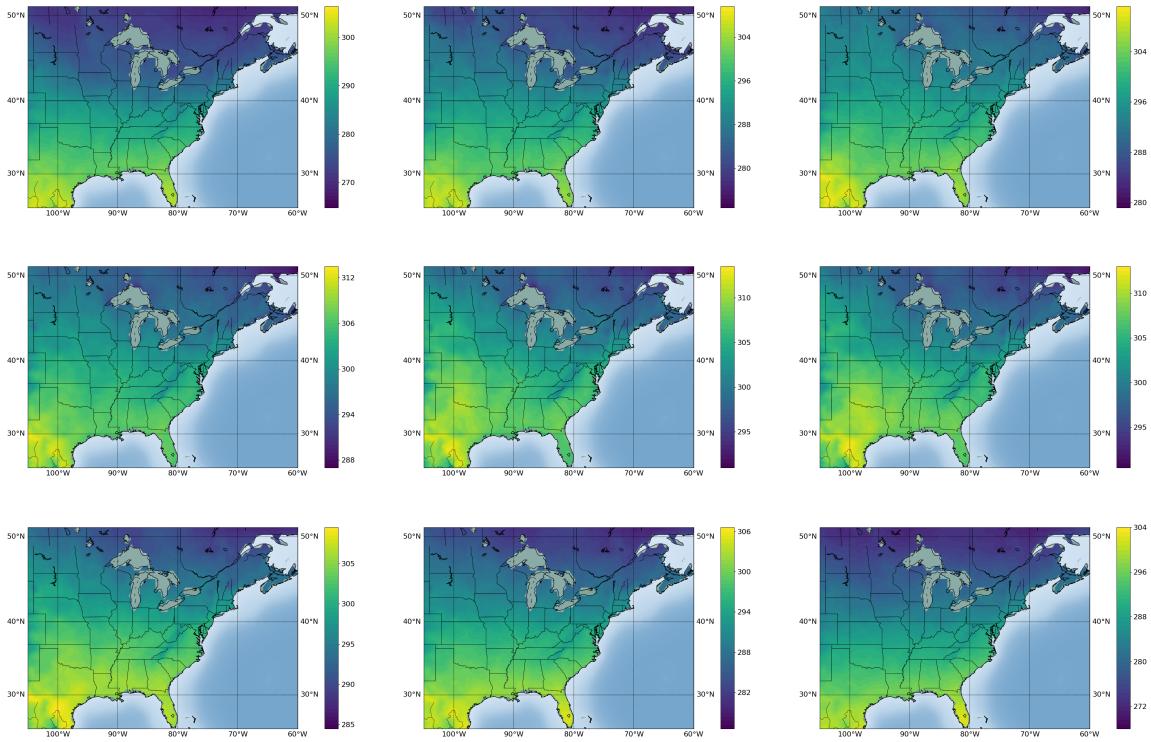


Figure 3: Monthly averages for maximum daily temperature (TMAX, K). Contour plots correspond to the months of March through November (left to right and top to bottom).

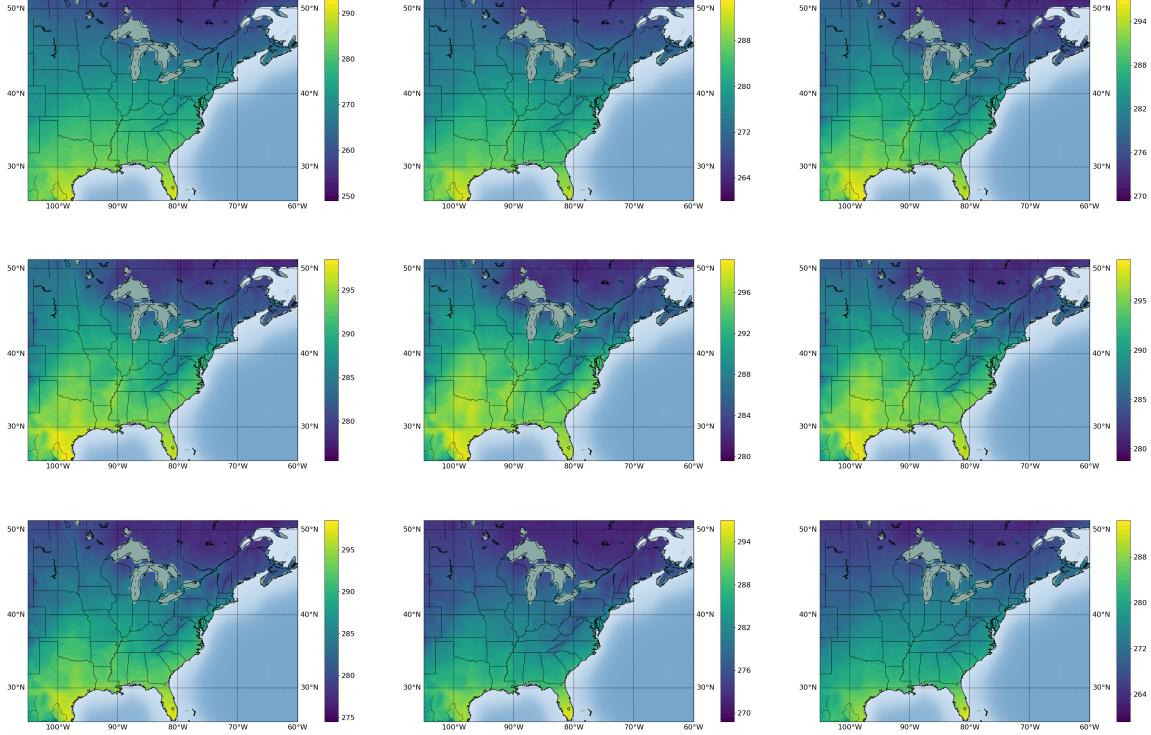


Figure 4: Monthly averages for minimum daily temperature (T_{MIN} , K). Contour plots correspond to the months of March through November (left to right and top to bottom).

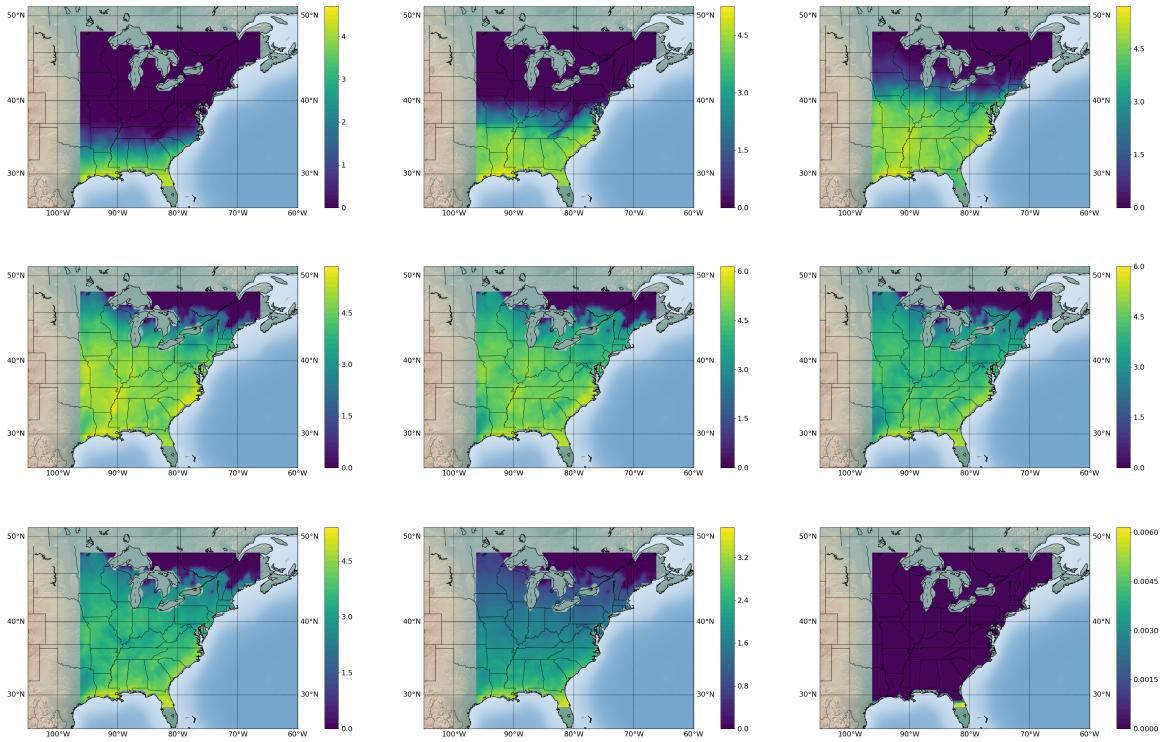


Figure 5: Monthly GPP averages for sample ID 100. Contour plots correspond to the months of March through November (left to right and top to bottom).

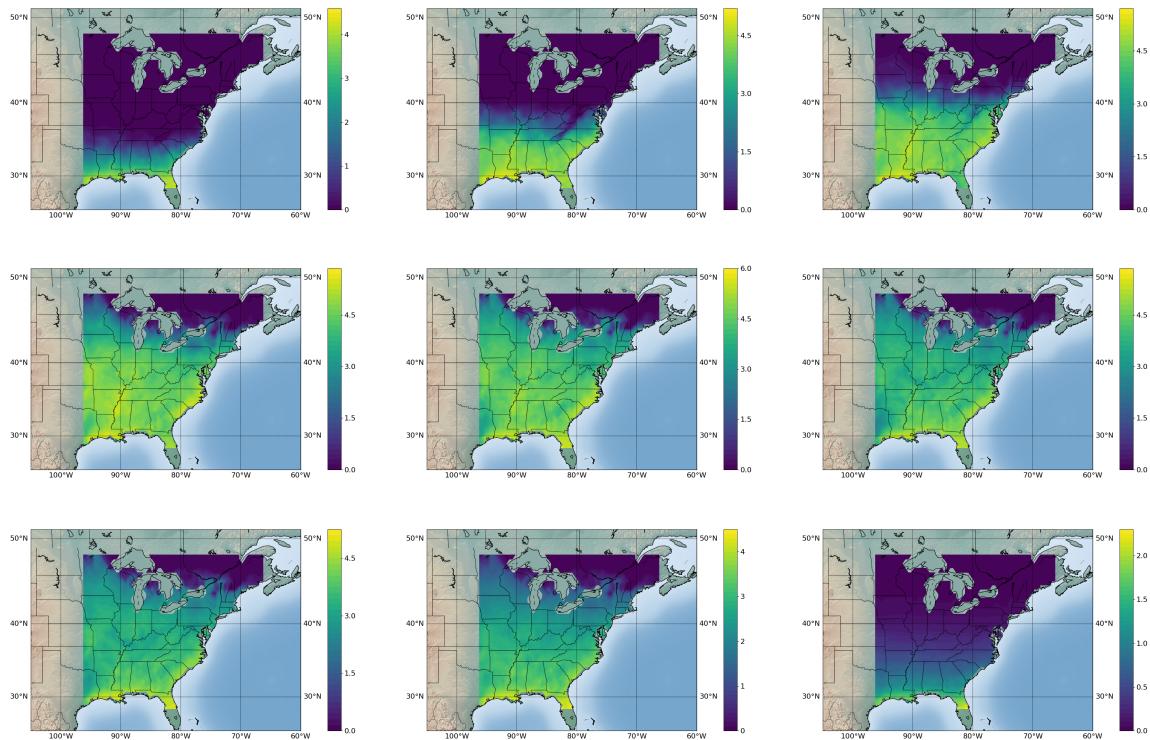


Figure 6: Monthly GPP averages for sample ID 1000. Contour plots correspond to the months of March through November (left to right and top to bottom).

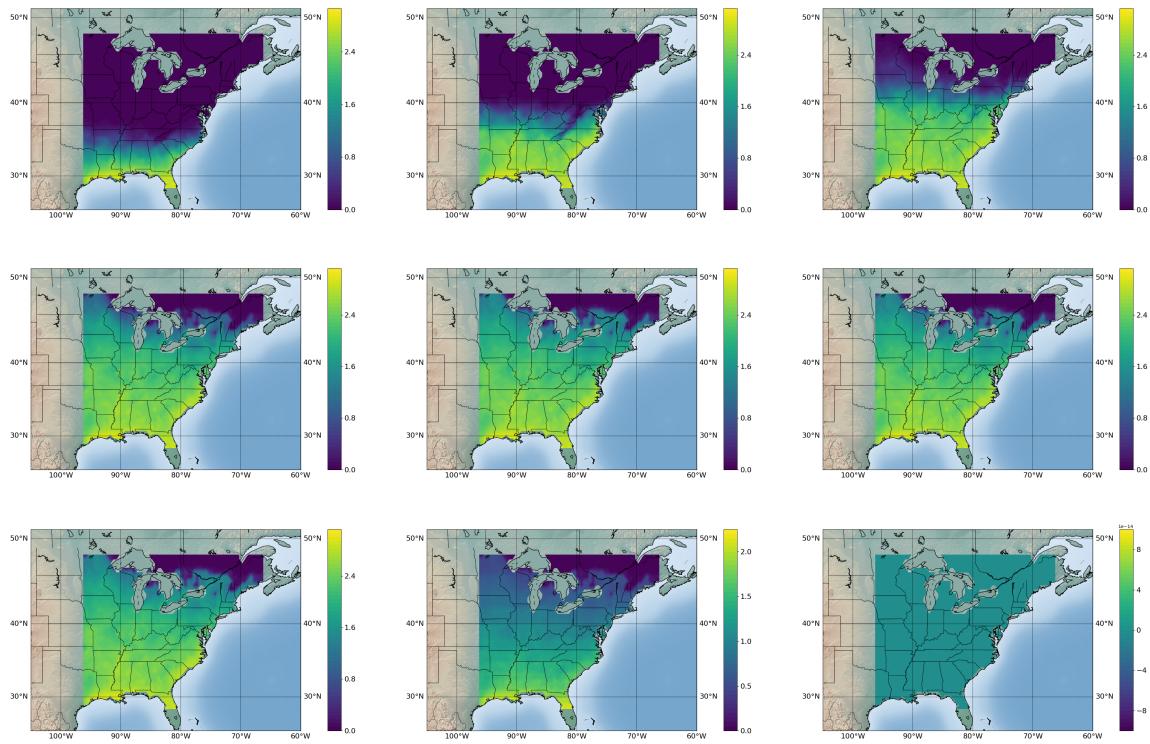


Figure 7: Monthly LAI averages for sample ID 100. Contour plots correspond to the months of March through November (left to right and top to bottom).

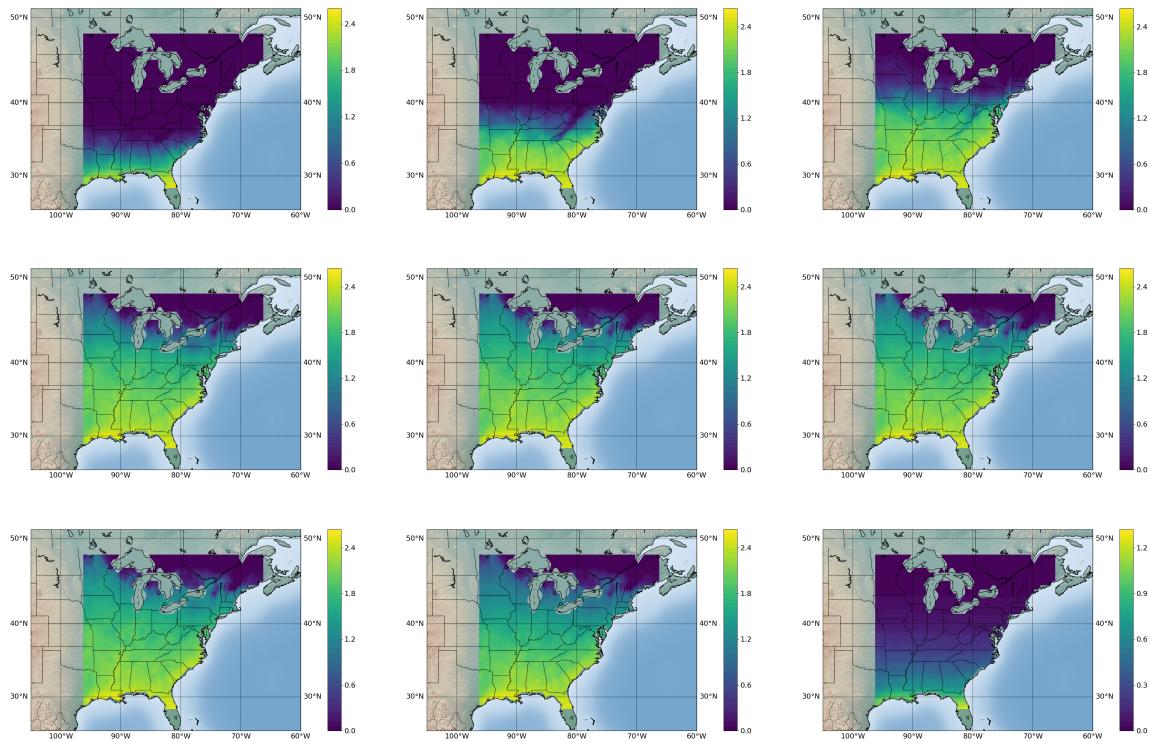


Figure 8: Monthly LAI averages for sample ID 1000. Contour plots correspond to the months of March through November (left to right and top to bottom).

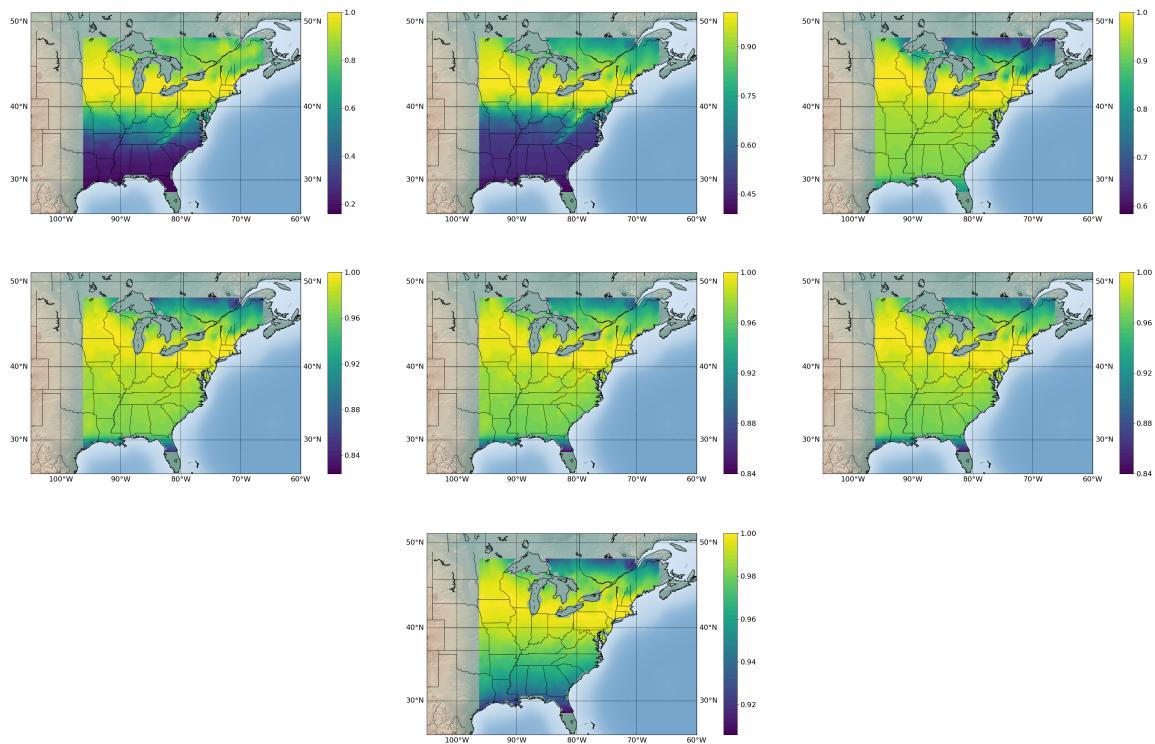


Figure 9: Pearson correlation coefficient between monthly GPP averages at US-HA1 and other land cells. Contour plots correspond to the months of April through October (left to right and top to bottom).

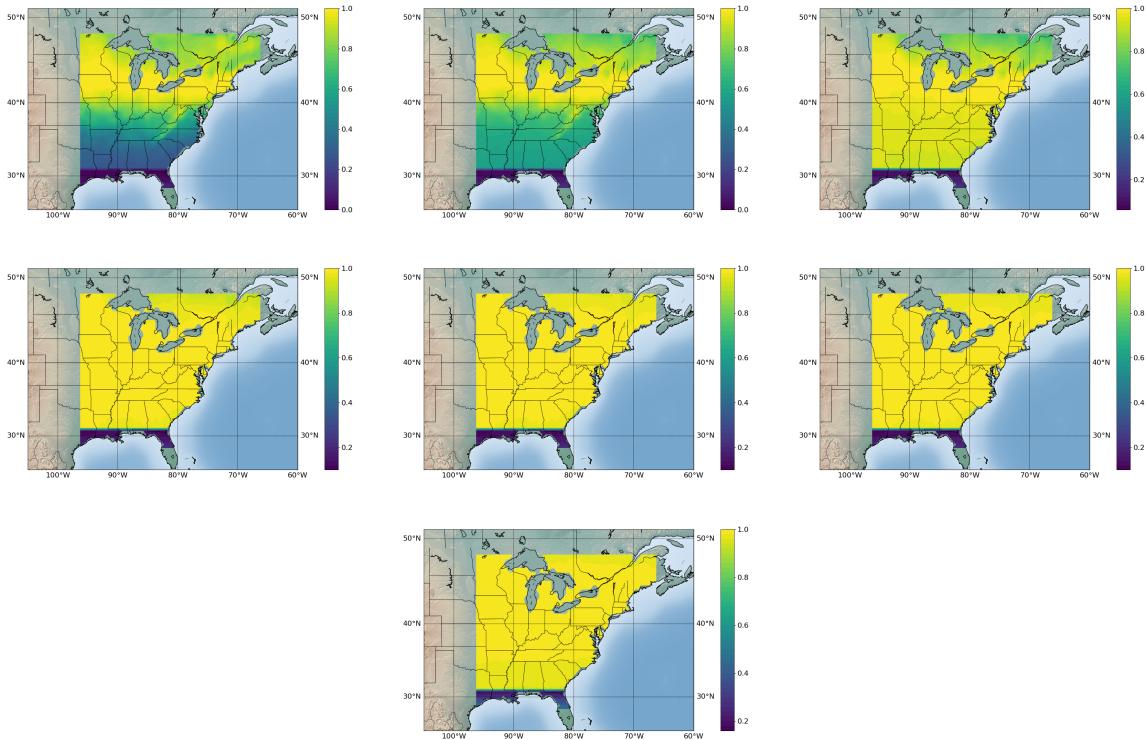


Figure 10: Pearson correlation coefficient between monthly LAI averages at US-HA1 and other land cells. Contour plots correspond to the months of April through October (left to right and top to bottom).

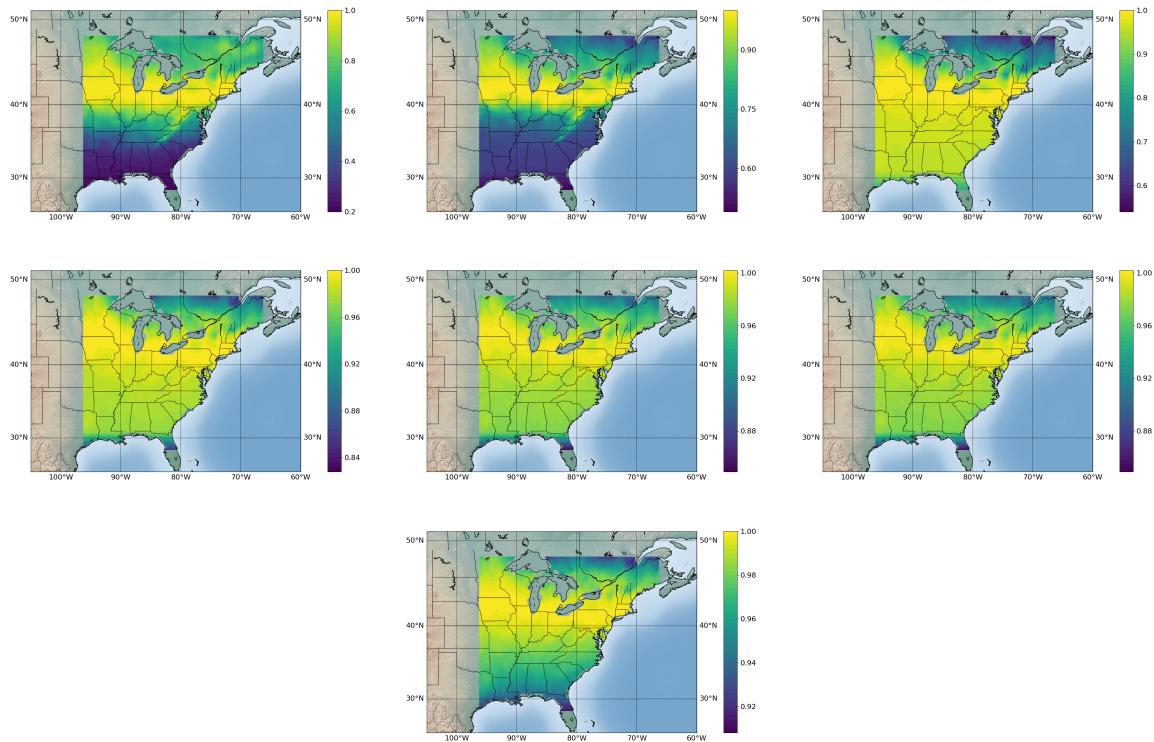


Figure 11: Pearson correlation coefficient between monthly GPP averages at US-Oho and other land cells. Contour plots correspond to the months of April through October (left to right and top to bottom).

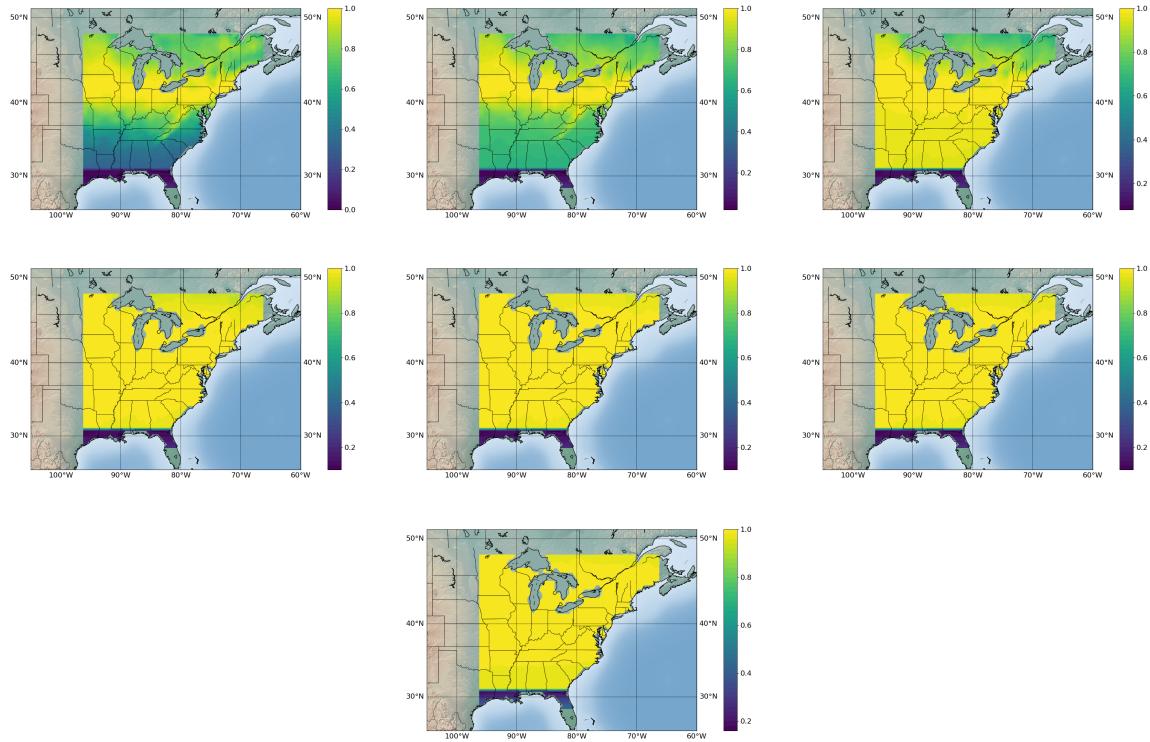


Figure 12: Pearson correlation coefficient between monthly LAI averages at US-Oho and other land cells. Contour plots correspond to the months of April through October (left to right and top to bottom).