1 Supplement

2 Observational Uncertainties

OCO-2 SIF Uncertainty for January 2015

SIF Uncertianty (W m−2 µm−2 sr−1)
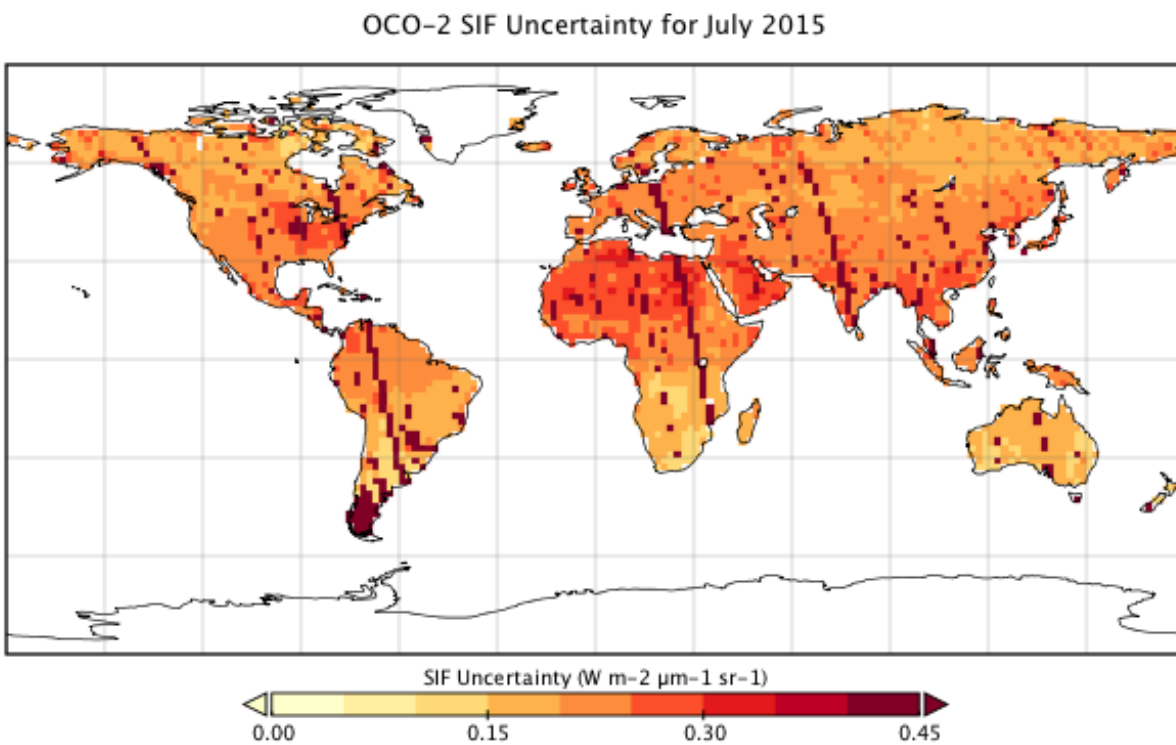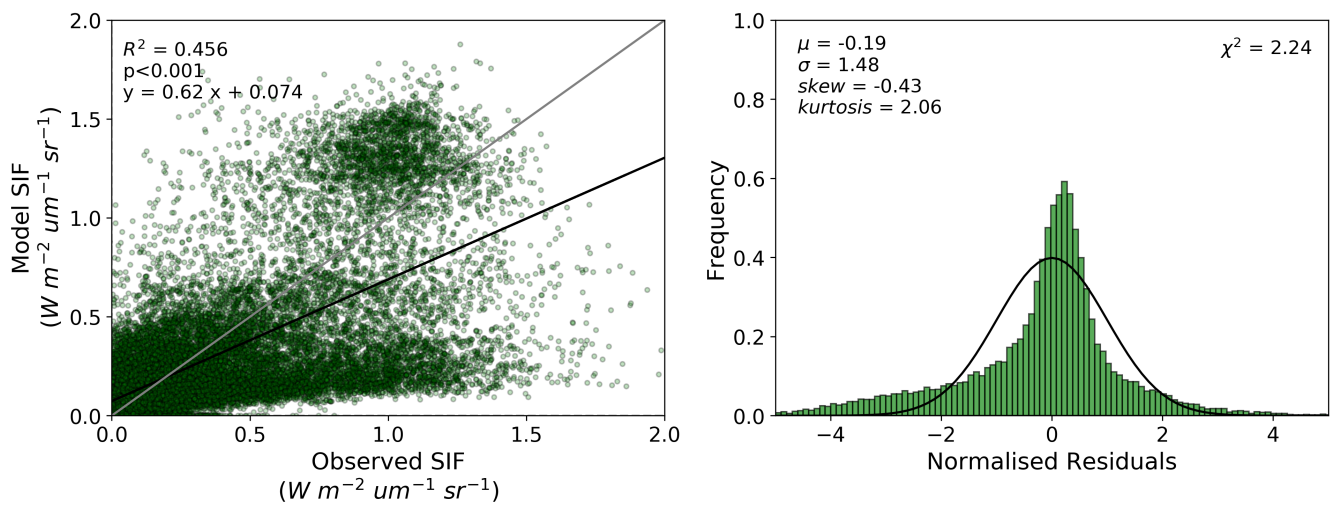
0.00   0.15   0.30   0.45

Figure 1. One standard deviation uncertianty in OCO-2 SIF for January 2015. Dark red grid cells have no observations.
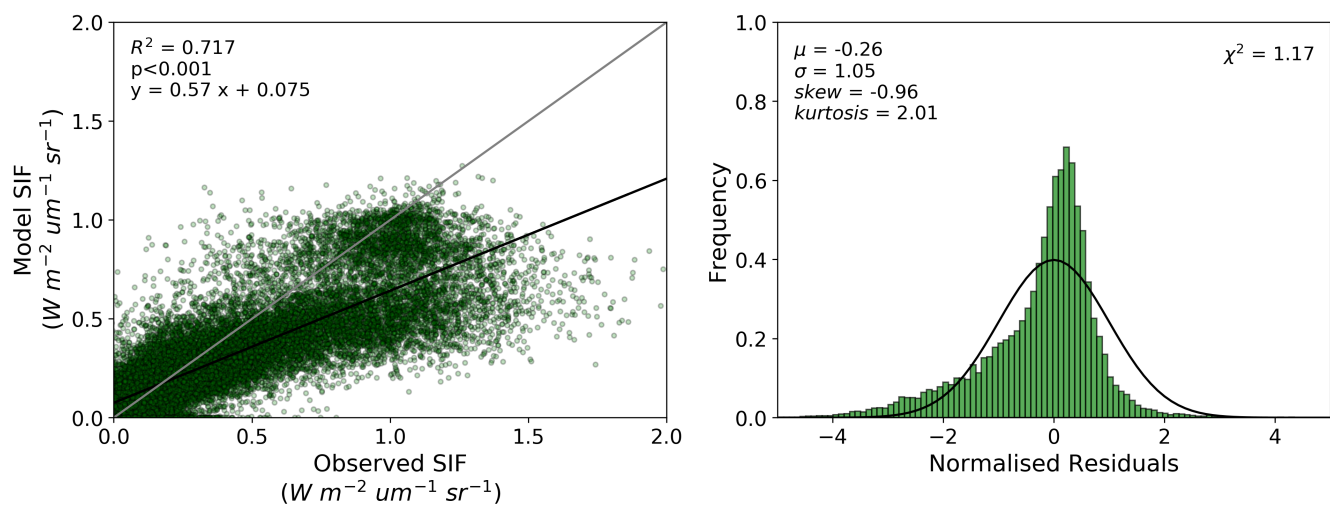
Figure 2. One standard deviation uncertainty in OCO-2 SIF for July 2015. Dark red grid cells have no observations.
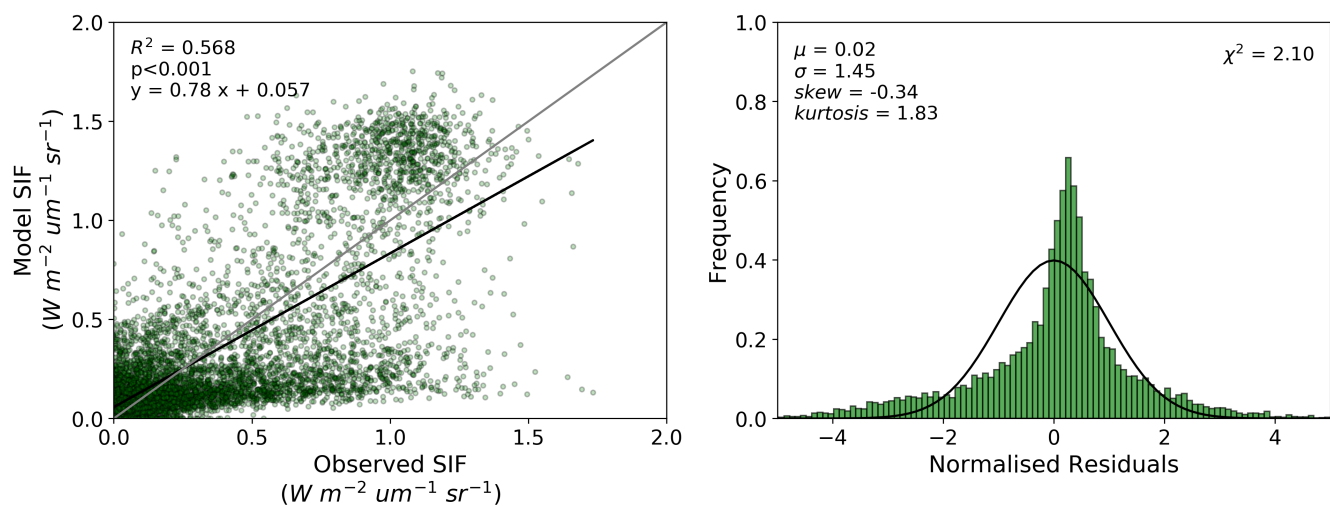
3 Model-Observed Fit

Figure 3. Prior model-observed fit and normalized residuals (modelled minus observed SIF divided by observational uncertainty) over the calibration period (SIF_{prior}).
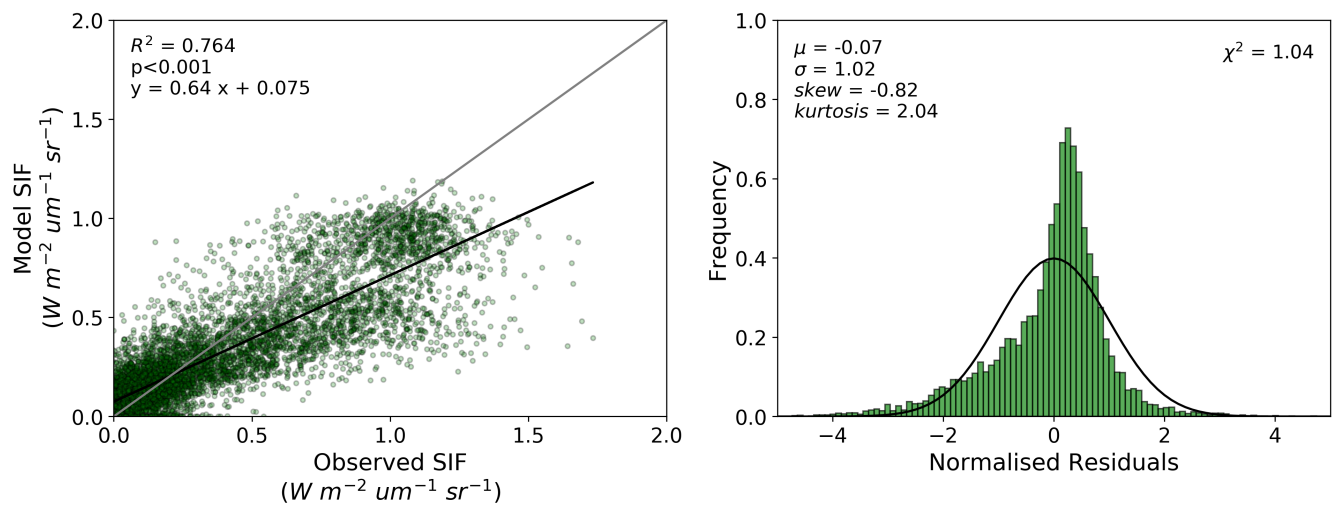
Figure 4. Posterior odel-observed fit and normalized residuals (modelled minus observed SIF divided by observational uncertainty) over the calibration period (SIF$_{\text{post}}$).
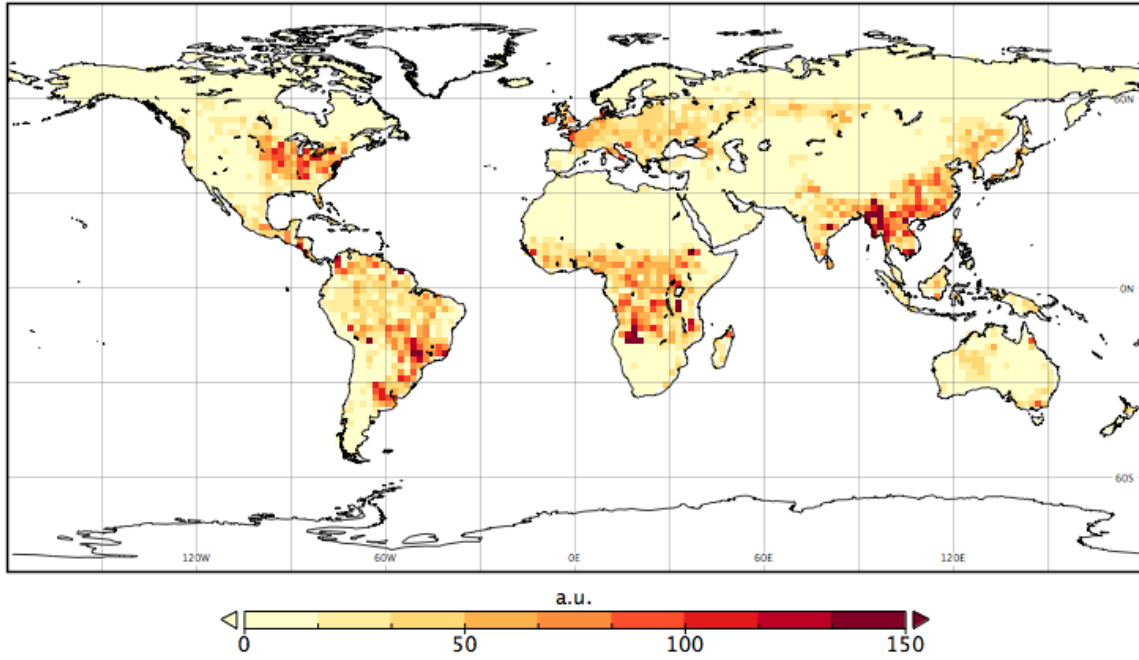
Figure 5. Prior model-observed fit and normalized residuals (modelled minus observed SIF divided by observational uncertainty) over the validation period.
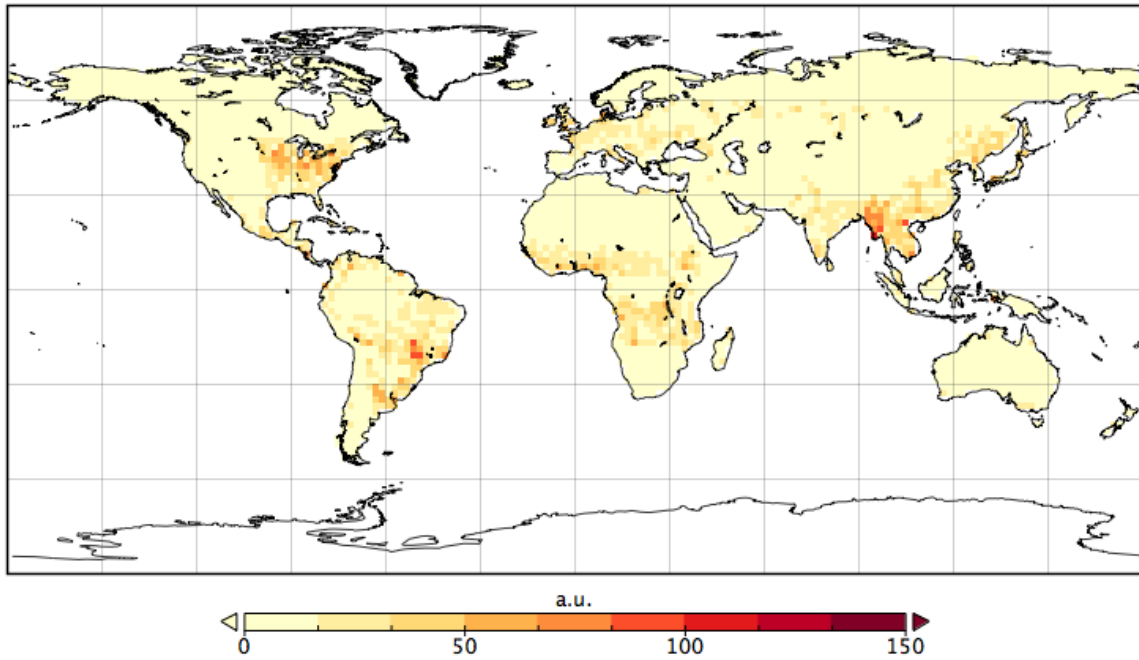
Figure 6. Posterior model-observed fit and normalized residuals (modelled minus observed SIF divided by observational uncertainty) over the validation period.
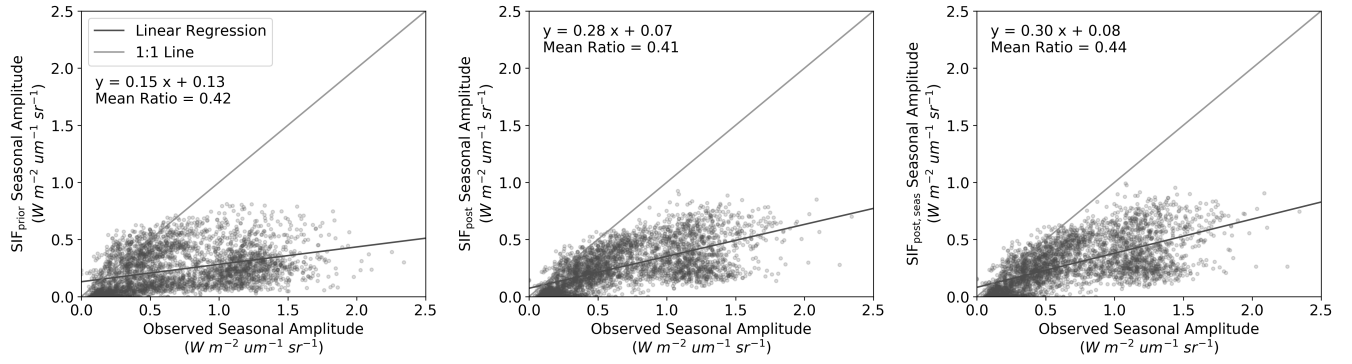
4 Model-Observed Mismatch

Figure 7. Annual total mismatch between the observed SIF and prior model SIF (SIF_{prior}).
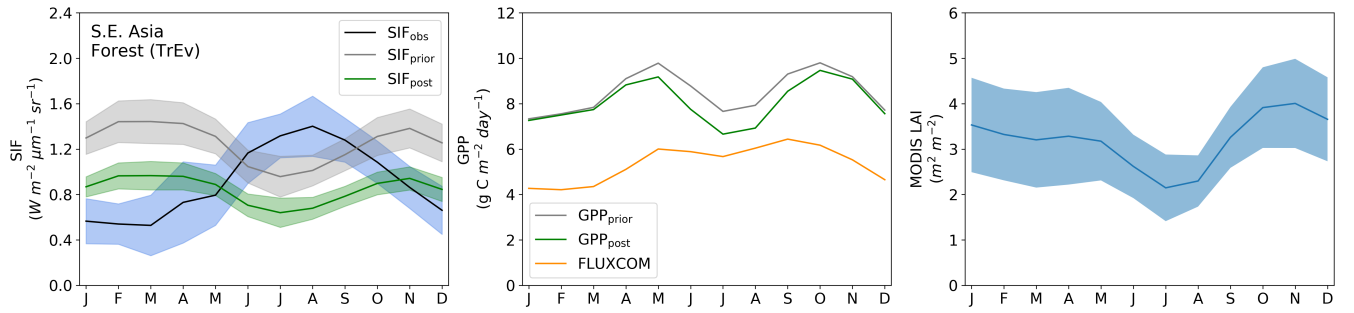
Figure 8. Annual total mismatch between the observed SIF and posterior model SIF (SIF_{post}).
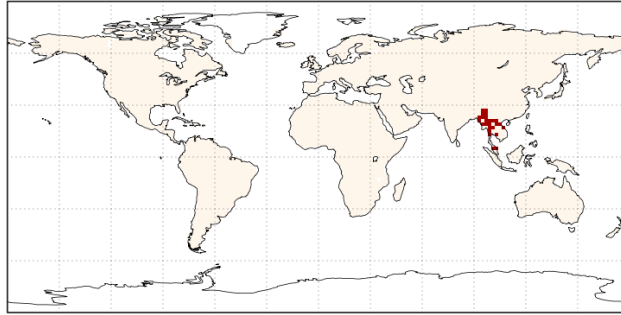
Figure 9. Model versus observed seasonal amplitude of SIF for the prior model (left), SIF-optimized model (middle), and SIF-optimized model with seasonally varying C_{ab} and V_{cmax} parameters (right). Shown on each plot is a 1:1 line (grey) and linear regression line (blue) with the associated equation. Also shown is the mean ratio between the model and observed seasonal amplitude.

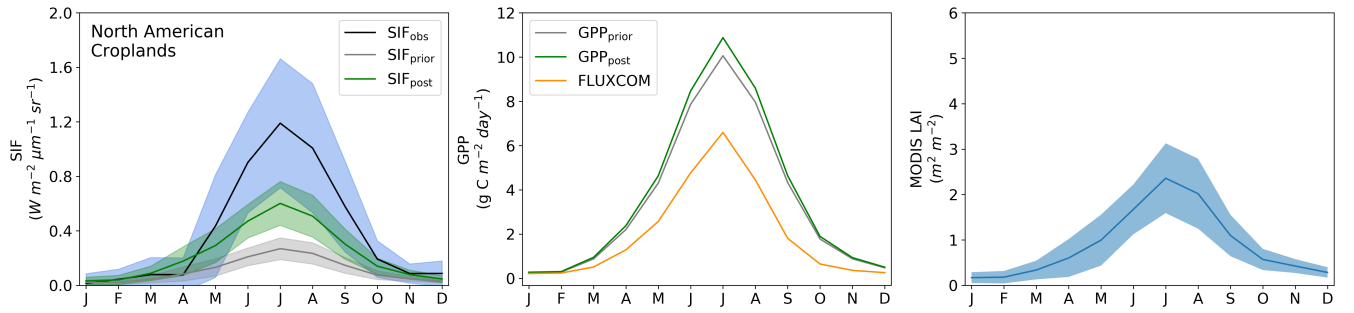# 5 Regional Model-Observed Differences

Figure 10. Regional patterns of SIF (left), GPP (center) and LAI (right) over mainland south-east Asia only for model grid cells with TrEv as the dominant PFT (see Fig. 11). The shading represents one sigma spread of data points in the selected region and month.

Figure 11. Model grid points selected for the regional analysis of mainland south-east Asia tropical forest.
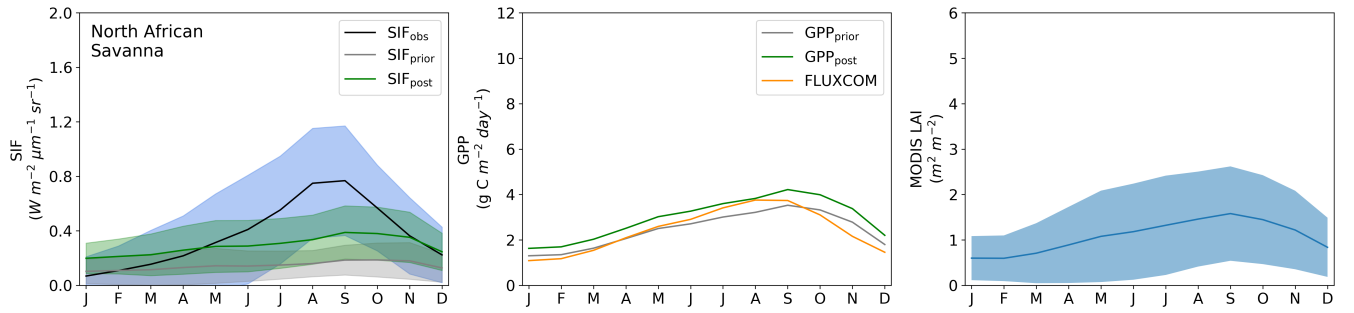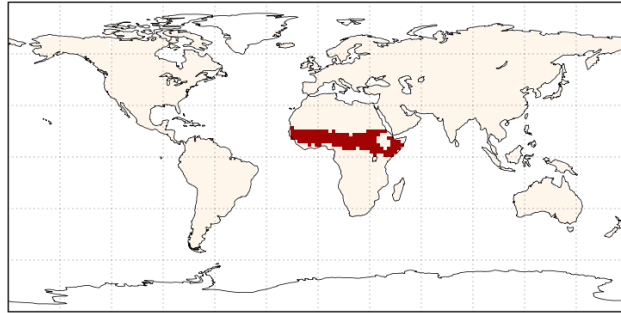
Figure 12. Regional patterns of SIF (left), GPP (center) and LAI (right) over North America croplands only for model grid cells with Crop as the dominant PFT (see Fig. 13). The shading represents one sigma spread of data points in the selected region and month.

Figure 13. Model grid points selected for the regional analysis of North American croplands.

Figure 14. Regional patterns of SIF (left), GPP (center) and LAI (right) over north Africa savanna only for model grid cells with C4 grass as the dominant PFT (see Fig. 15). The shading represents one sigma spread of data points in the selected region and month.

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Figure 15. Model grid points selected for the regional analysis of north African savanna.