1   **Supplementary Figures**

(a) Downwelling Shortwave Radiation (W/m^2)

(b) Downwelling Longwave Radiation (W/m^2)
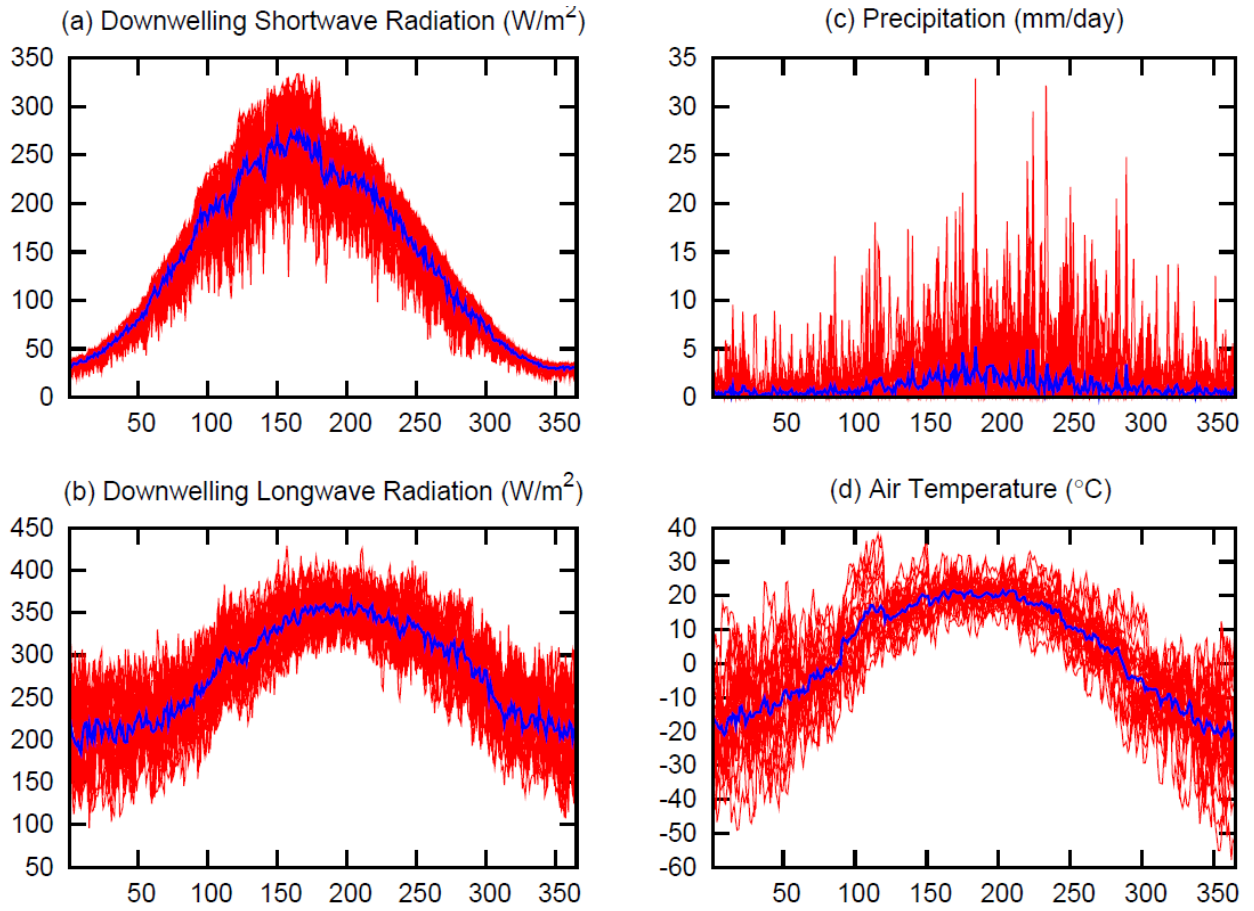
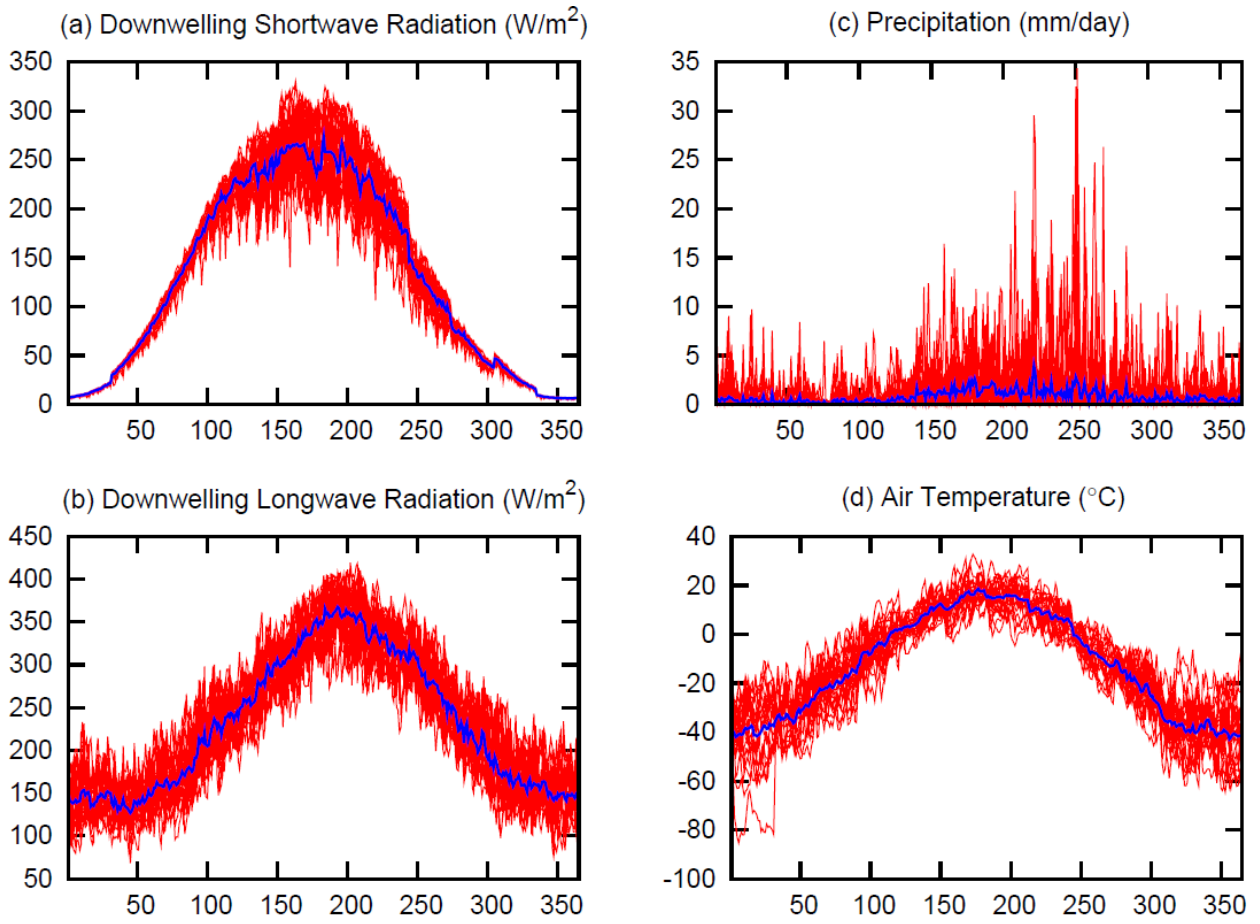(c) Precipitation (mm/day)

(d) Air Temperature (°C)

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3   Figure S1: Annual cycle of primary meteorological variables used to the drive the coupled
4   CLASS and CTEM models at the Manitoba location

(a) Downwelling Shortwave Radiation (W/m^2)

(c) Precipitation (mm/day)

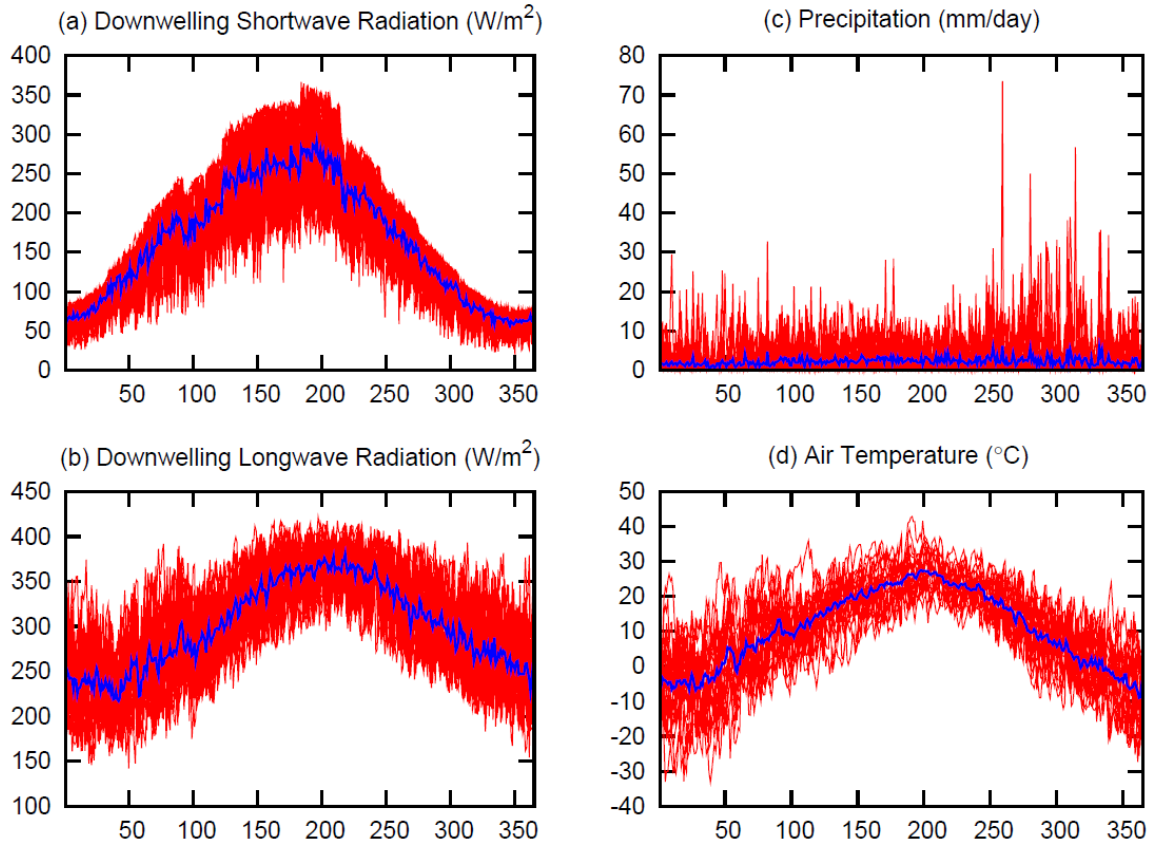(b) Downwelling Longwave Radiation (W/m^2)

(d) Air Temperature (°C)

Figure S2: Annual cycle of primary meteorological variables used to the drive the coupled CLASS and CTEM models at the Siberia location

(a) Downwelling Shortwave Radiation (W/m^2)

(b) Downwelling Longwave Radiation (W/m^2)

(c) Precipitation (mm/day)
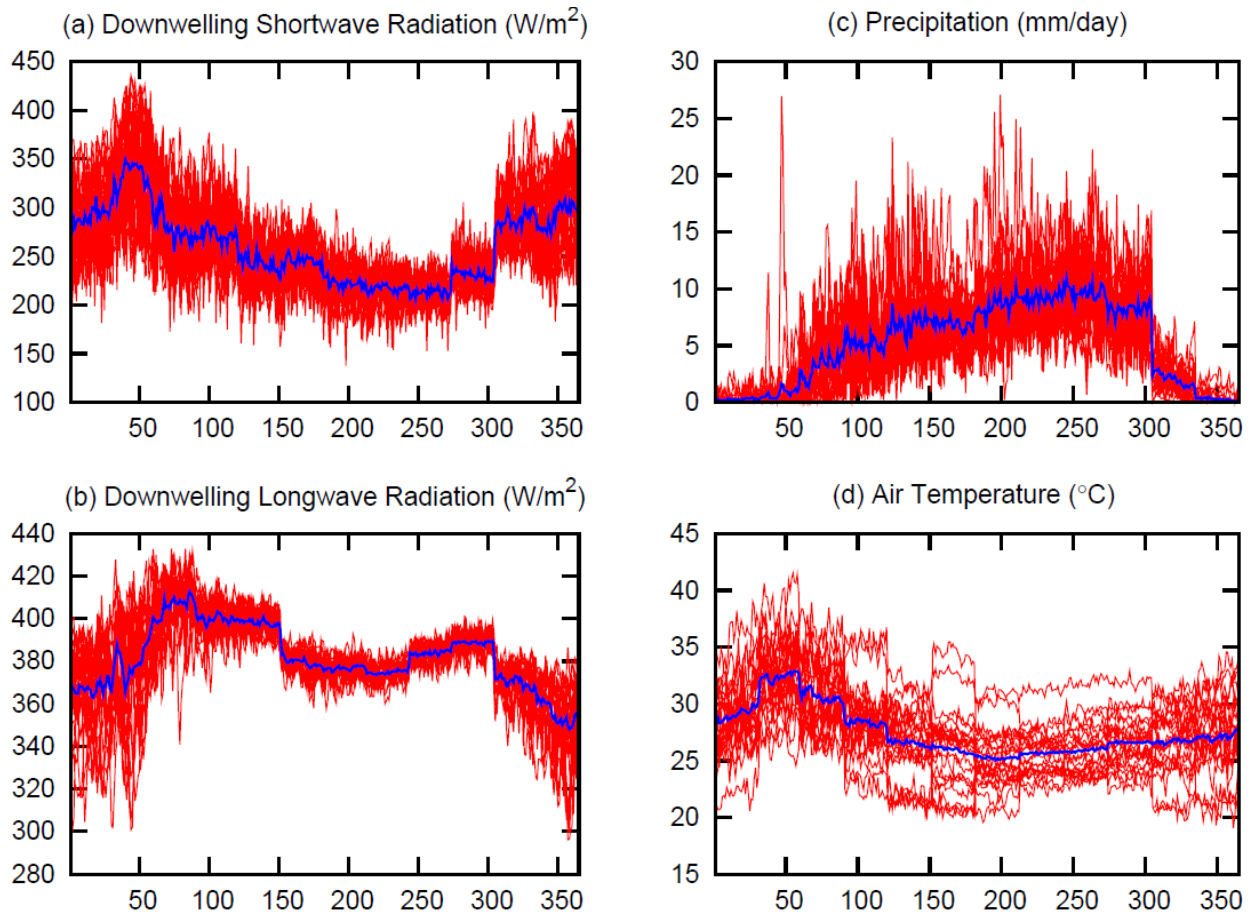
(d) Air Temperature (°C)

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9   Figure S3: Annual cycle of primary meteorological variables used to the drive the coupled
10   CLASS and CTEM models at the eastern U.S. location

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(a) Downwelling Shortwave Radiation (W/m^2)

(c) Precipitation (mm/day)

(b) Downwelling Longwave Radiation (W/m^2)

(d) Air Temperature (°C)

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13   Figure S4: Annual cycle of primary meteorological variables used to the drive the coupled
14   CLASS and CTEM models at the Africa location