

## Supplement: Table S1 and Figures S1-S13

Table S1. Satellite products used in the analysis of the vegetation state.

<b>Product</b>	<b>Usage</b>	<b>Instrument (data depository)</b>	<b>Product type</b>
Fraction of absorbed photosynthetically active radiation (FPAR)	Proxy for photosynthesis	MODIS (DAAC/NASA)	1x1 km, 4-day composite
Chlorophyll fluorescence	Proxy for photosynthesis	SCIAMACHY (Joiner/NASA)	Scientific, 0.5x0.5 deg, monthly
Fire radiative power (FPR)	Proxy for biomass burning aerosols	MODIS (FIRMS/NASA)	Collection 5, 1x1 km, daily
Leaf area index (LAI)	Proxy for photosynthesis	MODIS (DAAC/NASA)	1x1 km, 4-day composite
Soil moisture (SM)	Proxy for plant stress	SMMR, SSM/I, TMI, AMI-WS, ASCAT, AMSR-E, WindSat, AMSR2 (Soil Moisture_cci/ESA)	Level 3, 0.25x0.25 deg, daily

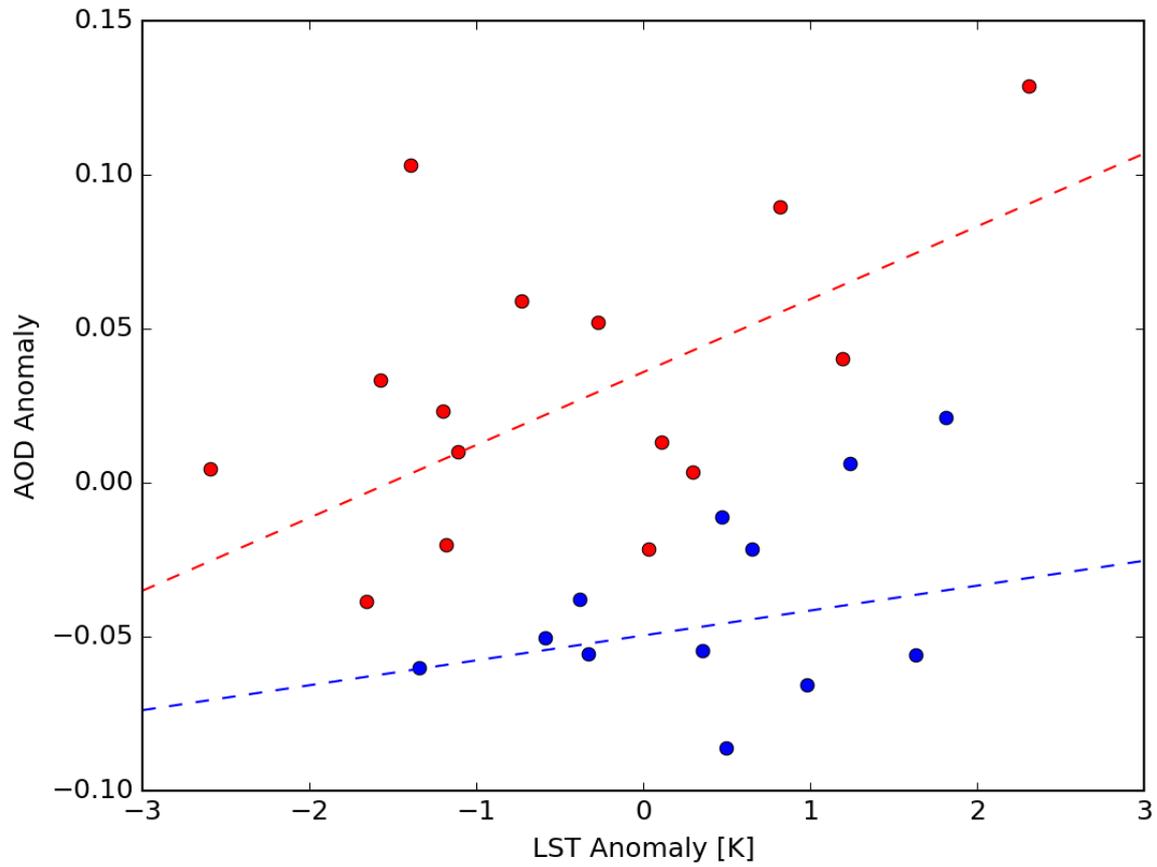


Figure S1. Monthly anomalies in summertime (JJA) aerosol optical depth (AOD) over southeastern US vs. regional mean land surface temperature (LST) for the years 2003–2011. LST and AOD are from L3 AATSR. Linear fits for the two time periods: red ( $AOD_{ano} = 0.024LST_{ano} + 0.036$ ; years 2003-2007) and blue ( $AOD_{ano} = 0.008LST_{ano} - 0.050$ ; years 2008-2011).

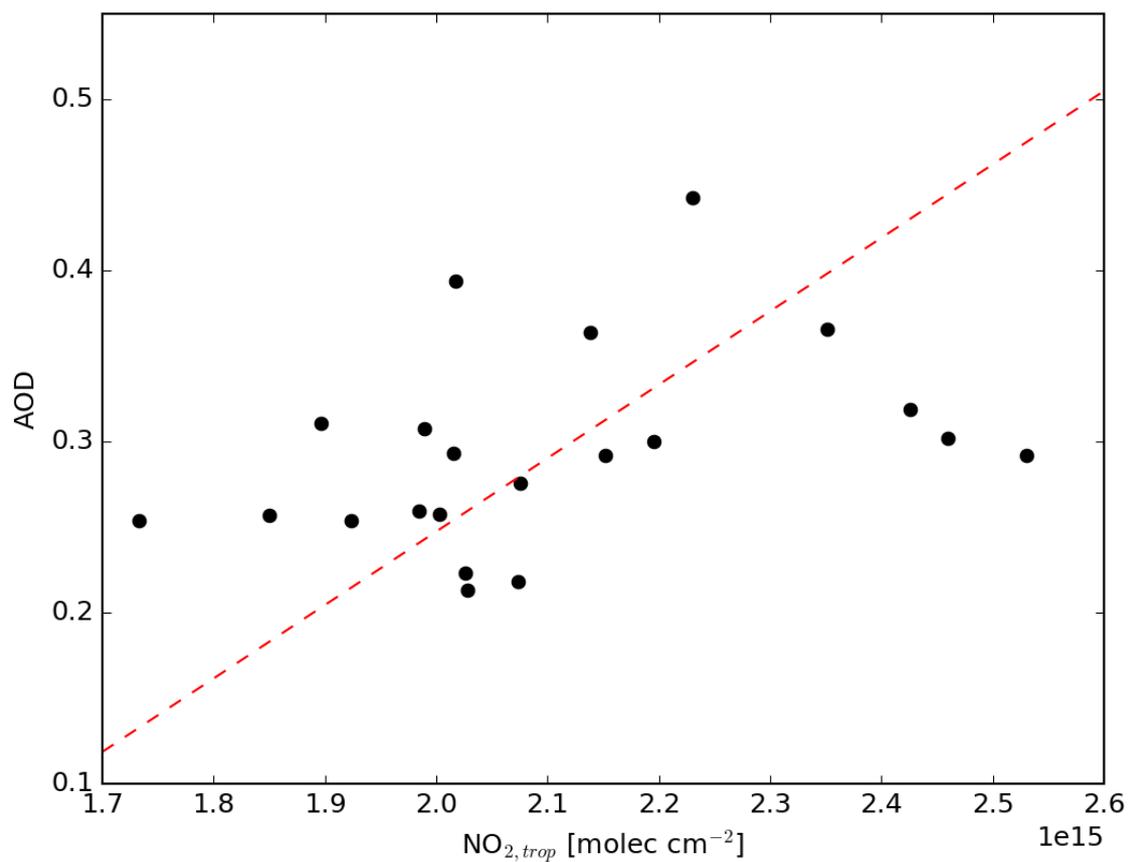


Figure S2. Monthly summertime (JJA) southeastern US regional mean AOD vs. tropospheric NO<sub>2</sub> column density for the years 2005–2011. Linear fit:  $AOD = 4.29e^{-16}NO_{2,trop} - 0.611$ .

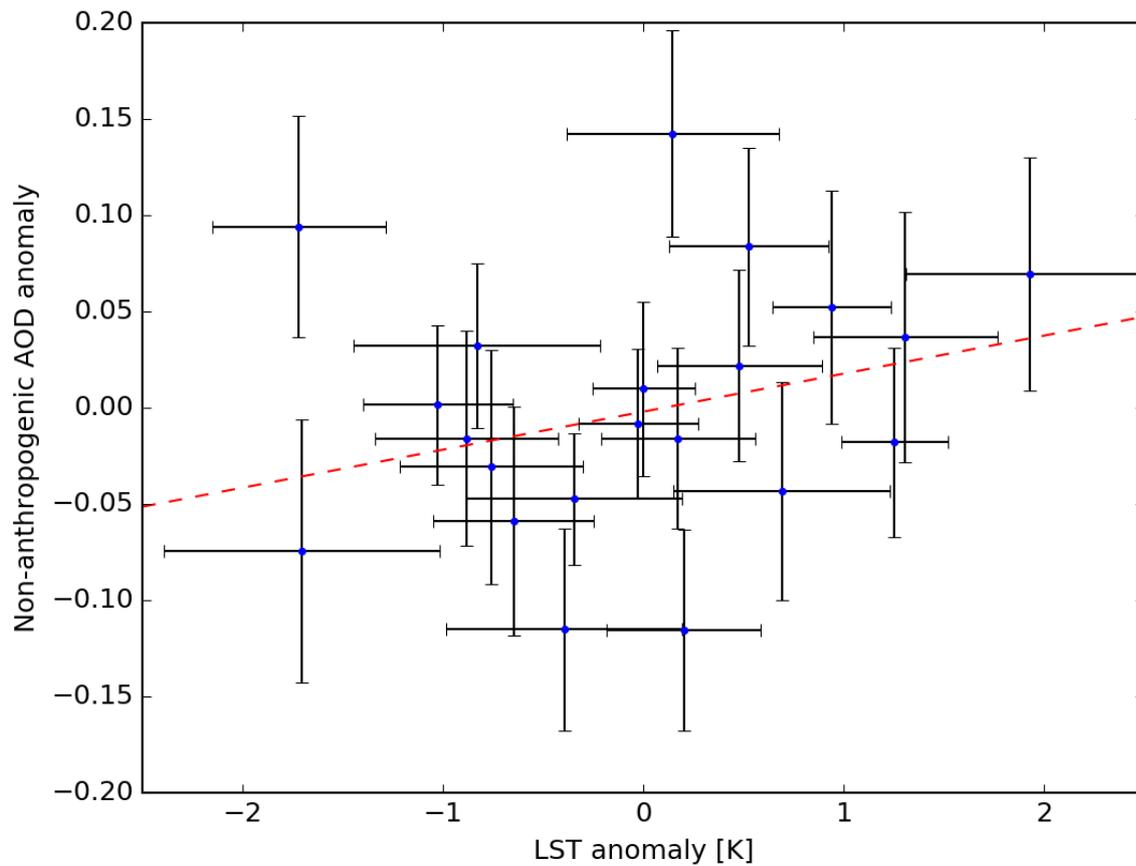


Figure S3. Monthly anomalies in summertime (JJA) southeastern US regional mean "non-anthropogenic" AOD vs. LST, for the years 2005–2011. Non-anthropogenic AOD is based on L3 AATSR AOD and OMI tropospheric NO<sub>2</sub> observations. LST is from L3 AATSR. The dashed line represents the linear fit to the data ( $AOD_{NA,ano} = 0.020LST_{ano} - 0.002$ ) and the error bars represent the uncertainty caused by averaging.

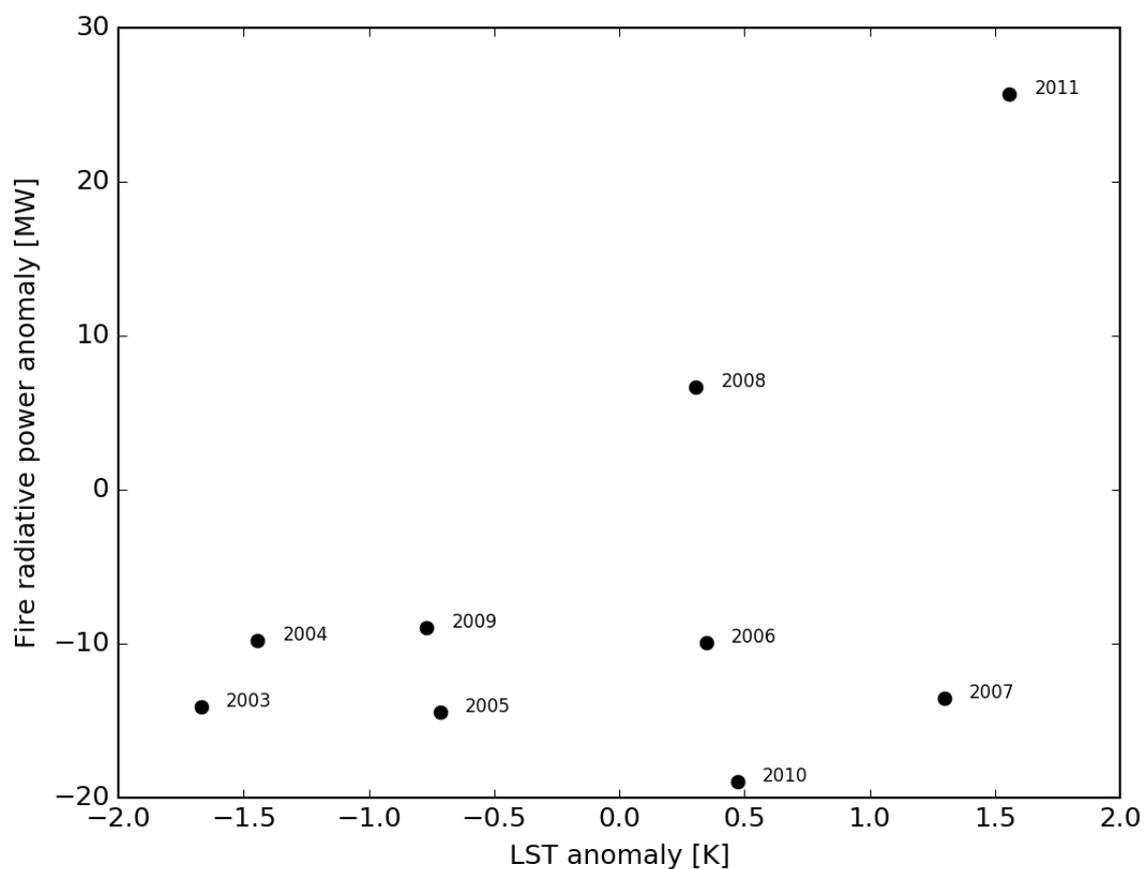


Figure S4. Yearly anomalies in summertime (JJA) southeastern US regional mean LST vs. FRP, for the years 2003–2011. LST is based on L3 AATSR observations. FRP is from MODIS.

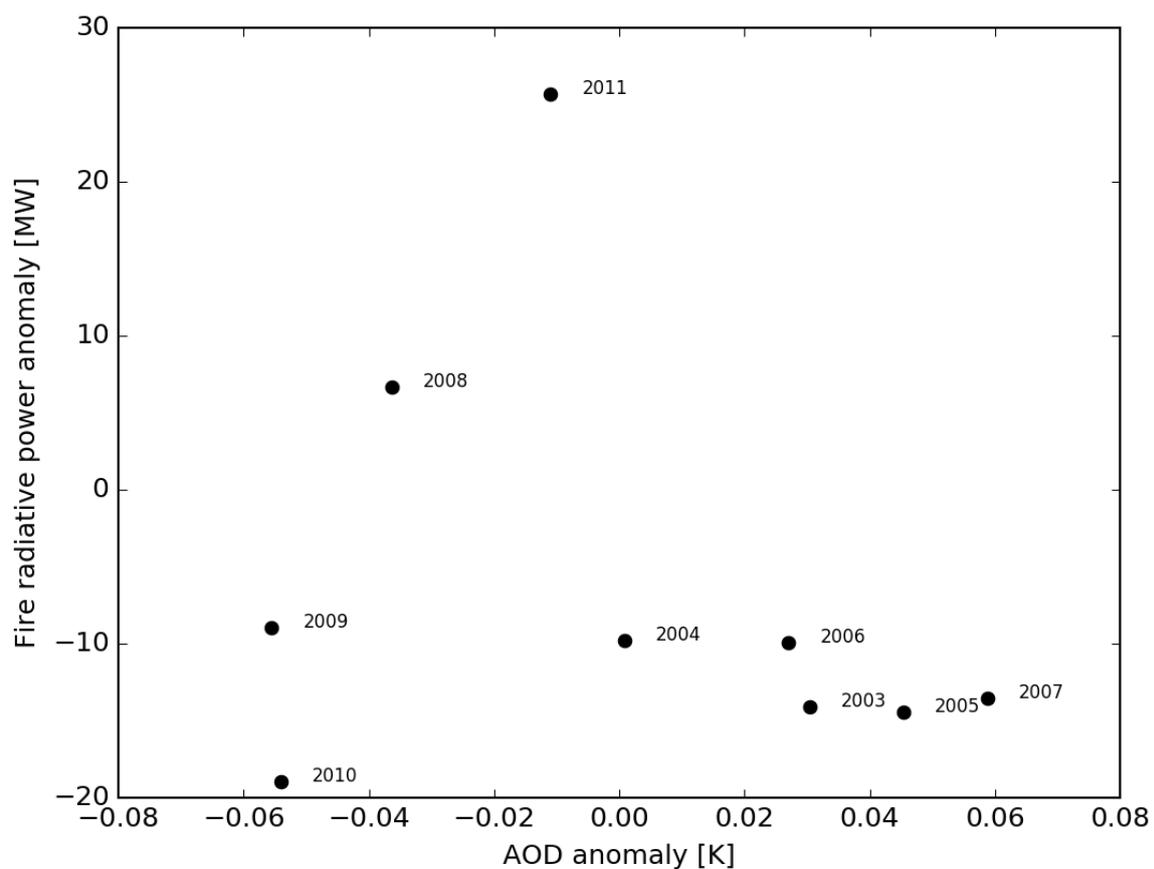


Figure S5. Yearly anomalies in summertime (JJA) southeastern US regional mean AOD vs. FRP, for the years 2003–2011. AOD is based on L3 AATSR observations. FRP is from MODIS.

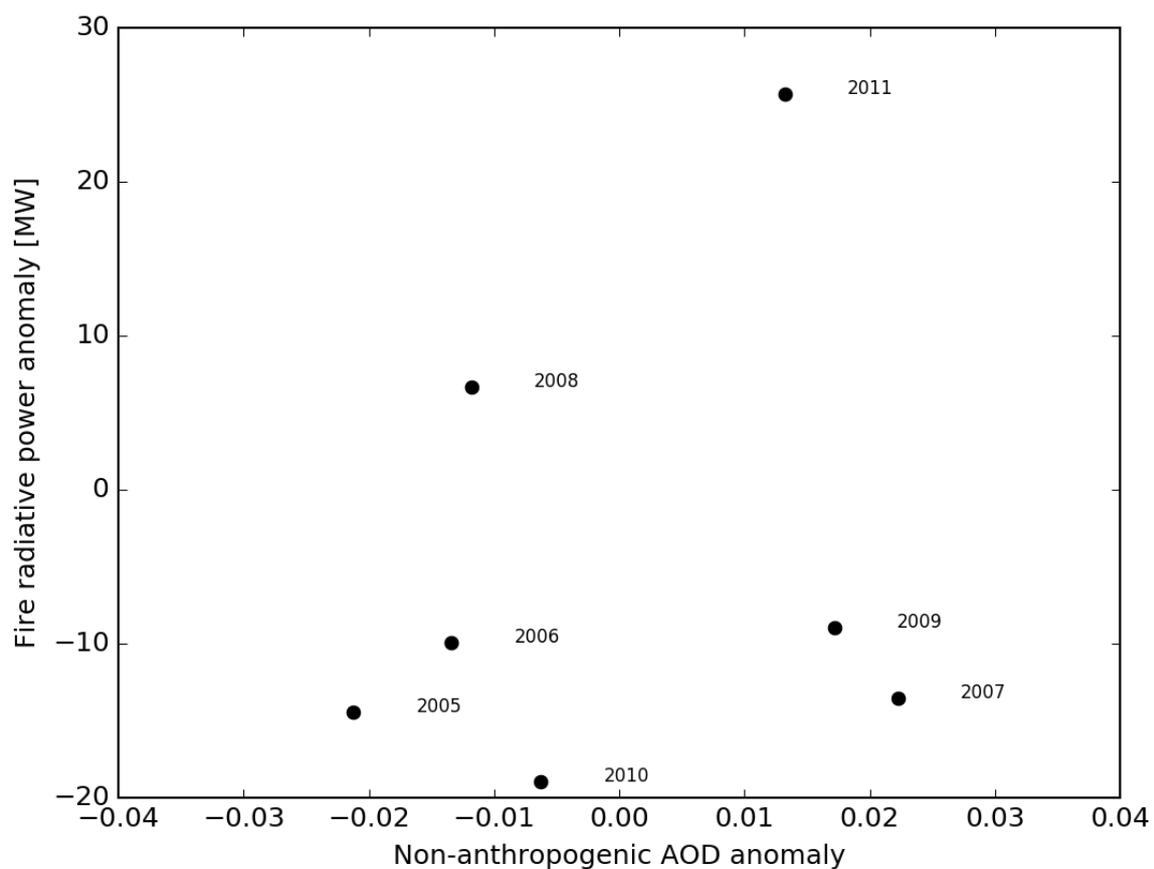


Figure S6. Yearly anomalies in summertime (JJA) southeastern US regional mean "non-anthropogenic" AOD vs. FRP, for the years 2005–2011. Non-anthropogenic AOD is based on L3 AATSR AOD and OMI tropospheric NO<sub>2</sub> observations. FRP is from MODIS.

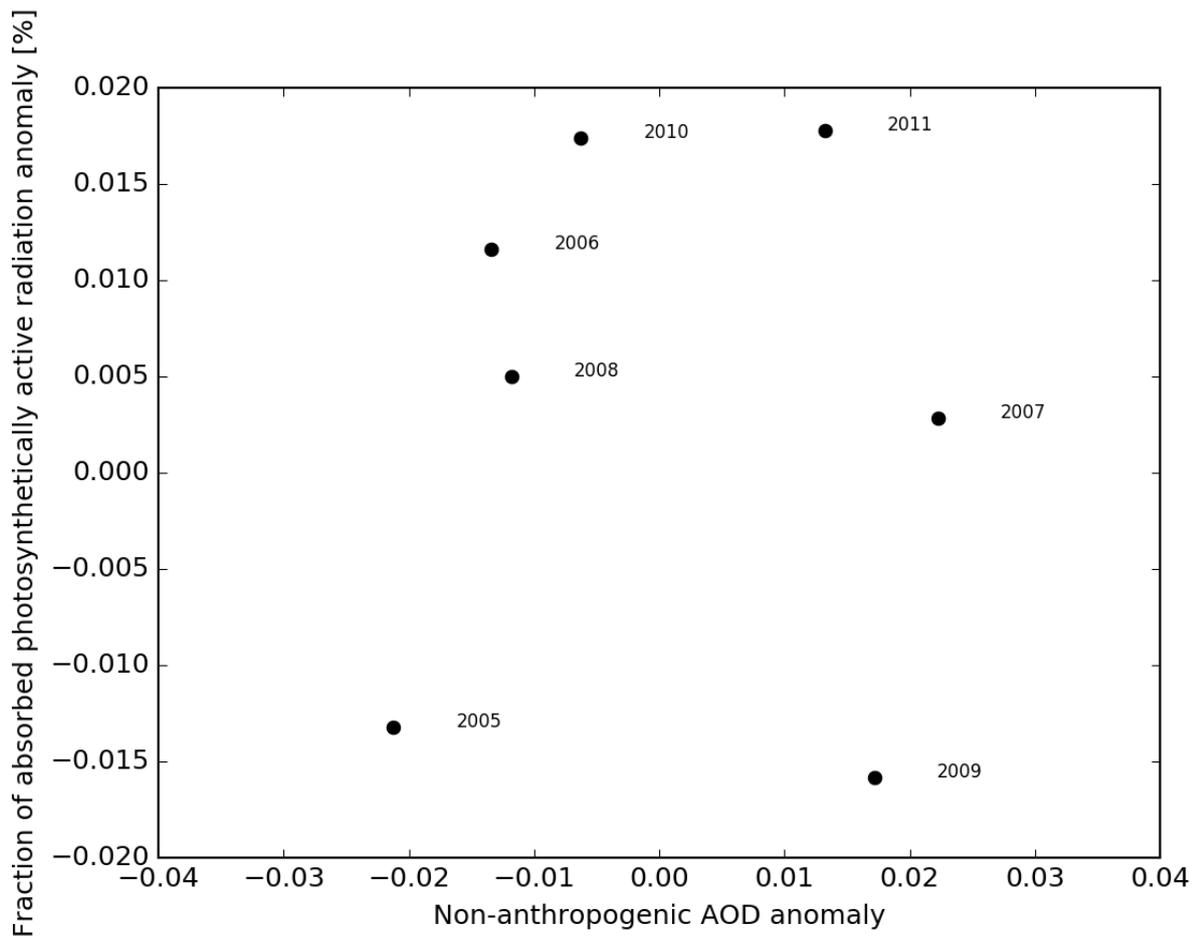


Figure S7. Yearly anomalies in summertime (JJA) southeastern US regional mean "non-anthropogenic" AOD vs. FPAR, for the years 2005–2011. Non-anthropogenic AOD is based on L3 AATSR AOD and OMI tropospheric NO<sub>2</sub> observations. FPAR is from MODIS.

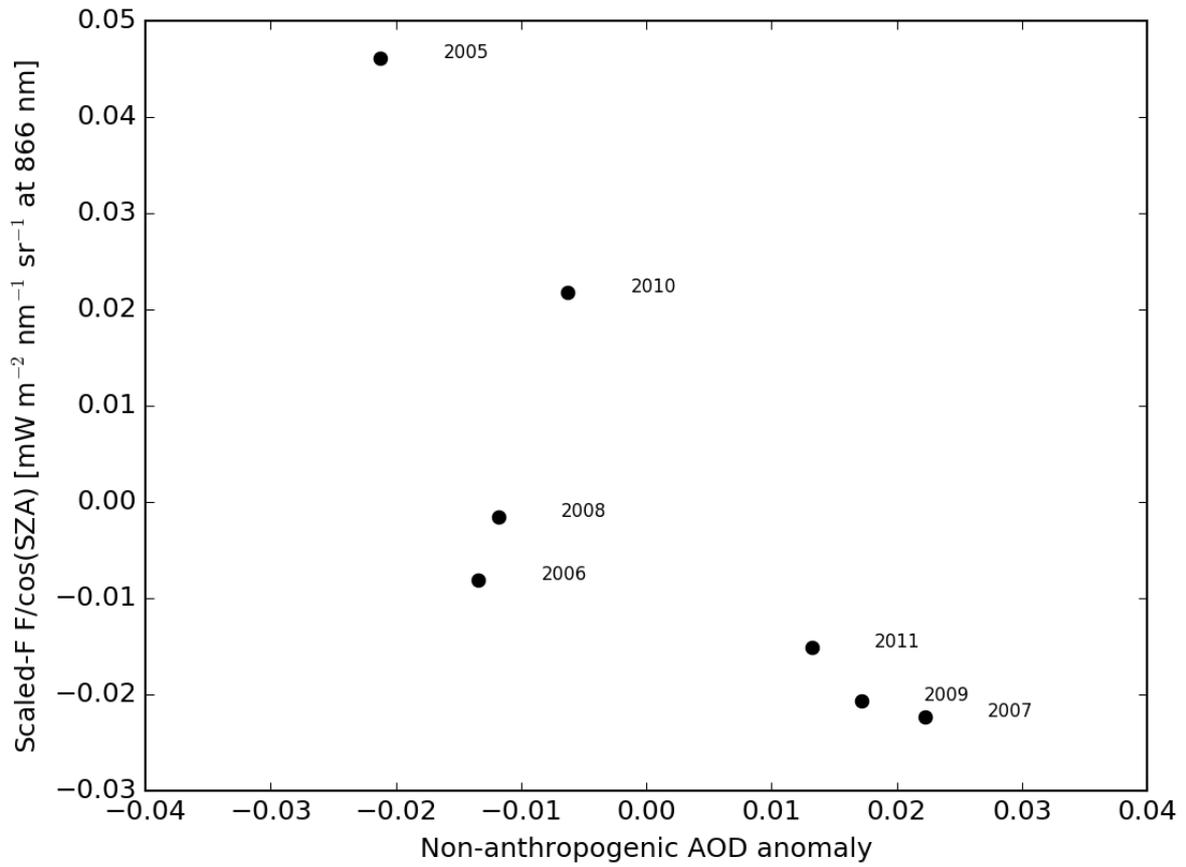


Figure S8. Yearly anomalies in summertime (JJA) southeastern US regional mean "non-anthropogenic" AOD vs. fluorescence, for the years 2005–2011. Non-anthropogenic AOD is based on L3 AATSR AOD and OMI tropospheric NO<sub>2</sub> observations. Fluorescence is from SCIAMACHY.

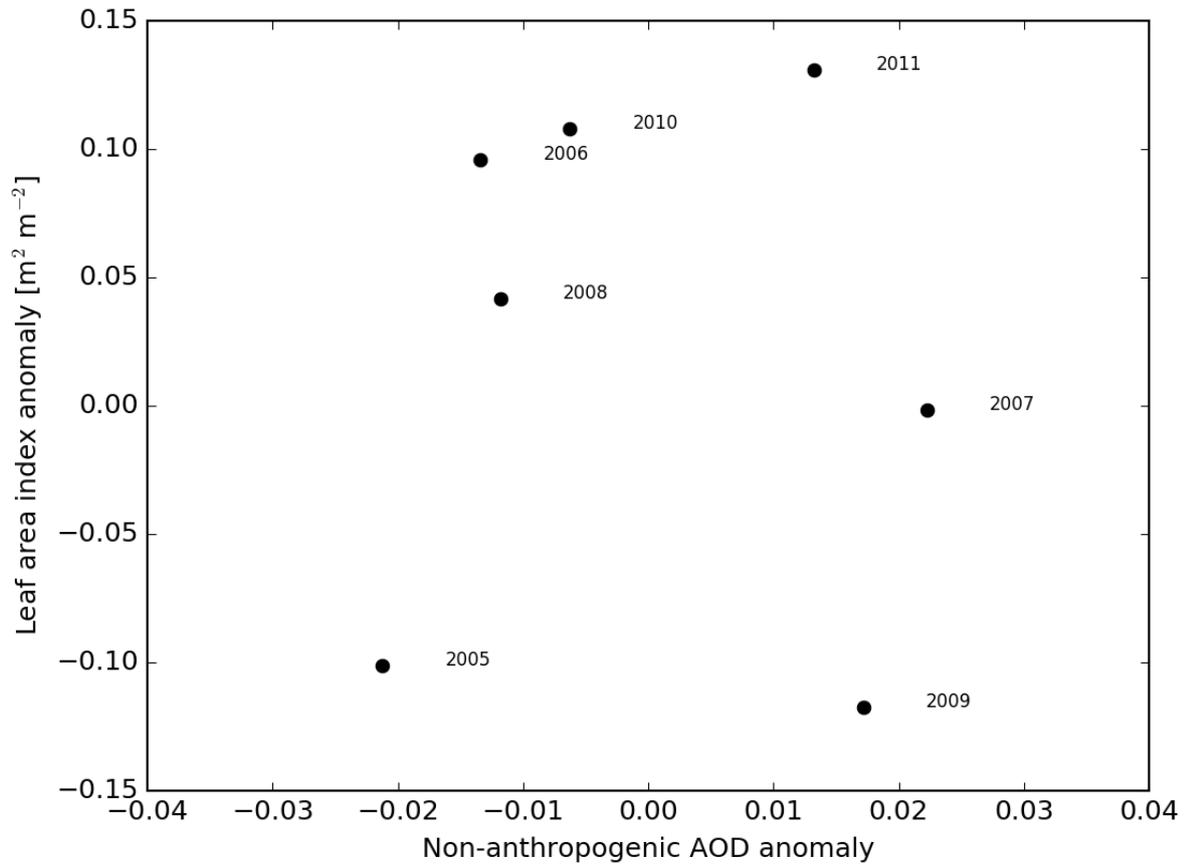


Figure S9. Yearly anomalies in summertime (JJA) southeastern US regional mean "non-anthropogenic" AOD vs. LAI, for the years 2005–2011. Non-anthropogenic AOD is based on L3 AATSR AOD and OMI tropospheric  $\text{NO}_2$  observations. LAI is from MODIS.

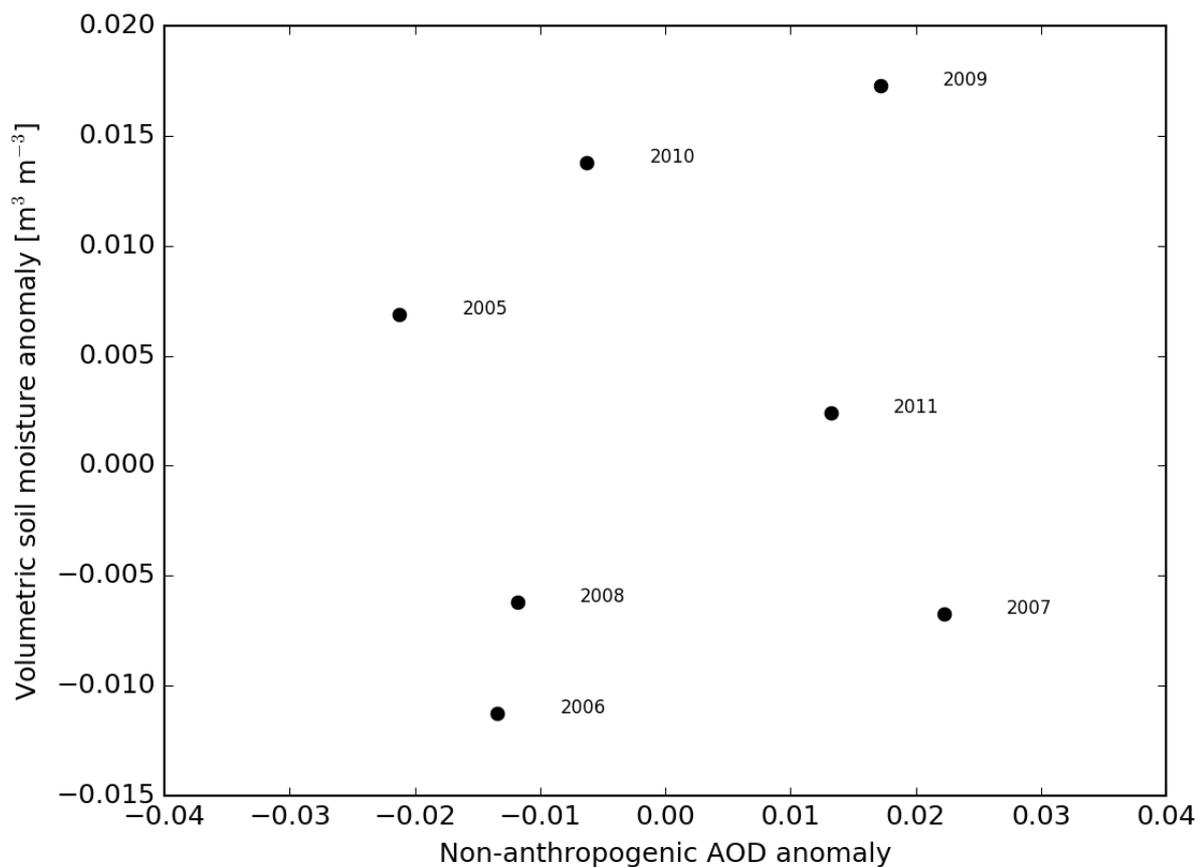


Figure S10. Yearly anomalies in summertime (JJA) southeastern US regional mean "non-anthropogenic" AOD vs. SM, for the years 2005–2011. Non-anthropogenic AOD is based on L3 AATSR AOD and OMI tropospheric  $\text{NO}_2$  observations. SM is from the Soil Moisture cci.

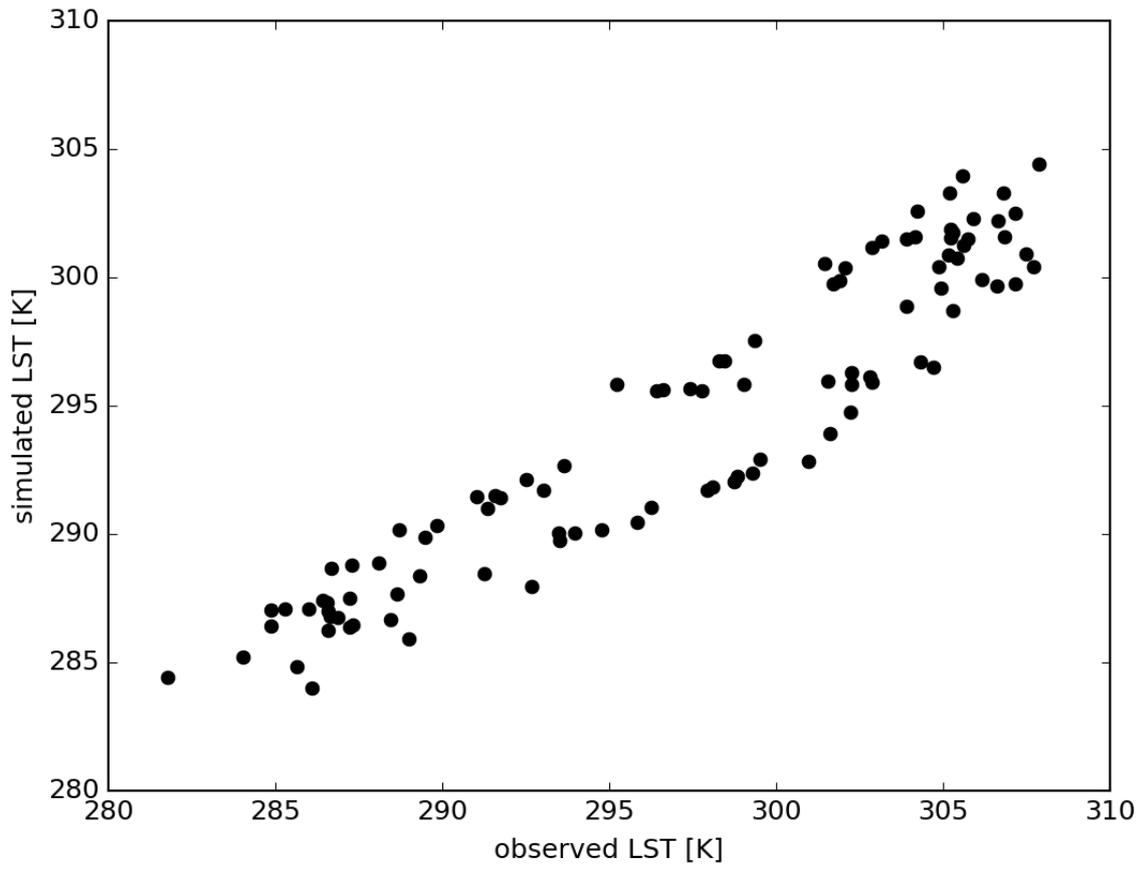


Figure S11. Monthly southeastern US regional mean observed LST vs. simulated LST, for the years 2002–2010. Observed LST is based on the L3 AATSR data and simulated on the CONTROL simulation made with ECHAM-HAMMOZ.

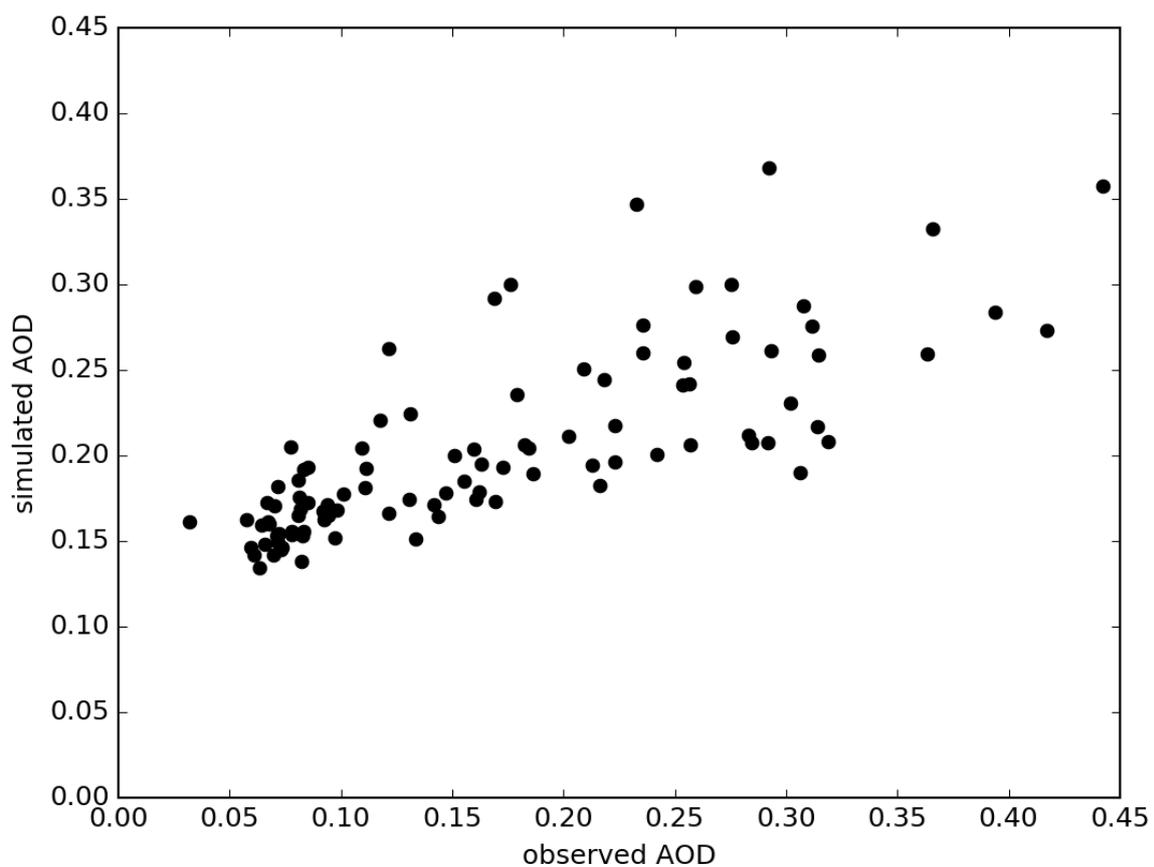


Figure S12. Monthly southeastern US regional mean observed AOD vs. simulated AOD, for the years 2002–2010. Observed AOD is based on the L3 AATSR data and simulated on the CONTROL simulation made with ECHAM-HAMMOZ.

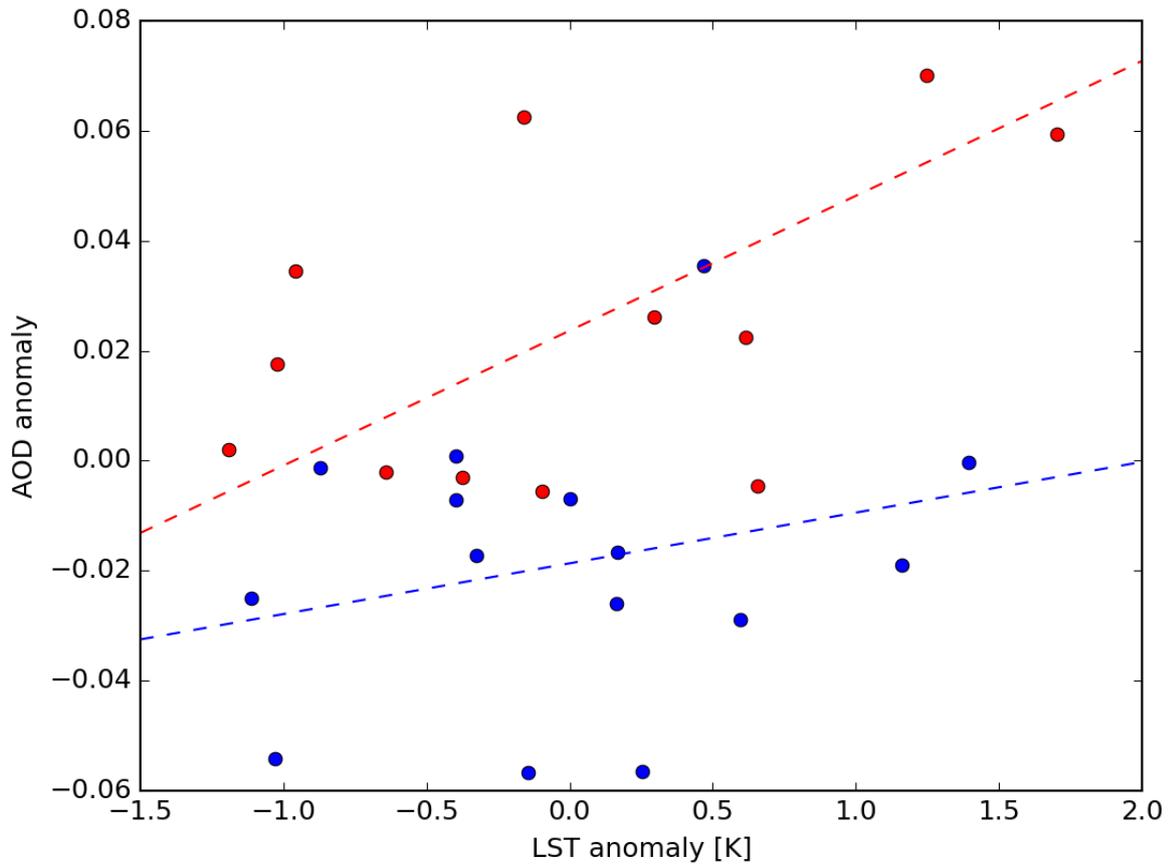


Figure S13. Monthly anomalies in summertime (JJA) southeastern US regional aerosol optical depth (AOD) vs. mean land surface temperature (LST) for the years 2002–2010. Based on the CONTROL simulation. The fitted lines represent two data sets separated based on the SO<sub>4</sub> burden: red ( $AOD_{ano} = 0.025LST_{ano} + 0.023$ ) and blue ( $AOD_{ano} = 0.009LST_{ano} - 0.019$ ).