

Extending the Pre-MODIS Global Fire Record Back in Time

Louis Giglio, David Roy, Maria Zubkova, and Joanne Hall

2022 GOFC Fire IT Meeting

Stresa

Relevant Data Sets (Burned Area)

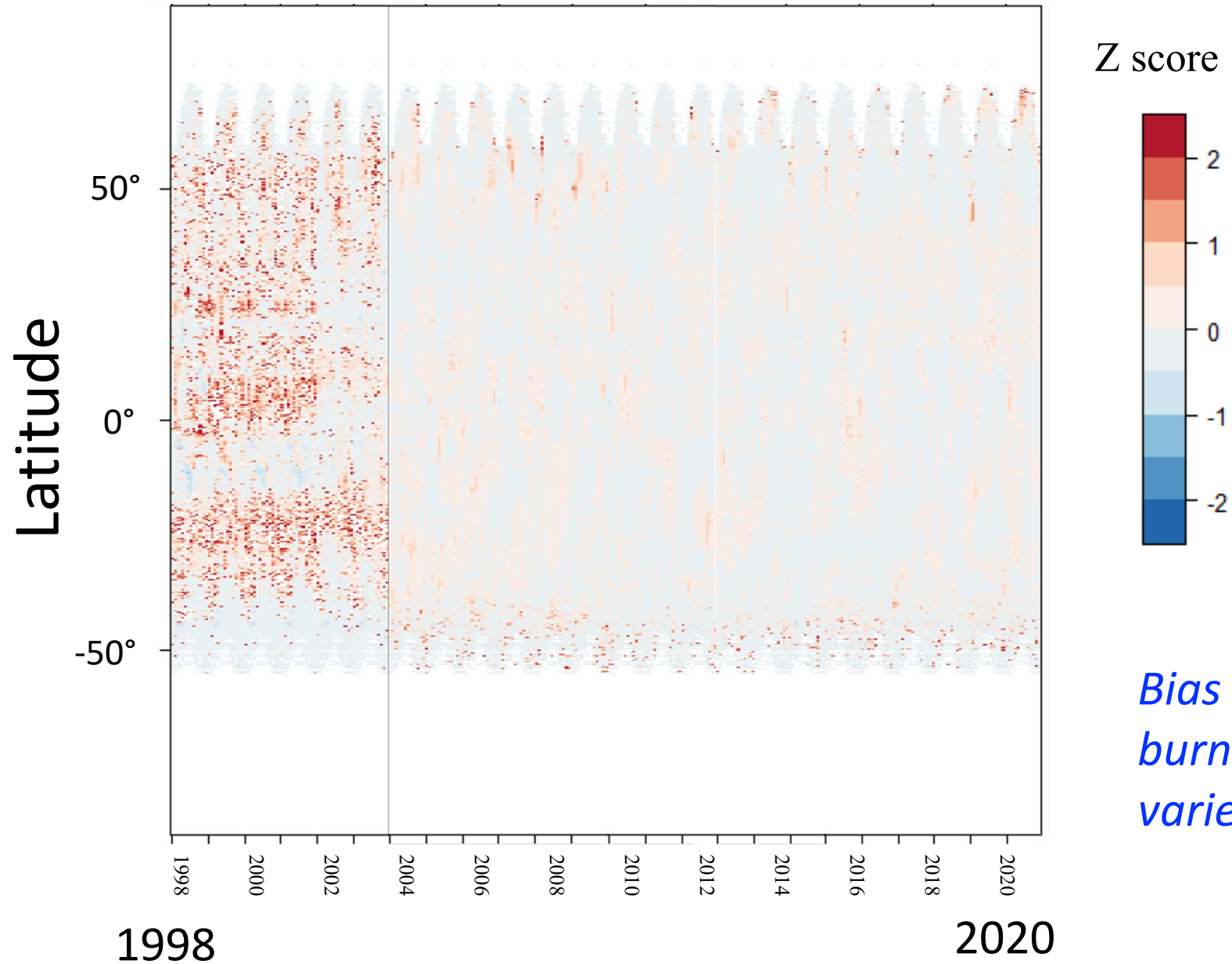
- Global Fire Emissions Database (GFED)
 - Forthcoming version will be GFED5 (BA mid-2022?, emissions late 2022?)
 - 0.25° monthly, 1996 – 2020
 - Calibrate ATSR + TRMM VIRS active fire data
- FireCCI11
 - 0.25° + 0.05° monthly, 1982 – 2018 (excluding 1994)
 - Gridded AVHRR GAC data from NASA AVHRR LTDR used as input
 - Random forest classifier + burned-proportion adjustment
- Question: *Can the latter be used to extend the former?*

GFED5

- 0.25° monthly, 1996 – 2020
- Non-cropland burned area based on C6 MCD64A1 (NASA/UMD) + recalibrated small-fire correction (UC Irvine)
- Cropland burned area estimated via expanded Hall et al. (2021) approach (UMD)
- Uses CCI-compiled BARD for both calibration and validation of small-fire BA contribution
- Currently in stasis after quality assessment to reconsider pre-MODIS approach

GFED5 Beta

Zonal Burned Area Anomalies

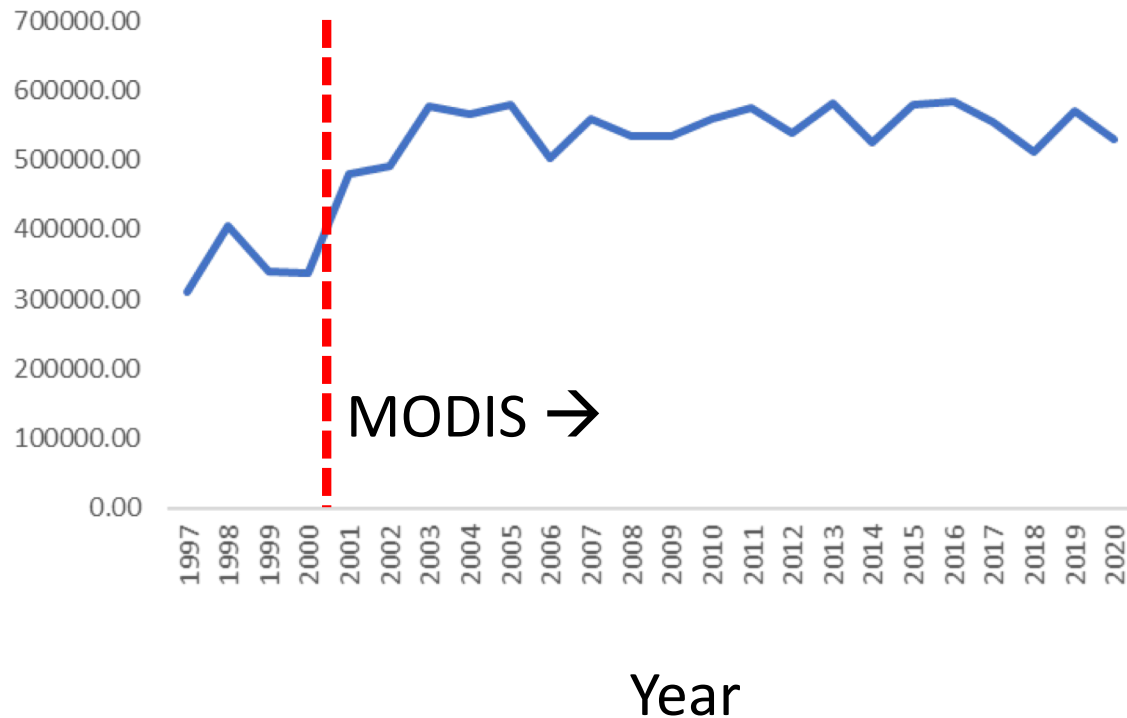


*Bias and apparent
burned area IAV
varies with sensor.*

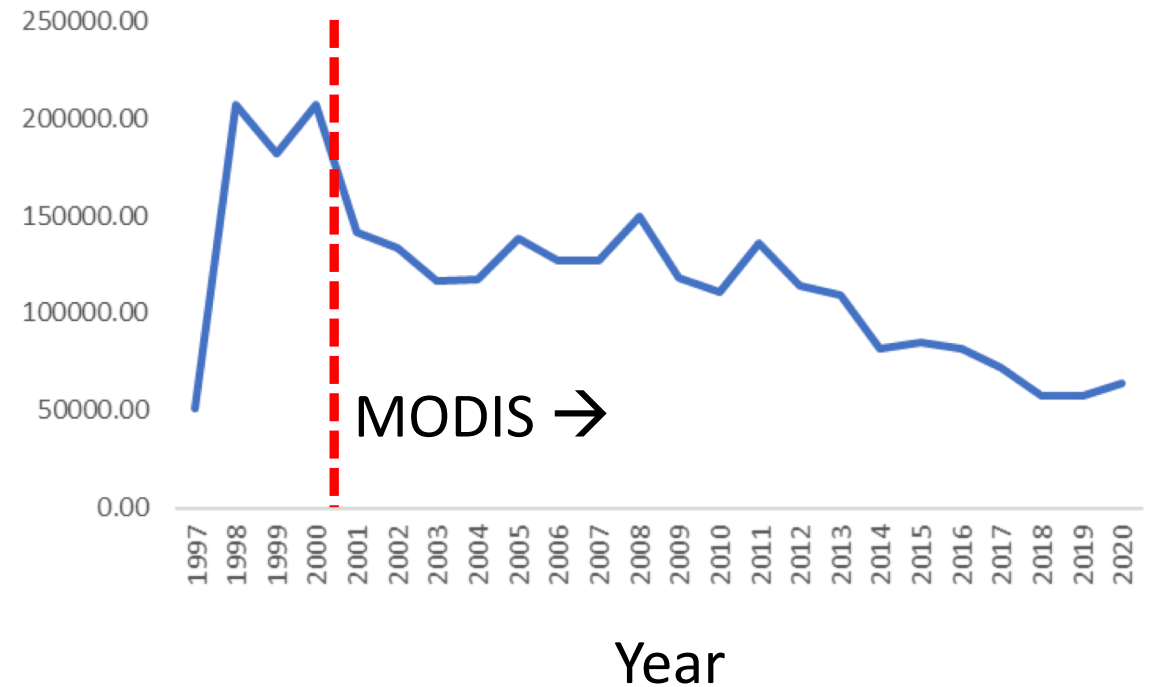
GFED5 Beta

Annual Burned Area (ha/yr)

Angola



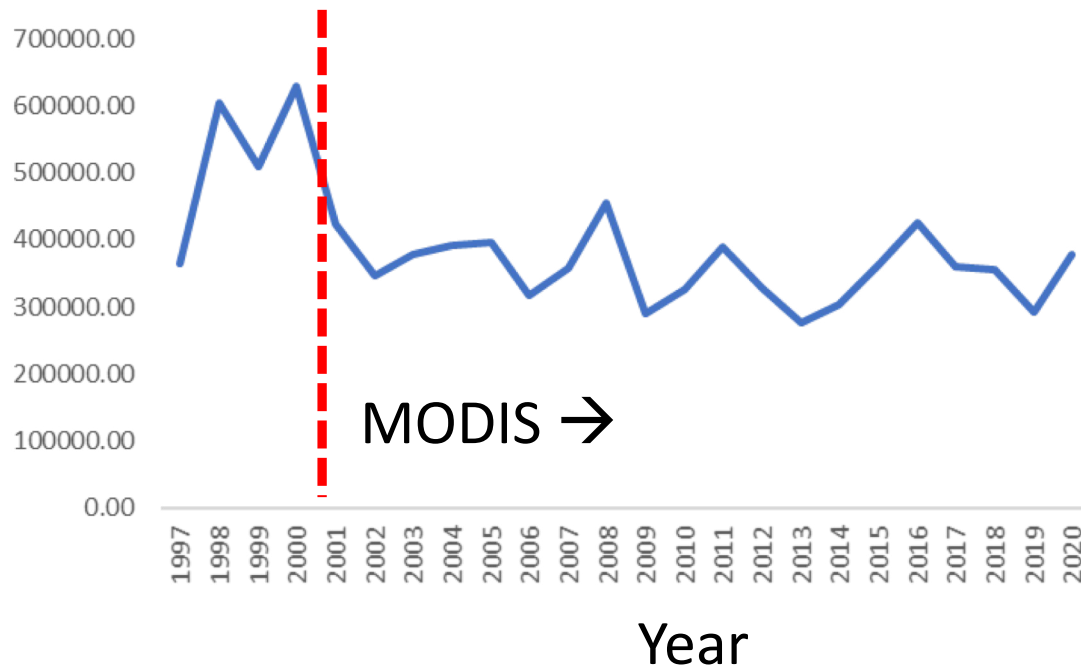
Cote d'Ivoire



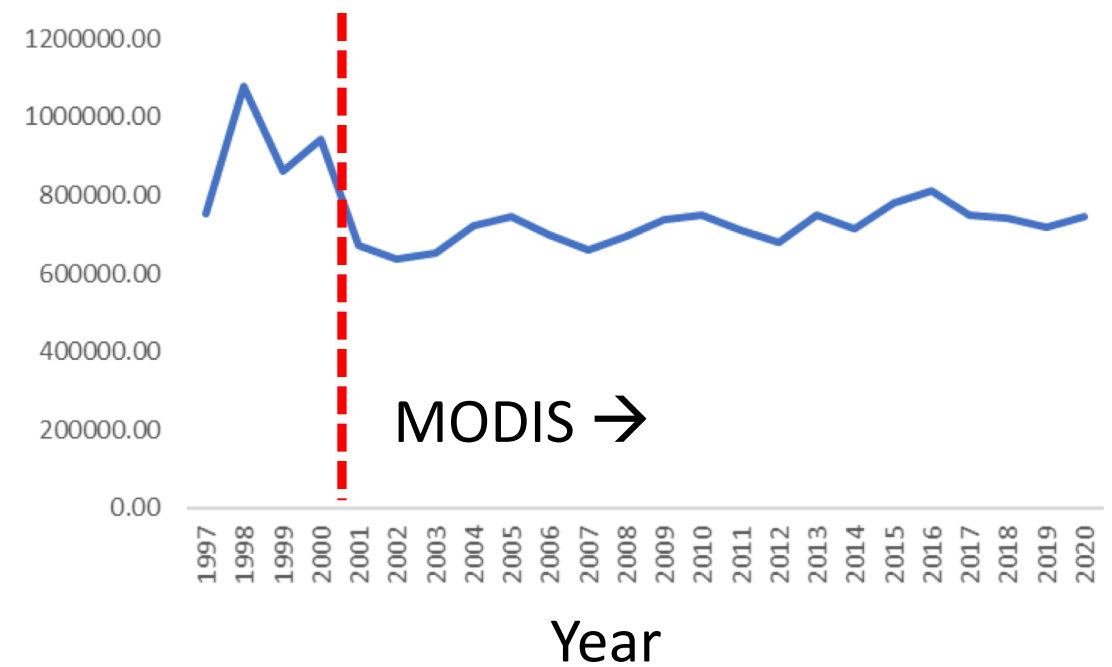
GFED5 Beta

Annual Burned Area (ha/yr)

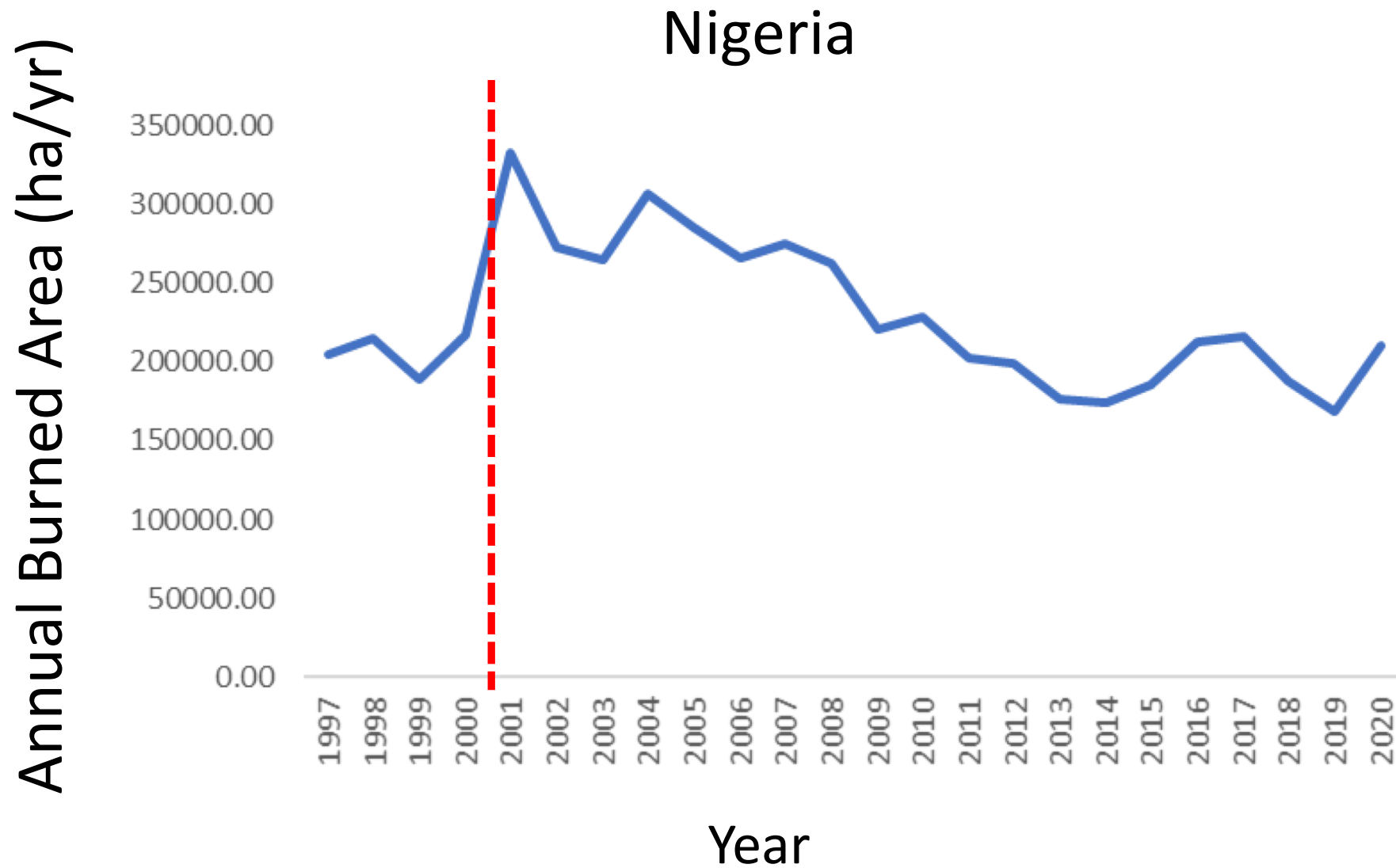
Central African Republic



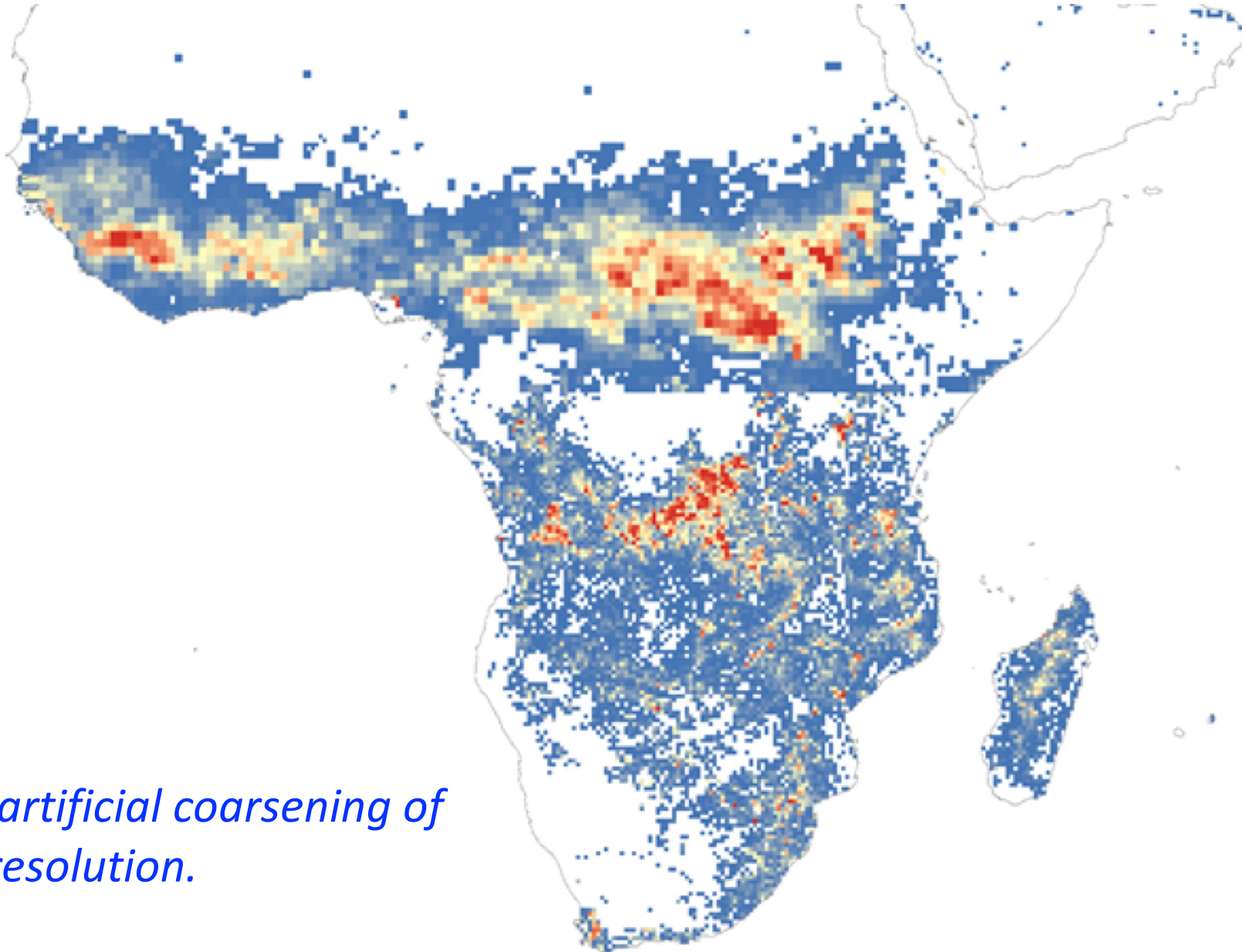
DR Congo



GFED5 Beta



2000 Annual Burned Area: GFED5 Beta



Seam + artificial coarsening of spatial resolution.

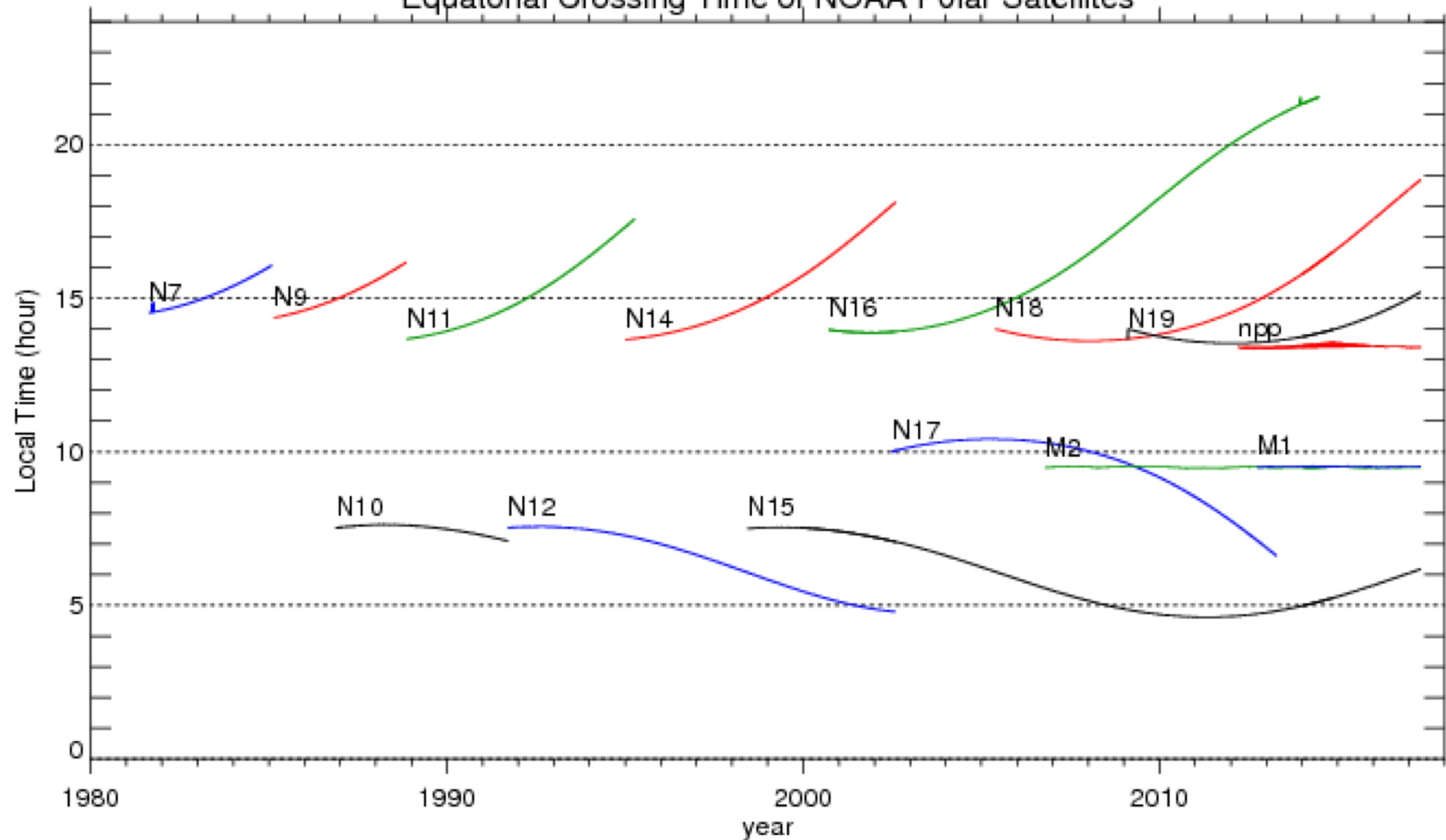
GFED5 Beta Post-QA Plans

- Reconsidering underlying approach
- Spatial resolution during pre-MODIS period will be reduced (1°)
- Include clear warnings + recommendations re. pre-MODIS period
- In worst case, will not produce the product for the pre-MODIS period

FireCCILT11

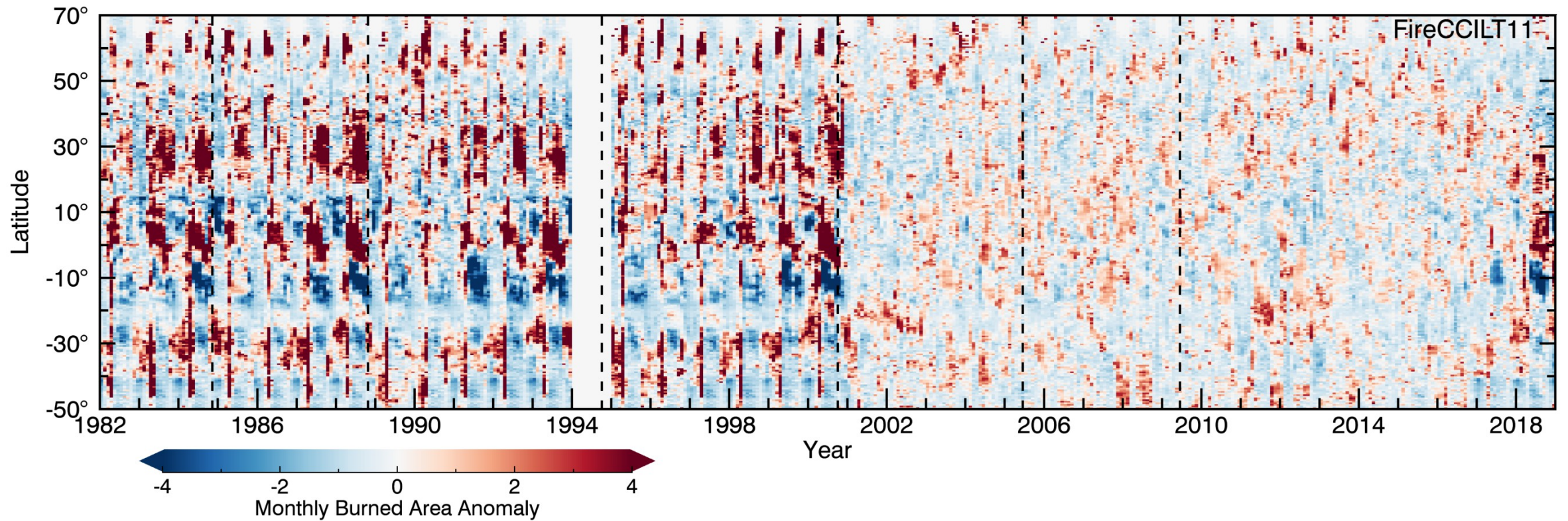
- Otón et al. (2019), Otón et al. (2021)
- $0.25^{\circ} + 0.05^{\circ}$ monthly, 1982 – 2018 (excluding 1994)
- Derived from daily NASA AVHRR LTDR GAC data set
- Billed as “consistent”

Equatorial Crossing Time of NOAA Polar Satellites



Updated On 04/30/2017 20:20

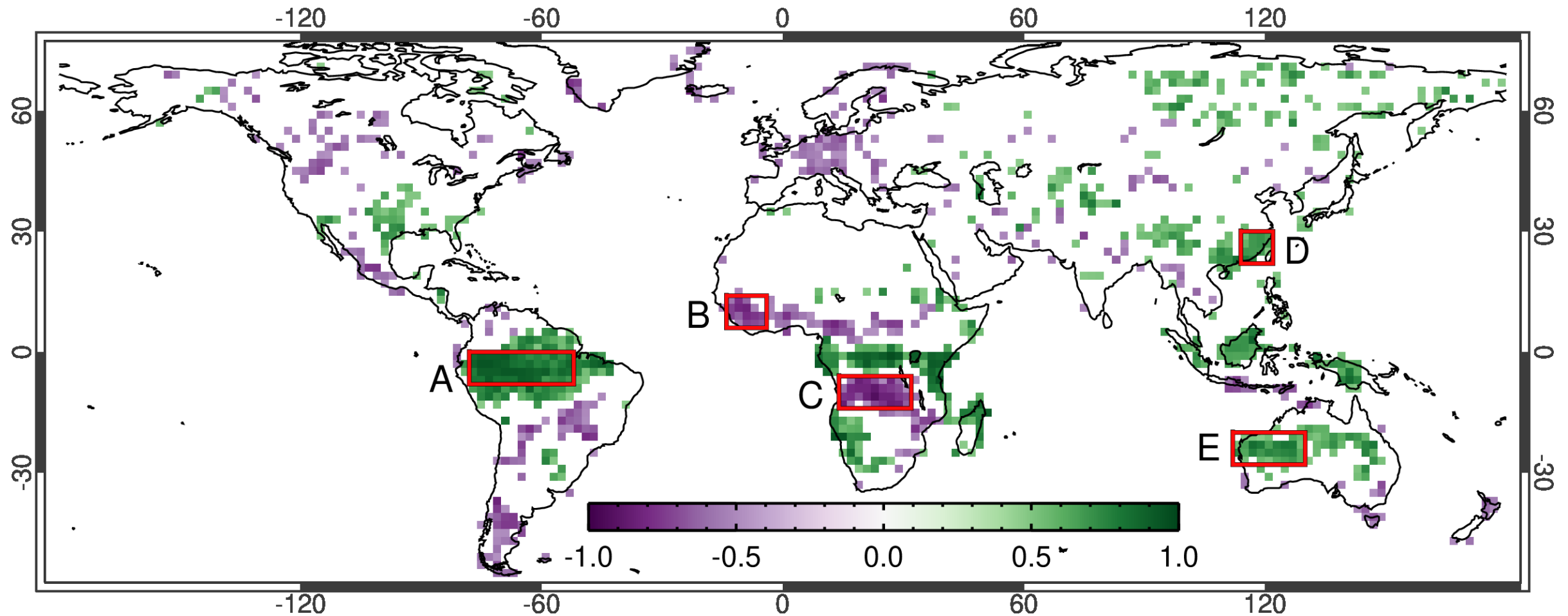
FireCCILT11



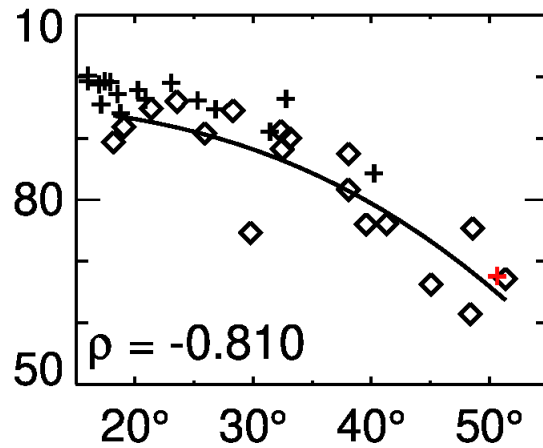
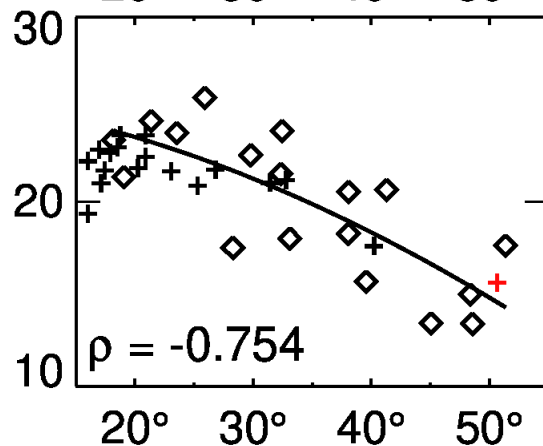
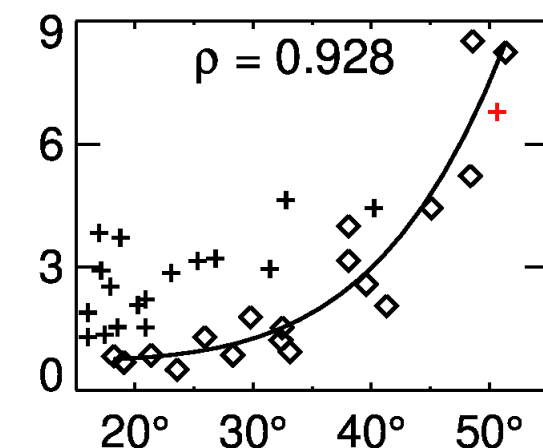
Giglio and Roy (2022)

FireCCILT11

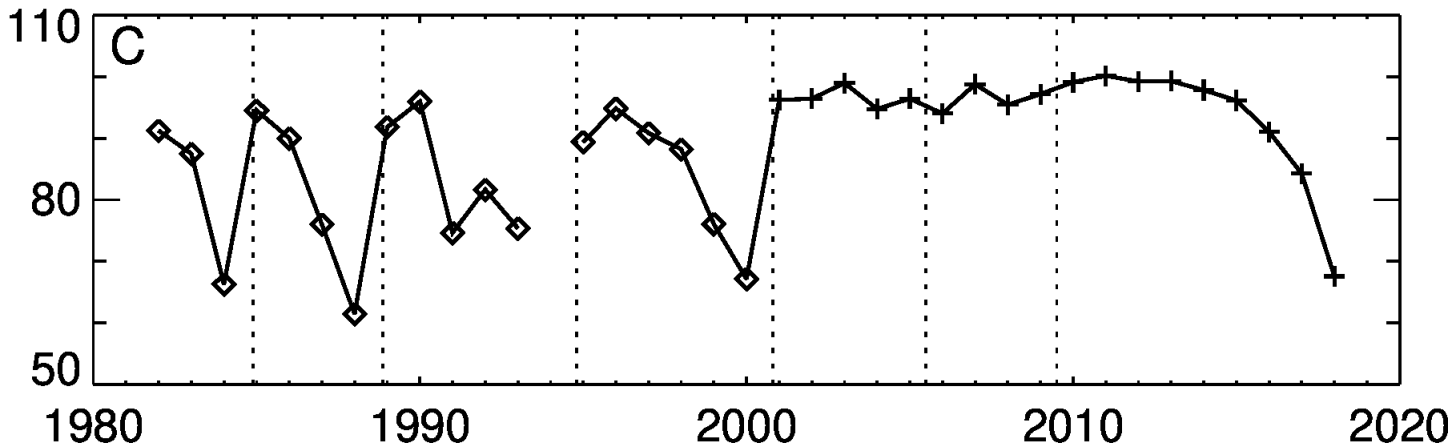
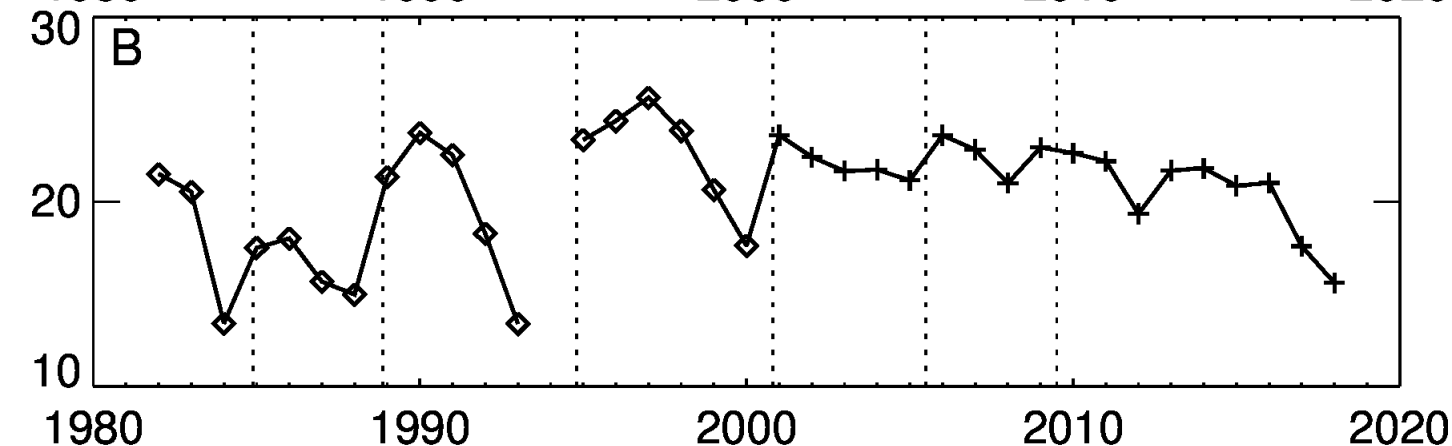
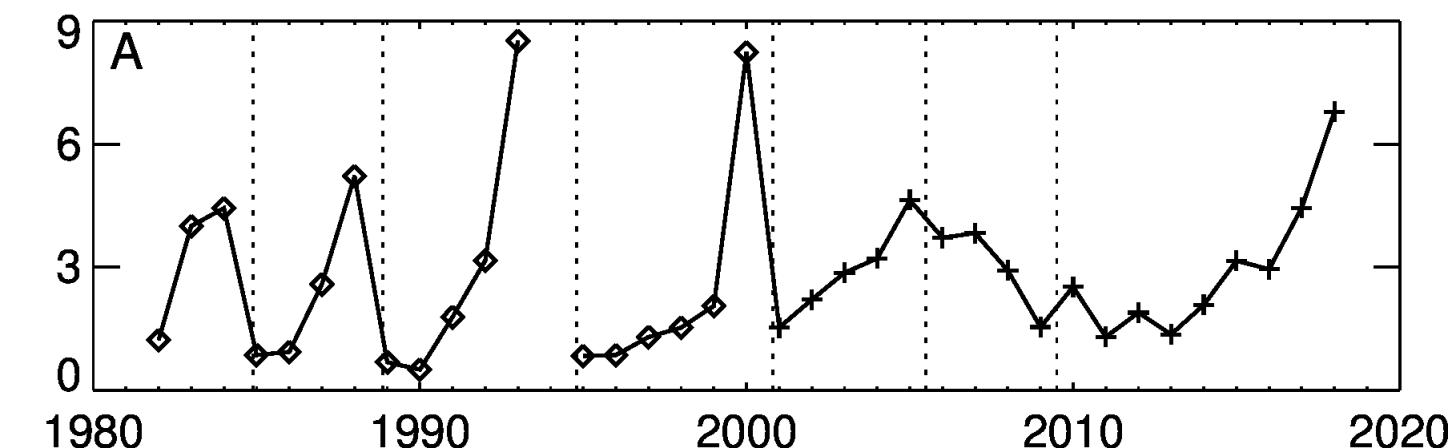
Significant correlation between annual burned area and solar zenith angle in some regions:



Annual Burned Area (Mha/yr)

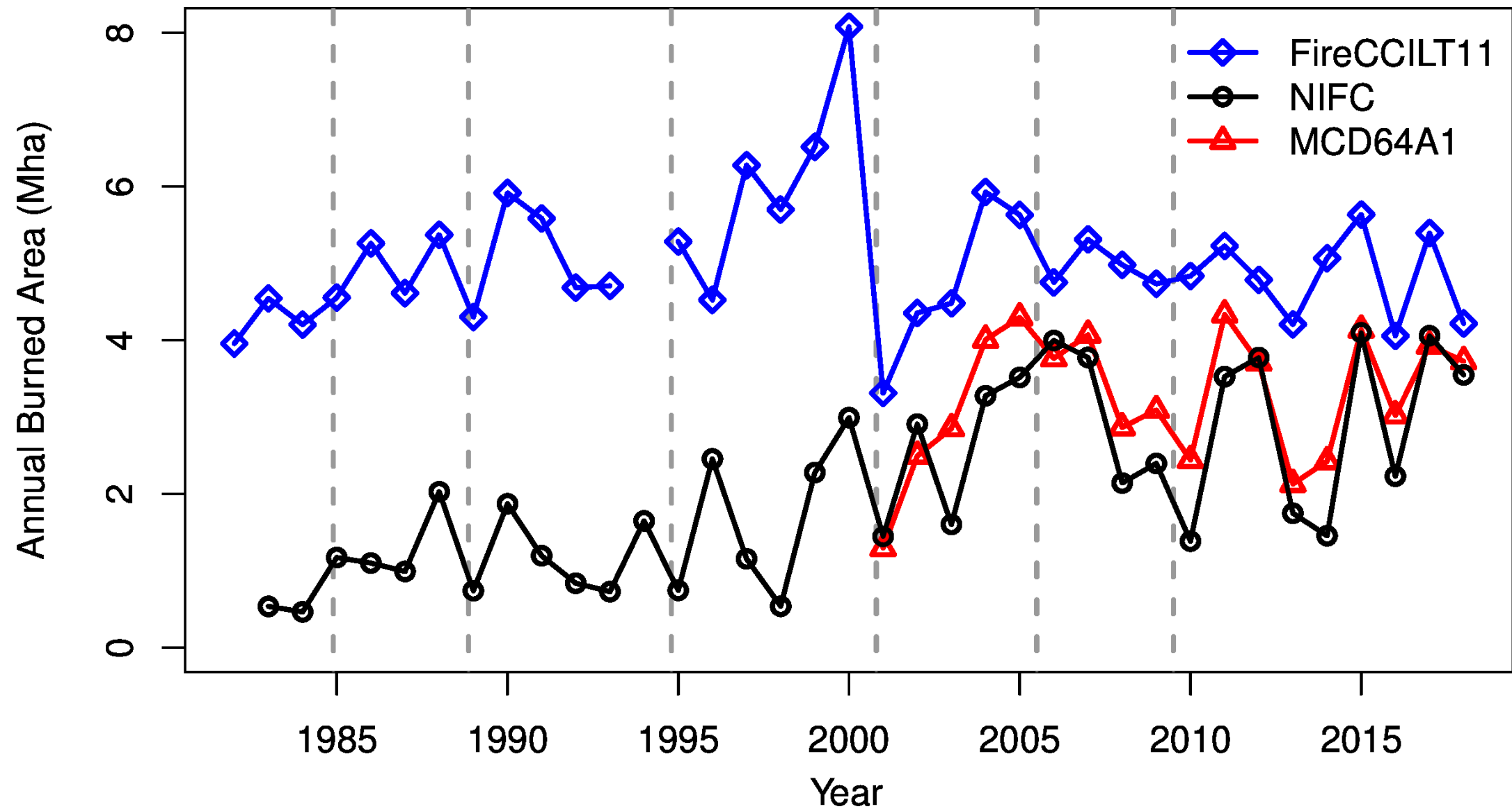


Solar Zenith Angle



Year

Giglio and Roy (2022)



Reminders

- User's Guides
 - Developers: Provide one! (GFED)
 - Users: Actually read it!
 - Developers: Recognize that some users will not read the fine print.
 - Build "safety walls" into product itself
- Heed upstream product developer's recommendations and/or warnings; justify ignoring them
- Use caution in extrapolating large-scale statistical relationships to much finer scales (both spatial and temporal)
- For AVHRR-based data sets, detailed interrogation of the time series for orbit drift artifacts is essential