Preliminary Comparison between GIMMS, PAL, LTDR AVHRR Datasets

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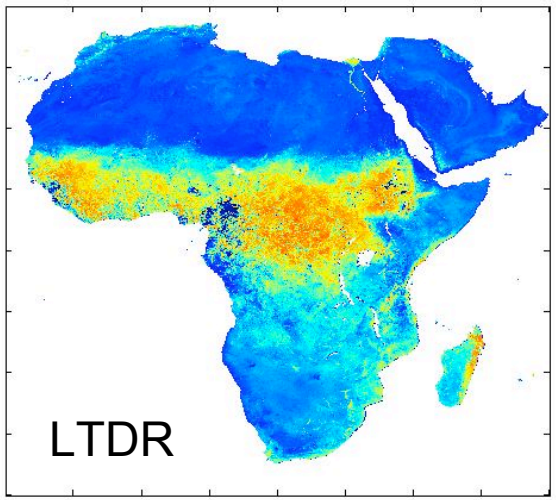
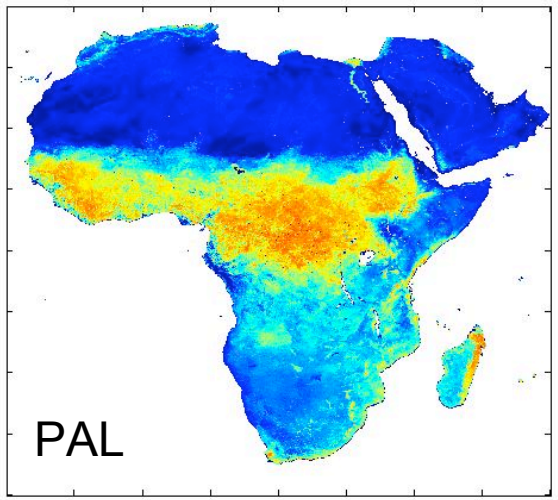
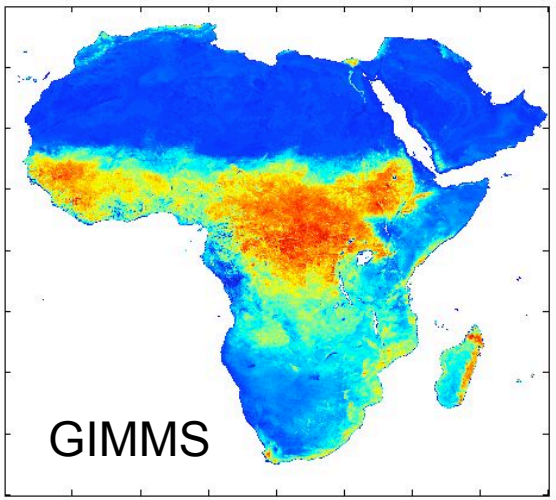
Overview

- Describe datasets and attributes
- Create comparable composites at the CMG resolution
- Compare composites in spatial and temporal domain

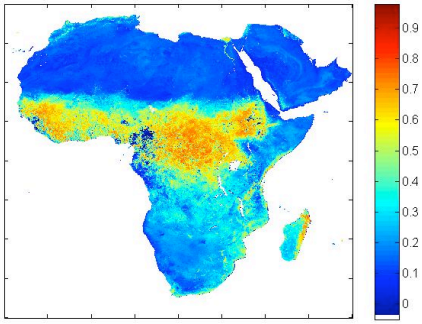




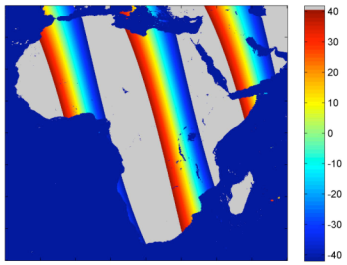


Datasets Summary LTDR

August 1-15, 1999

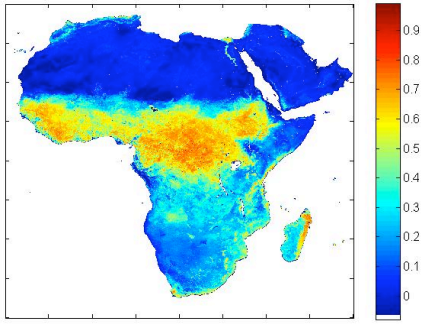


- Daily 1999 Africa Subset, 0.05 degree
  - longitude 20 degrees W to 60 degrees E
  - latitude 40 degrees S to 40 degrees N
- Compositing 1999 data to 15 day from daily
  - Data with View Angle of less than 42 degrees
  - Maximum Value Compositing
  - Temperature Threshold with Thermal Channel 5 degrees for cloud removal (273 K)
- Calibration: Vermote and Kaufmann
- Atmospheric correction:
  - Rayleigh Scattering, Ozone, clouds and cloud shadow identification
  - Water Vapor Correction
  - No BRDF, or aerosols has yet been applied



PAL

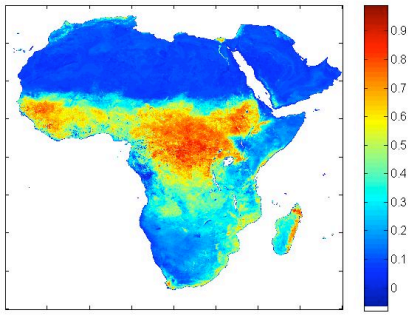
August 1-15, 1999



- Daily tiles at 8km resolution
  - Tiles composited to global, then subset to Africa LTDR window, using QA flags
- Reprojection, regridding to CMG 0.05 grid
- Composited 1999 data to 15 day from daily
  - Maximum Value Compositing
  - T5 screen (273 K)
- PAL data
  - The atmospheric correction scheme follows the algorithm of Gordon et. al (1988), including Rayleigh scattering and ozone.
  - No correction for water vapor or satellite drift
  - Calibration based on Rao and Chen (1993)

GIMMS

August 1-15, 1999

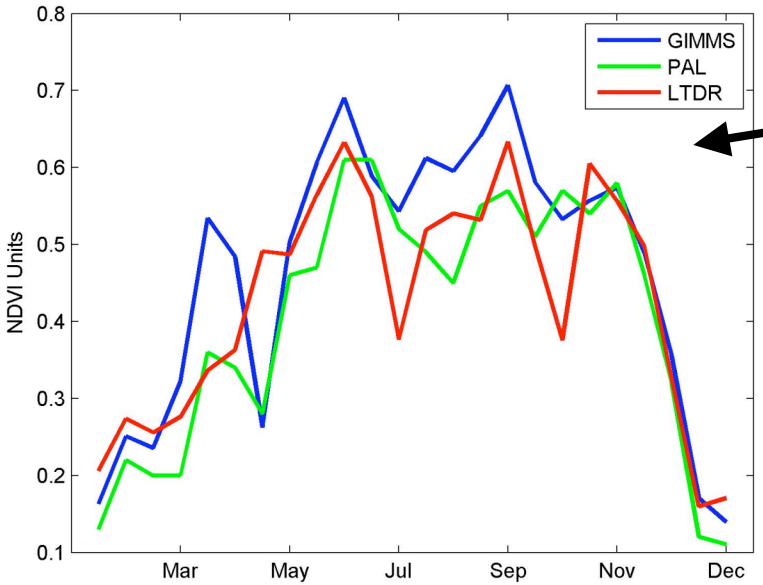


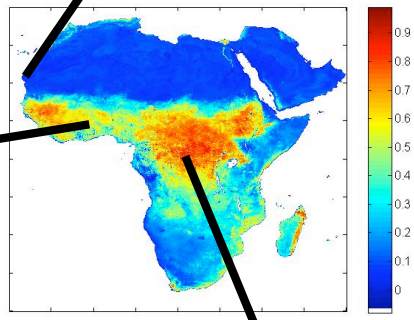
- 15 day Africa composites, 8km resolution
- Reprojection, regridding to CMG 0.05 grid
- NDVIg product has the following corrections:
  - T5 cloud screen
  - No atmospheric correction, Rayleigh scattering or stratospheric ozone
  - Calibration is Rao and Chen, with Los 1995 Desert calibration
  - Maximum value compositing has been used, with a forward binning procedure.
  - Artifacts in NDVI due to satellite drift have been corrected using the empirical mode decomposition (EMD) during post-processing.
  - Removal of clouds and sub-pixel cloud contamination with a kernel filter algorithm.

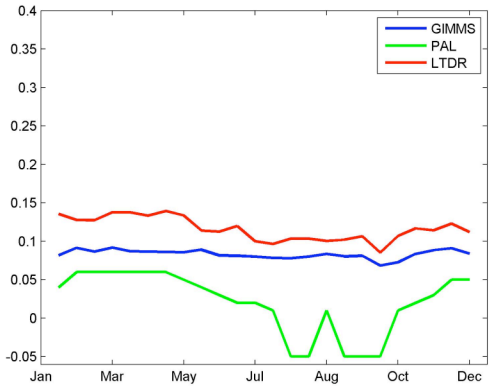
Results

Time series from 1999

Northern Ghana

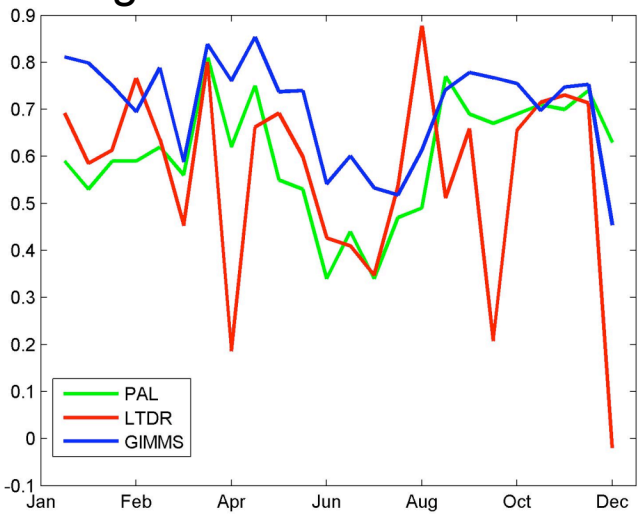




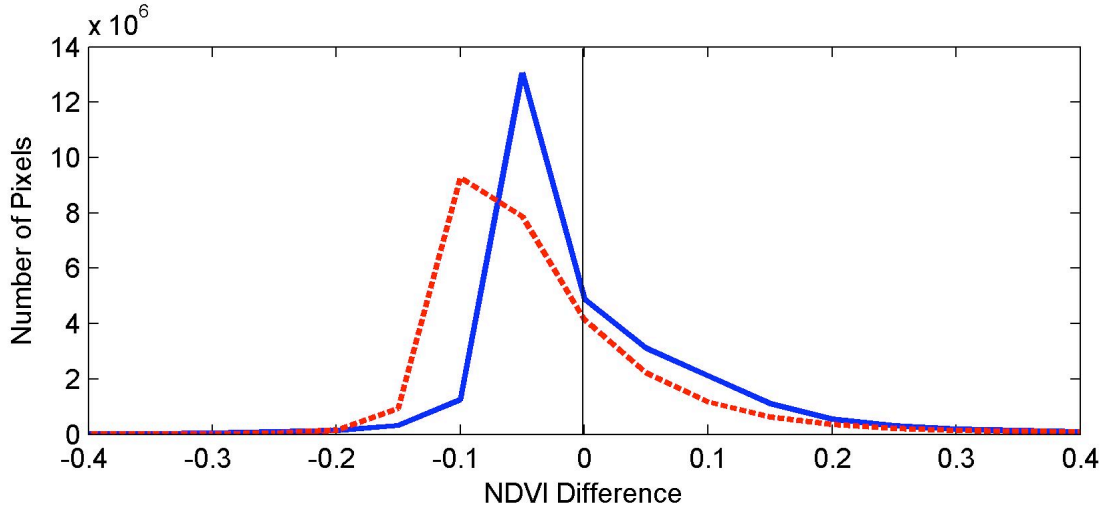


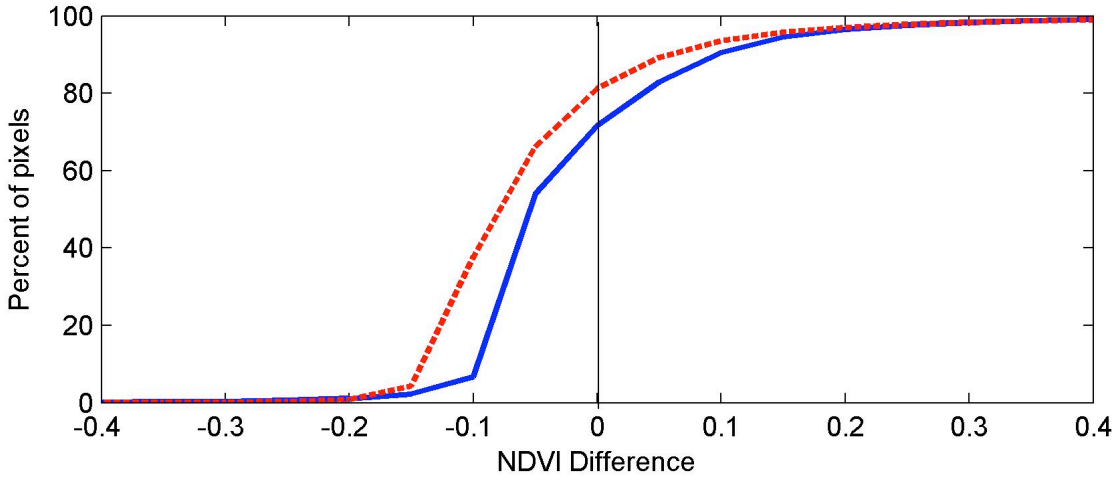
Western Sahara

Congo Basin



Histogram of differences



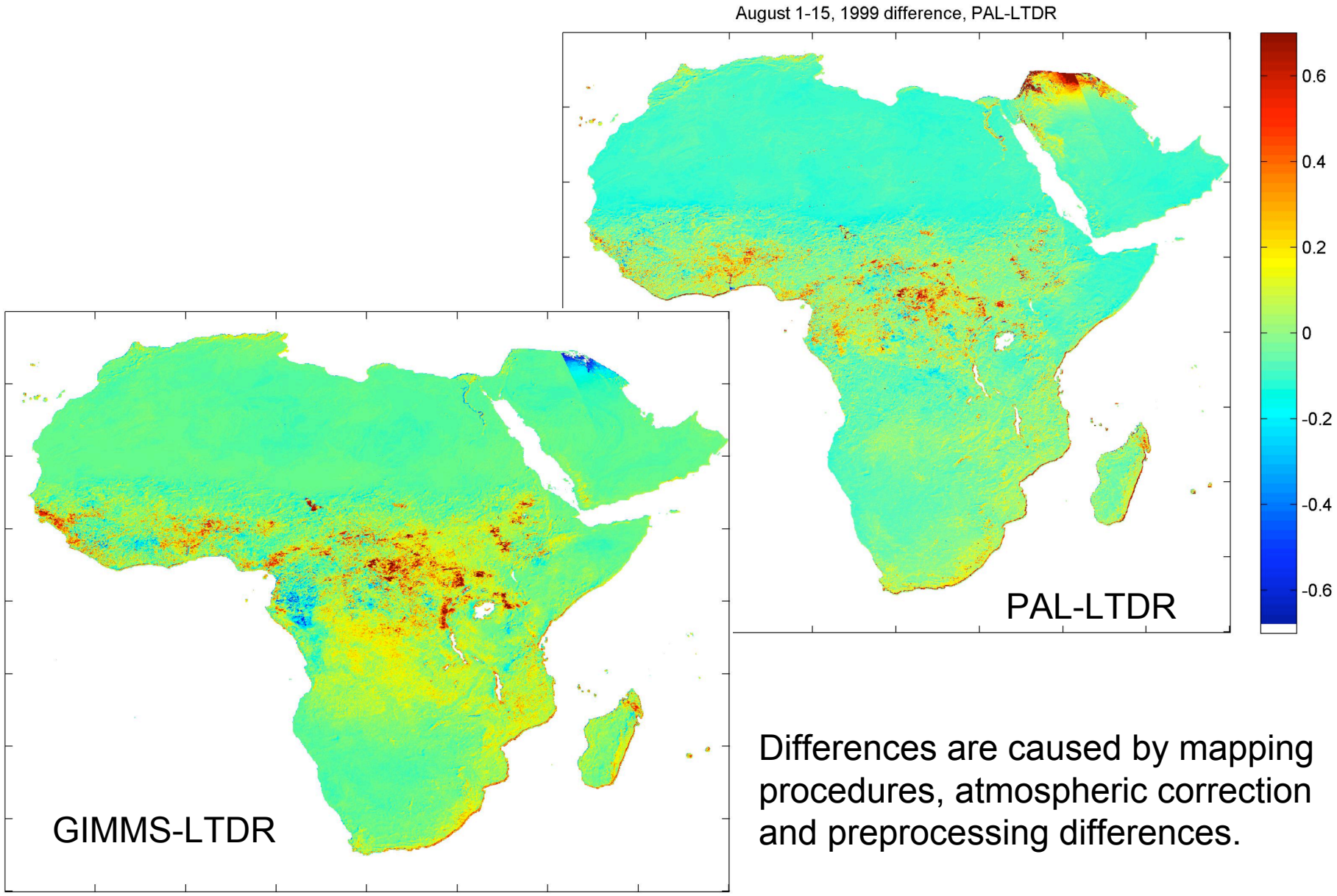


GIMMS - LTDR

PAL - LTDR

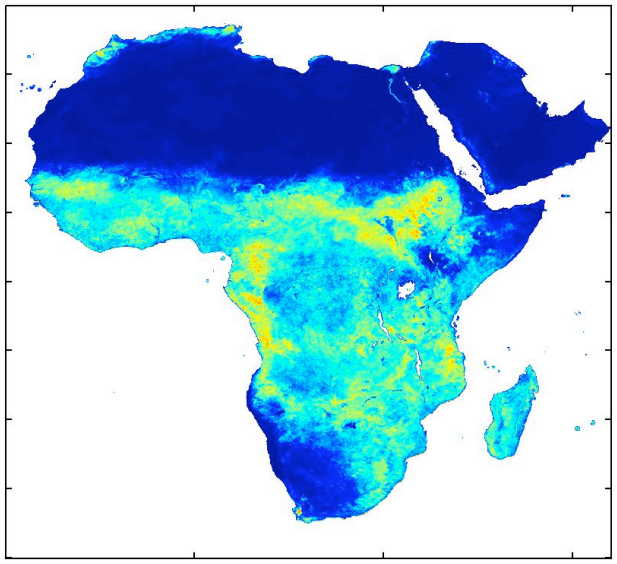
Subtracting all 24 composites from each other, the differences show LTDR has a higher NDVI than either GIMMS or PAL.

August 1-15 differences

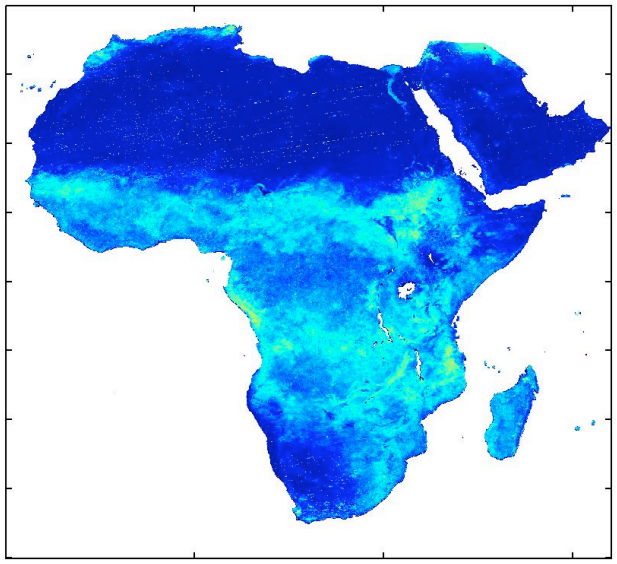


Differences are caused by mapping procedures, atmospheric correction and preprocessing differences.

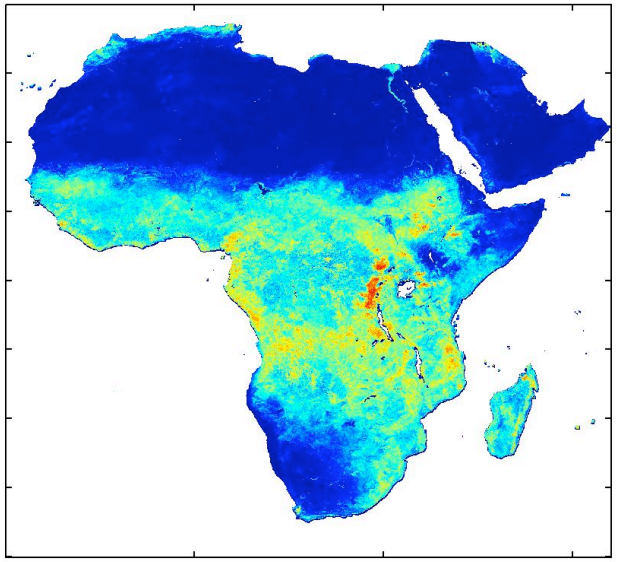
GIMMS

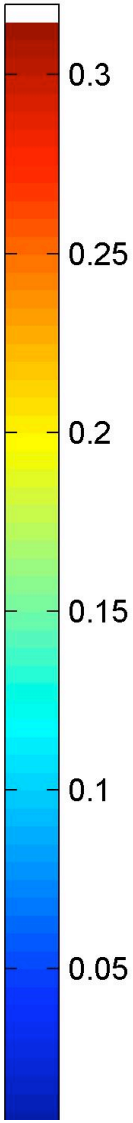


PAL



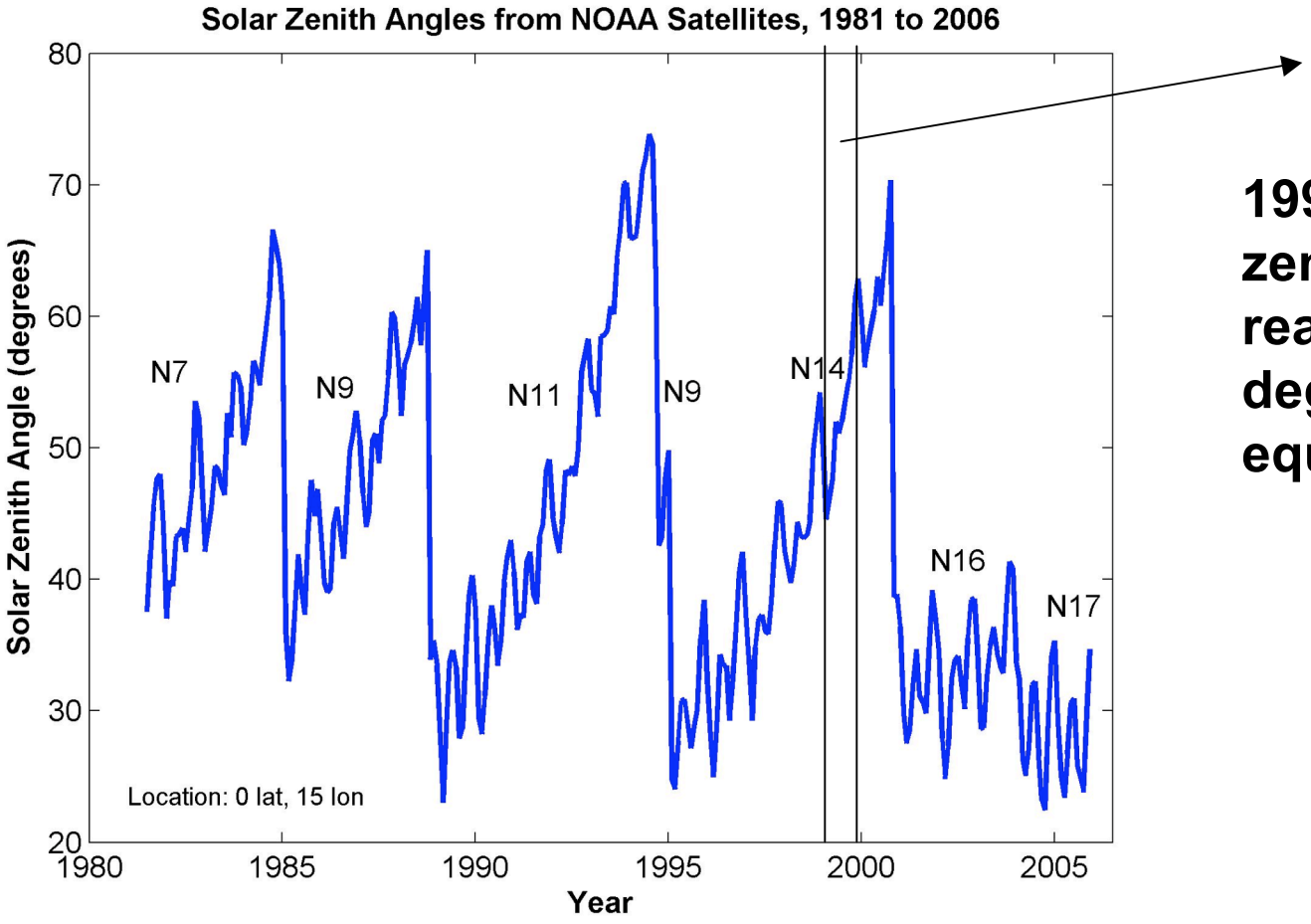
LTDR





Temporal Standard Deviation by Pixel shows similar patterns across all three datasets, with PAL with the smallest temporal range of the three.

Effect of Satellite drift on conclusions



1999 – solar zenith angles reach 60 degrees at the equator.

Sources of Difference in the datasets

- Atmospheric correction algorithms, particularly water vapor correction
- Mapping procedures and resolution
- Preprocessing of input data critical for quality of dataset
- Impact of Satellite drift, aerosols and BRDF correction on LTDR data yet to be seen.