

**LANCCE – NASA’s Land, Atmosphere Near Real-time Capability for EOS
User Working Group Meeting Nov 9-10, 2022
Sentinel 3 Pilot Study**

Sentinel 3 Pilot Study (part 1)

- Participants:
 - Louis Giglio, Eric Vermote, Sadashiva Devadiga, Diane Davies, Ryan Boller, Miguel Román, Jenny Hewson, Robert Wolfe, Chris Justice, Dawn Lowe, Karen Michael
- Primary Goal:
 - Demonstrate the use of Sentinel-3 data to ensure continuity for Terra-AM MODIS



Sentinel 3 Pilot Study (part 2)

- Study Approach:
 - Part 1: Evaluate the application of EUMETSAT S3 Fire products into LANCE FIRMS
 - Ingest EUMETSAT NRT SLSTR Fire Radiative Power (FRP) product and evaluate
 - Test and evaluate the product's application in FIRMS
 - Provide feedback to EUMETSAT
 - Part 2&3: Generate Land Surface Reflectance (LSR) and Corrected Reflectance (CR) Products and evaluate their application in Worldview
 - Obtain the S3 SLSTR and OLCI Top of Atmosphere (TOA) products from NSG Hub
 - SLSTR (Sea and Land Surface Temperature Instrument) TOA; NRT available from ESA but only standard product is currently available in NSG
 - OLCI (Ocean and Land Color Instrument) TOA; NRT currently available in NSG; latency 130-150 min
 - Update existing MODIS algorithms to run with S3 data
 - Ingest imagery into GIBS and evaluate the products application for Worldview

NASA Terra MODIS Sentinel-3 Continuity Pilot Study Update on Corrected Reflectance

LANCE UWG – November 2022

Eric Vermote and Sadashiva Devadiga

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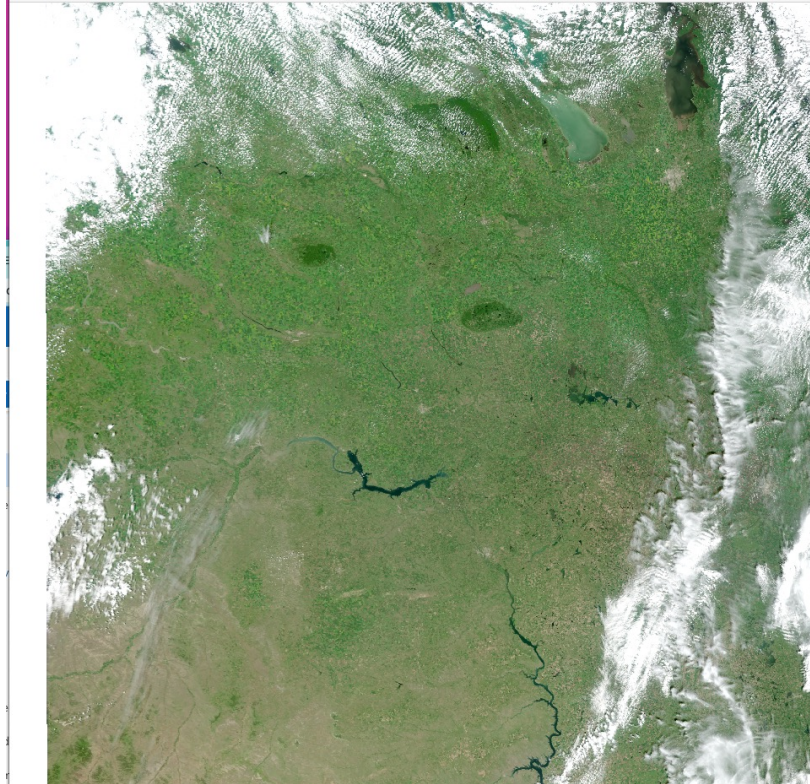
Sentinel-3: Continuity to Terra-AM MODIS

Corrected Reflectance and Land Surface Reflectance

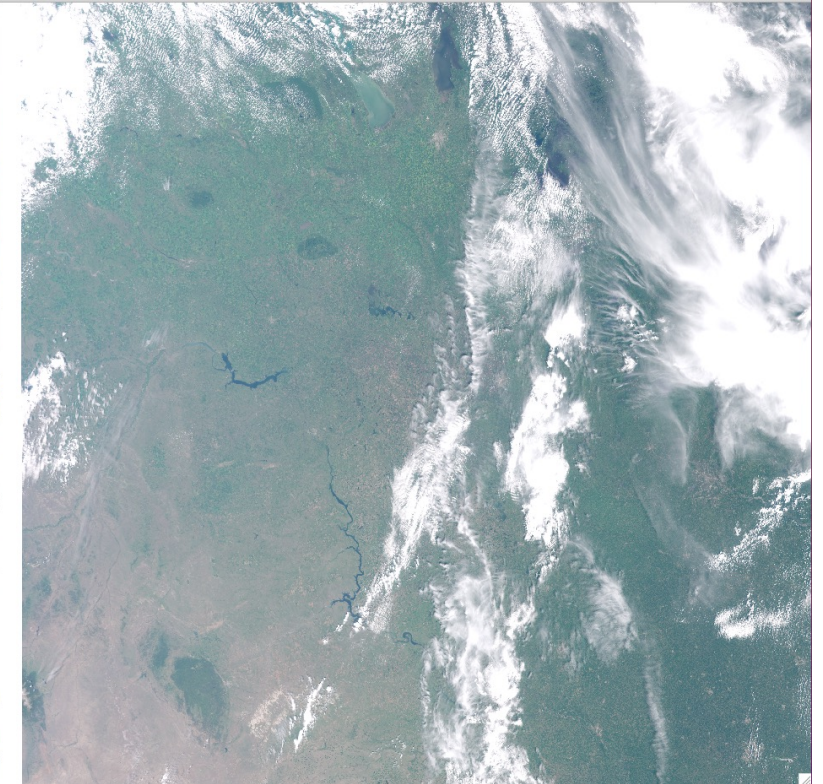
- Evaluate a Sentinel 3A (S3A) and 3B (S3B) NRT L2 Corrected Reflectance (CR) Product to be ingested in LANCE/GIBS/Worldview
- Prototype Sentinel 3 standard product for Land Surface Reflectance at SIPS.
- Support, as appropriate, program-wide engagement with CEOS WGCV on ESA/NASA Bilateral Activities

Sentinel 3 Corrected Reflectance (CREFL) Update (E. Vermote)

- **Two PGE's, CREFL-O (OLCI), CREFL-S (SLSTR) (L1 inputs netcdf)**
 - CREFL-O (300m bands R,G,B NIR), almost completed (see example) expected delivery in ~2 weeks.
 - CREFL-S (500m bands, R,G,NIR SWIR1 (1.6mic), SWIR2 (2.1mic) needs to be developed but Level 1 of SLSTR and OLCI are compatible in terms of format



Corrected reflectance's (OLCI)
RGB



Top of the atmosphere reflectance's (OLCI)
RGB

Terra/Aqua MODIS Fire Product Continuity Sentinel-3 Pilot Study Update

L. Giglio, E. Ellicott, M. Zubkova
University of Maryland

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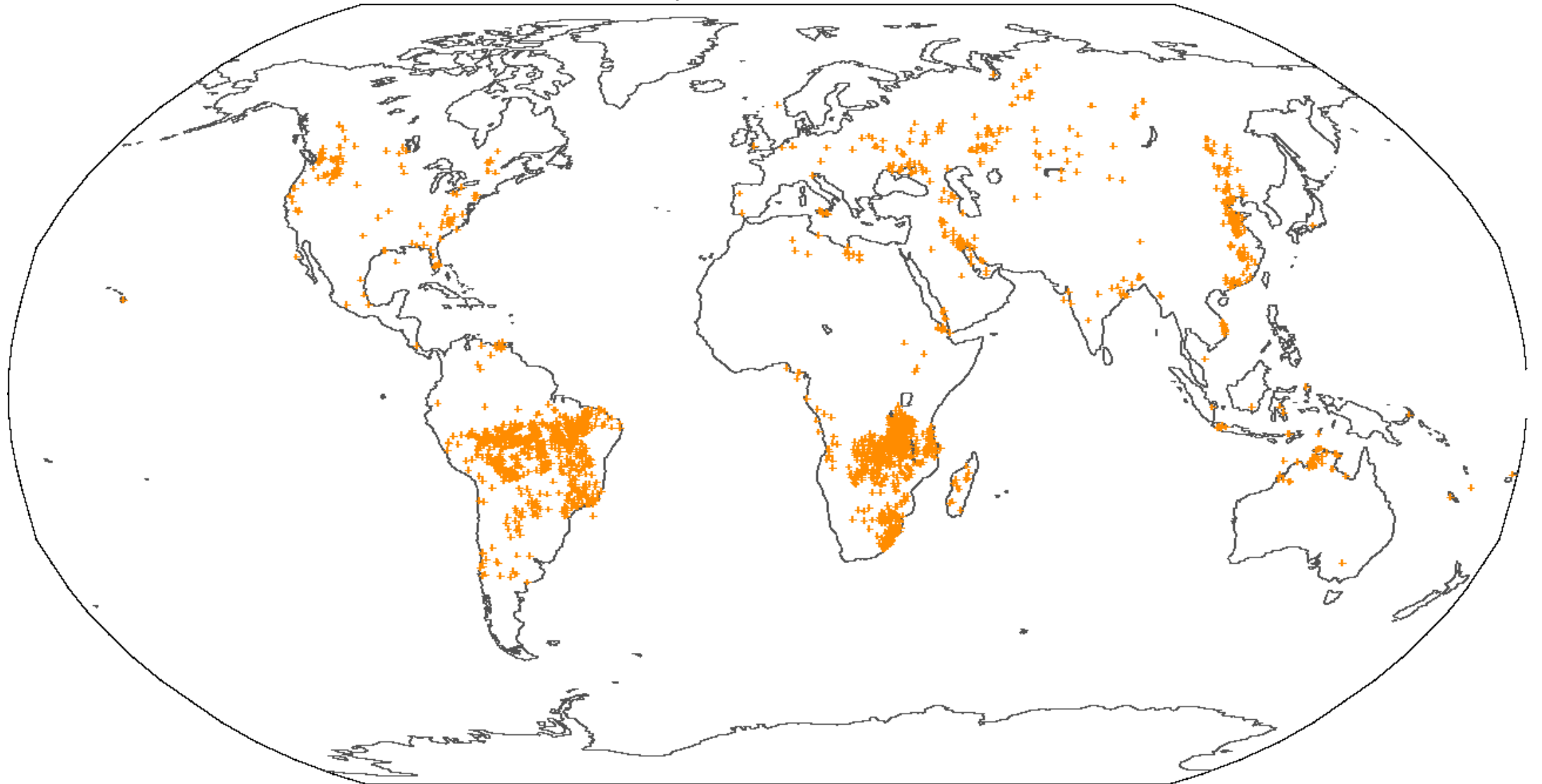
Sentinel-3A/3B SLSTR

- ESA Sentinel-3A (Feb. 2016 launch) + Sentinel-3B (Apr. 2018 launch)
- 10:00 local crossing time (sun-synchronous orbit)
- Sea and Land Surface Temperature Radiometer (SLSTR)
 - Somewhat less coverage than MODIS
 - 1420-km swath versus 2300-km swath
 - Oblique + nadir conical scans
 - Asymmetric swath avoids sun glint
 - 1-km fire bands
 - Quirks w/ respect to saturation and band-to-band co-registration
- NRT and science-quality SLSTR active fire products available from EUMETSAT and ESA
 - We are evaluating both

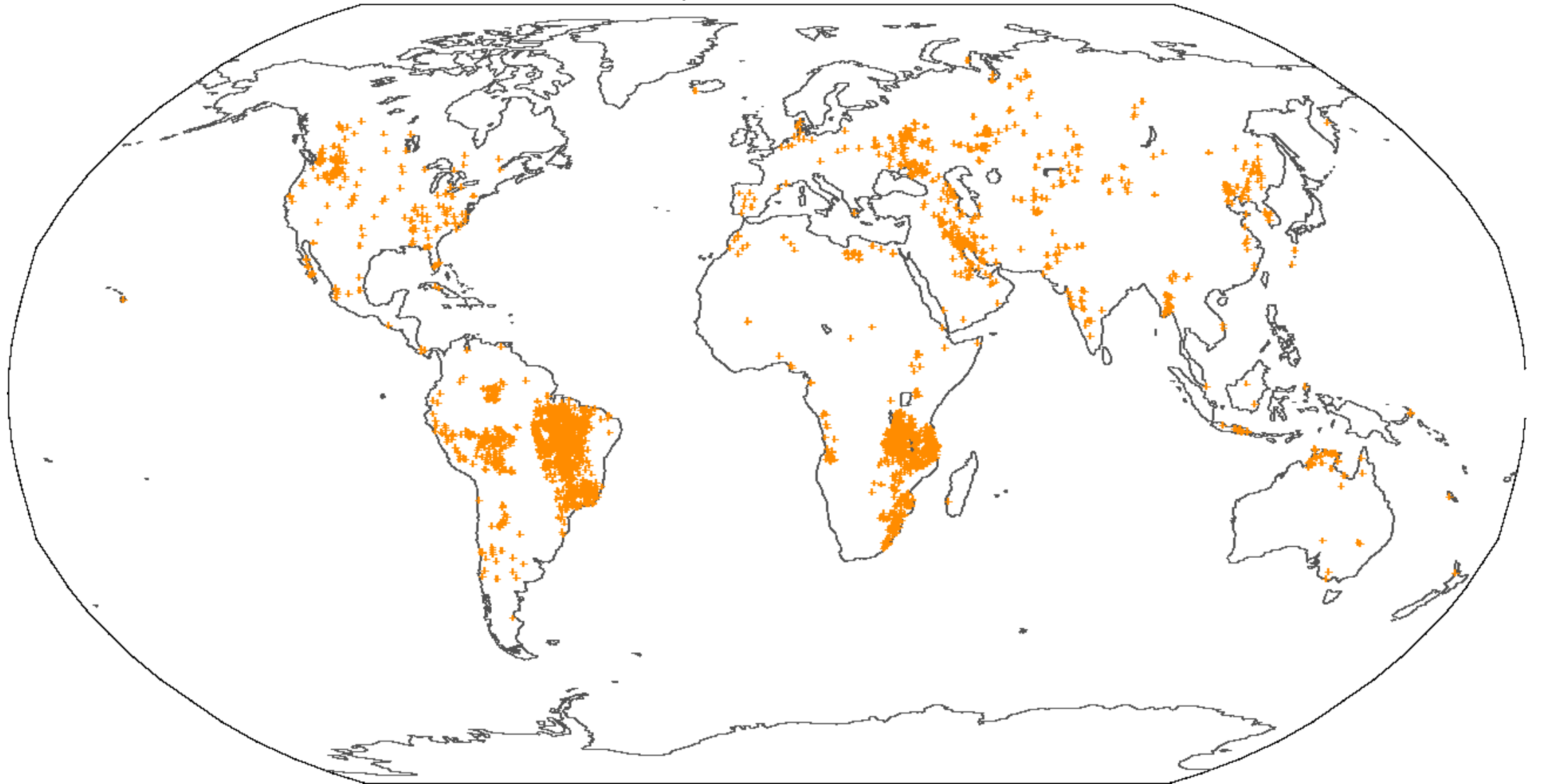
Initial Evaluation of SLSTRActive Fire Data

- Each SLSTR reports $\sim 3\times$ as many fire pixels as Terra MODIS
 - Higher sensitivity, especially at night
 - Constrained pixel growth (conical scan)
 - Wavelength: 3.74 μm MWIR channel vs. 3.96 μm for MODIS
 - High false alarm rate, especially along cloud edges
 - MWIR/LWIR misregistration + wavelength
- Significant differences in distribution of fire radiative power (FRP)

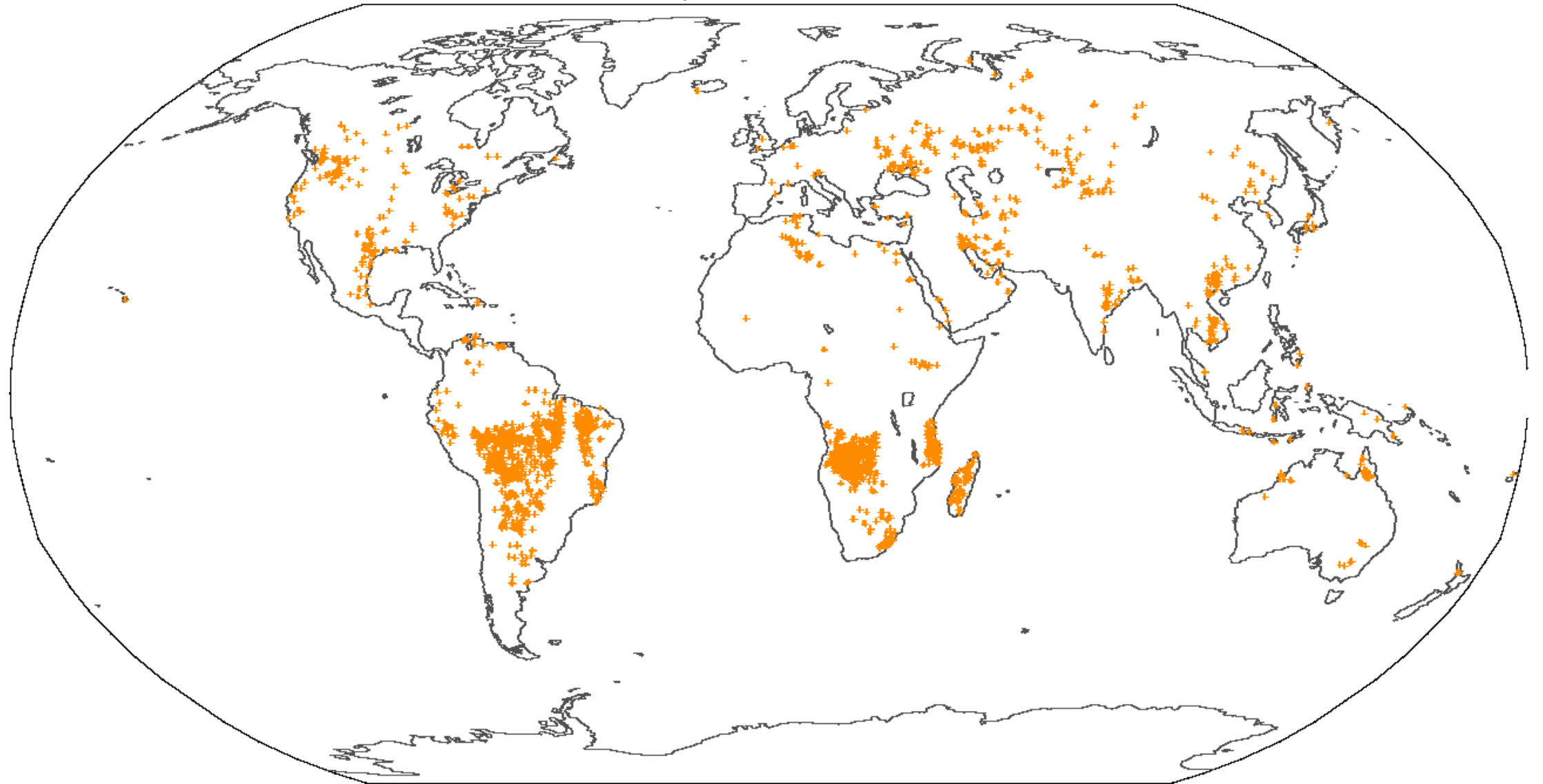
2 Sep. 2022 – Terra MODIS

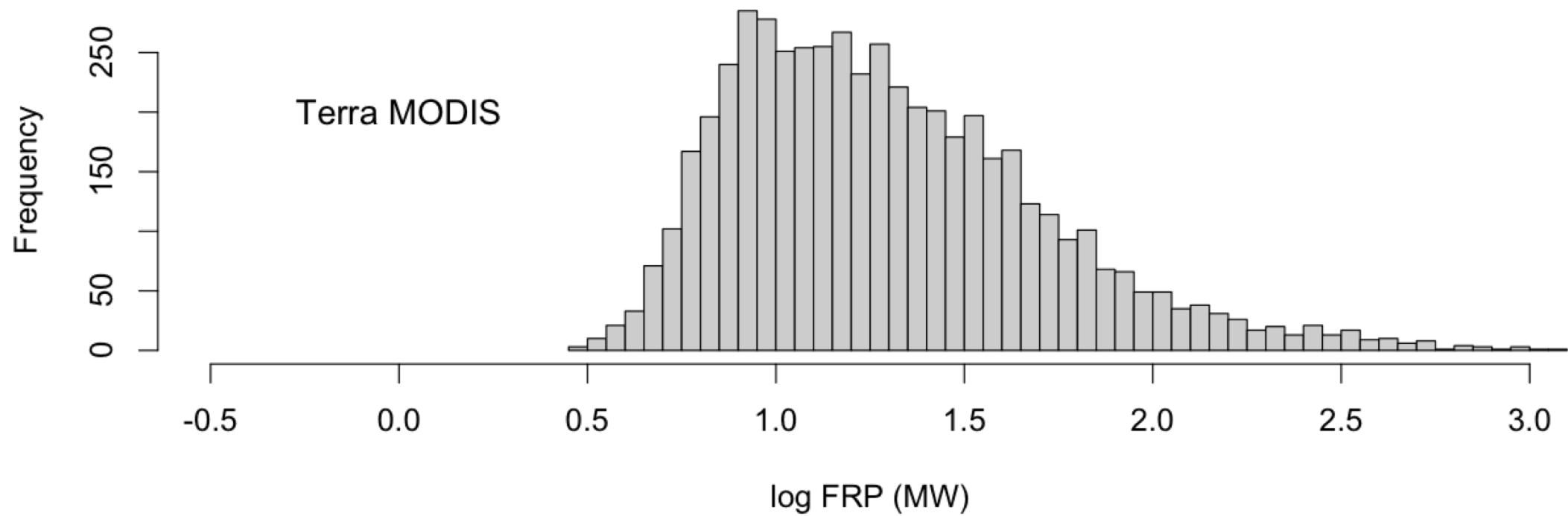
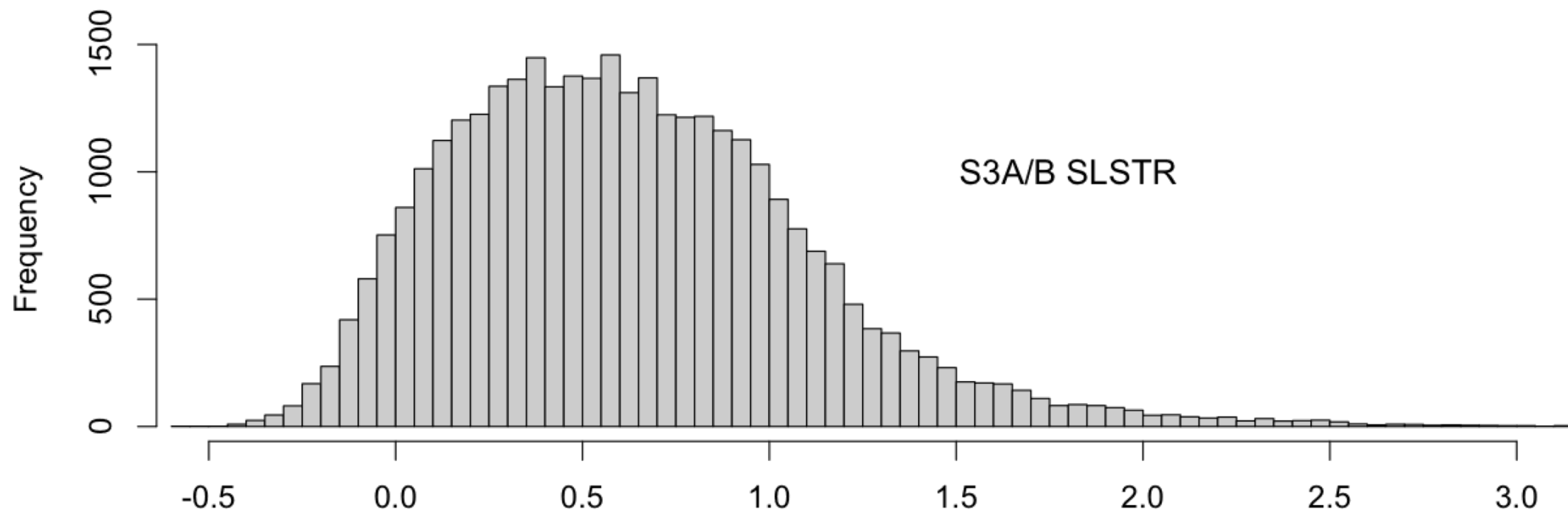


2 Sep. 2022 - S3A SLSTR



2 Sep. 2022 – S3B SLSTR





Initial Evaluation of SLSTRActive Fire Data

- Additional assorted practical (but manageable) product discrepancies
 - Product format (zip files)
 - Data volume (300× larger than MODIS swath product)_
 - Slight differences in contents of NRT vs. NTC products
 - L1B granules and L2 fire-product granules not synchronized?

Evaluation of SLSTRActive Fire Data

- Key step is to disentangle sensor, platform, and algorithm differences from overpass-related differences
 - Tolerance for validation reference data is generally **± 5 minutes**



Terra Timeline if Maximally Extended

