VIIRS Atmosphere SIPS Update

MODIS/VIIRS Atmosphere Discipline Telecon

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Atmosphere SIPS Overview

- The VIIRS Atmosphere SIPS (ASIPS) is located within the Space Science and Engineering Center at the University of Wisconsin-Madison.
- ASIPS is responsible for supporting the development, testing, evaluation, and production of VIIRS atmosphere products created by the ROSES-funded VIIRS Science Team members (aka “Continuity products”).
- ASIPS supports global standard and near real time processing in “forward stream” mode and reprocessing of entire mission records.
- ASIPS delivers VIIRS atmosphere products to NASA LAADS for archive and distribution.
- ASIPS delivers imagery to NASA GIBS for display in Worldview.

LAADS (not ASIPS) is responsible for the production, archive, and distribution of MODIS atmosphere products (MxD35, MxD07, MxD06, MxD04, MxD08, …) supported by NASA Senior Review.

Atmosphere SIPS Responsibilities: VIIRS/MODIS Products

Data Ingest

- Ingest and store SNPP and NOAA-20 Level 0 data (VIIRS, CrIS, ATMS)
- Ingest and store Aqua MODIS Level 1B and MODIS Level 2 Atmosphere
- Ingest and store all required ancillary data

Operational Processing

- Standard Products are created within 24 hours of observation.
- Near Real Time Products are created within 3 hours of observation.
- Reprocessing of mission record when new product version is approved by Science Team.

Product Delivery

- Level 2 and Level 3 standard products (VIIRS and MODIS) are delivered to LAADS in forward stream and when mission record is reprocessed.
- Near Real Time Products are hosted at ASIPS and accessed via LANCE.
- Level 2 Product imagery is delivered to GIBS for display in NASA Worldview.
- Copies of Level 2 and Level 3 products are stored at ASIPS.

Atmosphere SIPS Responsibilities: Science Team Support

- ASIPS provides a local test environment (sipssci2) for product generation software development and testing by ST members.
- ASIPS provides a local searchable archive of L1 and L2 products.
- When software is ready for more extensive testing by the ASIPS, a delivery system is used to ensure that every delivery is archived and tagged.
- Delivered/integrated product generation software can be run interactively.
- Each ST member has a dedicated ASIPS point of contact to support product generation software testing, integration into the processing system, and product delivery to LAADS, GIBS, and LANCE.
- ASIPS provides extensive tools and resources for product evaluation (e.g., local Worldview, sensor/satellite collocation, Matchmaker collocated products, …).
- ASIPS provides GPU server (sipsgpu1) for testing of products using ML/AI algorithms.

Atmosphere Discipline Team Members (Product Creators)

Team Leads	ROSES-20 A.52 and A.33 Funded Proposals
Christina Hsu (NASA GSFC)	Extending Long-Term Aerosol Data Records from MODIS to VIIRS using e-Deep Blue Algorithm. (ROSES – 2020 A.52)
Robert Levy (NASA GSFC)	Upgrading the Dark Target aerosol data record for the 2020s and beyond. (ROSES – 2020 A.52)
Kerry Meyer (NASA GSFC)	The continuation and evolution of the CLDMSK and CLDPROP continuity cloud product suite. (ROSES – 2020 A.52)
Kerry Meyer (NASA GSFC)	Transitioning an existing near real-time MODIS cloud and above-cloud absorbing aerosol retrieval algorithm into a new MODIS/VIIRS continuity product. (ROSES – 2020 A.33)
Vincent Realmuto (NASA JPL)	TIR-Based Volcanic SO2 Science Products for MODIS and VIIRS. (ROSES – 2020 A.33)

Former Atmosphere Discipline Team Members

Team Leads	ROSES-2013 A.29 and ROSES-2017 A.37 Funded Proposals
Eva Borbas (UW – Madison), **Bryan Baum** (retired)	Fusion of VIIRS and CrIS Data to Construct Supplementary Infrared Band Radiances for VIIRS. (ROSES –2017 A.37)
Bo – Cai Gao (NRL)	Continuation of Standard Cirrus Reflectance Product from the EOS Terra and Aqua MODIS to Suomi NPP VIIRS. (ROSES – 2013 A.29)
Eva Borbas (UW – Madison)	Continuation of EOS Clear Sky Infrared Total Precipitable Water Vapor Product Using a Combination of VIIRS and CrIMSS Measurements. (ROSES – 2013 A.29)

NASA headquarters and ESDIS have indicated that ASIPS can continue to support orphaned products if the former Team member has other NASA funding.

VIIRS/MODIS Atmosphere Level 2/3 Products Generated by the ASIPS (5/22)

Product Short Name	Product Description	ST Lead	DAAC Delivery
AERDB_L2_VIIRS_SNPP AERDB_D3_VIIRS_SNPP AERDB_M3_VIIRS_SNPP	Deep Blue Aerosol (day only) Standard and NRT	Christina Hsu (NASA GSFC)	LAADS (standard) LANCE (NRT)
AERDT_L2_VIIRS_SNPP	Dark Target Aerosol (day only) Standard and NRT	Robert Levy (NASA GSFC)	LAADS (standard) LANCE (NRT)
CLDMSK_L2_VIIRS_[SNPP|NOAA20]	Continuity Cloud Mask (day/night) Standard and NRT	Kerry Meyer (NASA GSFC)	LAADS (standard) LANCE (NRT)
CLDMSK_L2_MODIS_Aqua	Continuity Cloud Mask (day/night) Standard	Kerry Meyer (NASA GSFC)	LAADS
CLDPROP_L2_VIIRS_[SNPP|NOAA20] CLDPROP_D3_VIIRS_[SNPP|NOAA20] CLDPROP_M3_VIIRS_[SNPP|NOAA20]	Continuity Cloud Properties (day/night) Standard	Kerry Meyer (NASA GSFC)	LAADS
CLDPROP_L2_MODIS_Aqua CLDPROP_D3_MODIS_Aqua CLDPROP_M3_MODIS_Aqua	Continuity Cloud Properties (day/night) Standard	Kerry Meyer (NASA GSFC)	LAADS
FSNRAD_L2_VIIRS_CRIS_[SNPP|NOAA20] FSNRAD L2 subset SNPP|NOAA20	Fusion Radiances (day/night) Standard	Eva Borbas (UW-Madison)	LAADS LaRC (CERES)
CLDCR_L2_VIIRS_SNPP	Cirrus Reflectance (day only) Standard	Bo-Cai Gao (NRL)	LAADS

ASIPS Level 3 Development tool (YORI)

Yori is a user-configurable software package that efficiently aggregates geophysical variables into a Level 3 netCDF4 product file.

Step 1:

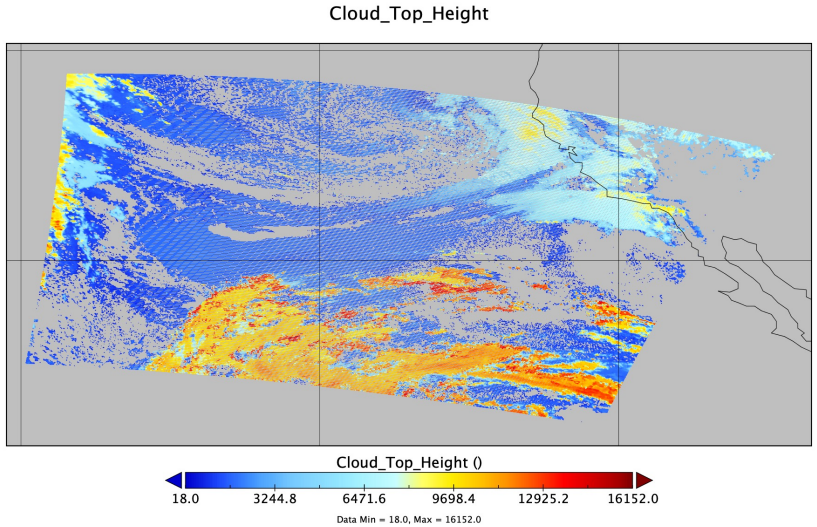
- The user prepares filtered input data files (e.g., from Level 2 granules) and a Yori configuration file.
- The configuration file tells Yori how to grid the filtered input data

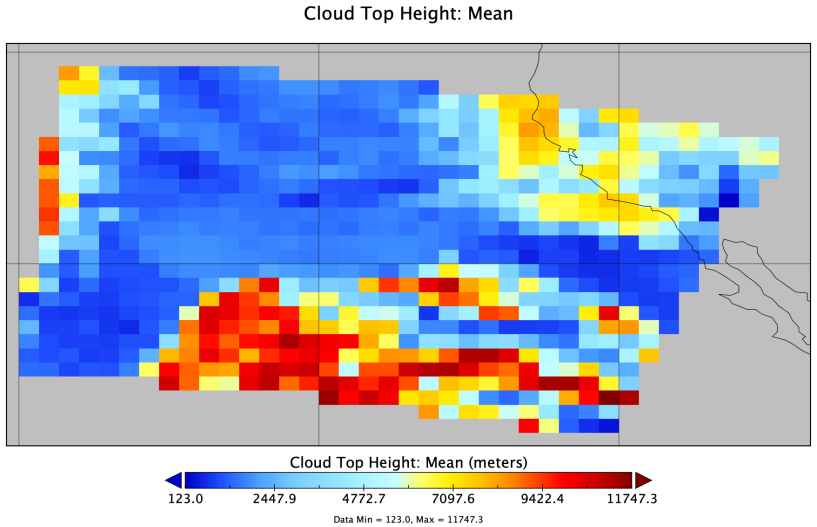
Step 2:

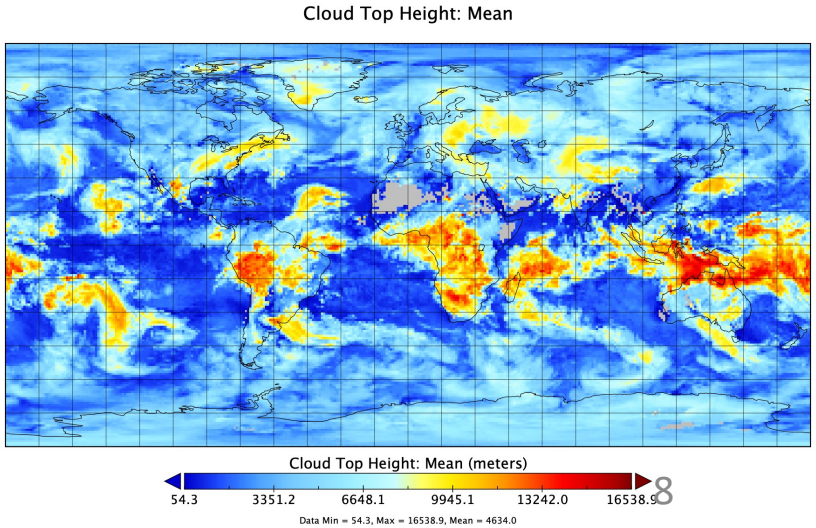
- `yori-grid` reads the filtered input data files and produces a gridded granule according to the instructions provided in the Yori configuration file

Step 3:

- `yori-aggr` aggregates multiple gridded granules (from *Step 2*) into Level-3 products







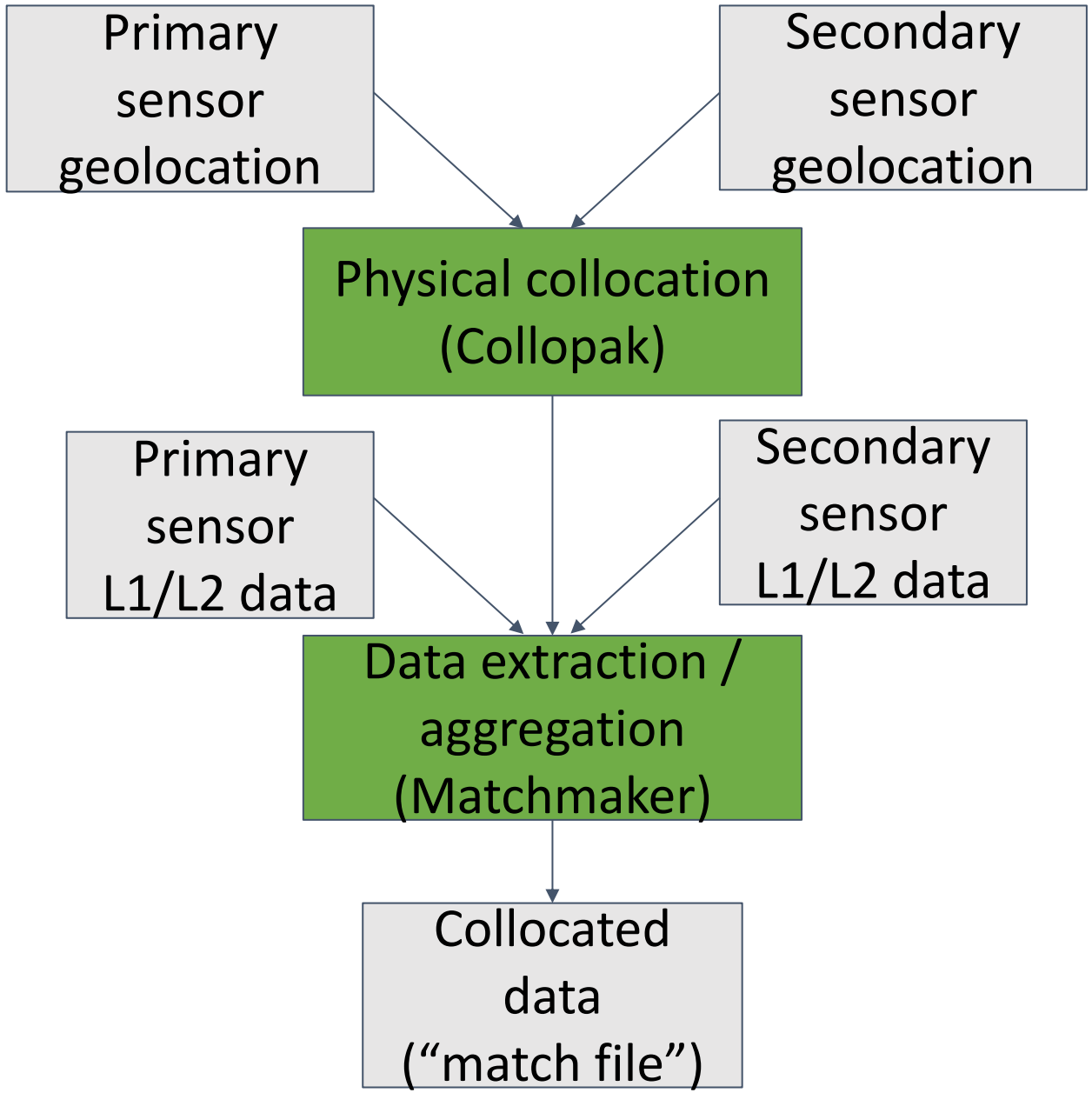
ASIPS Collocation Tools

SIPS multi-sensor collocation tools support:

- Calibration assessment of L1 data (e.g., MODIS-VIIRS reflectance biases)
- Validation of L2 products (e.g., CALIPSO for analysis of cloud & aerosol retrievals)
- Algorithm development using multiple instruments (e.g., Fusion, CrIS IMG)

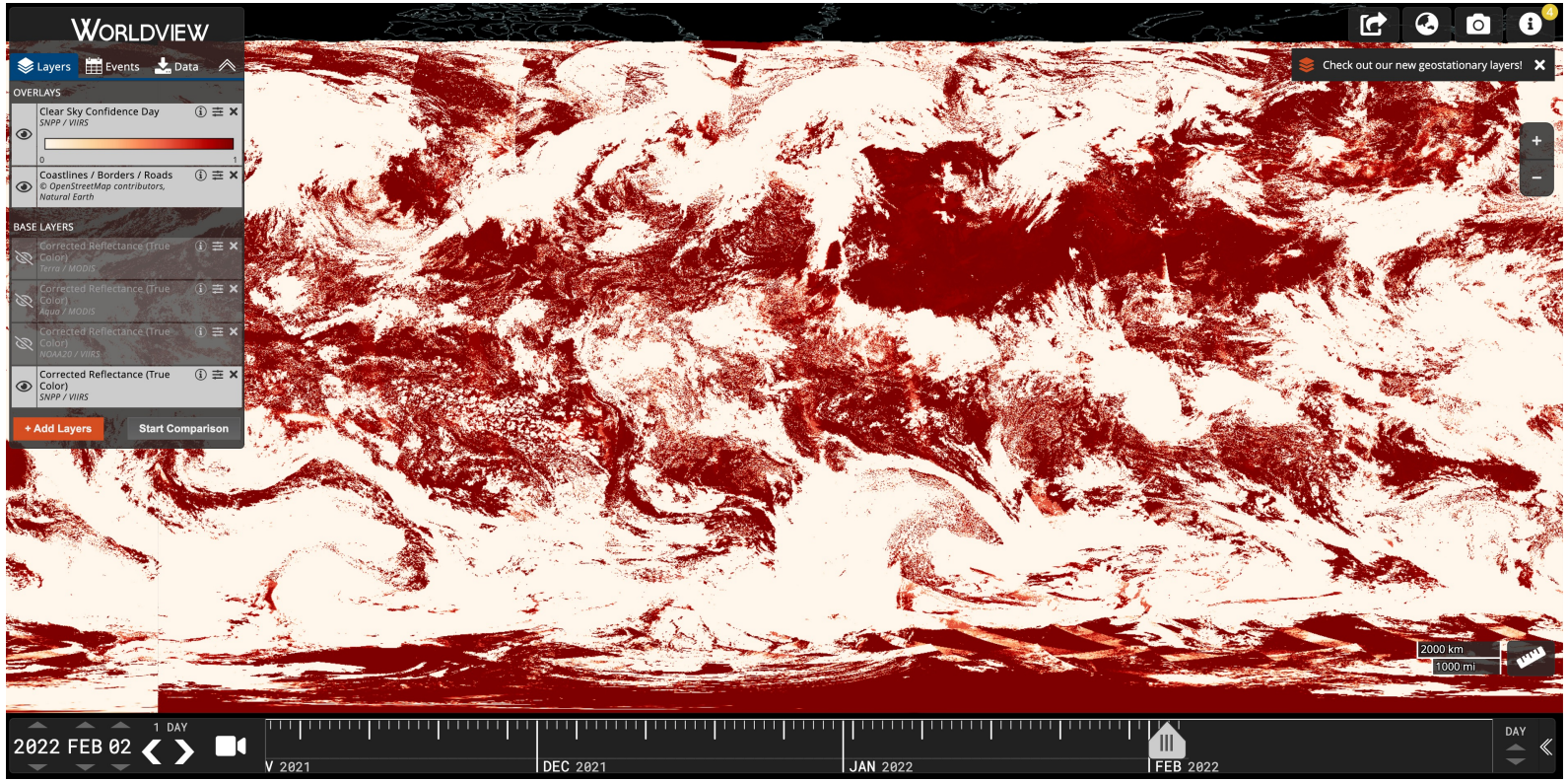
“Collopak” software performs geometric calculations to identify collocated observations

“Matchmaker” software aligns L1/L2 sensor data into a joint file for easy comparison or combined use



ASIPS Local Worldview

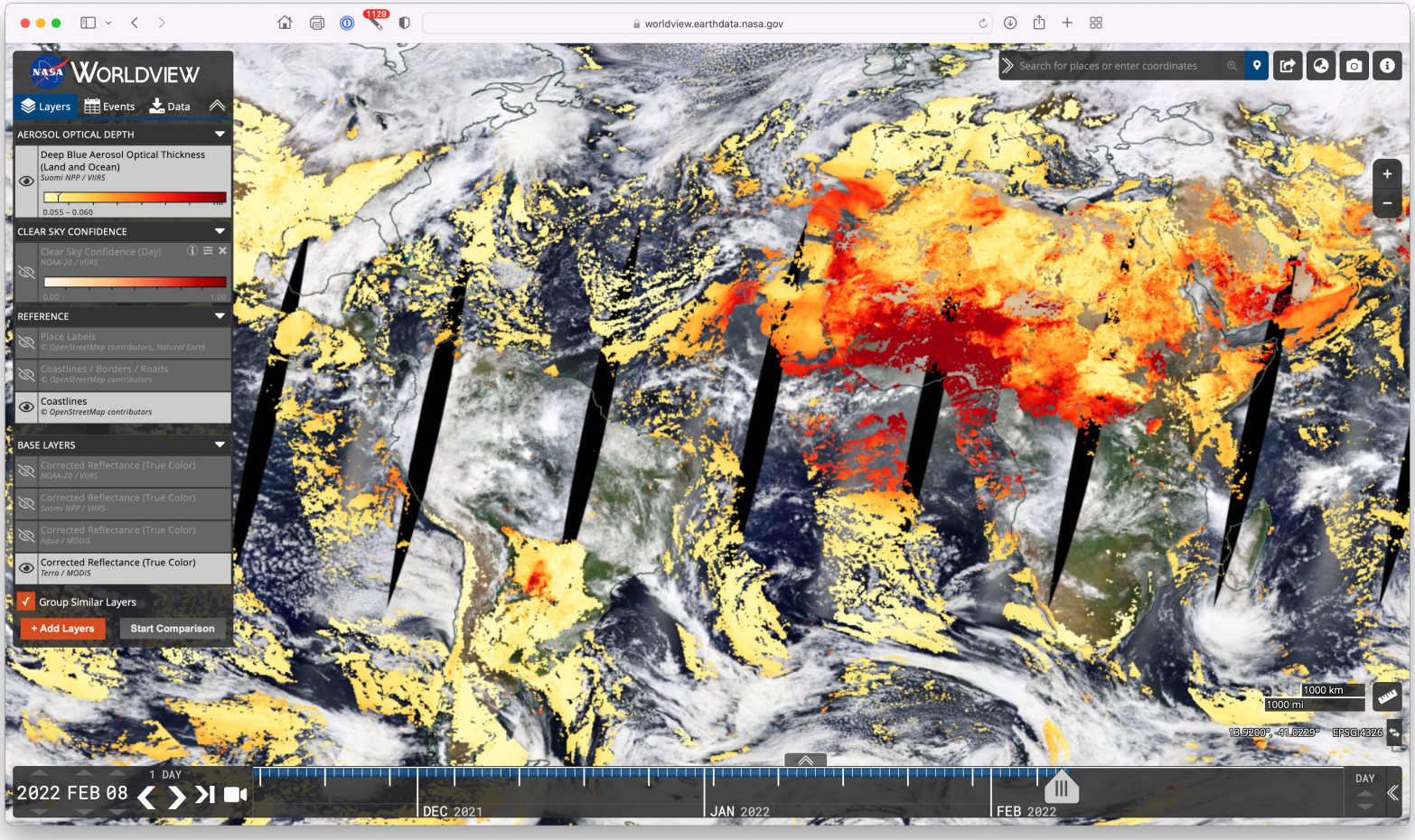
- L2 product imagery is generated by ASIPS and displayed in a local instance of Worldview.
- Able to display multiple days for test versions of L2 products.
- Can create unique colormaps with a specified min/max.
- Can create multiple layers for different bands.
- Fewer restrictions on the number of layers (compared to NASA Worldview).



https://sips.ssec.wisc.edu/worldview/

NASA Worldview

- L2 product imagery is created by ASIPS and delivered to NASA GIBS (the back end of Worldview).
- Recommended maximum of 4 layers per product (Day and night is two layers)
- ASIPS can reprocess and deliver a mission record to GIBS.
- However, this process can take several months due to resource limits at GIBS.



https://worldview.earthdata.nasa.gov/