Minutes of the Land, Atmosphere Near real-time Capability for EOS (LANCE) User Working Group (UWG)

November 9-20, 2022

Virtual Meeting

Date: 3 January 2023

1   LANCE UWG Members and Attendees

Twelve members of the Land, Atmosphere Near real-time Capability for EOS (LANCE) User
Working Group (UWG) were in attendance (Table 1). There were additional attendees
representing the Near real-time (NRT) user community, representatives of the individual LANCE
elements, NASA Headquarters (HQ), and NASA's Earth Science Data and Information System
(ESDIS) (see Appendix 1).

NAME	Email	ORGANIZATION
Miguel Román (UWG chair)	miguel.o.roman@leidos.com	Leidos HQ
Arlindo da Silva	arlindo.m.dasilva@nasa.gov	NASA GSFC
Brad Quayle	bquayle@fs.fed.us	US Forest Service
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Vanessa Escobar	vanessa.m.escobar@nasa.gov	NOAA/NASA GEO-XO

*Table 1: LANCE UWG Members that attended the UWG. * denotes UWG members that were unable to attend.*

2   Introduction

2.1   UWG Chair Perspective - Miguel Román

Miguel opened the meeting with some reflections on NASA's Earth Observing System (EOS). He congratulated the Aqua Mission Team for recently receiving the Pecora Award. He then stated that the EOS missions are entering a new era – a period of drifting orbits, with Terra reaching a Mean Local equatorial crossing Time (MLT) ~1.5 hr. earlier and Aqua and Aura moving to a MLT

~ 1.5 hr. later. He said that what happens next is inextricably connected to LANCE, and our plans to move forward with the ESO, while maintaining continuity with the EOS.

Miguel went on to provide a brief overview of the virtual community workshop, *NASA's Terra, Aqua, and Aura Drifting Orbits Workshop*, that was held November 1-2. NASA had issued a request for information (RFI) with 2 themes:
1. Science objectives that can be achieved with Terra/Aqua/Aura data that are uniquely enabled by observations made during the period of orbital drift, and
2. Benefits to and impact on current societal applications during the period of orbital drift.

There was a tremendous response to the RFI from the EOS community. The purpose of the workshop (with over 500 attendees) was to summarize and discuss the 100+ RFI responses received in order to help NASA Headquarters (HQ) decide whether Terra, Aqua and Aura should be included in the 2023 Mission Extension Senior Review. Many of the RFIs espoused the value of near-real-time data for science and decision-making applications. Miguel identified three highlights relevant to the discussion:

1. NASA HQ has made an initial investment in a pilot study to evaluate the feasibility of using data from the Sentinel-3 sensors to provide continuity with Terra MODIS. As Terra's orbit moves to an earlier MLT, we will have a unique opportunity to nearly match the orbit with Sentinel-3, enabling near-real time product continuity between the MODIS and future Sentinel-3-based products.
2. The orbit change has further implications for some of the most popular services that are part of LANCE. For FIRMS, for example, the orbit change will enable detection during the least-cloudy times of day, earlier morning, plus a better understanding of fire behavior and characteristics, fire spread, etc. Coverage will be provided over time periods where there are currently major gaps. Having data from both MODIS and Sentinel-3 will enable better detection of small fires, as well as big fire events, and will have value for new FireSense application themes and areas like air quality monitoring and situational awareness.
3. Better situational awareness will contribute to the goals of the new NASA Environmental Justice program, for which selections have been made. These proposals have called for continued use of Terra, Aqua and Aura data to conduct their investigations. At least 10 PIs have specifically proposed using Terra/Aqua MODIS data as a means of evaluating Environmental Justice factors at a city and regional scale.

Miguel concluded by observing that NASA has made significant investments in near real-time capabilities, that stand to benefit during the period of orbital drift. The benefits of some of those investments – e.g., adding MISR near-real-time data to LANCE and integration of imagery in to GIBS and Worldview, are only recently being realized. The longer the EOS mission sensors operate, the more science and decision-making applications, i.e., return on investment, can be achieved.

2.2   New UWG Members

Two new LANCE UWG members were welcomed. **Lori Schultz** from the University of Alabama/Huntsville has extensive experience in Remote Sensing applications, particularly development of capabilities and transition to stakeholder community. She currently supports the NASA's Applied Sciences Disasters Program and is also involved with SERVIR. At an earlier UWG meeting, NASA Headquarters recommended that the LANCE UWG seek input from NGOs. **Fred Stolle**, from the World Resources Institute (WRI) has joined the LANCE UWG. Fred is the Deputy Director of WRI's Forest Program, and brings an extensive background in Land Cover, Land Cover Change, Forest Change, and Crop Monitoring.

2.3   LANCE Update **- Karen Michael**, LANCE Project Manager:

Karen began with an overview of the LANCE Organization, including ESDIS Project management, each of the LANCE elements, and interfaces to NASA Headquarters, and EOSDIS Infrastructure elements. She also introduced new LANCE team member, Jenny Hewson, LANCE Outreach and Implementation Manager. Karen then provided status updates on LANCE, including:
- Release of SMAP NRT Soil Moisture and Brightness Temperatures in October
- Planned updates to the MLS algorithms providing improved NRT versions of the O3, CO, and SO2 products
- Release of FIRMS US/Canada Ultra-real-time (URT) active fire data from MODIS and VIIRS, via the Space Science and Engineering Center (**SSEC**) at the University of Wisconsin-Madison
- Addition of NRT 30-meter Landsat Fire and Thermal Anomalies (LFTA) products from USGS into FIRMS for continental U.S., the southern half of Canada, and the northern half of Mexico.

Karen then briefed the UWG on other potential LANCE products from:
- TROPICS
- TEMPO
- Satellite Needs Working Group (SNWG) products
- Future ESO missions (AOS and SBG)

2.4   NASA HQ – **Cerese Albers**, Earth Science Data System Program Executive

Cerese provided an overview of the NASA Science Mission Directorate's Open Source Science Initiative (OSSI), and infusion of OSS Data Policy via updates to SPD41a. She quoted guidance from the White House Office of Science and Technology Policy (OSTP): Federal agencies must update public access policies to make Publications and Research funded by taxpayers publicly accessible without embargo or cost, with compliance by December 32, 2025. NASA's Earth Science Division is fully committed to opening the entirety of the scientific process. The policy

is: As open as possible, as restricted as necessary, always secure. Cerese discussed implications of SPD 41a and other soon-to-be released policies on missions and solicitations.

She said the report-out of the ESO Mission Data Processing Study is expected in December 2022[1].

Cerese presented a graph depicting the significant growth in the NASA Earth Science data archive with new missions being added between 2023 and 2029. She presented progress on migrating high priority mission data to the Cloud. Arlindo da Silva asked how the selection of the top 50 datasets to move to the Cloud were prioritized. The response from Robert Wolfe was that it was largely driven by the DAACs, based on their knowledge of high demand products, and input from their UWGs.

Cerese concluded with a discussion of NASA's ESD's commitment to Equity and Environmental Justice (EEJ).

During follow-up discussion, Miguel raised his concerns about NASA's continued support for popular services like FIRMS and Worldview, as we move into the ESO, and how planning to ensure this continued support is proceeding. Cerese responded that the ESO Mission Processing Study, as well as other activities looking at Core Services across SMD will be factored in future plans. This was followed by some discussion about the process for preparing researchers to transition from developing cost estimates for proposed investigations using their organization's computing facilities, to understanding how to estimate costs for data access, processing, and egress from the Cloud.

3   Updates

3.1   An Ensemble Model for Global Flood Severity Alerts - **Maggi Glasscoe**, UAH

Maggi presented an ensembled model that forecasts flood severity at sub-watershed level daily. It incorporates hydrological models (Global Flood Awareness System (GLoFAS) and Global Flood Monitoring System (GFMS) for severity, and the Hurricane, Weather, Research and Forecasting (HWRF) Model for precipitation), to identify flood risk at a regional level, and uses data from MODIS and VIIRS to validate the model results. The flood risk maps use the same alert color scheme as the National Weather Service (red – warning; orange – watch; yellow – advisory). For areas at the high-risk warning level, remote sensing data in near-real-time is obtained and analyzed to ascertain flood extent and assessment of societal and critical infrastructure impacts. Flood event and severity is provided in near real-time. A flood severity forecast is provided for both coastal and inland areas and delivered to the DisasterAWARE (https://www.pdc.org/disasteraware/) Alert platform, a global multi-hazard alerting system run by the Pacific Disaster Center. Maggi presented the user interface and capabilities for displaying various layers, via output for recent flood alerts in regional areas. The displays are

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[1] https://www.nasa.gov/sites/default/files/atoms/files/eso_irb_documents.pdf

easily digestible by decision makers. MoM is the first global flood severity model, providing alerts and impacts.

Following the presentation, there was discussion on collaboration between MoM and LANCE. MoM is currently obtaining VIIRS data from NOAA, but the MoM team is interested in using the LANCE/VIIRS near real-time feed. Also, in addition to the output being displayed on DisasterAWARE, the team is interested in providing the information and displays via LANCE, where it can reach an even broader stakeholder community. Miguel observed that there seems to be a trend toward intercomparison of products and models. He asked the MoM team how MoM could facilitate open science goals. The MoM team highlighted that they have a plug and play architecture that will enable them to add other sources to produce the best results. Miguel asked about the relationship between the MoM team and the Federal Emergency Management Agency (FEMA), and how the MoM team could improve the use of information that is available. The MoM team has a member formerly from FEMA, so they have an understanding of what outputs are useful. Another point made by the MoM team was that while they have been successful at the macro, global level, they are interested in using SAR data to improve their output at the micro scale. Miguel indicated there is interest in collaboration between the MoM Team and LANCE, and asked Karen to follow-up to determine next steps.

3.2   Terra, Aqua, and Aura End of Life – **Robert Wolfe**, NASA/GSFC

Robert Wolfe, Chief of the Terrestrial Information Systems Laboratory (Code 619), presented additional information about the implications and opportunities derived from the drifting orbit of the three primary EOS flagship missions. All three missions are nearing end-of-life and are out of fuel for orbit-keeping maneuvers. Terra (10:30 am) will reach the 9:00 a.m. MLT in ~2026, and Aqua and Aura (1:30 pm) will reach 3:00 p.m. MLT in 2025-2026. He reminded the UWG that despite their 20+ years of operations, the 3 spacecraft are still very healthy, with a total of 11 well-calibrated instruments producing essential and validated Earth Science products for the Land, Atmosphere and Ocean science disciplines. These products are mature, having been heavily scrutinized and improved over the years. No degradation in instrument calibration is expected because of the drift.

Robert presented examples of how the Terra and Aqua orbital drift could provide novel fire science and applications:
- Terra and Aqua drift data will sample longstanding data gaps when fires are most common and often most intense.
- Repeat sampling, due to growing offsets between MODIS and VIIRS, will provide insight into sub-daily behavior of larger fires, which will benefit the next generation of fire spread models.
- Synergy from multi-sensor observations – e.g., smoke plumes form MISR, CO from MOPITT, and finer resolution from ASTER, will be complementary to the MODIS observations.

- Data collection during orbital drift is also expected to help optimize overpass times and algorithm development for future dedicated wildfire monitoring systems (e.g., WildFireSat) Terra drifting closer to the MLT of Sentinel-3 will enable cross-calibration with ESA's fire products, and enable extension of the Terra AM data record.

Robert concluded by reviewing next steps. A report compiling responses to the RFI and discussion at the workshop will be delivered to NASA HQ by Friday, 11/18/2022. By early December 2022, NASA HQ is expected to decide whether Terra, Aqua and Aura will be included in the 2023 Mission Extension Senior Review. If not included, the missions will stop collecting data in August (Aqua and Aura) and December (Terra) 2023. If included, the missions will submit proposals to extend the operations to ~2025 – 2026. In early Summer 2023, the Senior Review panel will review the proposals, and make a recommendation to NASA HQ to extend or not extend the missions. Based on this, NASA HQ will decide by ~August 2023 whether to continue the missions.

Miguel and Robert said they were impressed by the innovative science contained in the RFI responses, as well as the interest in ensuring continuity of measurements between the EOS missions and the ESO missions. Miguel pointed to the Tonga volcano eruption, which was captured by MLS, and provided a "once in a lifetime" opportunity to study the atmosphere under significant change. They also agreed that there would be significant continuity advantages to keeping MODIS operating in order to provide overlap with CLARREO and PACE. Especially in terms of the long-term climate record and near-real time science and applications, extending the overlap is key to understanding Earth system science.

4 Enhancement Proposals:

4.1 Plan to Continue the Aerosol index Product for NOAA-20/21 – **Colin Seftor**, NASA/GSFC

OMI and OMPS Aerosol Index (AI) was originally generated as a byproduct of the UV total ozone retrieval algorithm. AI is not a physically quantitative measure of aerosol characteristics. Magnitude depends not only on the amount of aerosol present but also on the type of aerosol, scene characterization (reflectivity), height of the aerosol, and other factors. The AI can be used over all types of land surfaces and clouds, making it ideal to detect and track smoke, dust and ash from fires, dust storms, and volcanic eruptions. Colin provided a description of the process for retrieving the AI, and examples of the many ways AI is used. Currently, LANCE contains UV AI products (including imagery) from Aura OMI and SNPP OMPS. The OMPS Science Team AI product uses an enhanced version of the heritage AI for SNPP. The OMPS Science team does not provide AI products from NOAA-20 OMPS, nor will it from NOAA-21 OMPS. With Aura OMI reaching end of life, and SNPP planned to be decommissioned within 18 months, there will no longer be any AI products in LANCE.

Colin's proposal would provide SNPP/NOAA-20/NOAA-21 AI products independent of the OMPS Science Team. NOAA-20 OMPS AI could provide higher resolution than SNPP, and NOAA-21 could provide even higher resolution than NOAA-20. Colin proposed to provide AI products for all current and future OMPS sensors, using the heritage AI, which is compatible with the products from TOMS, and the TROPOMI sensor. He believes he can have the products available in mid-2023.

Miguel pointed out that TROPOMI relies on a 20-minute tandem orbit with SNPP to get additional channels and cloud masking that TROPOMI doesn't have. Miguel asked what the impact will be on TROPOMI when SNPP is decommissioned. Colin didn't know, but he is a member of the calibration team of TROPOMI, and he has concerns about the quality of the calibration. However, Colin confirmed that the NASA calibration team has full responsibility for calibration of all OMPS instruments/products. Miguel asked Colin to generate a Con-Ops that points the user to the flow of products they can use, with AI being the starting point. Colin agreed to do that as part of the enhancement request. He shared that when users discover a pyroCB event through AI, they then go back to look at other sensor data – i.e., AI is an indicator/trigger mechanism.

Feedback from Arlindo da Silva: when the AI files are written out, it would be very helpful to the Data Assimilation community if the reflectance in the 2 channels used and any assumptions about surface reflectivity be included. Colin agreed.

Next step is for Colin to submit an enhancement request.

4.2 NRT Path to Assimilate Geostationary Aerosol Data – **Arlindo da Silva**, NASA/GSFC GMAO

Arlindo provided an update to his briefing at the May 2022 LANCE UWG, where he'd advocated for the generation of NRT Aerosol data, derived from geostationary satellites. The goal is to achieve a Geo-ring of sensors from GOES, Himawari and Meteosat-3G satellites, providing unprecedented resolution. The approach is to leverage the Dark Target/Deep Blue algorithms, that have been available with MODIS and have been extended to VIIRS. Recently, Rob Levy and Christina Hsu have been funded to extend the algorithms to the geostationary satellite sensors. Arlindo presented an example of aerosol retrieval from the Advanced Baseline Imager (ABI) on the GOES-R series satellites, but the algorithms also work with Himawari-8 data. His recommended next step is to leverage these algorithms to make the products in NRT, eventually covering the whole globe when Meteosat-3G is available.

Arlindo presented the status of Dark Target/Deep Blue Aerosol Products. MODIS Collection 6.1, which includes a Dark Target/Deep Blue merge product, is assimilated in most models around the world. MODIS is still considered the workhorse of aerosol data simulation and prediction. The VIIRS Version 1.1 Dark Target data is available, with most output parameters the same as MODIS. VIIRS Deep Blue has been available since early 2019, but there is no combined product

as there is for MODIS; Arlindo commented that this is a problem as users have tried to switch to VIIRS but there isn't a fully implemented follow on algorithm going from MODIS to VIIRS and this is making some end-users nervous. The Geostationary Beta product is being processed for 2019 – present, and is undergoing validation. The assimilated geostationary product in GEOS looks consistent with MODIS. Preliminary results show improvement of the MODIS and Geo Aerosol Optical Depth vs just MODIS when compared against data from AERONET.

Arlindo presented feedback from the International Cooperative for Aerosol Prediction (ICAP) regarding the incorporation of data from geostationary platforms. ICAP is primarily made up of data assimilation practitioners. There was a clear consensus that adding geostationary data in NRT is urgently needed.

Arlindo presented a path forward. While other MODIS heritage aerosol algorithms exist (e.g., MAIAC), the Dark Target and Deep Blue algorithms offer the breadth of sensors and maturity for NRT implementation. SSEC has access to the GOES ABI and Advanced Himawari Imager (AHI) data in near real time, and experience deploying the Dark Target/Deep Blue algorithms for both LEO and GEO sensors. While two NASA-funded proposals are creating geostationary algorithms, these are not NRT; so, the essence of the request will be the generation of an NRT version of the geostationary dark target/deep blue products. Arlindo is preparing a LANCE Enhancement Request, which will also include the generation of concurrent GIBS imagery with aerosol properties for Worldview.

4.3   Discussion on Enhancement Proposals

Miguel led the discussion after Arlindo's presentation. He expressed concern about the capacity of the "backbones" of much of the LANCE data (e.g., MODAPS) to add additional products and services into LANCE. Arlindo recommended the SNPP/JPSS Atmosphere SIPS (at SSEC) do the processing. Arlindo also mentioned that incorporating the NRT geostationary data in the Aerosol products will be an advantage to the AOS mission; the high temporal resolution of the geostationary data will enable greater understanding of how aerosols vary over time and this will benefit synergistic algorithms.

Mike Fromm raised a question regarding GIBS/Worldview: when aerosol data is presented as a layer, will the user be able to distinguish between very low aerosol depth, and a data gap. Arlindo agreed that this should be a requirement. Miguel observed that this will become increasingly important as we move to provide continuity using products from Sentinel-3, etc. Sensors will be different, with different sensitivities. He asked if Ryan could address this as part of the GIBS/Worldview update.

Karen and Miguel solicited feedback from the UWG members regarding the Enhancement Requests. Hazem Mahmoud (NASA/LaRC/ASDC) asked about getting data from other geostationary sensors such as Sentinel-4 (Meteosat-3G-S) (which will monitor trace gas concentrations/aerosols) and TEMPO, as well as the Korean GEMS mission (TEMPO's "sister" over Asia), to compensate for losing the Terra, Aqua and Aura instruments. Miguel cautioned that we need to pace ourselves in bringing in more non-NASA sensors as it can be a lot of work.

There are plans to start with Sentinel-3 and to get a feel for the relationship with the Sentinel program in general. Miguel's view is that the geostationary products Arlindo is proposing are a good first step for LANCE, as they will have a NASA science algorithm foundation. Regarding TEMPO (a NASA Earth Venture mission), Miguel suggested that that be a focus for the next UWG – in particular, understanding the data latency.

Steve Miller, UWG member, provided some additional feedback on the day's briefings. He encouraged collaboration between the MoM team and Sean Helfrich/NOAA UWG member. He also noted that Colorado State University submitted an RFI response. They expressed the value of MODIS Aqua data for improving user readiness in anticipation of possible future spectral band on NOAA's Geostationary Extended Observations (GeoXO) satellite system. A final comment from Miguel was that the MoM team should consider using surface reflectance data from Sentinel-3, with which they concurred and noted that this had been highlighted during a recent meeting with the LANCE team.

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5   LANCE Updates

5.1   LANCE Metrics and Updates - **Diane Davies**, NASA ESDIS

Diane acknowledged all the people working on LANCE and thanked them for their contributions. She presented a summary of latency over the last year. Overall, the latencies are within the 3-hour requirement, with some exceptions where there were system failures, upgrades, or issues or delays with receiving the data. Diane presented metrics on the number of registered users accessing LANCE data through Earthdata Login (not including imagery from FIRMS/Worldview or GIBS). The number of users continues to increase each year. Yearly number of files distributed is increasing; in 2021 and 2022 there was more than double the amount of data distributed in 2020. Steve Miller asked why the amount of LANCE data distributed for 2021 and 2022 is double that of 2020. Diane followed up after the meeting to say this was primarily due to an increase in MODIS/Terra and Aqua Level 1 data being pulled and, to a lesser extent, more AIRS data being pulled by NOAA after they decommissioned their NRT system at NOAA Satellite Operations Facility (NSOF). Over the last year Diane noted MODIS/Terra and Aqua make up nearly 72% of total data downloaded, this is a decrease on last year. Since FY20 there has been an uptick in number of files and volume of VIIRS data being distributed from LANCE. Metrics from ICESat-2 Quick Look were shown separately – since 22 March 2022 there have been 2,279 file downloads from 86 registered users.

Google Analytics were used to show visits to LANCE webpages and FIRMS since the last UWG. Peaks are seen during are major fire events in Europe and the Pacific Northwest. Various media outlets have used and cited FIRMS imagery and that leads to spikes in visits to LANCE. Diane showed a Google Analytics map of where users come from: US, France, Germany, Spain, and Ukraine were listed in the top 5. A spike in users from Germany, and Poland, was attributed to FIRMS being cited as an information source for tourists who want to know where fires are in relation to holiday destinations. A pie chart showed how users access LANCE: 26% come in directly, 23% are referred from other websites, 13% from social media and 37% are from organic searches.

Diane reported that the Aura Microwave Limb Sounder (MLS) team is finalizing an upgrade to the MLS Near-Real-Time (NRT) data processing system that will give improved versions of the O3, CO, and SO2 products (the latter intended for near-real-time volcano detection). She also noted that the ISS LIS was relocated on the ISS in June 2022 and is expected to continue operations until at least late 2023. A new version of Dark Target will be released from the Atmosphere SIPS in the last quarter of 2022.

Diane noted that the TROPICS Pathfinder satellite continues to perform well and that the mission has been extended through October 2023. Current latency remains near 12-18 hours, but the TROPICS science team is pursuing options to reduce the latency through partnerships with NOAA and the Office of Naval Research. TROPICS data from the Science Team is being used by the National Hurricane Center and the UN Navy Joint Typhoon Warning Center. Despite the loss of 2 satellites due to launch failure, the remaining 4 satellites can still achieve a median revisit of 60 minutes. It is anticipated that the remaining satellites will be launched ahead of the 2023 hurricane season. If anyone is interested in becoming a TROPICS early adopter, they should contact Patrick Duran. Additional information can be found at
https://tropics.ll.mit.edu/CMS/tropics/latest-news-and-updates

Diane highlighted outreach undertaken with the EOSDIS communications team – these included social media posts, presenting at ICAP, taking part in the Global Flood Partnership meeting, and three Earthdata feature articles, announcing new data sets in FIRMS (HLS false color imagery, Landsat active fire data and real-time MODIS and VIIRS active fire data from SSEC).

Diane mentioned that one of the takeaways from training and meetings with other stakeholders is a request for a Spanish version of FIRMS. Miguel noted that the GEOSS portal, hosted by ESA, is available in 5 languages, and suggested an inquiry be made to ESA about leveraging their translation capability.
Miguel also pointed out that JPSS-2 (declared operational as NOAA-21) had just launched, and data is expected in 90 days. He urged the LANCE UWG members to advocate for NRT products and services from JPSS-2.

5.2   FIRMS Global and FIRMS US/Canada – **Brad Quayle**, USDA Forest Service

Brad provided an update on new active fire products, and legacy products being made with new technology. Brad began with the very successful integration of MODIS and VIIRS direct read-out data from several ground stations into "ultra-real-time" active fire products, produced by the SSEC at University of Wisconsin/Madison using NASA algorithms. The SSEC produces 5-10 second "micro granules" that are streamed in real-time from each of the ground stations. The data is processed to Level 2 within 25 seconds for MODIS, and 50 seconds for VIIRS, and available in FIRMS within a few minutes of satellite overpass.

Brad next briefed on a new near-real-time product available in FIRMS – Landsat Fire and Thermal Anomalies (LFTA) data. At the request of the Forest Service, USGS EROS has developed an optimized processing path to generate near-real-time Level 1 Terrain-corrected Operational Land Imagery (L1T OLI) products from Landsat-8 and 9. The data coverage is currently limited to the EROS Landsat ground station mask, but covers CONUS, southern Canada, and northern Mexico. The L1T OLI is available within 20 minutes of satellite overpass. EROS then uses a NASA algorithm to produce the 30-meter NRT active fire products, which are available from FIRMS within 25-30 minutes of satellite overpass. Brad presented contrasting false-color images of the Double Creek Fire in Oregon, generated from Terra MODIS, Harmonized Landsat-Sentinel (HLS), and Landsat-9 OLI. The Landsat-based images are more spatially explicit.

Brad then discussed progress that has been made with integrating active fire data from geostationary satellites (GOES 16/17, Himawari-8, and Meteosat 9/11) into FIRMS. The sensors on these platforms have different technical specifications and different fire detection algorithms. The NASA Applied Sciences Program supported development of a global harmonized active fire data stream from these three geostationary systems, with two primary outputs:
- NRT global blended product with temporal and spatial resolution of the sensors on each platform preserved (used by FIRMS)
- Hourly harmonized 0.25 deg. gridded product.

The satellite observations are made every 10 minutes for GOES and Himawari, and every 15 minutes for Meteosat. The NRT global geostationary active fire detection products are available from FIRMS within ~ 30 minutes of observation. There are challenges for use of these products, as data accuracy and reliability can be inconsistent, due to inherent issues with sensor characteristics, as well as observation conditions. Additionally, the operational algorithms are subject to revision. FIRMS users are advised the data are provisional/beta, and to use with caution. FIRMS has developed filtering thresholds for the harmonized data to reduce omission and commission errors as much as possible. For GOES FDC-HSC products, only classes 10/30 and 11/31 are used by FIRMS. For EUMETSAT and GOES FRP-PIXEL products, FIRMS only allows pixels with > 50% confidence.

Brad next provided an update on new Worldview Snapshot Subset capabilities for US and Canada. In order to help users consistently generate subsets of the same size, Worldview preloads Areas of interest (AOI) boundaries or extents for each of the US states, and Canadian provinces and territories. When a country and state/province/territory is selected, Worldview will automatically load the AOI coordinates. AOI extent can be increased by increments of 5%, up to 20%.

Brad concluded with a page of links to the FIRMS application, as well as websites that provide additional information resources, including a FIRMS Blog, which provides practical tips.

Miguel asked Brad for his opinion on whether the scope of applications for the low latency Landsat L1T feed could be expanded beyond fire detection. Brad said yes, it could be used for flood mapping, disaster response, etc. Miguel asked whether the data feed could be expanded beyond just the EROS ground station. Brad concurred that this would be beneficial, and for FIRMS Canada, they would like to get data from the Prince Albert and Gilbert Greek ground stations.

5.3   Worldview & Global Imagery Browse Services (GIBS) Updates related to LANCE - **Ryan Boller**, ESDIS

Ryan began with a brief overview of the GIBS – Worldview architecture. He then reported on NRT product updates since the previous UWG meeting, including GPM/GMI Precipitation Rate V7, and Brightness Temp V7 (which are NRT but not LANCE products). Ryan then moved on to tool enhancements, starting with progress on visualizing individual granules or swaths, a capability requested by the LANCE UWG. There has typically been overlap of swaths in the regions of the poles, limiting the user's ability to see the data from the previous swaths. The GIBS Worldview team has been addressing this to better support science users who monitor evolving events like fire, cloud, or volcanic activity. Since the last meeting, MODAPS and GIBS have established a pipeline of Suomi-NPP and NOAA-20 VIIRS granule imagery on a 14-day rolling window basis. This includes Corrective Reflectance True Color and two False Color products. Worldview has operationalized the granule user interface, and a Beta version is being tested by users. Next steps are to address Beta tester feedback, release the capability to the public, and enable download of granule imagery (links to the actual data are already provided). Ryan presented a demo of the new capability.

Ryan then responded to a comment from Day 1 of the UWG meeting, about the importance of being able to distinguish between No Data Observed or a zero value for the quantity being measured. Ryan pointed out there is a capability within Worldview that allows the user to toggle between the two cases, but it does depend on the product and how the data provider chooses to provide it. He showed examples of the capability.

Ryan then transitioned to updates on capabilities currently in progress. The first one concerns exposing layer metadata. For each layer that has NRT and Standard versions, GIBS serves the

"Best Available" but users don't know if they are seeing imagery from the NRT or standard product. Also, product versions transition over time. So, in the future, GIBS will identify if the image is from NRT or Standard, and also the Version number.

The next capability for which some progress has been made is Vector Flow Visualization. Ryan showed screen shots of some examples including a vector flow with particles dropped into the vector field, and MISR Cloud Motion Vectors. Mock-ups of the user interface to the output have been developed. They are also considering adding the capability to display a static vector field, if that's deemed useful.

The final new capability presented by Ryan was integration of the Planet (Labs) Basemap with Worldview. This was accomplished via NASA's Commercial Smallsat Data Acquisition Program (CSDAP). For this prototype, Planet Basemaps are available as global (landmasses between 74N – 60S), high resolution (up to 5m/pixel) true color reflectance products, using MODIS as a color target. The basemap mosaics are available Monthly and Quarterly, from January 2016 to the present. Per Ryan, the earlier images are not as high quality as the more recent years, as Planet had fewer and less well-calibrated satellites. Latency is ~ 7 days. Ryan showed examples that illustrated the quality and advantage of time-based basemaps vs. more static basemaps provided by some other sources.

Ryan concluded with a briefing on Worldview Metrics, which show a slight increase in uptake, particularly during the summer wildfires in Spain and France.

Miguel raised the issue of how GIBS/Worldview can deal with the ever-growing volume of data and corresponding storage requirements. Ryan agreed that this is a concern, and the team has been looking at approaches for dealing with this challenge. Ryan acknowledged that they will not be able to pre-generate and store everything in the future. The solution will most likely be generating the images dynamically. The key will be storing the data in a cloud-optimized format (e.g., COGG, Zarr) and only render on demand. This is the approach they have taken with HLS, and is described in Ryan's backup charts on "Dynamic Data Visualization". It is also expected to be the solution for very high-volume data sets as expected with SWOT and NISAR.

Crystal Schaaf asked Ryan how Quality Flags are handled. Ryan replied this would need to be addressed with each data provider. In the case of Flood Maps, there are toggles that turn individual flags on and off. Ryan offered to work with Crystal and the data providers to address this. In the future, this could be included in the Cloud-optimized data, and the user can request relevant flags when the Worldview imagery is created dynamically.

Miguel posed a question to the flood applications UWG representatives: could Worldview imagery help to fill in gaps to existing monitoring systems? Would SWOT Worldview imagery be useful as a substitute for ground-based observations? Maggi Glasscoe responded that they would need to receive the imagery in a format that could be readily ingested into the modeling system. Miguel acknowledged that the Worldview/GIBS team has been working with the future

large data volume missions like SWOT. He would like to have additional follow-up on how Worldview services will be adapted to these large volume missions.

5.4   Update on LANCE Flood Product – **Dan Slayback**, NASA/GSFC

Dan began by saying that the new Worldview granule capability will be very useful for advanced flood product users, and the Planet Basemap will also be helpful, but he did have a concern how users would perceive the differences between the high resolution of the Planet Basemaps vs the coarse resolution of the flood data products. Dan then provided updates on the Flood Product. To date, the product has only been provided via LANCE – there is no standard science product, so there is no long-term archive. Dan is working on getting the code to run on the operational system so historical data, needed for reference, will be available. He is also improving the pixel selection algorithm, and the team is generating a new "lite" intermediate product as a source to the final Level 3 product. These improvements will be back-ported to the NRT product.

The team is working on the application of the Height Above Nearest Drainage (HAND) mask. This is a topographic mask that will remove terrain and cloud-shadow false positives in areas that are unlikely to hold flood water because of the topography. He showed contrasting images of the 1-Day Flood product and the 2-Day Flood Product. In the example shown, there were many cloud shadow false positives on the 1-Day product; the 2-Day product had fewer false positives, due to the compositing process.   Application of the HAND mask will remove many of the false positives. Currently they do not put the 1-Day Flood Product on Worldview, but plan to do this once the HAND mask is implemented. The mask is based on the Copernicus 90-m global DEM product.

Another effort underway is incorporation of VIIRS into the Flood product. The results are comparable, though resolution is slightly lower than MODIS Aqua, but VIIRS will provide continuity. Currently evaluation of the water detection algorithm is complete and undergoing testing. Development of the Level 3 product code is in progress.

Dan then discussed the impact of the Terra retirement on the Flood product. This leaves only afternoon overpasses, which are typically cloudier. The compositing approach of the current product takes advantage of the twice daily MODIS observations, allowing clouds to move and a better chance to capture the surface. Only one observation per day will degrade the product. To demonstrate this, Dan reprocessed some of the data from the Pakistan September 2022 flooding event, using only Aqua PM inputs. Dan displayed a graph showing the comparison between only afternoon 2-Day and 3-Day results, and those with both Aqua and Terra MODIS. Aqua-only results showed significant degradation in total flood area identified, and continuity through cloudy periods. Dan offered 2 possible ways to compensate: (1) include VIIRS from both Suomi-NPP and NOAA-20 – potentially some improvement but as there is much less separation in overpass times, clouds may persist for both observations; or (2) the preferred

approach, pursue use of Sentinel-3 OLCI (AM overpass) as there are less clouds in the morning enabling a better 'look' at floods. Dan concluded with a time- lapse of the 10-year flood event in Pakistan that showed the quality of the product.

Miguel strongly concurred with the need for a historical archive of flood events that complements the near-real time flood products available via LANCE.

5.5   Update on MODIS and VIIRS – **Sadashiva Devadiga**, NASA/GSFC SSAI

Sadashiva presented status and updates on the MODIS and VIIRS instruments. There have been no new additions or changes to the MODIS or VIIRS product suites or processing algorithms since the last UWG meeting 6 months ago. The MODIS Level 1 Atmosphere and Land product suite is Collection 61 (C61). The VIIRS product suite is Collection 2 (C2) FOR Suomi-NPP, and C2.1 for NOAA-20. Suomi-NPP VIIRS Land product suites are still C1, but GIBS images have not been generated, except for active fire products.

Terra MODIS continued nominal operations after the successful completion of the Constellation Exit Maneuver (2 retrograde maneuvers, on October 12 and October 19). The cold focal planes returned to normal operating temperatures on October 23, and resumed normal processing, using the revised Look Up Table (LUT) delivered by the MODIS Characterization Support Team (MCST).

Sadashiva then provided an update on work in progress. NRT products from MODIS C61 Multi-Angle Implementation of Atmospheric Correction (MAIAC) are expected to be operational by the first quarter of next year. The Suomi-NPP and NOAA-20 VIIRS Land product suites are expected to transition to C2 by the end of this year or early next year. The VIIRS Land Suite is being generated using the cross-calibrated VIIRS L1B data, producing continuity with Aqua MODIS. C2 reprocessing of the VIIRS standard Land products is expected to reach the forward processing by early next year. Then the NRT products will be produced using the C2 software. The VIIRS 375m Land Surface Temperature product, (which came from ROSES 2000, A.33) is expected to be operational in NRT by the end of this year.

GIBS global browse products for the full suite of VIIRS Land products are planned to be operational in NRT after the transition of the standard products to C2. The VIIRS GIBS image suite will contain the same suite of images generated for heritage MODIS products. Granule browses are being generated from NRT2 (Corrected Reflectance (CR) product from Suomi-NPP and NOAA-20). They are undergoing testing with GIBS – the GIBS/Worldview team rolled out a beta version for testing.

MODAPS/NRT is currently participating in the testing of GIBS in the Cloud (GITC).

5.6   SMAP Mission – **Nga Chung**, JPL and **Mike Sutherland**, NSIDC

Nga provided a brief overview of the SMAP mission (which has been extended through September 2026) and the Science Data System (SDS) architecture. Applications uses for SMAP data include soil moisture monitoring, flood prediction, crop productivity assessment, weather forecasting, ice thickness monitoring, and linking water, energy and carbon cycles. Users include NOAA, REMSS, Canadian Government Shared Services, U.S. Air Force and Navy. The SDS began delivering NRT data products to NSIDC in late July, but the spacecraft went into a safe mode from August 2022 until October 6, 2022. Since then, the spacecraft has been healthy, and the SDS resumed delivery of NRT data to NSIDC, and imagery to GIBS. The NSIDC began distributing SMAP NRT data in late October. Future work includes coordinating imagery release with GIBS; configuring and testing the redundant NRT processing stream at the SDS; migration of NRT data processing to AWS; and documentation improvements at NSIDC.

Mike presented the user interface at NSIDC for the NRT Level 1 Brightness Temperature, and Level 2 Soil Moisture products. Users can get data interactively, or through automated interfaces. Currently there is only a primary SMAP data stream, which can be impacted by weekly maintenance downtime, but a redundant stream is being established and is expected to be operational by the end of the year. Karen will follow up with Nga regarding users that are still going directly to the SDS rather than LANCE at the NSIDC DAAC. They should be advised to go the NSIDC, as the EOSDIS Metrics system does not capture distribution from the SDS at JPL.

5.7   Sentinel-3 Pilot Study – **Karen Michael**, ESDIS Project, LANCE Manager, **Sadashiva Devadiga**, NASA/GSFC MODAPS, **Louis Giglio**, University of Maryland

Overview
Karen provided an overview of the Sentinel-3 Pilot study, which was recommended by Chris Justice (UMD) and Miguel Roman to mitigate the future loss of Terra MODIS data from the morning orbit. The study has multiple parts. The first effort is to evaluate the use of EUMETSAT's NRT Sentinel-3 Sea and Land Surface Temperature Radiometer (SLSTR) Fire Radiative Power (FRP) product in FIRMS. Another objective of the study is to generate Land Surface Reflectance (LSR) and Corrected Reflectance (CR) products from the Sentinel-3 SLSTR and Ocean and Land Color Instrument (OLCI) and evaluate their application in Worldview. The Sentinel 3 SLSTR and OLCI Top of the Atmosphere (ToA) products are acquired from the NASA Sentinel Gateway (NSG). Currently the NSG acquires and distributes the standard SLSTR ToA product, not the NRT product. The OLCI ToA NRT product is currently accessible from the NSG with a latency of 130 – 150 minutes. Existing MODIS algorithms are being updated to run with Sentinel-3 data. The imagery will be ingested by GIBS and evaluated for application in Worldview.

Sentinel-3 in FIRMS

Louis discussed the characteristics of the Sentinel 3A and B missions and, in particular, the SLSTR instrument, which is most relevant to active fire detection. The swath for the individual SLSTR instruments is narrower than MODIS (1420 km versus 2300 km), but because there are two satellites, there is actually more coverage. SLSTR has a conical scan, and an asymmetric swath that avoids sun glint. Like MODIS, SLSTR has 1 km fire bands. However, there are some quirks with respect to saturation that require workarounds – there is a need to switch to alternative bands to perform fire detection, and not all bands are co-registered. NRT and Non-Time Critical (NTC), or standard quality, fire products are provided by EUMETSAT and ESA, respectively. Both are being evaluated as part of the Pilot study. Louis summarized results of the study's initial evaluation. Each individual SLSTR instrument reports triple the number of fire pixels detected by MODIS. The SLSTR has higher sensitivity than MODIS, especially at night. This is due to the constrained pixel growth with the conical scan, and the wavelength (3.74 μm MWIR channel, versus 3.96 μm for MODIS). The longer wavelength in MODIS reduces contribution from reflected sunlight, which reduces the false alarm rate.

The algorithm used for the SLSTR active fire product is based on the MODIS algorithm, but is more aggressive, and detects more small fires at night. There are also significant differences in distribution of FRP which is the characterization aspect of the fire product.

Louis presented global maps depicting active fire pixels detected by MODIS, Sentinel-3A, and Sentinel 3B on September 2, 2022. Whereas MODIS reported 5,195 active fire pixels, Sentinel 3A reported 16,066 active fire pixels, and Sentinel 3B reported 17,593. Louis observed that the Sentinel-3 orbits are synchronized smartly, so the two complement each other, filling in the unviewed areas from the opposite sensor. He then showed graphs of FRP distribution for Sentinel 3 and MODIS. Quantities are proportional to the mass combustion rate, so it is extremely useful for emissions and other applications. The distributions for MODIS and the Sentinel sensors were quite different, e.g. the low FRP is missing on the MODIS graph. The SLSTR is picking up many more small fires than MODIS, but also has a higher rate of false alarm.

Louis provided initial evaluation findings on the SLSTR active fire data. The product distribution format is zip files – requiring extraction of multiple files within those; the data volume is 300 times greater than MODIS; and there are slight differences between the NRT and science quality products. Louis is confident FIRMS can work through these challenges. He also noted that they found instances in which L1B granules and Level 2 fire product granules were not synchronized, making it necessary in those cases to get multiple L1B granules to understand the inputs to the Level 2 granule. Per Louis, the key step will be to disentangle the sensor and algorithm differences from overpass-related differences.

Given that fires change quickly, the normal tolerance for validation reference data is $\pm$ 5 minutes from observation, although up to 15 minutes could still be useful. This is an important consideration given the Terra retirement timeline. Louis displayed a graph of the Terra timeline, if maximally extended, showing when the difference in overpass time between Terra and Sentinel-3 would reach an acceptable limit. Terra would need to be extended until at

least mid-2024 to reach the 15-minute maximum discrepancy. This would greatly facilitate the replacement of the Terra MODIS active fire product with the Sentinel-3 product.

Miguel stated that the UWG should go on record advocating the continued operation of Terra as the bridge to maintaining continuity for NRT data products. Not only would this allow complete evaluation of the Sentinel-3 as a replacement for Terra MODIS NRT products, but would also allow assessment of higher level products science quality products, like FRP. Brad Quale, USDA Fire Service, strongly concurred.

Sentinel-3 LSR and CR

Sadashiva discussed initial prototype efforts and evaluation of the Sentinel-3 LSR and CR products for providing continuity with Terra MODIS. He noted that as with MODIS, the CR does not do an aerosol retrieval. The LSR product includes aerosol correction. The first objective of this part of the study is to use the Sentinel-3 NRT CR to generate the MODIS heritage imagery for GIBS. The second objective is to process, test and evaluate the standard LSR sample data at the SIPS. When the NRT LSR data is available, they will do the same processing and analysis on the MODIS NRT system. They have been working on two PGEs: Corrected Reflectance-OLCI (CREFL-O) and CREFL-S (SLSTR). Sadashiva showed preliminary examples of CR and ToA reflectance imagery (RGB) from OLCI, generated with a prototype algorithm from Eric Vermote. The prototype SLSTR PGE is still under development, and will provide RG, NIR and 2 SWIR bands. Next steps will include completing the bands for OLCI, integrating the code with the MODIS heritage code, and then testing on the NRT system.

6   NASA Disasters Program Update – **Robert Emberson**, NASA/GSFC

Robert provided a briefing highlighting recent Disasters Program activities, specifically Land-use characterization focused on the conflict in Ukraine, led by Jean-Paul Vernier. The Disasters Program response used FIRMS data to produce maps showing active fires detected by VIIRS on NOAA-20 and Suomi-NPP, throughout Ukraine. Through the U.S. State Department, the data was provided to Ukraine to assist in assessing damage to structures, crops, etc. The maps displayed active fires on clear days in 2-week increments, from late July to mid-October. The declining number of fires over the period is probably due to the lower number of clear days in September, and cooler weather in October.

Jean-Paul created graphs of cumulative fire counts by month, for the period of February through October, years 2012 -2022. The graphs present fire counts for different land cover regions: Grass, Forest, Urban, Savannas, and Crop Lands. The graphs for the Kiev warzone showed a dramatic spike in Grass area fires beginning in March 2022, related to the conflict. In the Donbas warzone there were dramatic spikes in areas of Forest and Savannas, related to the conflict, whereas for the other types of Land cover, the graphs are generally similar across the years. Jean-Paul's analysis was only possible with the data from FIRMS. The Ukraine government planned to use the data to help assess damages resulting from the conflict.

Robert then discussed the Disasters Program's support to FEMA in response to Hurricane Ian. Per Robert, an enormous amount of data was provided, more than any other historical event supported by the Disasters Program. High resolution imagery from Planet Labs and other commercial data providers was used to fill in gaps in FEMA's imagery collection, particularly in the Orlando area. Robert displayed a damage proxy map identifying zones of heavy damage to buildings and other structures, prepared by the JPL ARIA team, using SAR data. A NASA MSFC team generated binary water mask areas using SAR data, covering the entire area of interest in Florida, using the UDA Crop Data Classification scheme. It allowed differentiation between known water, anomalous water, flooded wetlands, croplands, and potentially flooded developed areas. This provided a real level of nuance, not replicated by any other data sets.

Robert emphasized that Flood response is the most consistent requirement for the NASA Disasters Program. Many of the optical and SAR-based products used in flood assessment response require manual input, rescaling of tools, etc., which slows down response time. Robert proposed a collaboration with LANCE to address these limitations, suggesting a "FIRMS for Floods" would be very valuable.

7   NOAA Pathfinder Initiative – **Vanessa Escobar**, NOAA/NESDIS

Vanessa provided a briefing on the NOAA/NESDIS approach to User Engagement, and the role played by their Pathfinder Initiative. User Engagement is a formal practice at NESDIS, initially approached from a thematic level, i.e., a "mission agnostic" perspective. The NOAA "missions" are LEO, GEO, and Space Weather (SWO). Vanessa provided an overview of the framework implemented by NESDIS for User Engagement that ensures that response to user feedback, digested and implemented by NESDIS elements, results in feedback to the user on the impact of their inputs. A clear record of impact is maintained, with traceability to products, services and observation that benefited from the user engagement. Vanessa is co-chair of the User Engagement Council, which is an advisory body with representatives from all NESIS elements and liaisons to NOAA line offices. One of their goals is to ensure awareness across elements, to reduce redundancy in studies, etc. One of their functions is to coordinate the "Meet the User" Speaker Series. A quote from a Fire Chief at a Fire Workshop was "One of the most important and challenging parts of wildfire response is translating complex geospatial information into meaningful products for decision-makers".

Pathfinders are communities of practice, creating Use Cases and Value Chains of observations, products and services. These communities of practice help NOAA identify *impact*, in a way that the NOAA Chief Economist can monetize the impacts, tying dollars and resources to benefits of NOAA missions. These value chains help inform and prioritize mission instrument development decisions, product implementation and distribution decisions, tools and services. Currently, NOAA has six Value Chains in progress, identifying current observations/products, and looking for ways to improve the use and economic benefits of future products and services. The six

Value Chains are Fire, Air Quality, Coastal Tourism, Flight Safety, Hurricane Evacuation, and Viticulture. The process is somewhat analogous to NASA's Early Adopters. Pathfinders coming out of missions like TEMPO, PACE and GLIMR are looking to bridge future gaps to ensure long-term observations from NOAA. The NOAA User Engagement process is also gauging user readiness through the Pathfinders and has developed a readiness scale similar to technology readiness measures.

Vanessa provided an overview of the three most mature Pathfinders. With WIFIRE (supporting the California Wildfire Detection and Response team), they conducted tabletop exercises, substituting the existing GOES-17 data with an example of what GeoXO data would provide in terms of better spatial resolution, leading to faster response time and better allocation of resources. Another Pathfinder underway is addressing Maricopa Air Quality Awareness and Equity. The third Pathfinder is Florida Coastal Health and Tourism. They are investigating the use of remote sensing data to manage harmful algal blooms.

At the conclusion of Vanessa's presentation, Miguel raised the topic of nontraditional uses of Earth Science data. He particularly discussed use of night lights products, and a desire to get NOAA more engaged in that domain. There is a demonstrated capability to use the VIIRS night lights product for assessing energy security. Miguel asserted that there are federal partners that would benefit from this data, but don't have the capacity that NOAA and NASA have to develop the architecture. He gave an example of the USDA, which wants to investigate energy resilience in hurricane prone areas, because of the effect on rural farming communities. Per Miguel, there is a need and an instrument, but a lack of commitment to invest in Earth-at-night research to operations in general, and disaster resilience using Earth-at-night data. Steve Miller mentioned that there was a day-night band user workshop in June 2022 that brought attention to some uses for the data, such as power consumption, ship monitoring, and other areas, including feedback from National Weather Service forecasters, with an eye towards establishing new requirements for future NOAA missions. Vanessa observed that the potential benefits of VIIRS are still being distilled, and agreed that further discussion is needed.

8   Final comments

Miguel asked for final comments from the UWG. Steve Miller applauded LANCE for forward thinking and strategic planning and for pursuing the use of Sentinel-3. Miguel added that the best approach for ensuring continuity for Terra AM with Sentinel-3 is through LANCE. Brad Quayle stressed that while the Sentinel-3 active fire data for FIRMS is extremely important to the Forest Service, the Surface Reflectance is also a priority.

9   Actions and Recommendations

1. Colin Seftor to put together a LANCE enhancement request to continue the Aerosol Index (AI) product, generated from the OMPS sensor, for NOAA-20/21. This should include flow charts on how AI triggers more in-depth analysis and be submitted to the

LANCE managers prior to the next LANCE UWG meeting.

2. Arlindo da Silva to finalize a LANCE Enhancement Request to determine a NRT path to Assimilate Geostationary Aerosol Data which will also include the generation of concurrent GIBS imagery with aerosol properties for Worldview. This should be submitted to the LANCE managers prior to the next LANCE UWG meeting.

3. If interested in becoming a TROPICS early adopter, contact Patrick Duran patrick.t.duran@nasa.gov

4. Worldview / GIBS team to work with Crystal Schaaf on QA flags. Ryan to consider how this could be baked into COGS in the future and pulled out by users dynamically.

5. Nga Chung (JPL) to follow up with Karen on how the SDS users can be moved over to NSIDC so SMAP user metrics can be captured. This is ongoing.

10 List of Other Attendees

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