**Minutes of the Land and Atmosphere Near real-time Capability for EOS (LANCE)**

**User Working Group (UWG) Meeting**



**20 October 2015**

**Location GSFC Building 32 and WebEx**

**Date: November 16th 2015**



1. **LANCE UWG Members and Attendees**

Four members of the Land and Atmosphere Near real-time Capability for EOS **(**LANCE) User Working Group (UWG) were in attendance at Goddard Space Flight Centre (GSFC), eight members were on the webex (Table 1). Nickolay Krotkov and Mike Fromm were unable to attend due to prior commitments.

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| --- | --- | --- |
| **UWG Members** | **Affiliation** | **Email** |
| Chris Justice\* - Chair | University of Maryland | [justice@hermes.geog.umd.edu](mailto:justice@hermes.geog.umd.edu) |
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| Vanessa Escobar | NASA /GSFC (SMAP Early Adopters) | [vanessa.m.escobar@nasa.gov](mailto:vanessa.m.escobar@nasa.gov) |

Table 1: LANCE UWG Members or affiliates that attended the UWG on 20 October, 2015. \* UWG members attending in person.

* 1. **Other Attendees**

There were a number of additional attendees representing other members of the user community, representatives of the individual LANCE elements, NASA Headquarters (HQ) and NASA Earth Science Data and Information System (ESDIS) (see Appendix 1).

1. **Welcome and program perspective**

The purpose of the UWG is to review the status of LANCE, progress made on previous UWG recommendations and to identify and discuss potential enhancements and upgrades to the LANCE system as well as to provide recommendations for future efforts.

**Karen Michael (NASA GSFC, ESDIS, LANCE Manager)** welcomed everyone to the meeting. She provided a brief summary of how LANCE operates. The goal of LANCE is to provide near real-time (NRT) data products from Atmospheric Infrared Sounder (AIRS), Advanced Microwave Scanning Radiometer 2 (AMSR2), Microwave Limb Sounder (MLS), Moderate Resolution Imaging Spectroradiometer (MODIS) and Ozone Monitoring Instrument (OMI) within 3 hours of observation to meet the timely needs of applications users. NRT data from the Multi-angle Imaging SpectroRadiometer (MISR) is expected to be added to LANCE in early 2016. LANCE is a virtual system that leverages the existing Earth Observing System Data and Information System (EOSDIS) components with an umbrella set of requirements to ensure consistency, collaboration and coordination. In summary these requirements include the following:

* Implement redundancy to ensure operational availability
* Provide metadata to EOS Clearing House (ECHO)
* Provide metrics to the ESDIS Metrics System (EMS)
* Provide imagery to the Global Imagery Browse Services (GIBS)
* Require users to login via Earthdata
* Maintain a minimum 7-day rolling archive, and maximum of 14-days
* Provide user services and inform users of planned downtime
* Obtain the latest algorithms from the science team for incorporation into LANCE
* Work with the science team to compare NRT products to standard products and identify and document differences

**Chris Justice (University of Maryland, LANCE UWG Chair)** said the aim of the UWG is to provide a range of user perspectives in terms of LANCE functionality and that generally this works well. The distributed system has now grown beyond just the EOS instruments with the inclusion of AMSR2. In the past there has been a tight coupling of standard and NRT products but this is changing. For the first time NRT products have been made available ahead of the standard products, with the appropriate documentation.

Given that there is a real interest in near real-time NASA data for operational applications, the UWG needs to decide on a process for entraining applications products, that are not part of the Science Team effort, into LANCE; a topic for discussion during the meeting. Chris suggested that it might be time to re-consider the structure for supporting LANCE products. Recently NASA calls for instrument team participation have opened the door to applications proposals, including those that are associated with LANCE products. Funding for instrument teams is tight and if the Applied Sciences Program wants to see additional LANCE products or developments, then funding will need to be made available for this. The LANCE UWG can advise on what new developments should be implemented in LANCE but NASA management needs to provide guidance on how this will be resourced. He reminded everyone that membership of the UWG is on a rotation basis and thanked everyone for their service.

**Kevin Murphy (NASA HQ)** also thanked the UWG and LANCE elements for their input. From a NASA HQ perspective, the work of LANCE is highly valued. The current era is very rich terms of EO observations, and there are many potential opportunities for LANCE to grow. He re-iterated the importance of feedback from the UWG who represent LANCE users. He also added that now he is less engaged in LANCE, their feedback is even more important to him at NASA HQ and he is happy to be contacted by any LANCE UWG members.

**David Green (NASA HQ)** said that LANCE is critical to the applied sciences community and that the guidance provided by the UWG is important for a range of applications. In his introductory remarks, David commented on the Decadal Survey, the Disasters Management Program and mentioned the intent to hold a NASA-wide NRT workshop.

The Decadal Survey, now ten years old, has made a difference to how NASA operates; it has driven much of the ongoing applications work. The next Decadal Survey is set to come out in 2017 and the NRC has requested community white papers. The last Survey report focused largely on missions and what data are missing; this time the expectation is that the focus will be on science and applications, and include how data are used. This could point to a strong future role for LANCE. David would like to see key messages from the LANCE UWG being included in the Survey.

The NASA Applied Sciences Disaster Response Program has recently been established. This year NASA is standing up a disaster response team. Each NASA Center has a point of contact and a go-to-person to show others how to get data related to disasters. The program is still establishing partnerships and determining what resources are available. The Program will have tiers of disaster response to be activated using a structured approach. Arlindo da Silva asked about drills for disaster events. David said some NASA staff are already collaborating with the Federal Emergency Management Agency (FEMA) and other organizations to run exercises and drills and there will be resources to do tailored exercises.

David also mentioned the intent to hold a NASA wide NRT workshop focusing on data and partnerships. This was discussed in more detail later in the meeting.

1. **Discussion on entraining application products in to LANCE.**

David introduced this discussion. There are potential NRT products that users find useful, which could be considered for the LANCE portfolio. Guidelines need to be established to provide a mechanism for deciding which products should be added and how they should be supported. A document (Appendix 2) was circulated to all UWG participants prior to the meeting. Referring to the document he asked for comments.

* **NASA HQ Sponsorship** Chris Justice stated that the quality of products is the biggest issue and this is directly linked to NASA sponsorship. A proposer should be cognizant of end users, the benefits of NRT delivery and be willing to support the QA and maintenance of that product. Funding for the LANCE data processing and management component would still presumably come from ESDIS. He added that as instruments are often lasting beyond their design life, a commitment to long-term maintenance of the products is needed. It boils down to program needs, resources and commitment. Arlindo da Silva agreed that a longer-term financial commitment is needed; the ROSES calls provide a mechanism for applications to be developed and their use demonstrated, but for longer term uptake, there needs to be additional funding. Arlindo asked if it is something the Applied Sciences program could fund. David Green said that at present, the Applied Sciences Program does not have a budget to provide this type of support. He thought if the LANCE UWG establishes the criteria for selecting applications products then it would help target resources.
* **Retiring products** David noted that he wants to avoid the situation where products need to be kept for perpetuity. When new products are considered, a timeframe should also be set for reviewing products and their uptake. Kevin noted that to date, none of the LANCE products have ever been discontinued; the only time this has happened is when an instrument fails. Dawn Lowe noted that once a product is in LANCE then the cost of running it is marginal. Arlindo commented that it would be unlikely that the demand for a product would go away as once requested there is generally an operational demand for products.
* **Tiered approach** Kevin suggested we might want to consider a tiered approach whereby products could be considered “experimental” and a product might go up a tier with wider use, or down a tier if the product was not used.
* **Product Maintenance** Miguel commented that some products are easier to maintain and that part of the process should capture the level of effort needed to maintain a product. It was agreed that all products being considered should be mature enough to require only nominal maintenance.

It was generally agreed that getting NRT products in to LANCE is easier with continuity missions; it is much harder with new missions. Chris pointed out that the NRT capability from EOS took a long time to establish and happened when products were deemed mature and validated. The NRT capability for EOS was an ‘after thought’, based on demand. Dawn Lowe said this was a shame; LANCE has demonstrated that for a small additional investment, the impact can be substantial. David Green said that for the next 5 years, NRT is unlikely to be a major design consideration prior to mission launch.

The UWG concluded that in addition to establishing a formal process, direct line of funding would be required to support the entrainment of new applications products in to LANCE. It was agreed we should refine the document that was circulated (to include tiers, level of automation, level of maintenance effort and an option to consider some sunset clause).

Kevin and David will take an action to talk to Mike Freilich, Jack Kaye and Lawrence Friedl (HQ) as to how such funding might be considered.

Arlindo noted that when looking at product users, or product uptake, it is important to try and capture the downstream users that receive data through an intermediary or broker; for example the European Centre for Medium-Range Weather Forecasts (ECMWF) receive data from LANCE, but they have many downstream users that get the data.

In the context of entraining products into LANCE, the group considered the global flood product as an example; in terms of meeting these criteria, the flood product has a good user base but it does not yet have a publication that could be considered as peer-review documentation on the algorithm and product implementation. Miguel commented that in the recent South Carolina floods various flood products from GSFC were showcased and that moving forward we need to bring the user community together and decide what is the best product(s) suited for LANCE NRT implementation.

Ana Prados asked how LANCE captures information on who users are and what their requirements are. Dawn Lowe said data on users is captured through the EMS metrics and comments via the American Customer Satisfaction Index (ACSI) survey. Chris added that this is also the role of the LANCE UWG. Kevin mentioned that once requirements are formulated, the Decadal Survey provides a mechanism for considering how such requirements might be met.

1. **Decadal Survey**

As already mentioned, the next report is set to come out in 2017. The Decadal Survey was delayed to bring the National Oceanic and Atmospheric Administration (NOAA) and the United States Geological Survey (USGS) on board so that the survey will ultimately have a broader impact. Arlindo commented that he is involved in writing several papers and that each of these should have a NRT paragraph included.

Chris asked if the UWG wanted to co-write a short white paper. It was agreed this would be a good idea and that the paper should look at past successes for NRT and how future missions might support NRT capabilities as the norm. It was suggested the paper draw on existing papers e.g. the NRT paper done by Molly Brown et al. and on other papers that reference the use of NRT data. A draft should be circulated to the UWG for comments prior to submission.

1. **NRT workshop**

It was agreed a NASA-wide NRT workshop should be scheduled for late spring 2016, at a date that does not conflict with the upcoming Direct Readout Laboratory (DRL) workshop, which is scheduled for June 2016. The objectives need to be fleshed out. LANCE management will participate and take a role in helping with the organization.

* The meeting should have representation from the various Science Teams, Applied Sciences and Missions.
* The meeting should serve to bring all NRT providers together so they are aware of each other.
* The meeting should catalogue all NRT capabilities, including airborne and summarize distribution architectures.
* The definition of NRT should not be limited to 3 hours but extended to encompass any data with low latency as compared to NASA standard products.
* If anyone on the UWG wants to volunteer to help they should do so by the end of October. Kim Richardson said he has a vested interest in NRT, endorsed the idea of a NRT workshop and agreed to help steer the organization.
* Regarding the organization of the meeting, David suggested there were a couple of routes we could go down. One option is an E.2 proposal through NASA ROSES; with this option a university partner can apply to help organize the meeting. If costs are kept below $50K this would not have to go out to review.
* David suggested one possible output is to produce a technical paper that would reference how NRT data could be produced and distributed. He would like to see such a paper sent to Missions so they can review and consider it.

1. **Progress and Action Item Review**

**Diane Davies (GSFC/ESDIS, LANCE Operations Manager)** gave an overview of LANCE’s status, actions and accomplishments.

* EMS Metrics were shown for FY 2015 (AMSR2 metrics are not yet integrated). LANCE is operating well within its three-hour latency requirement. The number of registered LANCE users and continues to rise steadily. The number of files downloaded between FY2014 and 2015 increased but for the first time there was a decrease in the volume of data downloaded[[1]](#footnote-1), however some Level 2 and 3 data showed slight increase from FY14 to FY15.
* GIBS and Worldview download metrics (separate to EMS) continue to rise. When GIBS begins ingesting standard quality imagery, then it will be easier to distinguish between downloads of NRT and standard quality imagery.
* A spike in all NRT downloads over the 4th July weekend was triggered by social media. Large wildfires in British Columbia were the cause; on July 6 there were 185 active wildfires in Canada. Social Media sites were top entry referrers to LANCE, NRT, MODAPS, Worldview and Earthdata. Twitter and Facebook referred most traffic to the sites. Many of the other referrers were blog and news sites with links to NASA satellite images of southern British Columbia smoke from fires.
* Since the last meeting, LANCE management coordinated and contributed 2 book chapters for “Time Sensitive Remote Sensing” (Springer). This was published in May 2015 [DOI 10.1007/978-1-4939-2602-2]
* Chris said that to date LANCE has not done much strategic outreach, and asked if this is something the UWG recommends. LANCE is used in a fairly wide range of application areas and it was acknowledged that more outreach would lead to greater uptake. It decided that at least participating in one or two extra outreach meetings a year and coordinating with the NASA outreach programs, would be a good way forward. It was suggested LANCE be presented at the American Meteorological Society (AMS). MISR already has plans to present there next year.
* It was noted that NASA already has a fire hyperwall presentation but that this does not showcase LANCE. David mentioned that MSFC has a display that can connect to the Internet unlike the hyperwall.

1. **S-NPP Updates**

Liam Gumley sent his apologies for not being able to attend or send any alternative. Via email he said there is not too much to report at this time. The Atmosphere discipline of the Science Team still has some work to do on deciding exactly what products they will create operationally and of those, which would be appropriate for NRT production. 

* 1. **Karen Michael – update on S-NPP architecture**

For SNPP, NASA will be moving from the Interface Data Processing Segment (IDPS) Raw Data Record’s (RDR) to the EDOS provided Level 0 (L0) data. EDOS will be providing both time based and session based (NRT) L0 data. EDOS will provide the data captured at Svalbard as prime and Alaska as backup. The Joint Polar Satellite System (JPSS) program has a signed agreement now to provide data to ESDIS, via the JPSS Stored Mission Data (SMD) Hub in Block 2.0. The JPSS SMD hub will be implemented next year. The NASA Science Data Segment (SDS) is in the process of procuring boxes for the hub-to-hub transfer; it is expected these will be ready in early January. Once the transition occurs and we are getting data successfully from the HUB then we will decommission EDOS at Svalbard and Alaska for SNPP only. Transitioning to this architecture will put NASA in a better position to support JPSS-1 and JPSS-2 in the future. We expect this to improve the latency over getting the data from the IDPS.

* 1. **Ed Masuoka – update on VIIRS Land**
* Products are currently being made using the IDPS RDR, but will not be made available until the Algorithm Theoretical Basis Documents (ATBD)/User guides are approved. The processing chain will be updated to use the NASA L0 and L1B/Geo SDR
* VIIRS Surface Reflectance 375m and 750m products take on average 3.7 hours to produce
* Land Surface Reflectance (LSR) is expected to become operational in the Land SIPS in December 2015.
* VIIRS Corrected Reflectance (CR) and Active Fire (AF)(M-band) are currently running on NRT3 using IDPS RDR as input. Latency of CR is 3 hours and AF is 3.1 hours. NASA L1B will be used as input from December 2015. The plan is to start processing Active Fire using the I-band in NRT, as it has higher spatial resolution (375m) and to make this available in FIRMS. Arlindo said for the aerosol modeling community FRP is required; this is not available for the I-band product. Diane is to raise this with Louis Giglio and Wilfred Schroeder.
* Standard MODIS-like browse images are being produced for these products. Software to generate VIIRS CR images in GIBS format is still under development.
  1. **Colin Seftor – update on OMPS**
* At the last UWG meeting, Colin said he had an optimistic and pessimistic view of the timeline for getting OMPS products in to LANCE. The pessimistic view was correct and it will be winter 2015 before products are available in LANCE. The calibration of radiance/irradiance data (for L1B datasets) took longer to finalize than anticipated. It is expected that implementation of the following products into LANCE should begin within the next month: Ozone, Sulfer Dioxide (SOz) and Aerosol Index.
* There is not an Aerosol Optical Depth (AOD) product, as the Science Team was not funded to make it. An AOD product may still be made, but it is not a funded activity.
* The OMPS granule definition starts about 45 minutes in to the orbit and ends in the middle of the next orbit. To get the data there are various approaches but the favoured approach seems to be to produce 1 partial orbit from 1st session, then one full orbit with the 2nd session along with the next partial orbit. This approach should also meet the latency requirement but it requires more work and repeated processing.
* Ana Prados (UMBC) said that for many applications, NO2 is more sensitive than Ozone and she wanted to know if a VIIRS NO2 product is being produced. Colin suggested Ana check with Nic Krotkov about this. Kai Yang is funded to do NO2 for OMPS Nadir only

1. **Updates from the Elements**
   1. **AMSR2, Sherry Harisson, UAH**

Sherry gave an overview of the AMSR2 system, products that are currently available, and those planned. A screenshot of imagery from the AMSR2 RainOcean product was shown in GIBS / Worldview. The number of users has increased to 63 from 23 countries. Following the last UWG the AMSR element has been using the NRT data feed from JAXA and their latencies are well within the 3 hour requirement. AMSR2 is ready to start sending metrics to EMS. The AMSR2 SIPS plans to make their data available using NetCDF and Sherry asked the UWG if they had a preference on which format they should use: direct translation, which creates 2 separate data files (HDF-EOS and NetCDF) or augmentation, which adds NetCDF dimensions to HDF-EOS files. It was agreed they should go with direct translation and then see what users’ preference is between HDF and NetCDF.

* 1. **MISR, Pamela Rinsland (ASDC)**

The MISR team has continued to make steady process towards complying with the LANCE requirements. MISR NRT is considered a pathfinder for an ECS data provider to interact with LANCE and GIBS. There are two products, MISR winds and the L1 multi-angle ellipsoid and terrain. The latency of the NRT MISR winds is within 2.5 hours. MISR is providing metrics to EMS however EMS has requested that ECS change to support latency calculation based on GMT instead of local time. (This will impact the 3 ECS DAACs and all ECS providers to EMS). Revised PGEs to generate browse imagery for GIBS are in test at ASDC and the second hardware string is expected to be operational in late fall.

Under the guidance of Karen Michael, they have been investigating the possibility of distributing MISR data via the WMO Global Telecommunications System (GTS) for European distribution through NOAA contacts. This additional distribution channel was recommended at the June 2014 International Winds Working Group (IWWG) meeting in Copenhagen. The aim is to have this capability running in winter/spring pending NOAA readiness and full integration of MISR into LANCE.

* 1. **MODIS**
     1. Ed Masouka, Overview

C6 NRT products are being produced on NRT3 with the exception of the L3 Value-added Aerosol Optical Depth (Hyer) which is waiting on final delivery and the 16-day Rolling Bidirectional Reflectance Distribution Function (BRDF) (Schaaf), which is undergoing testing. The average product latency is less than 3 hours.

Ingest of active fire data from MODIS C6 and VIIRS is being implemented in FIRMS.

* + 1. BRDF update - Crystal Schaaf (UMBC)

The C6 version of MODIS BRDF/Albedo/NBAR for LANCE uses day 16 as the day of interest. Standard products use the center day. While timely, the product will return poor quality flags at the initiation of change. The BRDF product is one of the most popular among the Direct Broadcast community; they are already using the product, and even with the poor quality flags they are very happy with the product. The product will be useful for the aerosol community and is currently used for rangeland management in Australia, South Africa and the Western Unites States. Jeanne Behnke suggested we increase the help for our users to make sure they understand the quality flags.

* + 1. McDAODHD update - Edward Hyer (NRL)

MCDAOD Collection 6 will be delivered to LANCE in Fall 2015. A wide range of modeling groups use the product. The updates for C6 include:

* + New ‘distance to cloud’ field used for filtering and uncertainty estimation
  + Uncertainty model upgraded to include view geometry
  + Addition of ‘Deep Blue’ data
  + Revised surface albedo filtering
  + Code will have option for output at L2 resolution

Discussing use Edward said he thinks users want L2 products rather than gridded half-degree products. It was suggested that it would be good to look in to use and consider changing the format for C6. Arlindo asked if Ed is planning to use the daily BRDF product in his code. Ed agreed to get samples from Crystal to see how well it works. He would like to see the download metrics for this product.

Jeanne asked if LANCE should be looking at Climate and Forecast (CF) compliant metadata (ISO 1995). Ed Hyer said the aerosol modeling community does a lot of work with climate and CF compliance is important to this user group as it reduces the learning curve for that product. However CF compliant metadata is still a work in progress and the community needs to establish standards. It was agreed this should perhaps be considered for Collection 7.

* + 1. Spotlight on FIRMS – Diane Davies (ESDIS)

The Fire Information for Resource Management System (FIRMS), delivers MODIS hotspot / active fire data from LANCE to end users in easy to use and easy to download formats. Formats include: fire email alerts, text files, shape files, KML files (for Google Earth), WMS and data can be viewed and queried using an online mapping interface, Web Fire Mapper. FIRMS was developed at the University of Maryland with funds from NASA’s Applied Science Program and the United Nations Food and Agriculture Organization (FAO). It has users in over 100 countries and sends out over 1,200 email alerts a day. FIRMS has a lot of direct users but also a growing number of ‘brokers’ who add value to the data and re-distribute it to other end users. Diane cited long-term partners conservation international and the showed examples of use by the World Resources Institute (WRI) Global Forest Watch (GFW) Fire. GFW-Fire have a dynamic online forest monitoring and fire alert system for SE Asia; it provides NRT information that can empower people to better combat forest and land fires before they burn out of control. They also work with partners to identify where the smoke and haze originates and which forest or oil palm concessions have fires. Chris Justice added that he visited Indonesia this summer and was impressed to see how widely FIRMS data are being used across the region and included in the daily newspapers – in some cases people were being taken to court for burning illegally.

* 1. **AIRS and MLS - Feng Ding (GSFC)**

AIRS is operating well. Products include: AIRS L1B version 5 (VIS/NIR radiances, microwave brightness temps) and AIRS L2 version 6 (standard retrieval, cloud cleared radiances, support product). At the recent science team meeting plans were presented for AIRS version 7 including: netCDF4 format, parceled 4 products (core retrieval, minor gas, cloud property, cloud cleared radiance), and only higher vertical resolution product. The final schedule has not been determined (possibly late 2016).

MLS is also operating well. Products include L2 version 3 (Temperature, Water Vapor, O3, CO, HNO3, N20, SO2). Version 4 was recently released for standard products but the NRT version will not be ready until 2016.

Both AIRS and MLS imagery have been added to GIBS and there are plans to improve the AIRS image service in collaboration with the team at NASA’s Jet Propulsion Laboratory (JPL).

* 1. **OMI - Phil Durbin (GSFC)**

The OMI instrument and data processing are nominal. The row anomaly is still present but has been stable since September 2014.

LANCE OMI are updating the color palettes used in GIBS to be consistent with those produced by Goddard Earth Sciences Data and Information Services Center (GES DISC). There are plans to add web distribution of data products and a new product, Aerosols over Clouds, that was requested by Arlindo. The product should be released in the next 6 months and will be included in LANCE.

1. **Worldview / GIBS update – Ryan Boller**

Ryan provided an update on Worldview and GIBS; he gave examples of NRT imagery from GIBS being in the news, on social media and showed how NRT satellite imagery from GIBS can now be used in conjunction with real-time airborne mission data such as aircraft position and instrument status. He mentioned some of the product updates and then highlighted some upcoming plans including a re-design of how layers are handled, as the number of imagery layers has increased from 30 to over 100. Other longer term plans include the integration of the Earth Observatory Natural Event Tracker (EONET), plans for vector support and profile investigation. Arlindo expressed an interest in adding L4 simulated data in to Worldview. GPM data is included in GIBS and it was recommended that LANCE management to discuss whether GPM might consider joining LANCE

Ryan also noted that they plan to do a GIBS hyperwall presentation at AGU this year and that this will showcase some of the LANCE NRT data.

1. **Product Enhancement: VIIRS Day / Night Band Product Suite – Miguel Roman**

Miguel Roman asked the UWG to consider adding the VIIRS Day / Night Band (DNB) Product Suite to LANCE. A product enhancement request had been circulated to the UWG prior to the meeting. Miguel gave some background to the product and commented on how the data are being used. The success of the DNB band will depend on other existing science products. Miguel mentioned the Lunar BRDF product is not ready yet and may need additional resources. Miguel and his team have experienced problems validating DNB as there is no standard. Further refinements need to be done before the product is ready to be distributed to LANCE.

1. **SMAP Update, Vanessa Escobar, SMAP Applications Coordinator (NASA GSFC)**

Vanessa highlighted some of the SMAP (Soil Moisture Active Passive) Early Adopter (EA) applied research. Before the loss of the radar, the SMAP instrument managed to collect 10 weeks of Radar data. Early Adopters have been asked to communicate feedback on this existing radar dataset. Early Adopters as well as the extended user community is invited to exploit the use of the existing radar data. The SMAP mission applications program will be collecting feedback on the value of radar for science and applications. This feedback is enormously useful for the decal survey, thus early feedback on the use of radar is appreciated. This feedback will also be used by NASA HQ to discuss potential future Radar mission.

With the loss of radar, the SMAP Early Adopter (NOAA) project focused on the Ocean Surface Wind Vectors (OSWV) will be impacted and is currently not being developed. The use of radiometer for OSWV is being investigated. NOAA (SMAP EA) is in the process of evaluating the SMAP radiometer data to develop a hurricane wind speed product and will be updating the SMAP project over time. The LANCE WG will be updated accordingly. SMAP derived products from the mission EAs will be made available through the SMAP Applications Website in the near future. It is up to the instrument team to propose standard products. The UWG can then consider if any of these might be appropriate for NRT use. The conclusion of the UWG is that SMAP is still at early stage but not too early to start planning.

1. **The Potential for Oceans products in LANCE,** Sean Bailey, Ocean Biology Processing Group, NASA GSFC

Sean was asked to present on the potential for oceans products in LANCE, so the LANCE UWG could better understand what NRT products are already being produced and what are being planned for VIIRS. The Ocean Biology Processing Group (OBPG group), formally known as SeaWIFS and SIMBIOS, has been providing NRT data since 1998. NRT applications for oceans data include algal bloom detection, fisheries management and assimilation of sea surface temperature (SST) for weather modeling. As part of the VIIRS SIPS proposal, the OBPG is expected to provide data (presumably SST) to the PO.DAAC. Chris asked why move the NRT oceans to LANCE if they are currently working well and seemingly meeting current demand? Karen commented that they might get broader uptake through the enhanced search capabilities via the Earthdata Search Client and they might attract new users. Mark Trice (Maryland Department of Natural Resources) said they already use the SST products from NOAA’s Coast Watch. Ryan pointed out that NRT SST and chlorophyll are in Worldview even though they are not part of LANCE. NOAA and NASA SST products are currently the same but Sean thought eventually there will be a different product coming out of NASA. Sean said that without trying the latency of most OBPG products is approximately 2 hours. SST is slightly longer due to the processing order, but it could be shortened. The group concluded Oceans already have most of the requirements to be part of LANCE in place, and already meet the latency requirement, however it was not clear what the distinct advantage would be to bring NRT Oceans data into LANCE at this time.

1. **Wrap up**

**Chris Justice** wrapped up the meeting by saying that overall LANCE is doing well and has good visibility. LANCE seems to be coming to a turning point moving beyond EOS data; in the short term there will be data from SNPP and SMAP. He recommended that at the next UWG group we should ask the Science Team lead for SMAP to talk about possible SMAP NRT products. He also recommended that David look across the Applications program to see who can use / benefit from LANCE and bring them in to discussion. Justice summed up the action items from meeting. These are listed below.

* 1. Get process for getting application products in to LANCE refined and vetted (Action Diane to send to Chris for finalizing)
  2. Discuss the possibility of a LANCE budget from NASA HQ for applications products (Action David Green and Kevin Murphy to discuss with Mike Freilich, Jack Kaye and Lawrence Friedl (HQ)
  3. Prepare a white paper on the value of NRT data for the upcoming Decadal Survey (Action all – Diane to send around draft)
  4. LANCE will participate in, and help organize a NASA-wide NRT workshop in Spring 2016
  5. Outreach: work with NASA outreach, look in to hyper wall presentation. Attend 2 new meetings e.g. AMS. Consider a generic hyperwall LANCE demo, and consider working the Worldview and GIBS in their hyperwall presentation to highlight LANCE
  6. Add FRP for NRT VIIRS: Diane to feedback this requirement to Louis Giglio and Wilfrid Schroeder
  7. It is recommended AMSR2 Products are produced in both HDF and NetCDF format. In future, an assessment should be made of use and the UWG should consider only creating NetCDF format
  8. Provide Edward Hyer with EMS metrics on the MCDAODHD product
  9. LANCE management to discuss whether GPM might consider joining LANCE
  10. The next UWG will be on the back of the NASA-wide NRT workshop in Spring 2016.

**Appendix 1: List of Other Attendees**

|  |  |
| --- | --- |
| **Name** | **Representing** |
| Alfreda Hall | GSFC / ESDIS DAAC Engineer |
| Colin Seftor | GSFC / OMPS |
| Crystal Schaaf | UMBC / BRDF product |
| Dan Slayback | NASA / GSFC |
| David Green | NASA HQ |
| Dawn Lowe | GSFC / ESDIS |
| Diane Davies | ESDIS / LANCE Operations Manager |
| Drew Kittel | GSFC / ESDIS |
| Ed Hyer | NRL / MODAODHD product |
| Ed Masuoka | GSFC / MODIS Element / VIIRS |
| Feng Ding | GSFC / AIRS and MLS Elements |
| Gang Ye | GSFC / MODIS Element |
| James Williams | GSFC / ESDIS |
| Jeanne Behnke | GSFC / ESDIS |
| Jeff Schmaltz | GSFC / Worldview/GIBS/Rapid Response |
| John Kusterer | NASA / ASDC |
| Karen Michael | GSFC / ESDIS / LANCE Manager |
| Kelvin Brentzel | GSFC / Direct Readout lab |
| Kevin Meuller | NASA JPL / MISR |
| Kevin Murphy | NASA HQ |
| Lalit Wanchoo | GSFC / EMS |
| Mark Middlebusher | Naval Oceanographic Office |
| Miguel Roman | GSFC / VIIRS and DNB product suite |
| Pamela Rinsland | LaRC/ASDC/MISR NRT products |
| Phil Durbin | GSFC / OMI Element |
| Ross Bagwell | GSFC / Earthdata content |
| Ryan Boller | GSFC / Worldview/GIBS |
| Sarah Hemmings | NASA HQ/ USRA / Applied Sciences |
| Sean Bailey | GSFC / OBPG |
| Sherry Harrison | UAH / AMSR Element |
| Stephen Berrick | NASA HQ |
| Tiffany Mathews | NASA / ASDC |
| Tracy Zeiler | ESDIS |
| Zhousen Wang | GSFC / BRDF product |

**Appendix 2: Document circulated to UWG Members**

**Proposed model for getting new Applications Products into LANCE**

1. Existing mechanism for adding new products to LANCE

An incoming request for a product enhancement generally comes from a user, or a LANCE UWG member, representing a broader user community. If the request is considered feasible by the LANCE Element and LANCE Manager, then an Enhancement Request is be submitted to the UWG using the existing template. A sample template can be found in Appendix 1.

The UWG will assess the benefit of making the enhancement in terms of the potential benefits to the end user community. If the UWG approves, the request is then passed to ESDIS management who decide whether or not to fund the enhancement based on system costs and technical feasibility.

To date, most product enhancements have been a NRT version of a NASA Standard Science product. There have been 3 exceptions to this over the past 4 years: the MODIS/ Terra and Aqua NRT value-added Aerosol Optical Depth Product and the NRT Rolling Vegetation Indices and Surface Reflectance products. All three products were built on existing standard products and have been created to serve the needs of the applications communities.

1. Adding Applications Products to LANCE

In addition to NRT versions of standard products, LANCE management needs a process for determining which applications products should be added to LANCE. Products need to be mature, validated and documented so that users understand the strengths and limitations of an applications product and can easily find information about appropriate use.

The proposed approach for approving applied products should be very similar to the model for getting new Standard Science Team products into LANCE. As Science Team validation and ATBD documentation will be missing, suitable alternatives need to be found. This might vary slightly according to each product proposed but in general the enhancement request should contain the following:

* Benefit: Scientific objective and/or application objective achieved through the enhancement
* Product Documentation e.g. peer reviewed paper describing the product, the algorithm, the processing, the level of validation
* Effort: A summary of the effort, support required and source of funding
* NASA HQ or Science sponsor providing commitment to support QA and maintenance of the product within LANCE.
* Level of validation achieved (equivalent of CEOS Level 2 validation[[2]](#footnote-2))
* Endorsement of request from users
* Plan for maintaining the product[[3]](#footnote-3)

The applications product request should be submitted to the UWG for review. If the UWG approves the request, the recommendation goes to ESDIS. As with all enhancement requests, ESDIS management then has the final say as to whether or not the enhancement should be implemented in LANCE.

Application products maybe considered ‘provisional’ products and such products will need a review period to assess performance.

Once accepted, production-ready code should be delivered according to LANCE specifications and the product should go through an integration and testing phase prior and evaluation of the product by the proposer prior to distribution.

1. 105 TB less was downloaded from FY14 to FY15. Most of the decrease comes from the large volume Level 1 MODIS data. [↑](#footnote-ref-1)
2. Level 2 Validation from CEOS Working Group on Calibration and Validation (Land sub group) (http://lpvs.gsfc.nasa.gov/): Product accuracy is estimated over a significant set of locations and time periods by comparison with reference in situ or other suitable reference data. Spatial and temporal consistency of the product and consistency with similar products has been evaluated over globally representative locations and time periods. Results are published in the peer-reviewed literature. [↑](#footnote-ref-2)
3. Product maintenance would need to be done through NASA HQ or Science Team funding. It is estimated (ball-park) that the cost of maintaining a product approximately $30-40K per year (equivalent to 2 calendar months per year of a FT scientist inc. overhead). [↑](#footnote-ref-3)