Land and Atmosphere Near real-time Capability for EOS (LANCE)
User Working Group (UWG) Meeting

May 1st 2013
Location GSFC Building 32 and WebEx

Report Date: May 20th 2013

1. LANCE UWG Members and Attendees

There are fifteen members of the User Working Group (UWG) and eleven members, or their designated alternates, were in attendance / on the WebEx. Robert Brakenridge, Rama Nemani, James Verdin and Jose Harris did not attend.

Name	Affiliation	Alternate	Element of Interest
Chris Justice	University of Maryland		All Elements
Liam Gumley	University of Wisconsin/Madison		MODIS
Jeff Hawkins	Naval Research Lab	Kim Richardson	MODIS/AMSR-E
James Verdin	USGS		MODIS
Gary Jedlovec	NASA/MSFC/SPoRT		MODIS/AIRS/AMSRE
Rama Nemani	NASA/ARC		MODIS
Nickolay Krotkov	NASA/GSFC		OMI
Arlindo da Silva	NASA/GSFC		MODIS/AIRS
Mike Fromm	Naval Research Lab		MODIS
Robert Brakenridge	Dartmouth Flood Observatory		MODIS
Brad Quayle	Forest Service		MODIS
Jose Harris	DOD		MODIS
Justin Sherin	HIFLD	Tiffany Holland	MODIS
George Blaisdell	NSF		MODIS/AMSR-E
Mark Trice	Maryland/DNR		MODIS

1.1 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). These are listed in Annex 1.

2 Minutes

2.1 Welcome and program perspective

Chris Justice (UWG Chair) welcomed everyone to the meeting. He said that in his opinion LANCE is a great success; it is one of the most important things NASA has done in recent history for applied science and operational users for the distribution of data products. He mentioned that there continues to be a high level of interest in NASA LANCE from science and applications around the World. For example, data from LANCE were showcased at the G8 Open Data Meeting in DC this week, which emphasized the necessity for open data for societal benefit. Chris stressed the need to continue to do more outreach as there are still a lot of potential users who do not know about LANCE.

Martha Maiden provided the program perspective. She said LANCE is a flagship for NASA. NASA's administrator wants government data to be useful for the real world; LANCE is a good example of this. Looking forward we need to understand how we can do things for the next generation of satellites. NASA's senior review panel, currently underway, highlights latency as important for data users. Frank Lindsay, program scientist for LANCE, concurred with this.

2.2 Progress and Action Item Review

Diane Davies provided key LANCE metrics: Over 200 registered users downloading data each week. Of these 160 are unique; over 40 users download data from 2 or more instruments. In addition, in excess of 100,000 downloads each week from anonymous users accessing imagery through Rapid Response. This does not include downloads from Worldview or GIBS. There are over 4,000 unique FIRMS fire email alert subscriptions and FIRMS sends more than 14,000 fire email alerts per week. For FY 2012 LANCE distributed 16.02 TB per week, 2.1 times the 7.55 TB of data archived each week[1]. Over the past year there has been a steady increase in registered users downloading data from LANCE and increase in total volume and number of files distributed for NRT products.

LANCE is operating well within its 3-hour latency requirements. A graph of latencies for MODIS Terra for 2010 - 2012 highlighted how latencies have improved since 2010, particularly following the EDOS ground updates in March 2011. Data from Terra is usually available with a one-hour latency and data from Aqua in 1.5 hours.

Kevin Murphy (ESDIS) asked if UWG members are satisfied with the current latency for applications. Chris reminded the group at the UWG last year we were told it would be difficult to lower the latency significantly and that there would be diminished gains for further investment and commented that Direct Broadcast (DB) could be used if a 15-20 minute latency is required. Gary Jedlovic said for SPoRT they use both LANCE and DB and that for the MODIS products from LANCE 1.5 hour latency is acceptable.

Liam Gumley suggested looking at the geographic distribution of granules e.g. if the majority of downloads are granules covering North America, DB coverage could be used to further reduce latencies.

Action to LANCE: Analysis of granules downloaded by geographic location

Bruce McLemore (EDOS) said latencies for Terra are as good as can be but there were potentially reduced latencies to be gained from Aqua over the next 2 years if network connections are improved at Troll (in Antarctica). Testing is currently ongoing.

2.3 Updates from the elements

2.3.1 OMI

Phil Durbin (GSFC) presented slides for OMI. He said the instrument status is essentially unchanged over the past year; nominal performance with exception of an

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[1] This figure excludes AMSR-E

existing row anomaly[2], which has not deteriorated further. Updates include new versions of the retrieval algorithms for Clouds, Ozone, and SO2. The Aerosol algorithm is still to be updated. The agreement between standard and NRT products remains good; NRT produces are within a very small percentage of the standard products.

2.3.2   AIRS

Feng Ding (GES DISC) provided an update on AIRS and MLS. AIRS Version 5 and 6 algorithms are running in both systems for level 1 and 2 respectively. GES DISC is currently working on updating the science quality documents comparing NRT and standard products for version 6 algorithms. They expect the results to be similar to Version 5.

2.3.3   MLS

For MLS NRT Temperature and Ozone data is lower quality than standard products. AMSU channel 5 is not working well and channel 6 is starting to degrade. There are ongoing efforts to mitigate the effects of not having microwave data combined to AMSU.

Nickolay Krotkov (GSFC) said his group are looking at the AIRS vs OMI SO2 products and would report back on their findings.

2.3.4   MODIS

Karen Horrocks (MODAPS) provided an update on MODIS. Over the past year: the value-added MODIS aerosol optical depth product (MxDAODHD) has been added; browse image processing has been integrated with near real-time production; FIRMS was incorporated into the Earthdata web site and new data sets were added to the subset tiled data delivered to the flood watch team (including cloud top temperature and pressure).

Regarding Collection 6, the NRT component of Collection 6 will be implemented once the science algorithms have been integrated to MODAPS. Products will be added gradually to ensure sufficient hardware and CPU processing capacity to run C5 and C6 in parallel.

2.3.5   LANCE wide updates

Diane Davies said that of the 33 2012 UWG action items and recommendations, 29 were complete, 2 would not to be implemented and 2 were in progress. The decision not to map the applications matrix to the GEOSS SBAS was questioned and will be reconsidered. **Action to Frank Lindsay: work with Diane on mapping the LANCE applications matrix to the GEOSS SBA.**

The website was redesigned to fit with the rest of the NASA Earthdata site and to make it easier for new users coming to LANCE. Quick links are provided for users who want to go straight to the data download tables, to Rapid Response, FIRMS or Worldview. Based on recommendations from the last UWG an external data page was added providing links to NRT data from PO DAAC (Oceans), Direct Readout

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[2] the rows on one side of the instrument have an external blockage which results effects about 1/3 of the pixel

Laboratory, AMSR-2 and Suomi NPP. Suggestions were made to include links to international NRT data but there were concerns with upkeep and maintenance. Kevin suggested instead that a link should be included to the CEOS WGISS, who maintains that type of information. Links to science quality data and explanations on the difference between NRT and science products has been made more prominent. The hazards and disasters page now includes a page for each of the key application areas, providing a list of products that may potentially be of use for monitoring that particular hazard or application, as well as a Worldview permalink, showing an event with a brief description of that event from the Earth Observatory.

All user feedback is now handled through the User Support Tool. All feedback is ticketed and can be tracked in the tool.

2.3.6   Worldview and GIBS

Ryan Boller presented Worldview and GIBS. Ryan reminded the group the goal of these tools is to provide interactive, full resolution product viewing capability for EOSDIS products; LANCE NRT products are being used as a pathfinder for a more general capability, additional NRT products have been added to Worldview and GIBS; full resolution download capability has been added as well as color bars and legends. Michael Goodman commented on how useful Worldview had been in helping solve a query from NOAA.

Diane continued highlighting the use of GIBS in the AirNow-Tech Navigator application, which will be released mid-summer 2013. EPA and Sonoma Technologies approached LANCE over a year ago to figure out how to get the LANCE NRT imagery into their online interactive GIS tool, as it was the number one request they received from their users. AirNow-Tech Navigator provides air quality forecasters, managers, and analysts with a spatial analysis tool; it displays spatial plots of air quality data, surface weather conditions, and satellite data.

3   Enhancements

3.1   Enhancements for Approval by the UWG

Chris Justice and Kevin Murphy reminded the UWG that their role in considering enhancements is to consider the merits of a proposed product and determine whether there is sufficient demand from the applications community. Once recommended by the UWG, EOSDIS management will consider the enhancement request in terms of feasibility and cost.

3.1.1   NRT Rolling NDVI

Diane presented this enhancement request. The purpose is to generate and distribute a near real-time 8-day rolling NDVI product to support the dust modelling, weather forecasting and agricultural monitoring communities. The enhancement is supported by both agriculture and aerosol modelling and forecast communities. The UWG recommended this product be included in LANCE. **Action to LANCE / MODAPS: Move Rolling NDVI product enhancement to feasibility /cost study.**

3.1.2 NRT rolling BRDF Surface Albedo (Collection 6)

Diane presented the enhancement request. The purpose is to generate and distribute the (Collection 6) MODIS rolling surface albedo to support the worldwide air quality and atmospheric modeling communities. The UWG agreed to these enhancements.

Ed Masouka (MODAPS) outlined the large CPU requirements of producing this product in NRT and pointed out that a number of tests will need to be run to determine the cost/latency. Two options will be considered: i) NRT processing and ii) just standard processing with lower latency. It was explained that this was a 'high cost' product due to the large number of tiles (380+) that would need to be processed at a rate of about 58 minutes per tile in at least 2 streams to ensure latency requirements are met.

ESDIS should evaluate the cost, and MODAPS should run some trials to see how production will impact on existing systems. Endorsers should check the quality of the products. **Action MODAPS: Ed Masuoka to report back to group on feasibility, costs and latency.**

3.2 Potential Future Enhancements

Kevin prefaced this discussion by informing the UWG that the following 3 presentations were for information and initial discussion only – to let the UWG know that these are possible future products for LANCE.

Chris commented that at the outset of LANCE we were told that NASA was considering NRT capability for its future missions but initially we would focus on EOS data. He questioned whether products from MISR and LIS would be 'mission creep' or a managed expansion in the NRT capability. Martha Maiden said that it might be time to consider the E in LANCE to represent Earth Science rather than just EOS.

3.2.1 MISR NRT Winds

Pamela L. Rinsland (Atmospheric Science Data Center) presented the MISR NRT winds product. The original request for a 5-hour latency came from the winds community (there is currently a 10-12 hour latency). The proposed enhancement would use EDOS.

Chris asked what it would take for the standard science processing chain to reduce latency to 5 hours and asked about the condition of MISR considering it is a relatively old instrument. Veljko Jovanovic from JPL ensured the UWG that the instrument is working well.

Arlindo da Silva (GSFC) said that from a NRT science perspective there is a strong case for MISR NRT winds. ECMWF have tested NRT wind products from MISR with good impact on their models. At present MODIS is used. MISR would be a good complement.

Action to LANCE: Work with the MISR team to look at process, cost and latency and determine whether latency explore the latency of the standard products could meet the 5-hour requirement from the winds community.

3.2.2 Lightning Imaging Sensor

Michael Goodman presented. The purpose of the suggested enhancement is to generate lightning products from the Lightning Imaging Sensor (LIS) instrument on the Tropical Rainfall Measuring Mission (TRMM) satellite on a near-real time basis, display the products on the LANCE LIS web sites, and create browse for LANCE Worldview and GIBS. In addition to the existing LIS on TRMM, there are plans underway to fly the LIS flight spare for TRMM on the International Space Station (ISS). The ISS LIS will provide real time lightning data (one to three minutes latency) using the ISS Low Rate Telemetry channel. The ISS LIS will provide real time lightning for data sparse regions, especially over the ocean. The ISS LIS was approved for the International Space Station in mid-April 2013 with launch and operations in early 2016 aboard a SpaceX-10 launch vehicle. The LANCE ISS lightning product could also support Fire Weather assessment in the data sparce regions of the western United States. These data will be used for storm warnings, oceanic aviation safety and international Significant Meteorological (SIGMET) advisories, long-range lightning system validation, and hurricane rapid intensification evaluations.

Martha said this prototype could pave the way for future instruments and she had no objection to look at this specific case. It was suggested a workshop with the other capabilities (OBPG, PO.DAAC, TRMM) be organized to think about the future options for delivery of products in NRT.

Kim Richardson (NRL) said they would be very interested in LIS data if it were available in less than 3 hours.

Action to Michael Goodman / Kathryn Regner: Lightening Imaging Sensor NRT proposal to be further developed in terms of user community precipitation.

3.2.3 AMSR2

Michael Goodman presented an update on AMSR2 and asked the UWG to consider adding AMSR2 products to LANCE to ensure the continuity of a research-quality and self-consistent record of a variety of global datasets that the climate research community has relied upon from AMSR-E. The approach would be to set up ingest of Level-1 data from GSFC Precipitation Processing System, work with AMSR2 U.S. Science Team to update AMSR-E processing automation for the AMSR2 instrument, integrate applicable AMSR2 science algorithms into LANCE.

Action AMSR2 and LANCE: It was agreed the proposal should be developed and that this should be included in the workshop being proposed.

4 NSF and the Use of NRT data

George Blaisdell (NSF) provided an overview of how NSF uses historical AMSR-E and NRT data to determine when to send supply ships to and from McMurdo station in Antarctica. They need to select a time for passage when open corridors exist. Satellite imagery is helpful for narrowing this window.

There were some questions about which data are used now that AMSR-E is not functioning. Diane is to meet with George to look at alternative data sources.

5 Discussion on HTTP distribution of LANCE

Kevin Murphy asked the UWG what they thought of a proposal to transition the distribution of data from FTP to HTTP. The advantages would be: HTTP is more secure; with HTTP it is possible to have a virtual combined data directory structure, single sign in (not supported by FTP). He added that in the future there would be web services that would not be supported by FTP.

There was a general consensus that users with FTP scripts would not want to make the change. The advantage of not moving to HTTP would be that users do not have to change anything and developers do not have to change the back end. Ed Masouka suggested SFTP be considered from a security standpoint. Gary Jedlovic (SPoRT) said that at SPoRT they were transitioning to HTTP and they could see the advantages.

Action LANCE Elements: To consider the level of effort in transitioning from FTP to HTTP

6 Discussion: Approving products for application science

Chris asked the UWG to consider how applications products can be considered mature enough to be included in LANCE with particular regard to long-term algorithm support. There is currently a good process for approving products; however there is no distinction between science and applied science products. In the past there has been a dependency on science products; leveraging the significant investment and technical expertise provided by science teams. Applied science products do not have the same structure in place. For example if a product was endorsed from a 3 year applied sciences project, who would provide the continued technical support, and technical/applied science oversight once the project was completed? Kevin suggested that when a product is endorsed by LANCE, the endorser should continue provide some technical backstopping even if the project ends. Frank Lindsay said these tools exist but need to be developed. Chris suggested the process be reviewed and general guidelines developed for how this should be done. Frank agreed to work with the applied science program to make a better connection between products, solicitations and standard application products towards developing a set of practices.

Action to Frank Lindsay: Work with Applied Sciences group and bring up the topic at the Applied Sciences Review meeting, with a view to getting feedback and offer guidance on how applied science product maintenance could be done.

7 Discussion: NPP LANCE

Chris chaired the discussion on NPP. The LANCE – EOS capability has been developed and is stable. One of the roles of the UWG is " Identifying the possible evolution of the LANCE system on a 1-2 year timeframe".

S-NPP instruments have undergone preliminary evaluation and data are being distributed with products in various levels of maturity. Given the dominance of MODIS data downloads in LANCE there is considerable interest in establishing a LANCE capability for NPP VIIRS. The Applied Sciences Advisory Group and the

Land Group of the NASA VIIRS Science Team have both recommended a LANCE capability for VIIRS for NASA Science and Applied Sciences users. Members of the LANCE UWG have also recommended a VIIRS LANCE capability but no formal request has been made so far. The question is do we need a VIIRS NRT capability when we have an Aqua capability in place? It was agreed that we need an overlap of data from Aqua and NPP to enable product continuity to be evaluated and established.

Chris added that demand for NRT from other NPP instruments may be forthcoming e.g. OMPS, CrIS adding that the extension products would have to be evaluated individually to see if they are mature enough.

Nickolay said there is a demand for NRT OMPS data. Gary said SPoRT produces VIIRS data similar to existing MODIS data for the operational weather community. Gary said CRiS products would also be useful to ensure continuity. Arlindo suggested that Fire and Aerosol products are added to the list of products and Chris said that as a user of data he would also like to see the vegetation index products added. Nick added that SO2 and Aerosol index from OMPS specifically would be useful.

Martha suggested the Applied Science Program should help advocate and suggest that S-NPP products are added to LANCE. She said everyone was poised to establish continuity from MODIS to VIIRS but said Diane Wickland still considers VIIRS beta. She said it was fine to make recommendations but reminded the group that the available VIIRS products are labeled as for evaluation and not standard products. She acknowledged however that there is a groundswell for making these data available.

Action to LANCE UWG: Advocate for useful products from S-NPP including Fire, Aerosol, Vegetation Indices products and OMPS - SO2, Aerosol index.

8   Wrap-up

Wrapping up, Chris said LANCE is a very successful initiative. Follow up and outreach should continue as there is a broad need for open NRT data. He summarized the action items as follows:

8.1   Analyze geographic location of downloaded granules with a view to determining whether Direct Broadcast could be used to further reduce latencies. **Action: LANCE**

8.2   Report back ongoing efforts that could further reduce latency on Aqua and other instruments if network connections at Troll are improved. **Action: Bruce McLemore (EDOS)**

8.3   Revisit the mapping of LANCE capabilities to GEOSS Societal Benefit Areas **Action: Frank Lindsey to work with Diane Davies**

8.4   Future Worldview presentations at LANCE UWG meetings should focus on LANCE specific activities. **Action: Ryan Boller**

8.5   Hold a NRT workshop with other groups (P.O. DAAC, OBPG, PPS etc) to review NASA NRT architecture, best practices and develop strategy for moving

forward. **Action to develop a date / venue / attendees / agenda: Frank, Martha, Kevin and Chris.**

8.6   UWG Approved the Rolling NDVI product proposal. **Action to LANCE / MODAPS: Move Rolling NDVI product enhancement to feasibility /cost /impact study.**

8.7   UWG Approved the Rolling Albedo product proposal. **Action to Ed Masouka: to report back on cost /latency.**

8.8   Work with the MISR team to look at process, cost and latency and determine whether latency explore the latency of the standard products could meet the 5-hour requirement from the winds community. **Action to: LANCE to work with the JPL MISR Team.**

8.9   Lightening Imaging Sensor NRT proposal to be further developed in terms of user community participation. **Action to: Michael Goodman / Kathryn Regner, NASA MSFC**

8.10   Develop a proposal for AMSR2 (measurement continuity), to feed off GSFC PPS (Precipitation Processing Ssytem) and include it at the NRT workshop being proposed. **Action to: LANCE and Michael Goodman / Kathryn Regner, NASA MSFC**

8.11   Improve understanding of general data availability for Antarctic Sea Ice. **Action to: Diane to contact George Blaisdell NSF to identify potential additional data sites.**

8.12   Consider level of effort to transition LANCE Elements from FTP to HTTP **Action to: LANCE Elements**.

8.13   Work with Applied Sciences group to discuss how Applied Science-endorsed products might be better supported in LANCE. The aim is to make a better connection between products, solicitations and standard application products towards developing a set of practices. Feedback from applied scientists should offer guidance on how this could be done. **Action to: Frank Lindsay.**

8.14 Advocate for useful products from S-NPP including Fire, Aerosol, Vegetation Indices products and OMPS - SO2, Aerosol index. A recommendation to NASA HQ that an NPP-NRT type capability be developed building on the success of LANCE. **Action to: Chris Justice to Lawrence Friedl, Diane Wickland and Martha Maiden.**

Annex 1: Other UWG Attendees

Name	Affiliation	Representing
Martha Maiden	NASA HQ	HQ
Stephen Berrick	NASA HQ	HQ
Michael Goodman	MSFC	LIS, AMSR-E
Jeanne Behnke	GSFC	ESDIS
Kevin Murphy	GSFC	ESDIS
Ryan Boller	GSFC	ESDIS
Feng Diing	GSFC	GES DISC
Ed Masuoka	GSFC	LANCE MODIS
Gang Ye	GSFC	LANCE MODIS
Karen Horrocks	GSFC	LANCE MODIS
Jeff Schmaltz	GSFC	ESDIS / LANCE
Kelvin Brentzel	GSFC	DRL
Kathryn Regner	UAH	LANCE AMSR-E
Sherry Harrison	UAH	LANCE AMSR-E
Diane Davies	UMD	ESDIS / LANCE
Minnie Wong	GSFC	EDOS
Ross Bagwell	GSFC	EDOS
Phil Durban	GSFC	LANCE OMI
Terri Wood	GSFC	EDOS
Bruce McLemore	GSFC	EDOS
Ed Sofinouski	GSFC	EDOS
Terri Wood	GSFC	EDOS
Bruce McLemore	GSFC	EDOS
Pamela Rinsland	ASDC	MISR
Velijko Jovanovic	JPL	MISR
Kevin Mueller	JPL	MISR
Anand Swaroop	Sigma Space	