Expanding NASA’s Land, Atmosphere Near Real-time Capability for EOS (LANCE)

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Abstract

NASA’s Land, Atmosphere Near real-time Capability for EOS (LANCE) is a virtual system that provides near real-time data and imagery to meet the needs of scientists and application users interested in monitoring a wide variety of natural and man-made phenomena in near real-time. Over the last year: near real-time data and imagery from MOPITT, MISR, OMI and VIIRS (Land and Atmosphere) have been added; the Fire Information for Resource Management System (FIRMS) has been updated and LANCE has begun the process of integrating the Global NRT flood and Black Marble products. In addition, following the AMSU-A2 instrument anomaly in September 2016, AIRS-only products have replaced the NRT level 2 AIRS+AMSU products. This presentation provides a brief overview of LANCE, describes the new products that are recently available and contains a preview of what to expect in LANCE over the coming year. For more information visit: https://earthdata.nasa.gov/lance

LANCE Near Real-Time Products

Table 1: LANCE NRT Products

<table>
<thead>
<tr>
<th>Instrument</th>
<th>Platform</th>
<th>Product Categories</th>
<th>Average Latency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Atmosphere Infrared Sounder (AIRS)</td>
<td>Terra</td>
<td>Radiative, Temperature, Water Vapor, Ozone, Aerosol, Clouds, Dust, and Aerosol Time Series</td>
<td>79-142 minutes</td>
</tr>
<tr>
<td>Advanced Microwave Sounding Unit (AMSU)</td>
<td>Earth Observation System (EOS)</td>
<td>Real-time Precipitation, Snow, Land/Sea Ice, Sea Surface Temperature, Precipitable Water, Total Water Vapor, Clouds, and Cloud Top Temperature</td>
<td>75-150 minutes</td>
</tr>
<tr>
<td>Multi-angle Imaging SpectroRadiometer (MISR)</td>
<td>Terra</td>
<td>Cloud motion vectors (CMVs), Radiance</td>
<td>90-120 minutes</td>
</tr>
<tr>
<td>Moderate Resolution Imaging Spectroradiometer (MODIS)</td>
<td>Terra</td>
<td>Ozone, Temperature, Cloud Properties, Sea IceExtent, Sea Surface Temperature</td>
<td>75-140 minutes</td>
</tr>
<tr>
<td>Visible Infrared Imaging Radiometer Suite (VIIRS)</td>
<td>Terra, NPP</td>
<td>Sea Ice, Sea Surface Temperature, Clouds, Aerosol, Sunlight, Ocean Color</td>
<td>60-120 minutes</td>
</tr>
</tbody>
</table>

New Products in NASA LANCE

MOPITT

Global carbon monoxide (CO) data from the MOPITT (see table 1) are the newest near real-time products available through LANCE. Global CO concentrations vary through activities such as seasonal agricultural burning as well as from natural events such as wildfires and volcanic emissions. Higher atmospheric CO concentrations can increase levels of ground-based ozone and affect oxygen transport in the blood which can lead to health problems, so these data provide a vital resource for forecasting air quality and atmospheric chemistry.

MISR

NRT imagery from MISR (see table 1) is now available through the Global Imagery Browse Services (GIBS) and Videoweb. The imagery are available for the nadir, four and four ault views provided by MISR’s nine cameras. That’s looking at the earth from 9 different angles in two band combinations - a total of 38 imagery products! The NRT MISR data have been available for over a year in LANCE.

OMPS

Data from the OMPS (see table 1) will be available through LANCE in 2017. The specific products are: Total Column Ozone and Aerosol Index (NOMI3), Sulfur Dioxide (OMSIO2) and Ozone Profile (NPSO/D3-12). All three products will provide continuity from OMI.

FIRMS

The Fire Information for Resource Management System (FIRMS) is being updated. FIRMS distributes global active fire data, in easy to use formats, from VIIRS (375m) and MODIS (1km). The data are available as SHP, TXT and KML as well as via an email alert service, web services and a web mapping interface. The updated version of FIRMS just released in beta is available for testing and feedback on https://firms2.modaps.eosdis.nasa.gov/. Additional features will be added in 2018.

What is in the pipeline?

Over the coming year users can expect to see the following products added to LANCE:

- Lightning Imaging Sensor (LIS) products
- Additional NRT products from VIIRS (land and atmosphere)
- FIRMS products
- Global Flood Products

Global Flood Products

NASA’s Global Flood Mapping System, located at NASA Goddard Space Flight Center since 2010, is being transitioned to LANCE. Numerous organizations use the flooding mapping data to respond to on-going flooding, including the World Food Program, GeoSurf, MapAction, the Federal Emergency Management Agency (FEMA) and the International Red Cross. The surface water extent and flood maps are expected to be available in LANCE in Spring 2018 and will ensure continued service to stakeholders, facilitate processing of the entire MODIS archive, and achieve greater scientific use of the data.

Black Marble

The VIIRS Black Marble, or nighttime light images, captures low emissions from a number of sources including city lights, lightning, fishing-boat navigation lights, gas flares, lava flows and even auroras. In the wake of Hurricane Maria, Miguel Roman (NASA GSFC) and NASA’s Short-term Prediction Research and Transition Center (SPoRT) produced hand-crafted Black Marble products to highlight power outages. Groups such as the National Guard and the Federal Emergency Management Agency used these products to help prioritize where to deploy resources. An automated NRT version of the product is expected to be available in LANCE by the end of 2017.

Lightning Imaging Sensor (LIS)

In February 2017 the US was placed on the International Space Station (ISS) for a two – four year mission. Data from the LIS will be made available from LANCE with a 2 minute latency using the ISS Low Rate Telemetry channel. The ISS LIS was originally built as the flight spare for NASA’s EOS Tropical Rainfall Measuring Mission (TRMM) satellite. The data will be used by a number of NOAA operational partners, including the NWSS Pacific Region, NWS Ocean Prediction Center, the NWS Aviation Weather Center, and the NOAA National Hurricane Center.

Science vs. NRT Data

In order to generate data products within 3 hours of observation time, a number of changes have been made to the standard processing approach to expedite the availability of input data sets. Characterizations of the differences between science and near real-time products reveal some minor differences, but overall the agreement is high. More information on the differences can be found at https://earthdata.nasa.gov/earth-observation-data/near-real-time/near-real-time-versus-standard-products

Accessing LANCE Data and Imagery

For more information and links to data: https://earthdata.nasa.gov/lance

Earthdata Search: https://search.earthdata.nasa.gov

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

Global Imagery Browse Services: https://earthdata.nasa.gov/gibs

For Active Fire data: FIRMS: https://earthdata.nasa.gov/firms

Contact: support@earthdata.nasa.gov