EO 4 Ecosystem Accounting 2022

Applications of NASA's LANCE Earth Observations for Ecosystem Assessments

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Outline

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➢ NASA Earth Science Applied Sciences Program

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NASA's Land, Atmosphere Near Real-time Capability for Earth Observing Systems (LANCE)

LANCE (https://earthdata.nasa.gov/lance) supports users interested in monitoring a wide variety of natural and man-made phenomena using near real-time (NRT) data products that are made available much quicker than routine processing allows.

LANCE provides more than 170 data products from 11 instruments including AIRS, AMSR2, ICESat-2, LIS, MISR, MLS, MODIS, MOPITT, OMI, OMPS and VIIRS.

LANCE is managed by NASA's Earth Science Data and Information System (ESDIS) but steered by a User Working Group (UWG) responsible for providing guidance and recommendations concerning a broad range of topics related to the LANCE system, capabilities, and services.

The UWG meets at least once a year to ensure that LANCE capabilities are aligned with the NRT community needs.

The UWG is chaired by Dr. Miguel Roman, Leidos.

LANCE: NASA Near Real-Time Data and Imagery

NASA's Land, Atmosphere Near real-time Capability for EOS (LANCE) supports users interested in monitoring a wide variety of natural and human-created phenomena using near real-time (NRT) data and imagery that are made available much quicker than routine processing allows.

Find Data

Most data products are available within three hours from satellite observation. Imagery are generally available 3-5 hours after observation. If latency is not a primary concern, users are encouraged to use the standard science products, which are created using the best available ancillary, calibration and ephemeris information.

Discover NRT Data and Imagery

More

About LANCE

What is Data Latency?

Near Real-Time versus Standard Products

10 LANCE milestones over the past decade

NASA Earth Science Applied Sciences Program

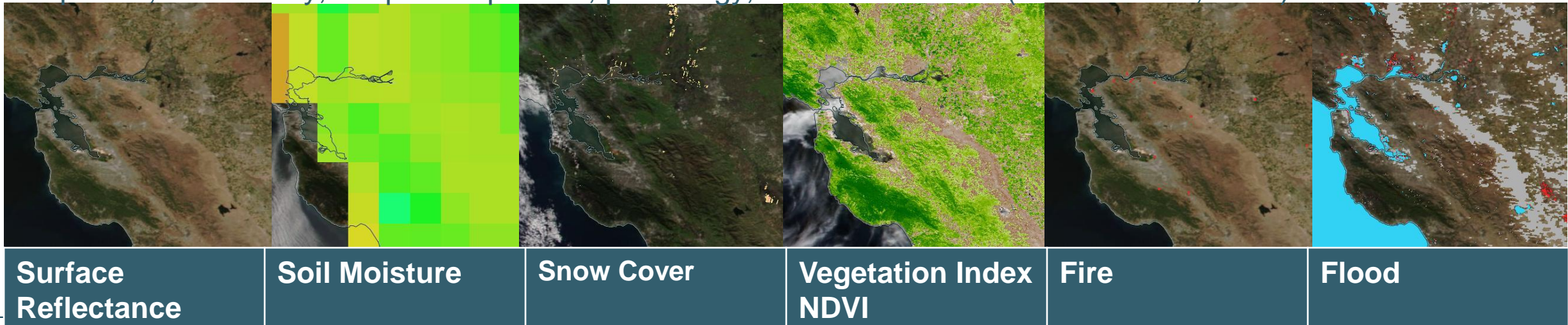| CAPACITY BUILDING	DISASTERS	HEALTH & AIR QUALITY	WATER RESOURCES	AGRICULTURE	ECOLOGICAL FORECASTING	WILDLAND FIRE
Our skill-building initiatives empower people around the world to solve local challenges using Earth observations and remote sensing technologies.	Resilience. Response. Recovery. When disaster strikes, our team provides decision-makers, communities and governments with life-saving Earth observations.	We use Earth-observing data to inform air quality standards and support solutions for public health initiatives — all to strengthen our communities' well-being.	Water is one of our most invaluable resources. We help monitor the demand, supply and quality of water around the world and the development of tools to promote conservation.	From individual farmers to global food chains, we help optimize decision-making about food availability and access through Earth-observing data.	To protect our natural land, marine and freshwater resources, we promote the use of Earth observations in conservation, sustainability and resource management.	Fire is an essential process for many ecosystems, but uncontrolled fire can be disastrous to anything in their path. We leverage Earth-observing data, applied research, and partnerships to reduce risk before, during, and after a fire.

NASA Earth Science Applied Sciences Website: https://appliedsciences.nasa.gov/

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Applications of LANCE Earth Observations for Ecosystem Assessments

➢ LANCE data can support the SEEA-EA framework by both facilitating the creation of ecosystem spatial extent and condition accounts, as well as quantifying and mapping of ecosystem services, much more quickly than routine data processing allows.

➢ During the past 13 years, LANCE near real-time satellite data products (e.g., surface reflectance, albedo, vegetation height, thermal anomalies, soil moisture, snow cover etc.) have been used to produce ecosystem-related indicators such as vegetation indexes, biomass, land cover maps, fire, and flood products. LANCE provides global continuous, high-quality and spatially explicit biophysical and environmental variables which can inform ecosystem assessments. These information is useful to map and monitor vegetation condition, species, biodiversity, evapotranspiration, phenology, disturbance et al. (Andrew et al., 2014).

| Surface Reflectance | Soil Moisture | Snow Cover | Vegetation Index NDVI | Fire | Flood |

EO Challenges, Opportunities and Recommendations

- ➢ **What are key challenges and opportunities of Earth Observation applications?**

  - • <u>Challenges</u>: 1) Analysis-ready data products from EO in user-friendly data formats, especially for applied users with no experience or training using EO products. 2) Low-quality information overload is an issue. For example, terabytes cloudy optical images don't help anyone in fire, flood or land use applications.

  - • <u>Opportunities</u>: 1) Integrating EO products into existing ecosystem models and tools will advance the assessment of ecosystem. 2) Machine learning may enable the use of big data from EO and assist applying ecosystem models. 3) NASA data are all open and free, which enables large scale mapping and monitoring ecosystem services and accounting with relatively low cost, especially in remote, rugged areas.

- ➢ **Do you see limitations for certain Ecosystem Services in using EO methods for their assessment?**

  - • Spatial coverage and refined spatial resolution is critical especially in local scale.

  - • The finer the temporal resolution, the information from EO is more valuable. Latency is important for many applications.

  - • Validation is essential for using EO products. However, ground measurements maybe don't exist or difficult to collect.

- ➢ **Where do you see promising developments and trends in EO applications for ES assessments?**

  - • The massive expansion in applied uses of EO will continue to support ecosystem assessments.

  - • Cloud infrastructure framework enables users to obtain quick access to the cloud services which would reduce data transfer and link together multiple satellite capabilities.

  - • In data sharing platforms, different ecosystem models and tools could be linked together.

Thank you!

NASA's Land, Atmosphere Near Real-time Capability for Earth Observing Systems (LANCE):
https://earthdata.nasa.gov/lance

NASA Earth Science Applied Sciences Program:
https://appliedsciences.nasa.gov/

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Many thanks to my co-authors!

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