



# Beyond Today's Internet Experiencing a Smart Future



## EODN-IDMS

A distributed storage service for open access to Landsat data for natural resources and educational applications using GENI's flexible cloud infrastructure

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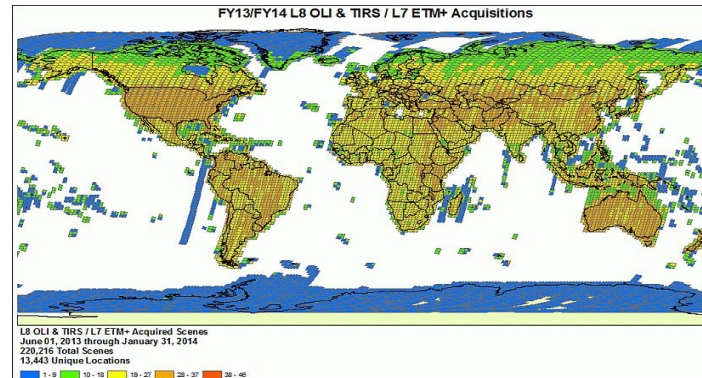
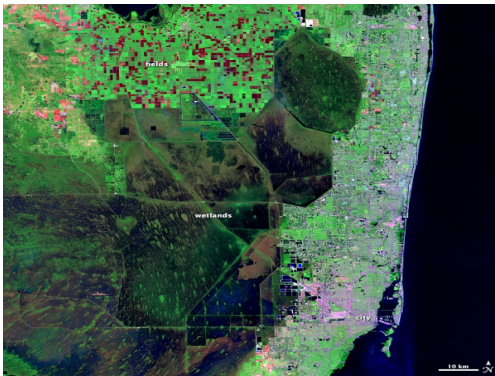
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Director, WisconsinView

**SFASU:** Paul Blackwell  
Exec. Comm., AmericaView



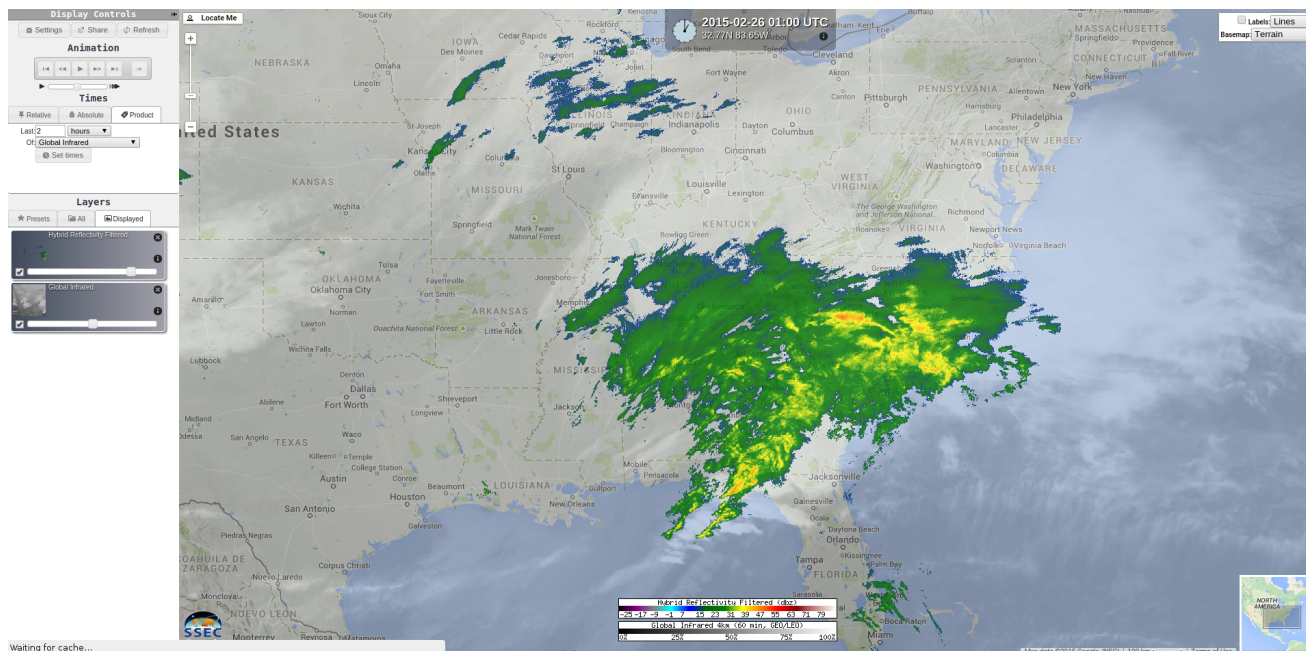
# Landsat data

- Landsat 8 launched February 13<sup>th</sup>, 2013
- Covers the entire land surface of the Earth every 16 days – 8 day offset from Landsat 7
  - ~700 scenes each day
- Each scene contains a GeoTIFF product: high-resolution sensor images
  - ~1GB compressed, 2GB uncompressed
- Thermal Infrared (TIRS) and Operational Land Imager (OLI) sensors
  - 11 bands total : deep blue through thermal infrared
- Traditionally used for environmental monitoring and land use and land cover change studies



# Integrating Weather and Land Imagery

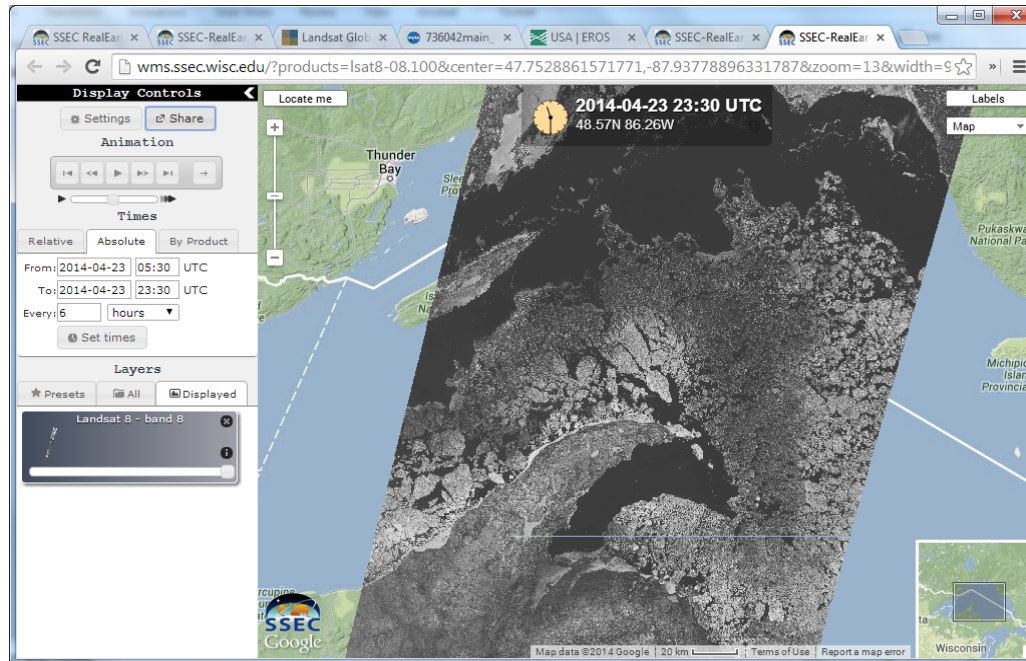
- **RealEarth**: Delivering Near Real-time Remote Sensing Content to Mobile Devices & Browsers
- Supports atmospheric **science** and meteorology **research** communities (and the **public**)
- A way to **overlay** different data products and **share** visualizations
- **EODN** makes **RealEarth** better by making land imagery available faster





# Landsat imagery for Weather?

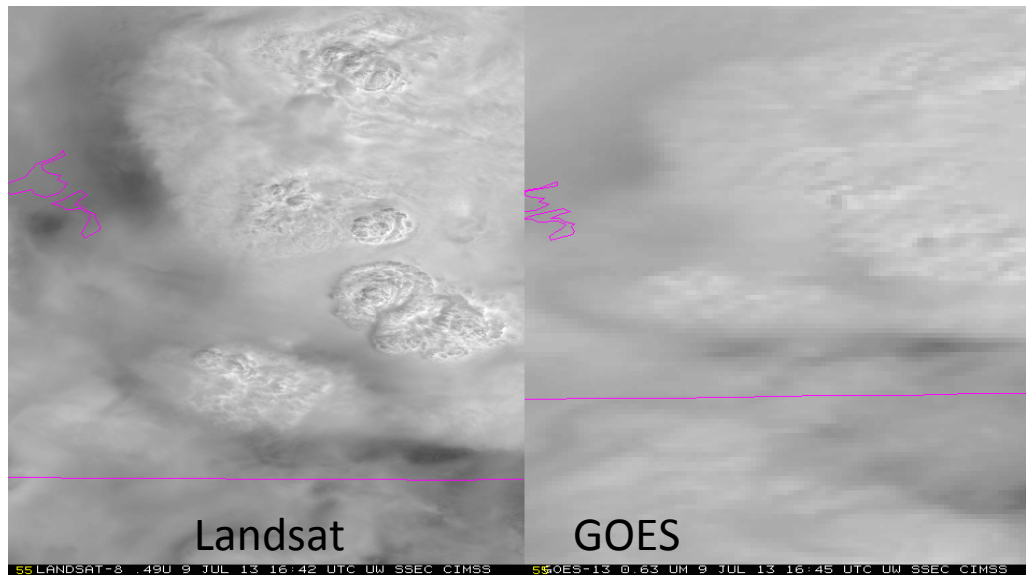
- Interest in relationship between land surface features and weather
  - Such as: ground fog, wildfires, cloud patterns, ice coverage, hail swaths...
  - Visualize the imagery together for discovery





## Landsat imagery for Weather?

- **Landsat data:**
  - Low temporal resolution (16 days)
  - High spatial resolution (15m-30m)
  - High latencies (24hr +)
  - Low spatial coverage (185km)
- **Weather data:**
  - High temporal resolution (15 min)
  - Low spatial resolution (1km pixel)
  - Low latencies (30min for polar orbiter)
  - Whole hemispheric coverage



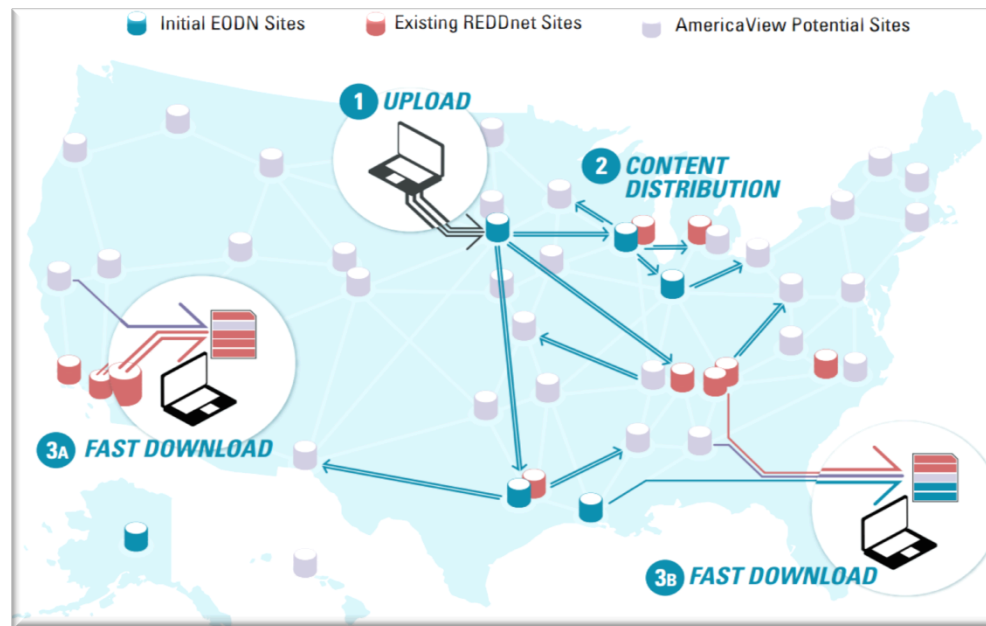
## Primary workflow barrier

- Latency
  - Weather imagery: low; land imagery: high
- How to Enhance Access to Landsat Imagery?
  - Bypass shopping cart approach
  - Define locations of interest
  - Staging imagery at locations where it can be quickly processed
  - Accessible to multiple applications
- Answer: data logistics (EODN)



# Earth Observation Depot Network (EODN)

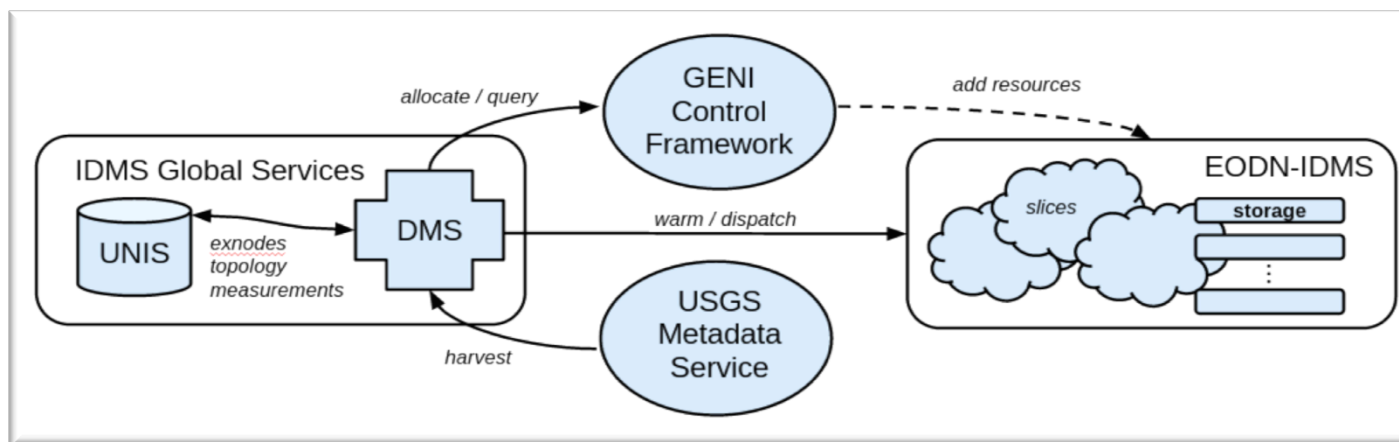
- Addresses the deployment concerns in enabling open access to remotely sensed data from a wide range of public, private, and commercial sources
- Deployed on a volunteer basis by AmericaView members in conjunction with existing REDDnet resources
- Built in part with the NSF-funded Data Logistics Toolkit (DLT)





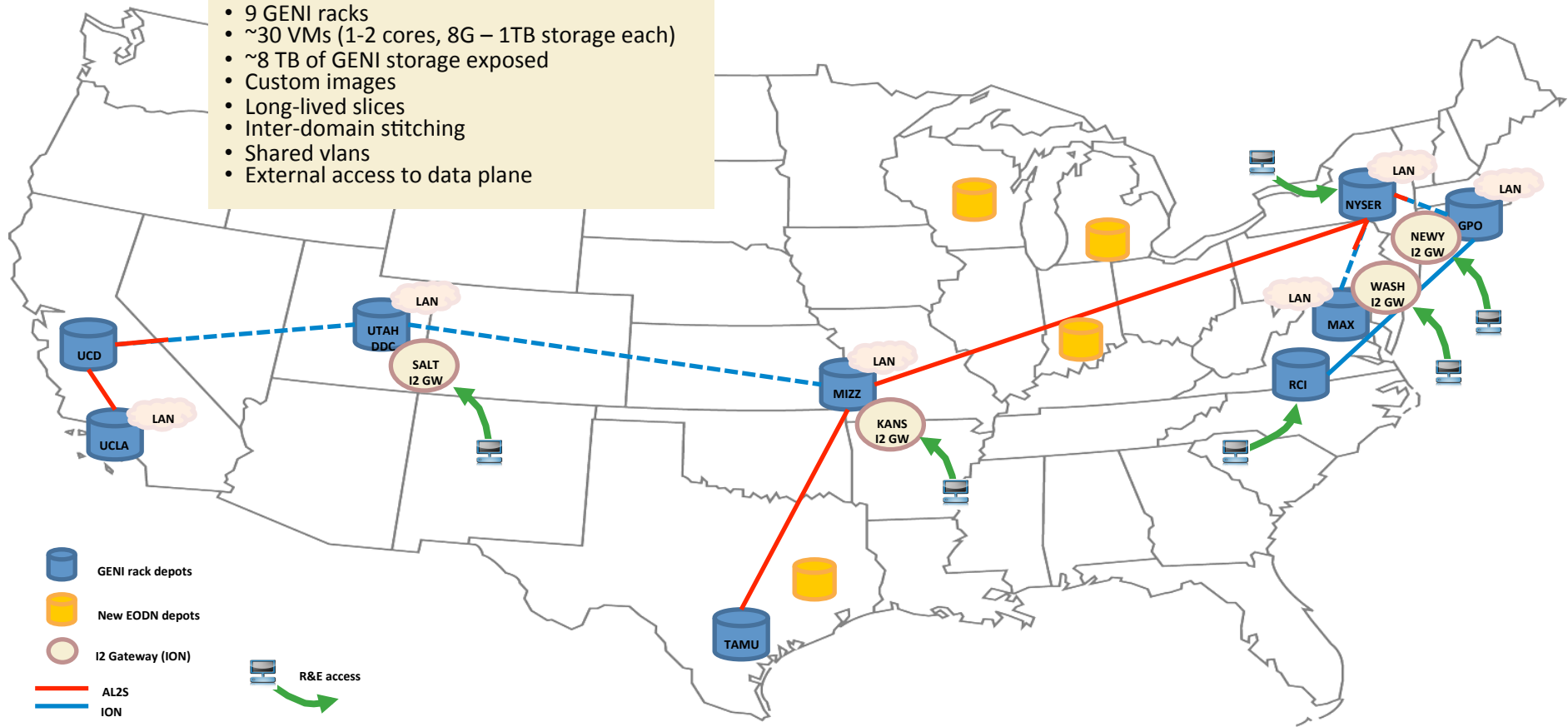
# Intelligent Data Movement Service (IDMS)

- IDMS extends EODN to work on GENI
  - Uses common DLT storage components with additional software
- Makes use of dynamic and geographically diverse storage and networking resources across aggregates
  - Uses GENI CF to create additional storage based on demand
- Extended functionality that facilitates the distribution of and access to remote sensing data

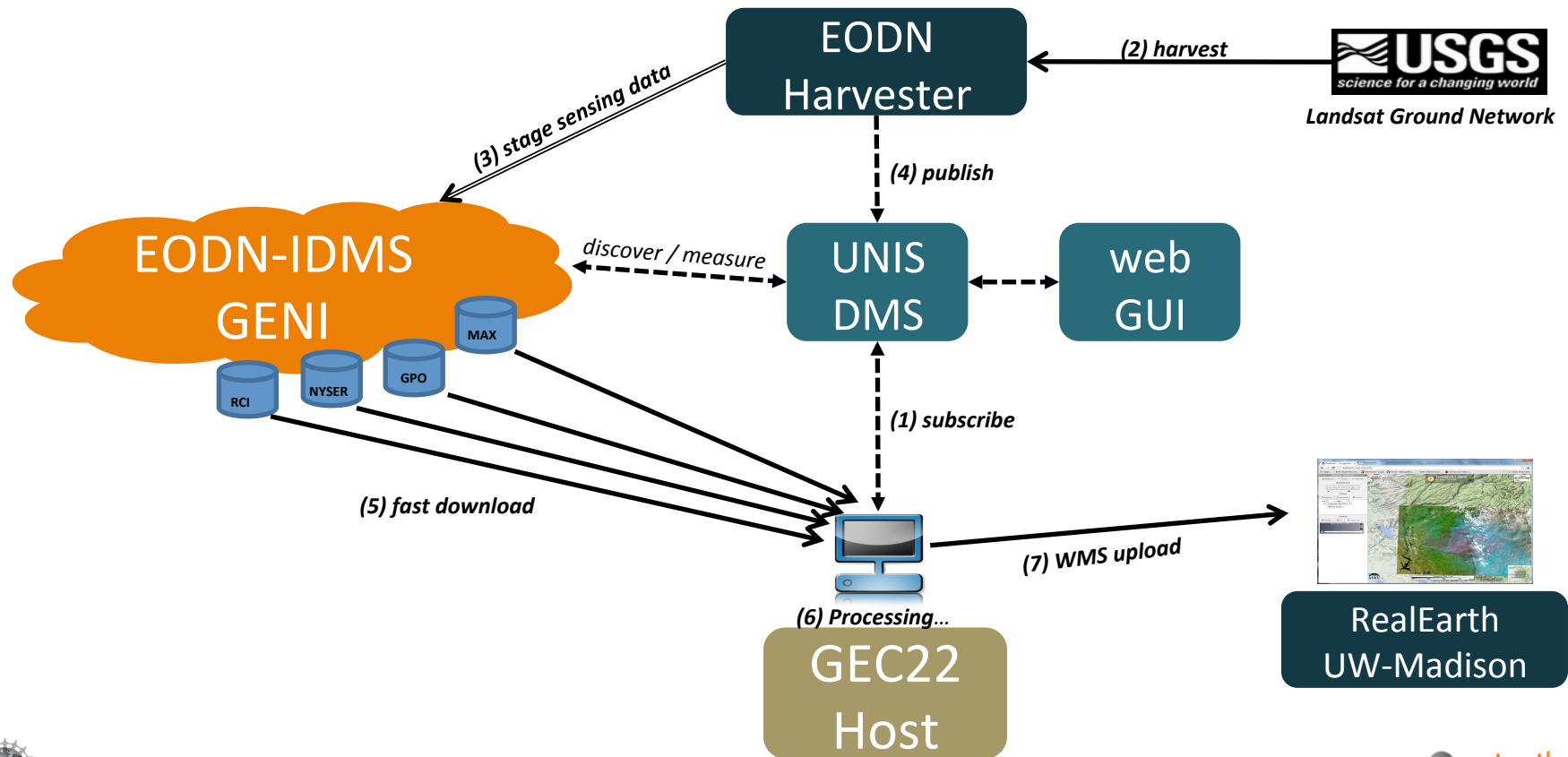


# GEC22 core topology

- 9 GENI rack depots
- ~30 VMs (1-2 cores, 8G – 1TB storage each)
- ~8 TB of GENI storage exposed
- Custom images
- Long-lived slices
- Inter-domain stitching
- Shared vlans
- External access to data plane



# Today's demonstration





# Summary and Future

## Today:

- GENI enables on-demand, local storage acting as “fast caches” for time-sensitive data in EODN-IDMS
- Reduced time to acquire and expose new high-resolution map data for RealEarth users
- Shared vision has driven rapid development and cross-collaboration between the EODN, DLT, and IDMS projects
  - Prototyping a functional, long-lived service for the remote sensing community

## Future:

- Upload and publish processed data sets for broader use (reduce duplicated effort)
- Tighter integration with existing and widely-used map-based browsers and USGS metadata query systems



Thank you!

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<http://groups.geni.net/geni/wiki/sol4/IDMS>

<http://data-logistics.org/>

<http://americaview.org/>

