

Deriving biophysical products from Landsat

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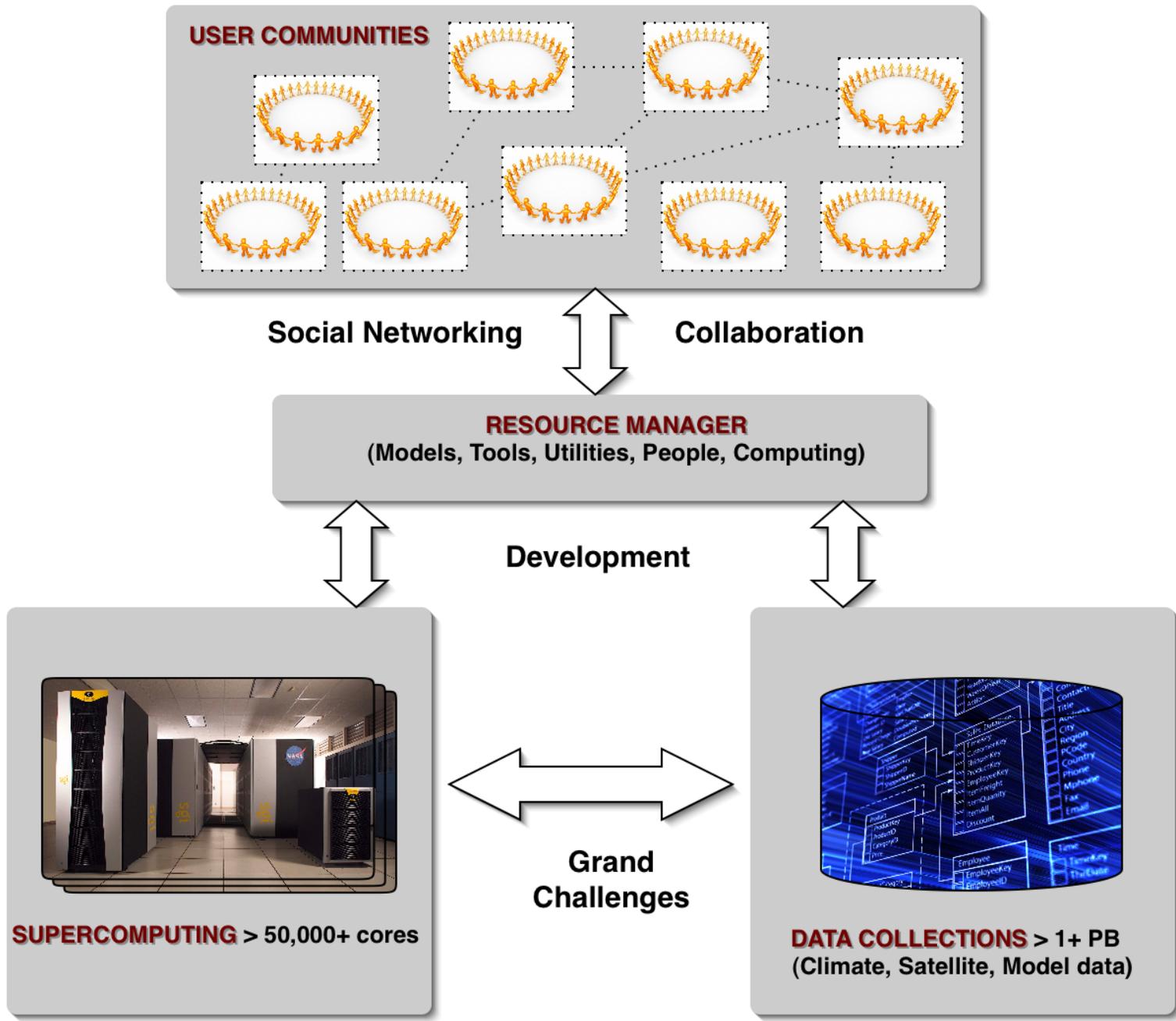
**Earth Science Research and Applications
Collaborative (ESRAC)**

Biophysical products from LANDSAT

ESRAC

Project Goal

To improve availability of Earth Science data, models, analysis tools and scientific results through a platform that fosters knowledge sharing, collaboration, innovation and direct access to compute resources.



ESRAC Architecture

Project Features

- NASA Prototype for Earth Systems Science:
 - **Computing:** Supercomputing and storage through NASA Advanced Supercomputing Division (NAS)
 - **Data:** MODIS, AVHRR, Landsat, GCM Scenarios, weather data, etc.
 - **Models:** Publicly available models
 - **Software Utilities:** public domain and commercial (pending licensing)
 - **Web portal:** Based on NASA DASHLink social network

Example Usage

- User registers and specifies resource requirements: data, tools, models and computing resources
- A temporary environment is created for the user containing the requested resources
 - Within this environment user can:
 - Allocate CPUs and disk space
 - Run existing models
 - Bring in new data, models, and algorithms
 - Extend existing models
 - Share models and data with community
 - Provide access to the results and *environment*
- When work is completed, the resources are recycled, but the knowledge is captured
 - The specific environment can be saved and reused

Agency Benefits

- Significantly reduces costs associated with scientific efforts using NASA assets
- Increase in usage of NASA data and models will provide improved return on investment in both past and future research activities such as the Earth Observing System or the Decadal Survey missions
- Provides a lower barrier of entry especially among climate change impact modeling groups with significant societal benefits

Community Modeling Portal

- Social networking component based on NASA DASHlink system
- Users can search for related activities
 - Who is doing what where?
 - Map interface
 - Categorized by discipline
 - Categorized by geographic region
- Users can create projects and link to other projects
- Users can control the visibility of their project
- Users can control access to the project and the level of sharing
- Users can share algorithms, data, knowledge

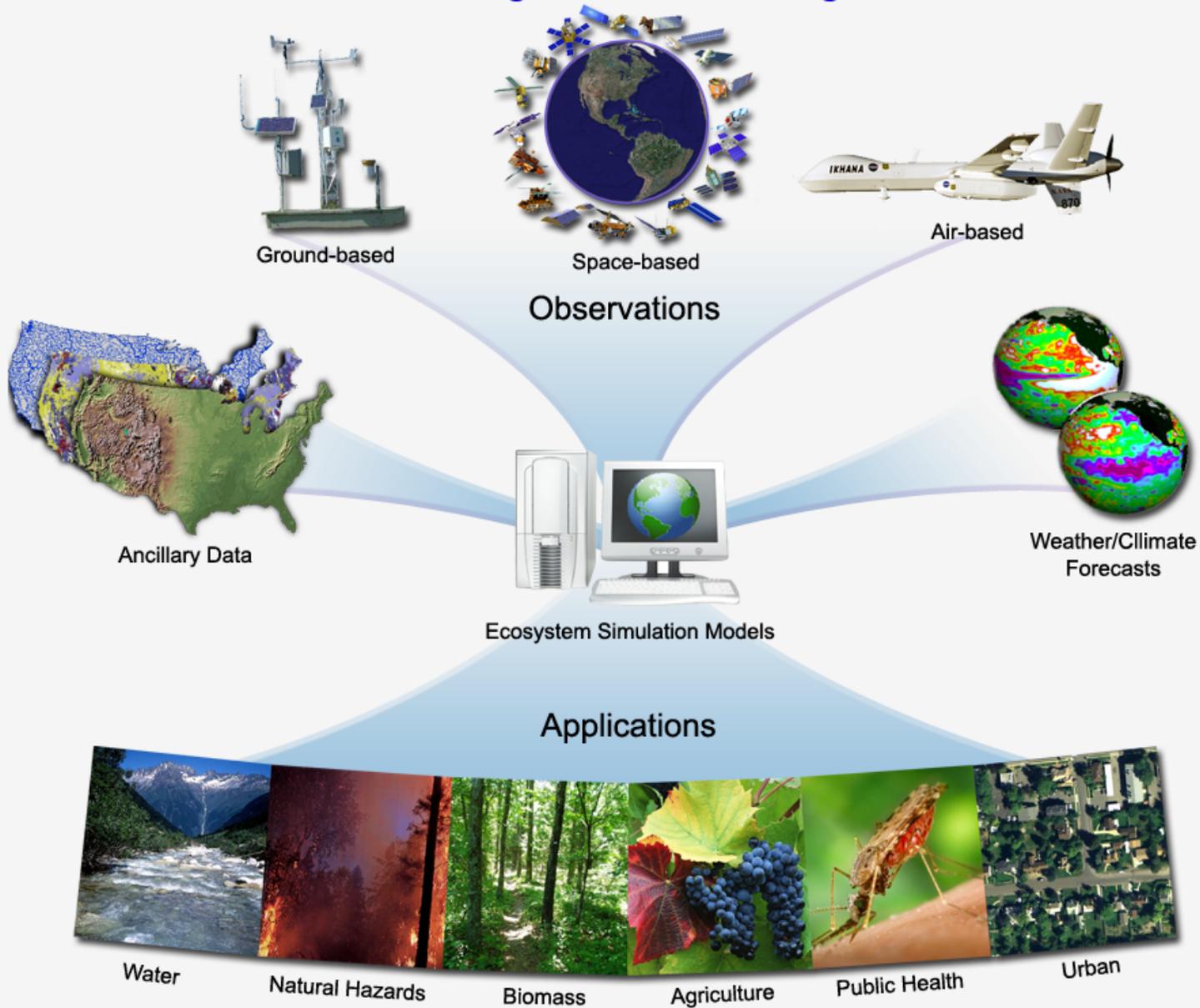
Project Team

- Ecocast/TOPS
 - Project coordination, software integration and community outreach
- DASHLink
 - Community web development
- NAS
 - Hardware setup and management
 - Supercomputing interface

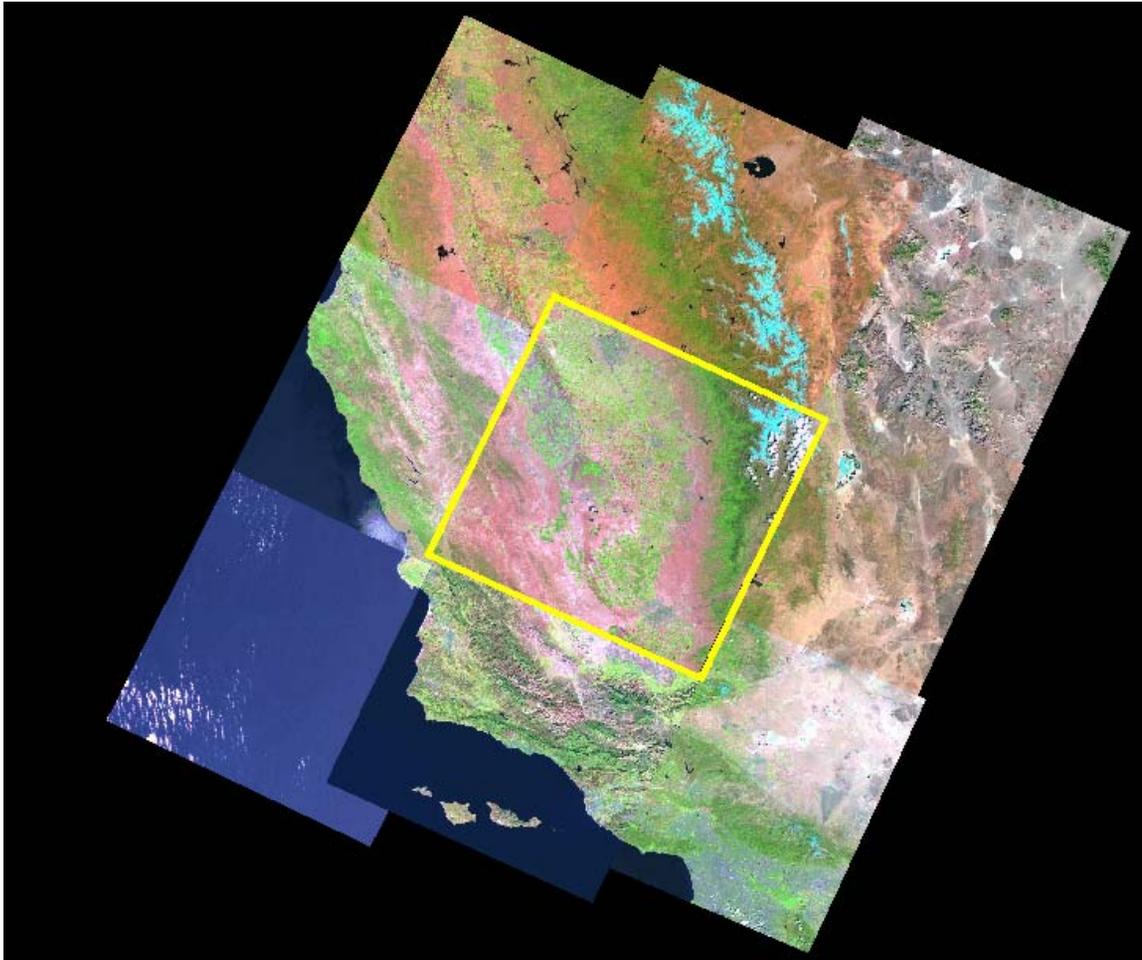
Need for MODISizing LANDSAT

Terrestrial Observation and Prediction System

Turning Data into Knowledge



Prototyping Landsat Biophysical Products, Leaf Area Index



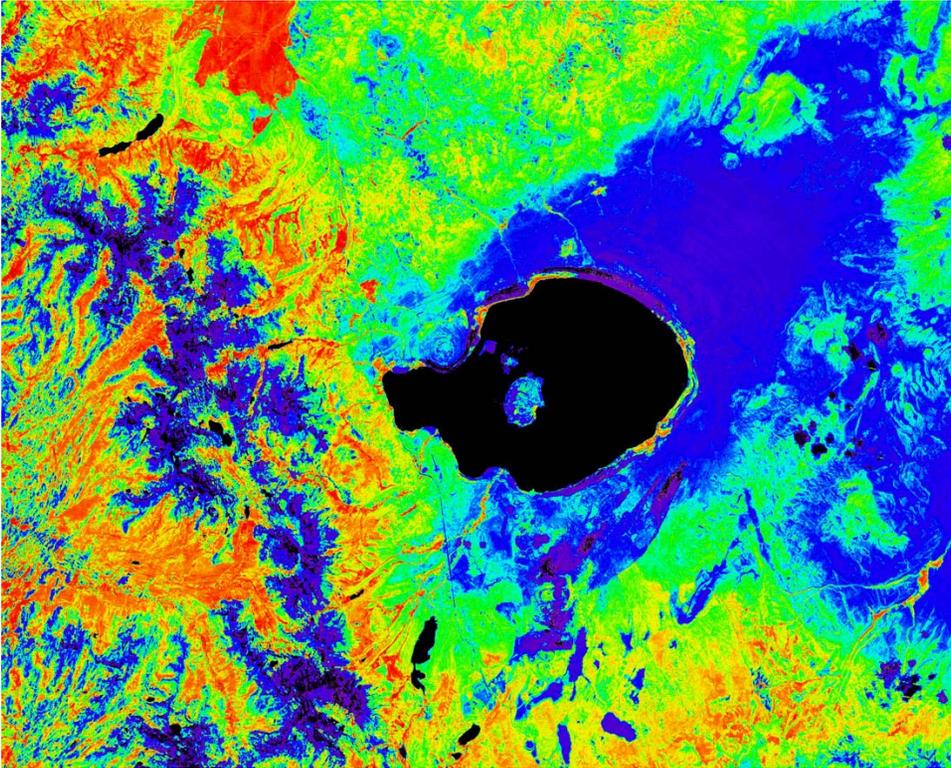
Surface Reflectances

Land Cover

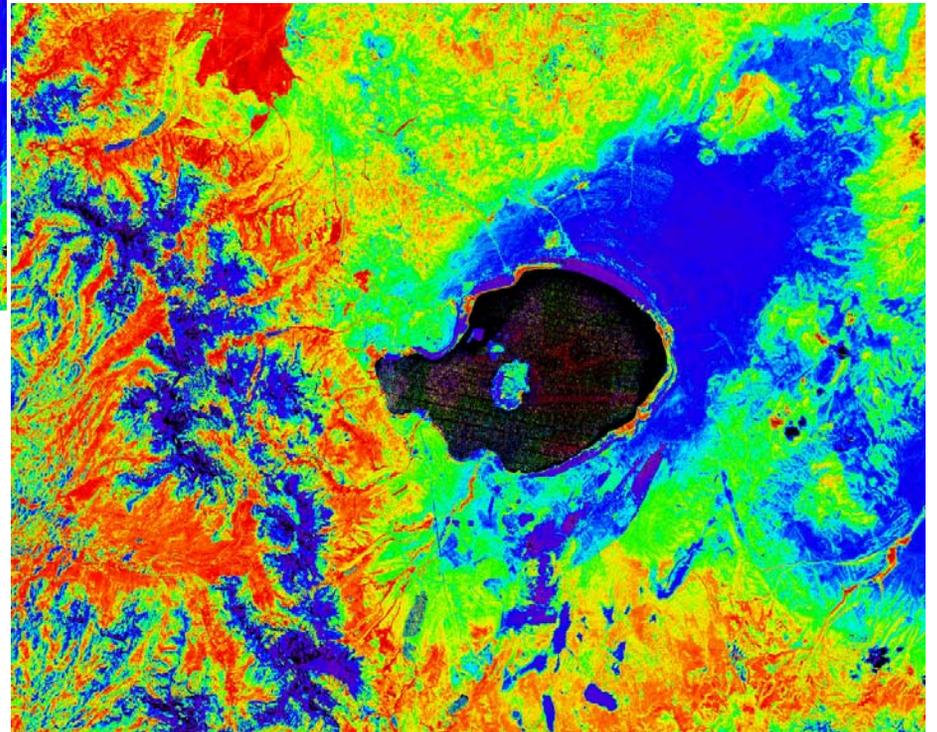
LAI LUT

LEDAPS Implementation

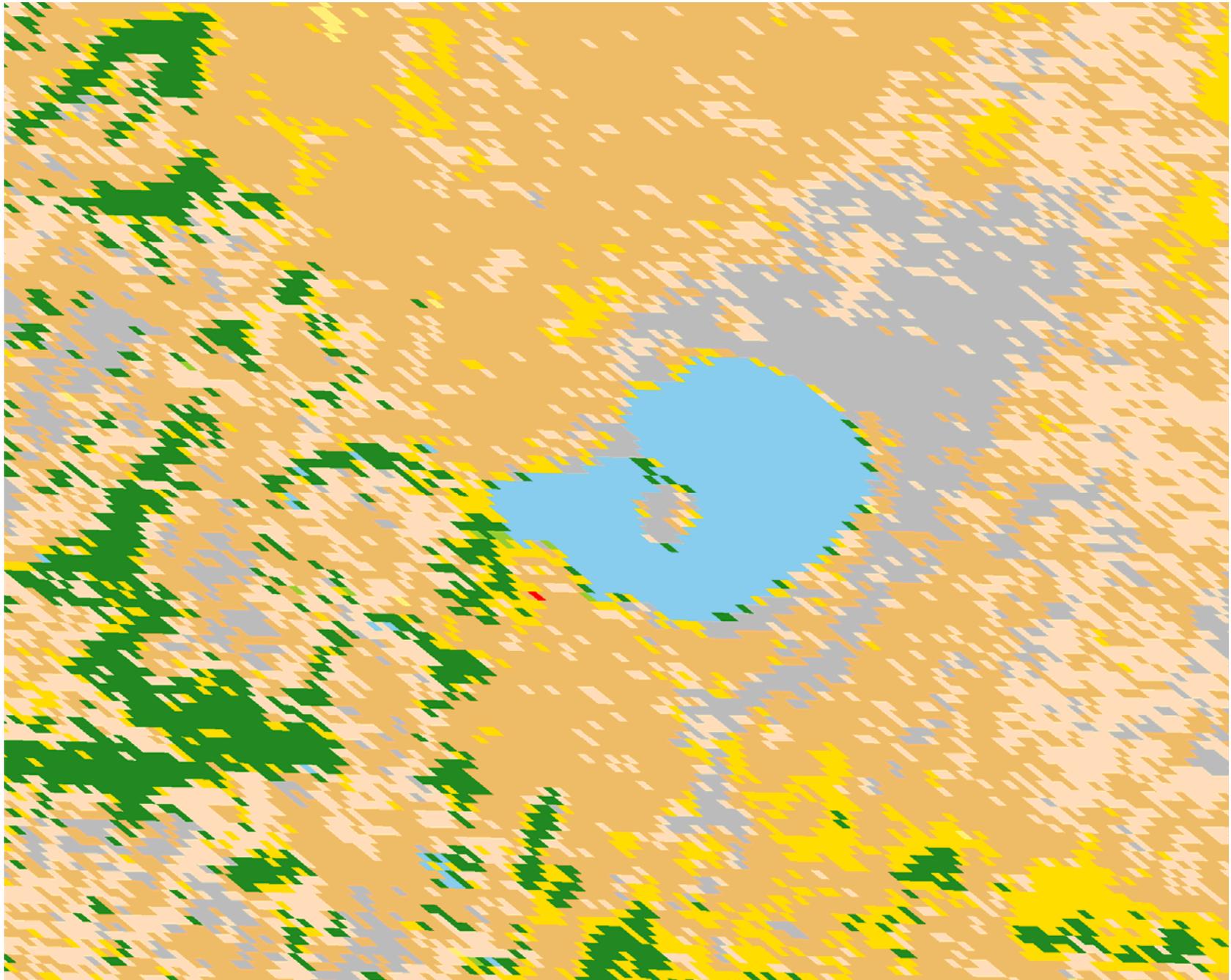
NDVI Before



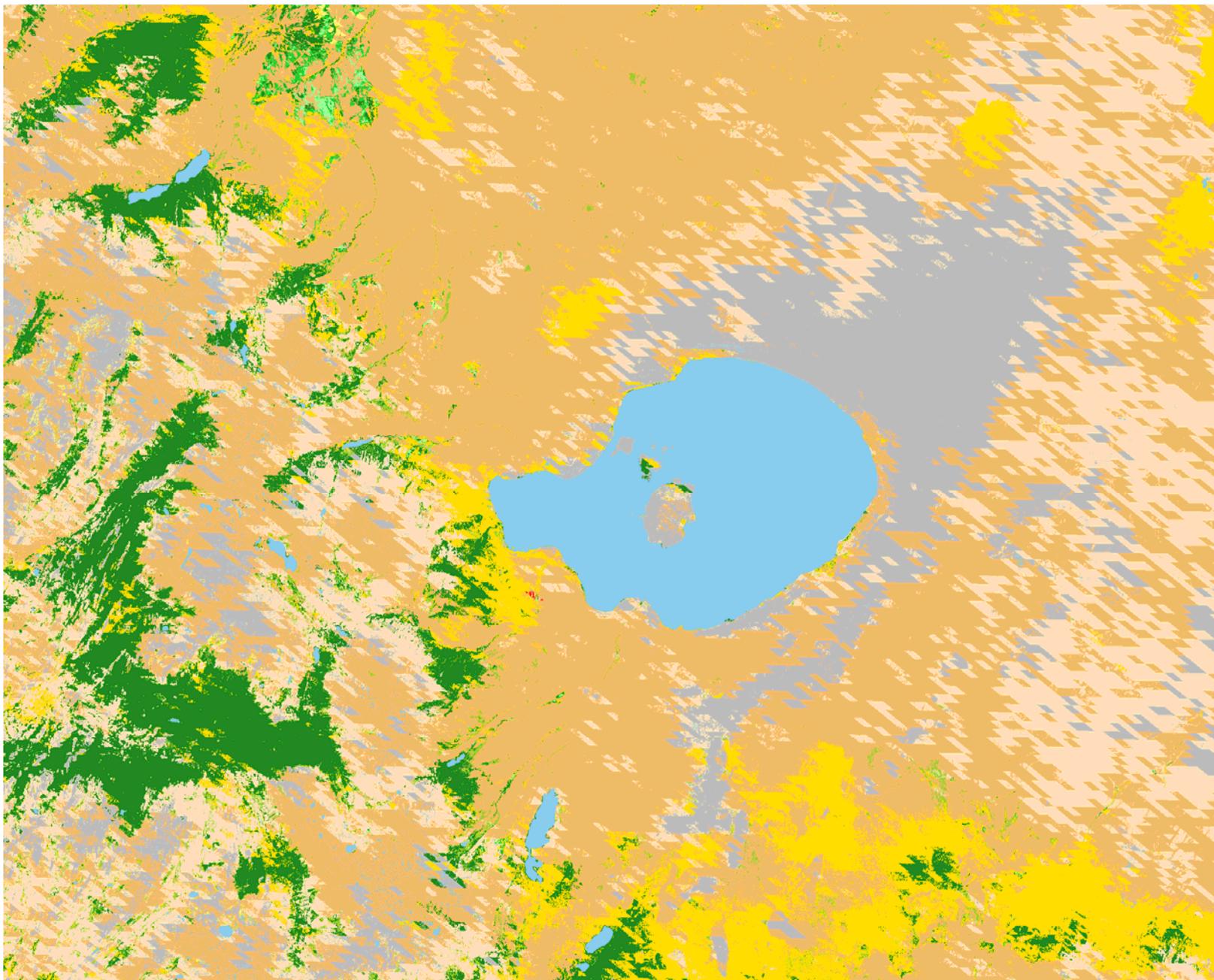
NDVI After



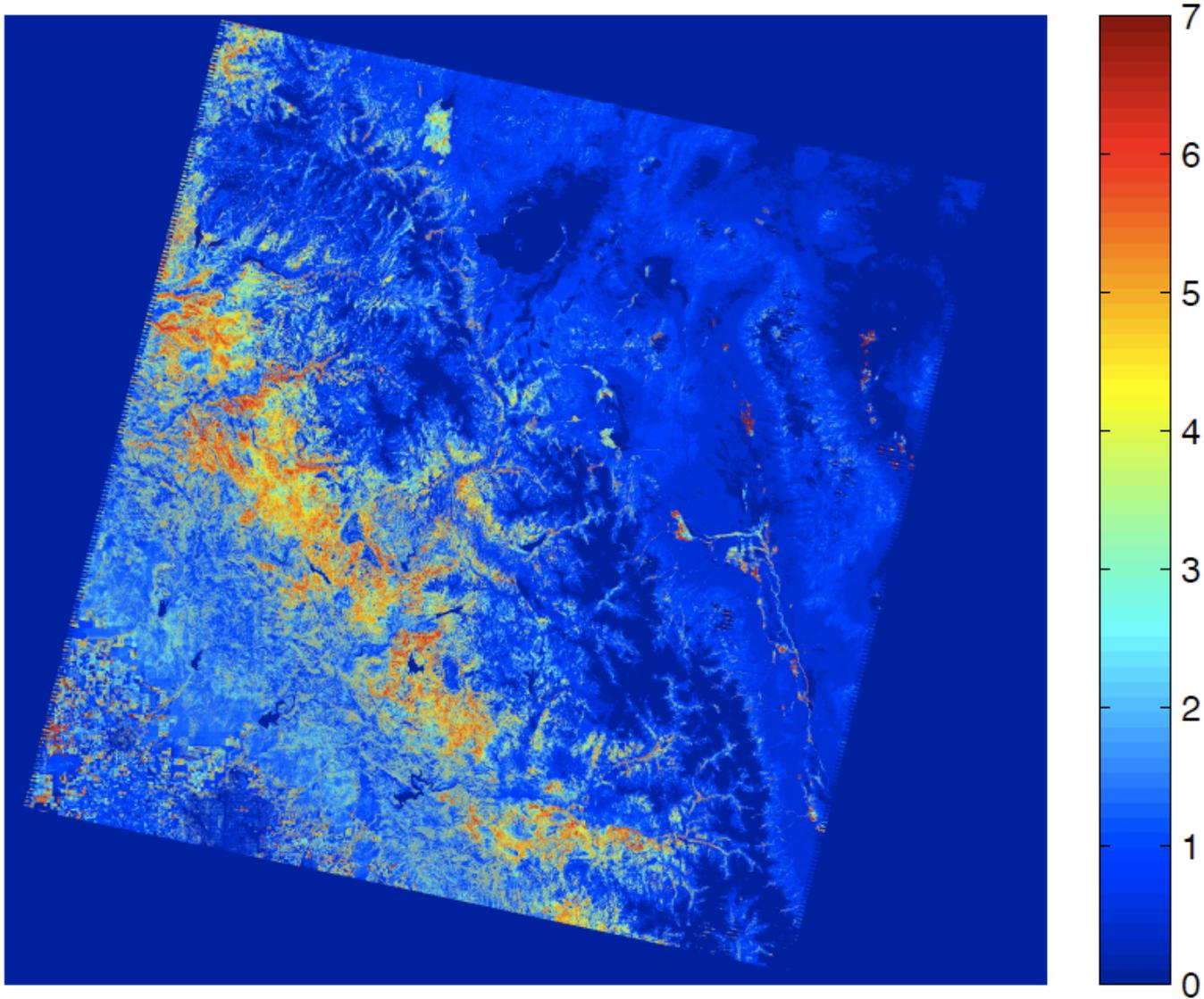
MODIS 500m Land Cover



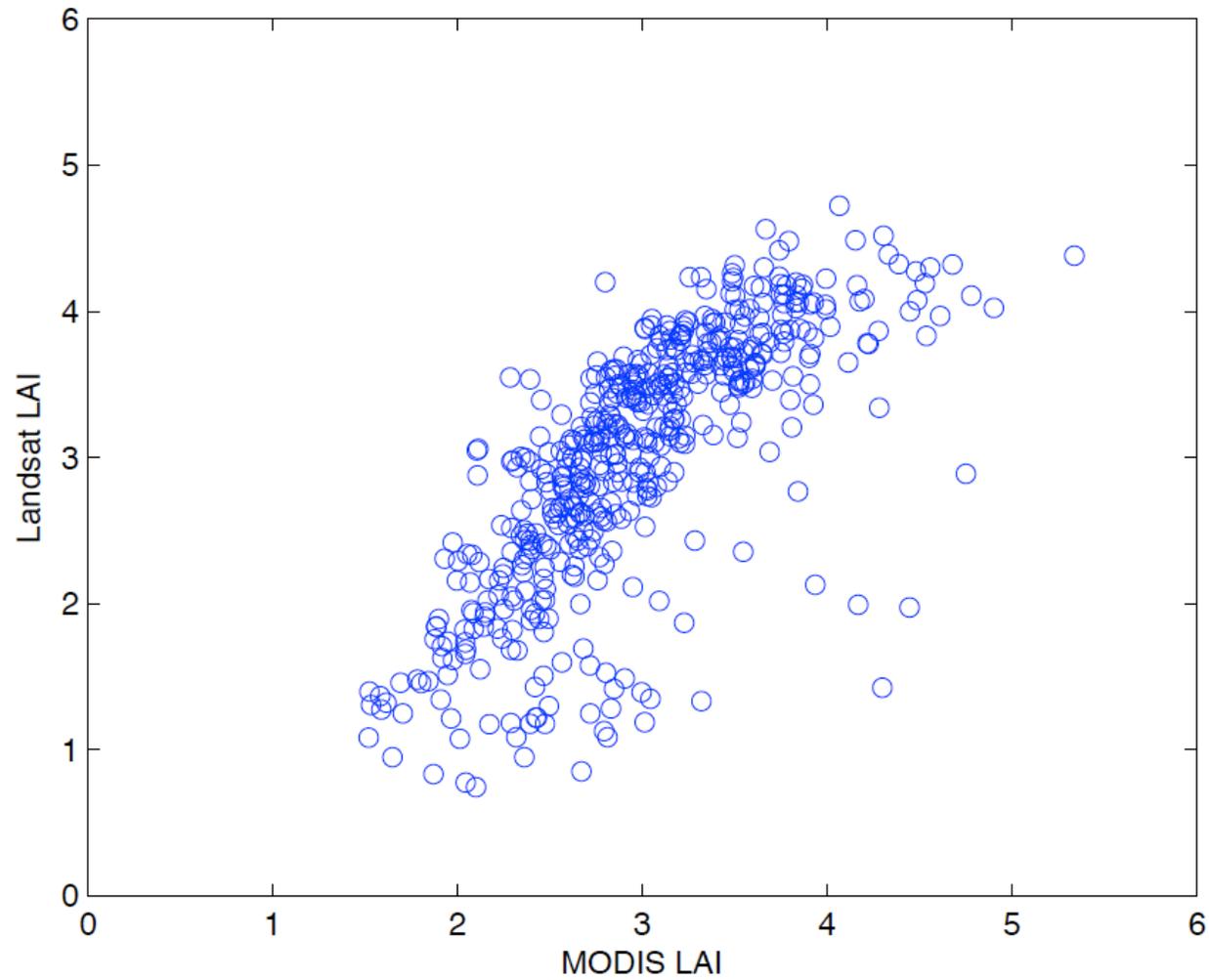
30m Land Cover downscaled from MODIS 500m



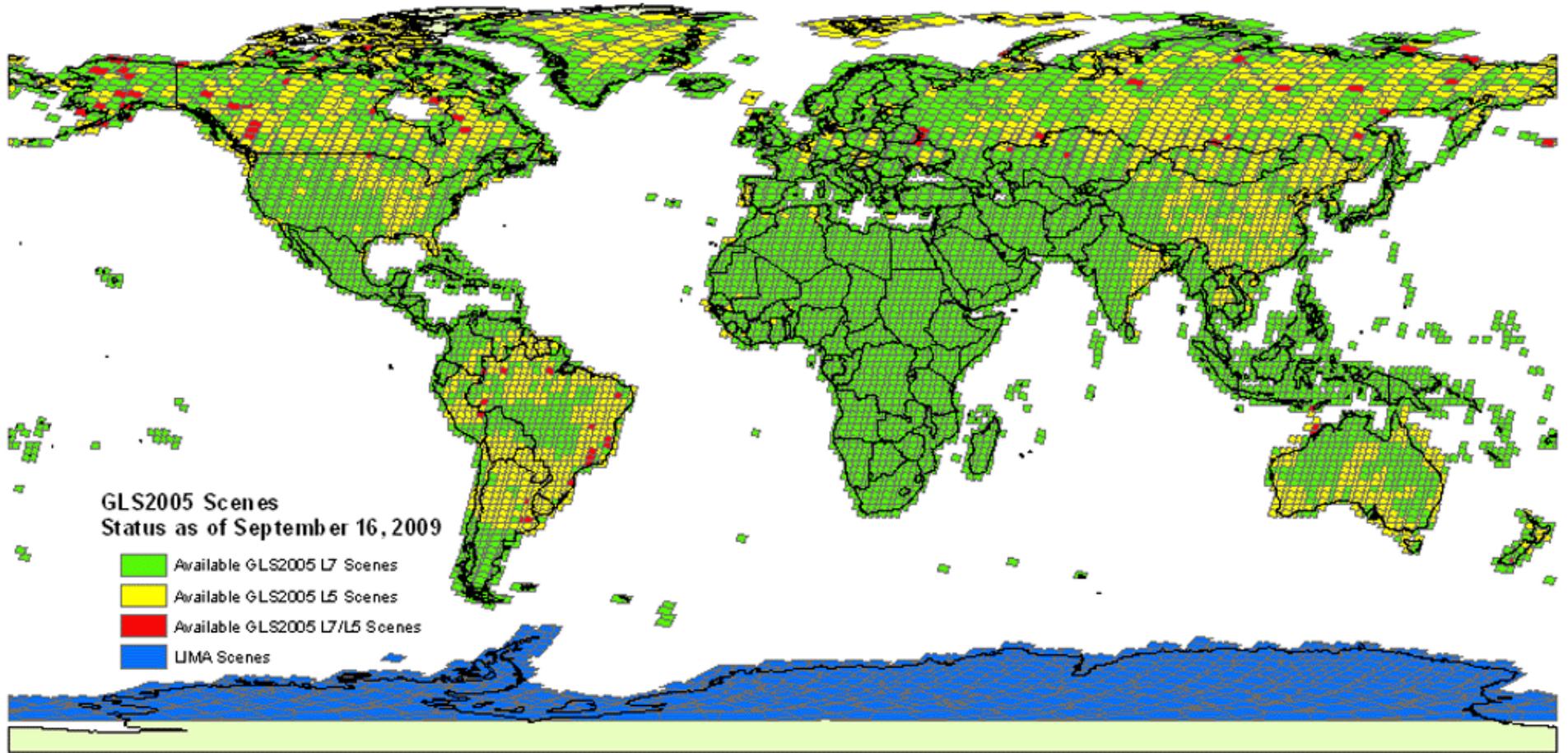
LANDSAT 30m LAI using MODIS LAI LUT



MODIS vs LANDSAT LAI for forest pixels, July 31, 2007
MODIS 1km, LANDSAT, 40x40 aggregated LAI



Implementing the LAI process globally with GLS 2005 data



Summary

**ESRAC could be a valuable resource for LDCM
algorithm development and testing**

can easily handle GLS processing/product generation

facilitates community participation

**leverage historical studies of vegetation
LAI and biomass**