NASA EARTH EXCHANGE
IN SUPPORT OF THE
NATIONAL CLIMATE ASSESSMENT

Earth Science Division/NASA Advanced Supercomputing

NASA Ames Research Center

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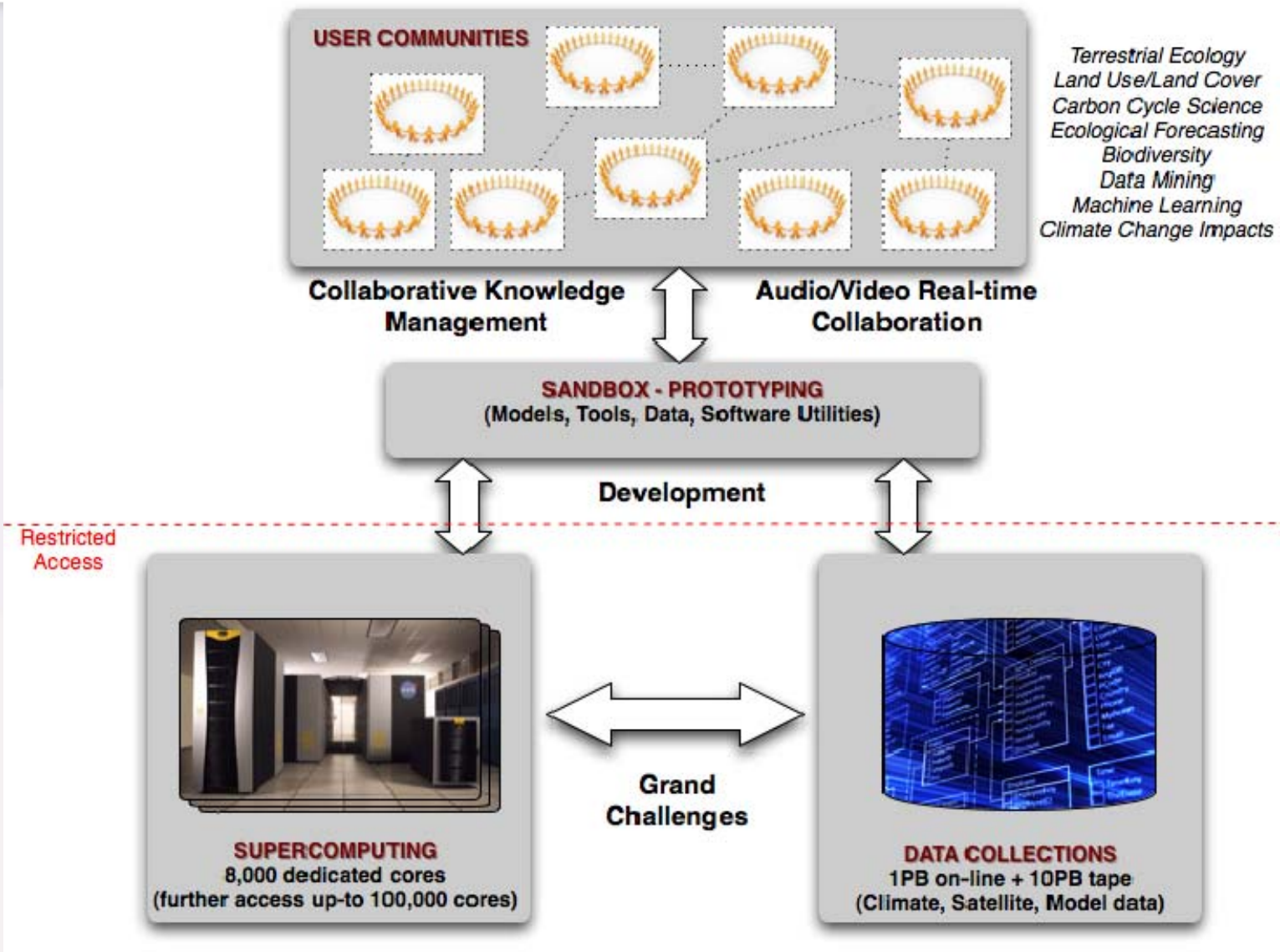
Goals and Objectives

To provide enabling tools for the Earth science community supporting the National Climate Assessments.

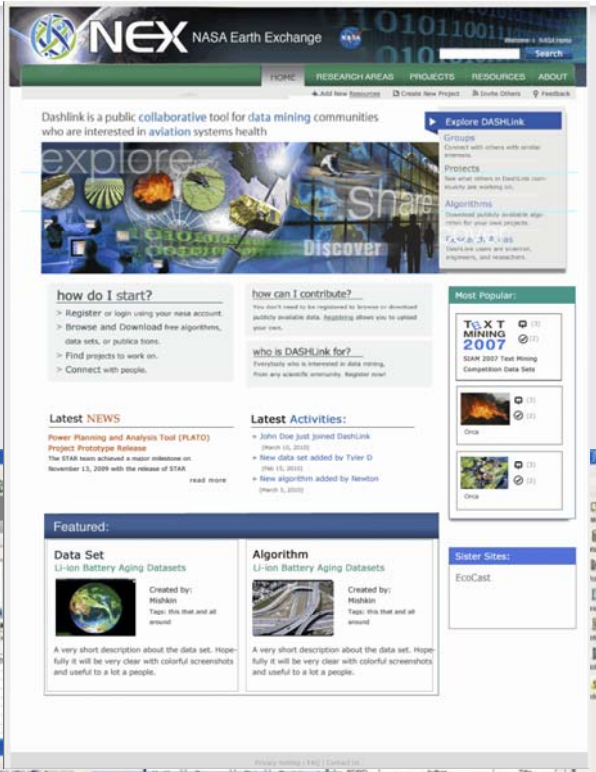
NASA Earth Exchange Components

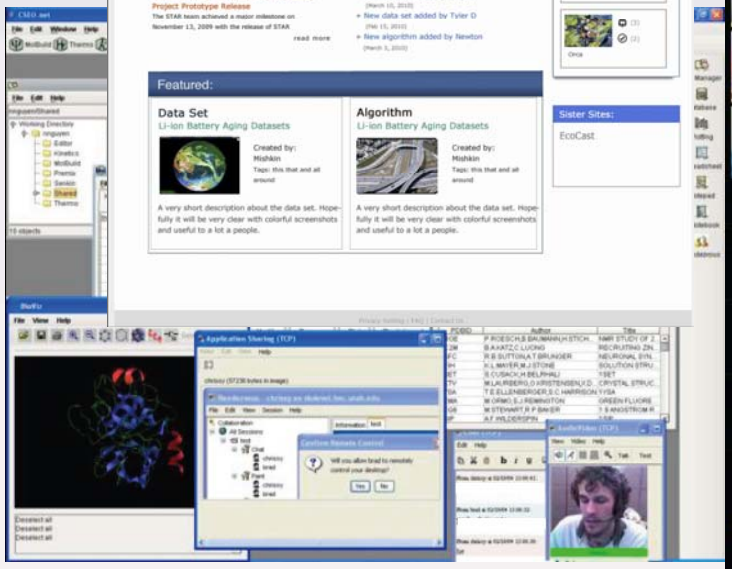


Nemani et al., 2011, *Eos Trans AGU*

Collaboration Tools

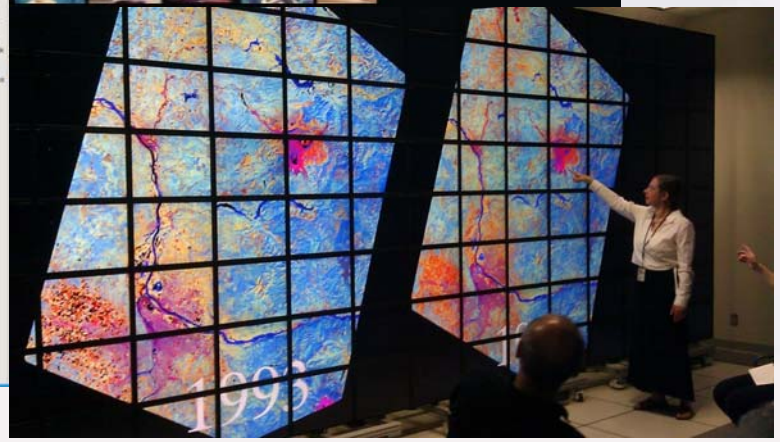
Share





Collaborate

Conference



Visualize

Leveraging collaborative research tools at NASA

NCA@NEX Objectives

- **Creation/distribution of high resolution historical and projected climate data**.
- **Development of climate change indicators and monitoring**: Analysis of long-term satellite data for the U.S. to quantify spatial and temporal patterns in indicators of terrestrial ecosystem condition.
- **Facilitate climate impacts modeling**: Facilitate ensemble modeling experiments to quantify changes in biogeochemical cycling in response to changes in climate as well as land use.

NEX Activities

- Creating ready-to-use data sets for NCA
- NCA Community Engagement
- Technology Development/NEX

Data sets

- Historical Climate Gridding
  - In collaboration with NTSG/U of MT, we created a 1km daily gridded historical climate data from 1950 to 2010
  - Complimentary to PRISM data but at daily resolution
  - Useful for downscaling GCM output at daily timescales.
  - This dataset supports a number of hydrology/ecosystem models

- 30 years of satellite-derived Leaf Area Index
  - In collaboration with Boston U, we implemented and customized the MODIS LAI algorithm for AVHRR
  - Obtained and processed GIMMS AVHRR NDVI data
  - Created a first generation LAI product spanning 1981 to 2010

NCA Community Engagement

- **Climate gridding**
  - *University of Montana*
  - *California State University*
  - *ORNL*
- **Satellite data analysis**
  - Boston University
  - GSFC
  - University of Maryland
- ***Climate downscaling***
  - Climate Central
  - University of Montana
  - Santa Clara University

NCA Community Engagement

- ***Climate data analytics***
  - University of Minnesota
- ***Data-model intercomparison***
  - ORNL
  - Northern Arizona University
  - Colorado State University
  - Boston University

NCA Community Engagement

- ***Ecosystem modeling***
  - University of Montana
  - Oregon State University
  - Montana State University
  - Yale University
  - WHRC

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- ***Hydrology modeling***
  - Climate Central
  - BLM
  - Santa Clara University
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Technology Development/NEX

- NEX infrastructure implementation plan completed
- VisTrails workflow management tools implemented
- Testing iRODS data management

NCA Contributions

- Chapter 5: Evolving Weather and Climate Conditions of the Southwest United States, R. Nemani

- Climate impacts on Ecosystems, NCA, F. Melton

Publications

- Ganguly et al., 2012 Generating global Leaf Area Index from Landsat: Algorithm formulation and demonstration, Remote Sens. Environ. doi:10.1016/j.rse.2011.10.032, (2012)
- Hashimoto et al., 2012 Exploring simple algorithms for estimating gross primary production in forested areas from satellite data, Remote Sensing, 4, 303-326; doi:10.3390/rs4010303
- Gopalakrishnan et al., 2011: Sensitivity of terrestrial water and energy budgets to CO2-physiological forcing: an investigation using an offline land model. Environ. Res. Lett. 6 (2011) 044013 (7pp) doi:10.1088/1748-9326/6/4/044013.
- More papers are in review or in preparation