G·A·B·B·S

geospatial data analysis building blocks

Project Overview & Opportunities

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Rosen Center for Advanced Computing

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Brown Dog Workshop, July 23, 2014

Overarching goals

Making it easy for scientists to share geospatial data and tools

Reach broad user community

- Anyone can create an online app and share
- Anyone can share geospatial data

Building for self service (DIY) – Leverage successful software – Develop building blocks

Project goals

- Data and Tool are one
- Support geospatial data processing, analysis and visualization
  - Data services interface
  - Rapid tool creation APIs
  - Map and image renderers for online tools
  - Enabling geospatial data driven workflows
- All of these integrated with HUBzero core
  - Open source release
  - Hosting

Funding

- A National Science Foundation grant
- Data Infrastructure Building Blocks (DIBBs) program
- GABBs: 1 of 4 implementation awards in 2013
- $4.5M, 10/2013 – 9/2017
- Collaboration with other awards

Team (11+)

Carol Song, PI

Larry Biehl (remote sensing, GIS)

Venkatesh Merwade (hydrology, Civil Eng)

Nelson Villoria (global geospatial data, Ag Econ)

Ed Lee (project manager)

Michael McLennan (HUBzero architect)

Rob Campbell (sr developer, tool development)

Leif Delgass (sr developer, visualization)

George Howlett (sr developer, RAPPTURE Toolkit)

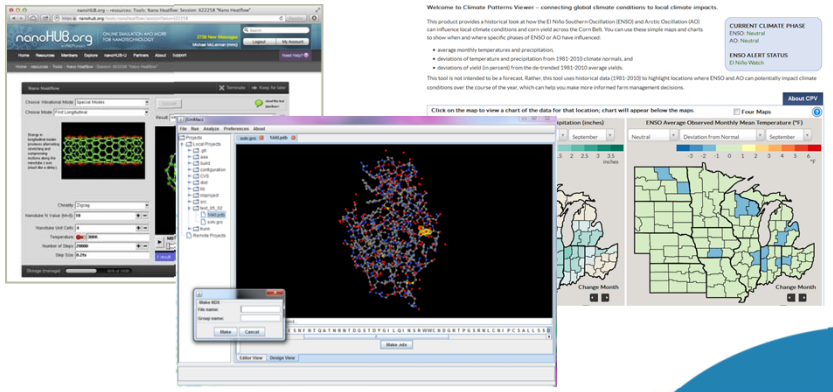
Lan Zhao (research scientist, geospatial applications, data management)

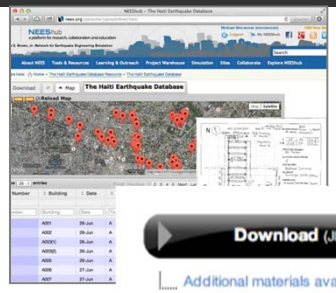
Rajesh Kalyanam (GIS data processing, management)

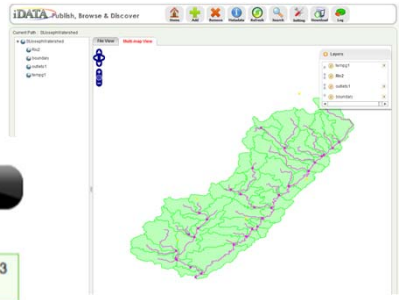
Geospatial hub projects

- Efforts in developing integrated geospatial data/modeling capabilities using HUBzero
  - Drinet hub (http://drinet.hubzero.org)
  - Geoshare hub (http://geoshareproject.org)
  - Water hub (http://water-hub.org)
  - Useful to Useable (u2u) http://drinet.hubzero.org/groups/u2u
- Many hubs can make use of GABBs, such as NEES (network of earthquake engineering simulation), GENI (k-12 education), PURR (Purdue Research Repository), etc.

Platform for Scientific Collaboration



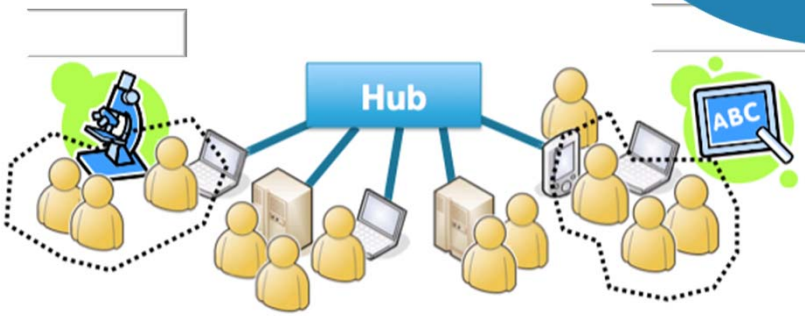


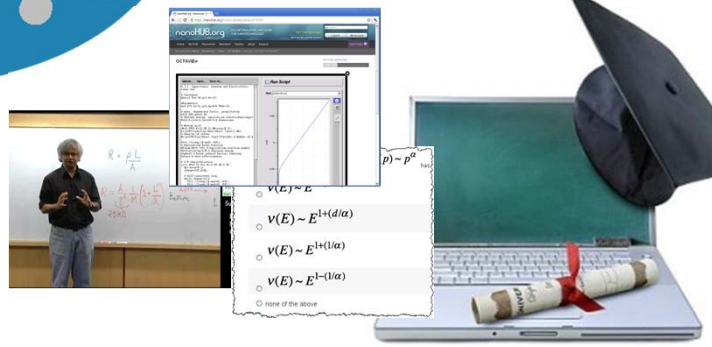


Computational Tools

Databases / Publications

hubzero



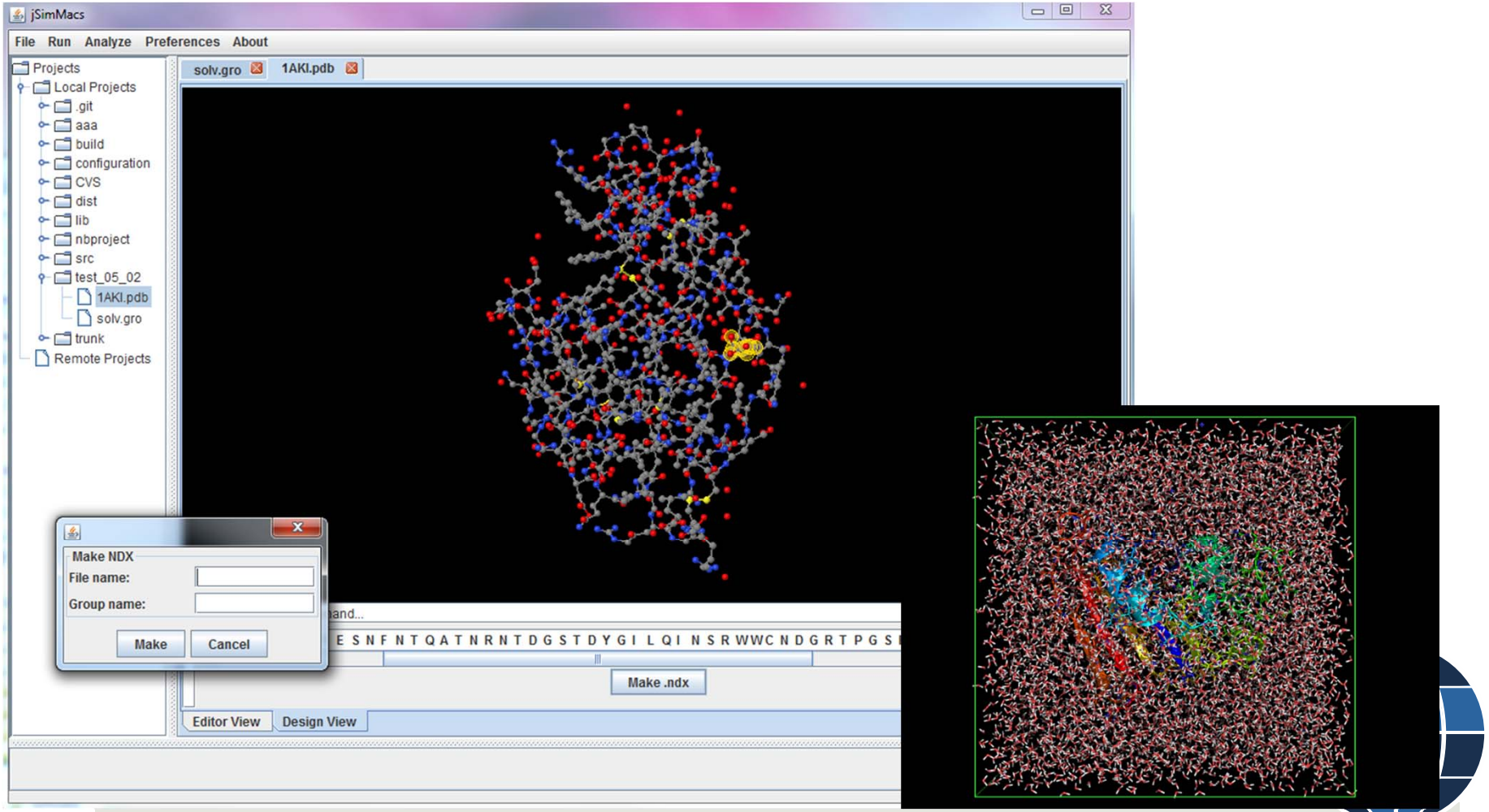


Group/Project Collaboration

Learning Management

Courtesy of M. McLennan, Purdue University

Online tools



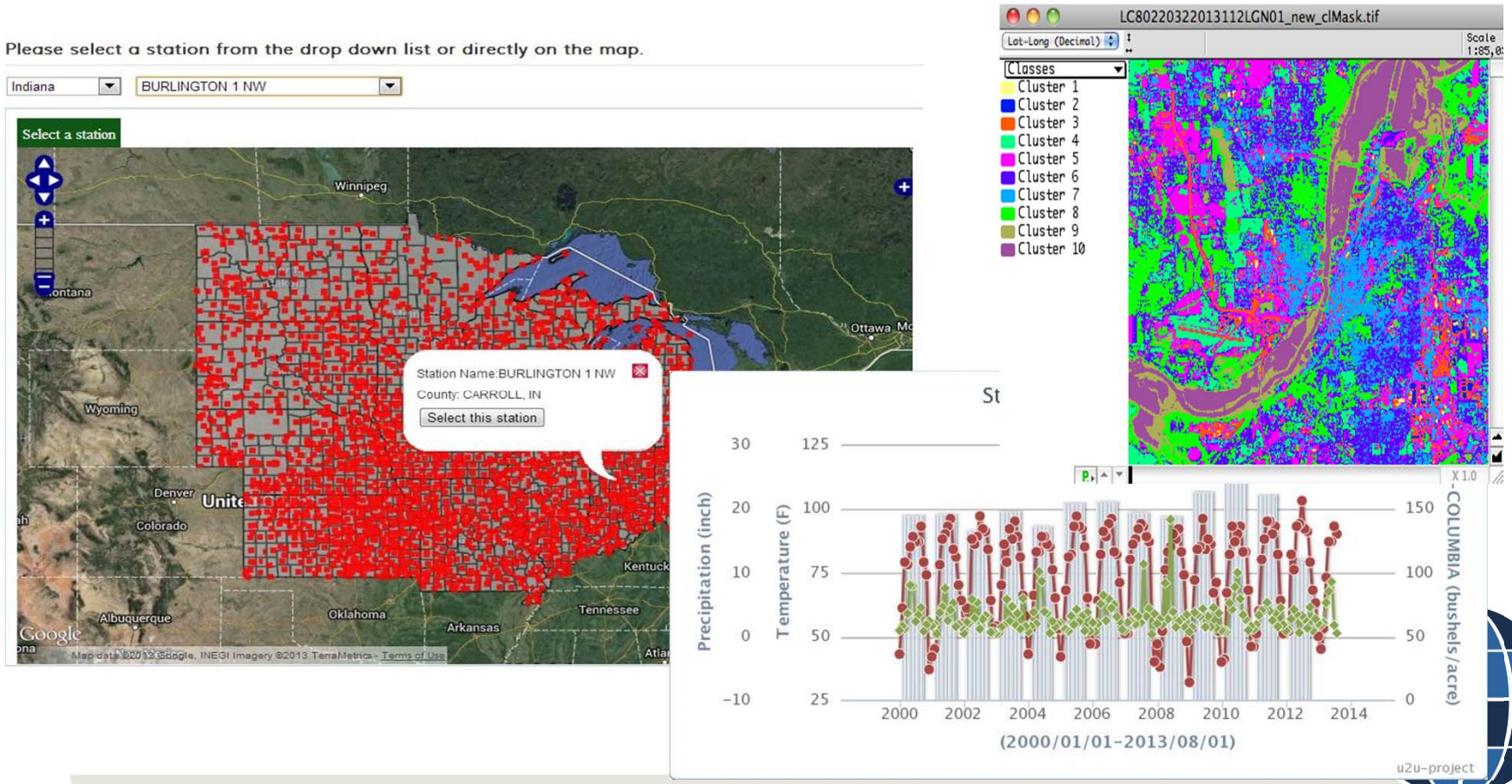
HUBzero for Scientific Collaboration

- An open source collaborative cyberinfrastructure for research and education
- Provides out-of-the-box support for developing web portals with content contribution, tool development workflows, user groups, wikis, ticketing systems, etc.
- Transparent access to large scale computation resources from online tools (no download, installation)
- Adopted by more than 50 science gateways cross many disciplines
- Serves more than 1,000,000 unique visitors in past 12 months
- Currently no integrated geospatial capabilities

Driving Examples

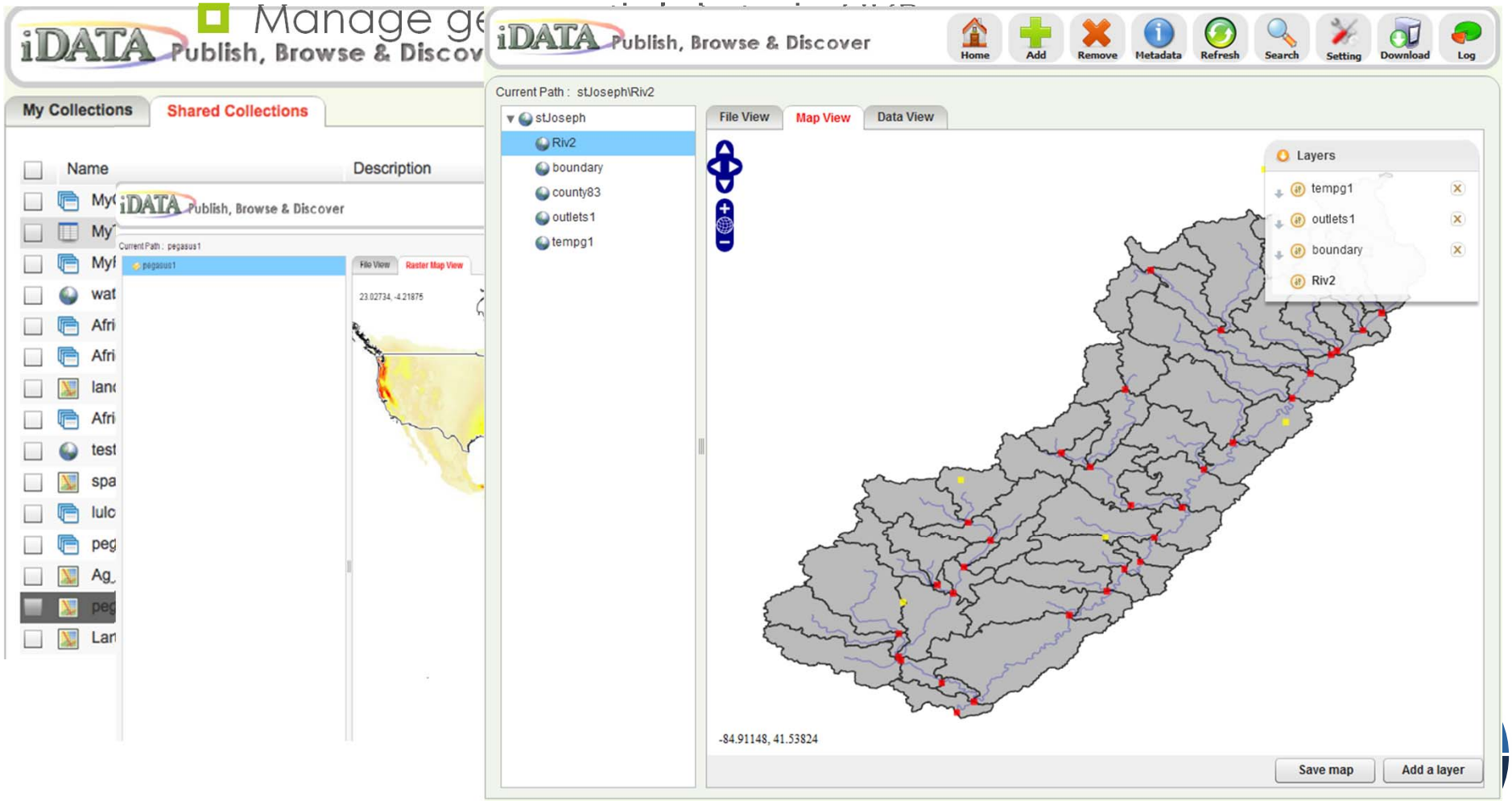
Driving examples

- Easy deployment of geospatial tools



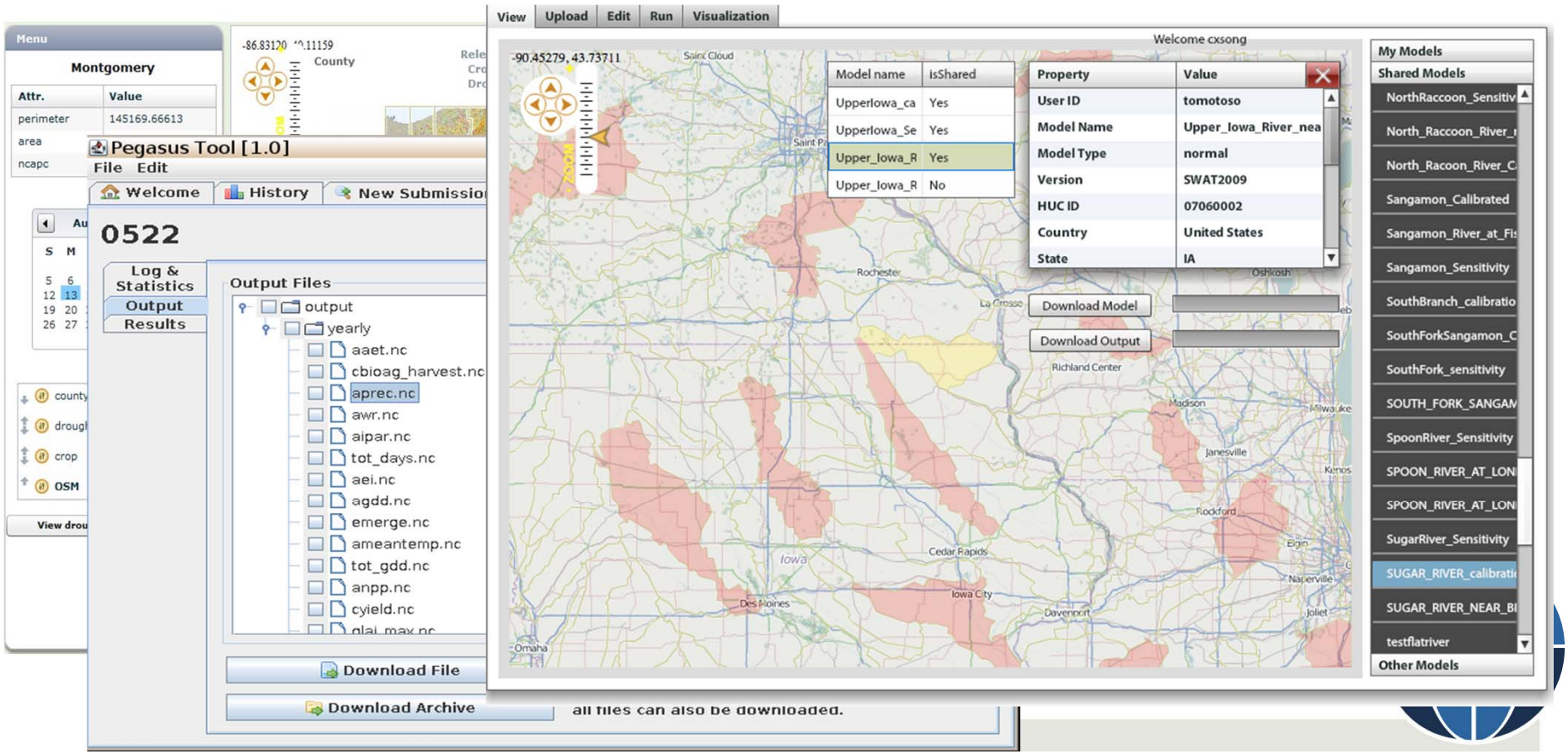
Driving example

- Manage ge



Driving example

- Multi-scale and multi-disciplinary data and modeling for addressing hydrologic and ag economic issues

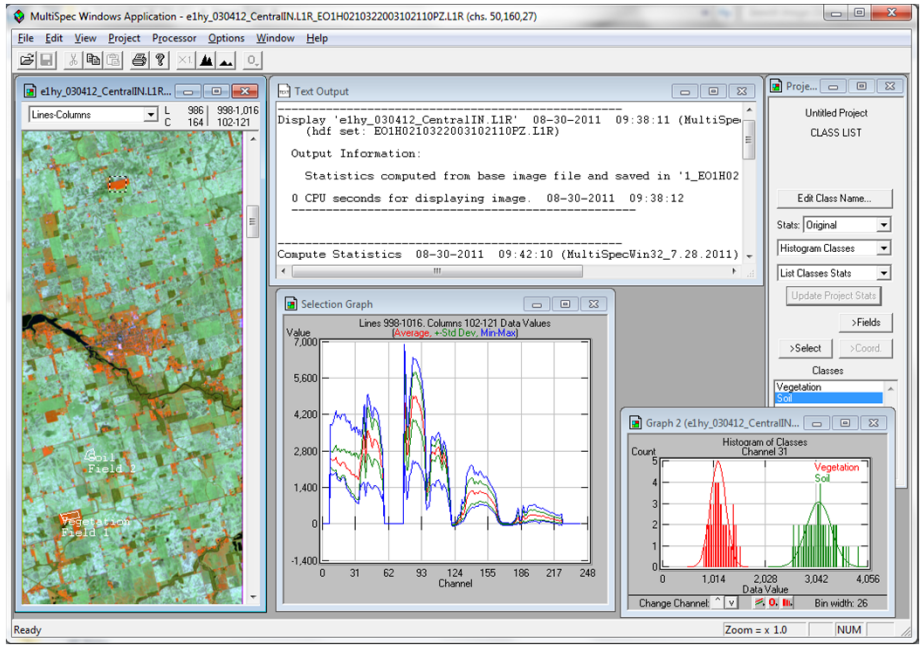


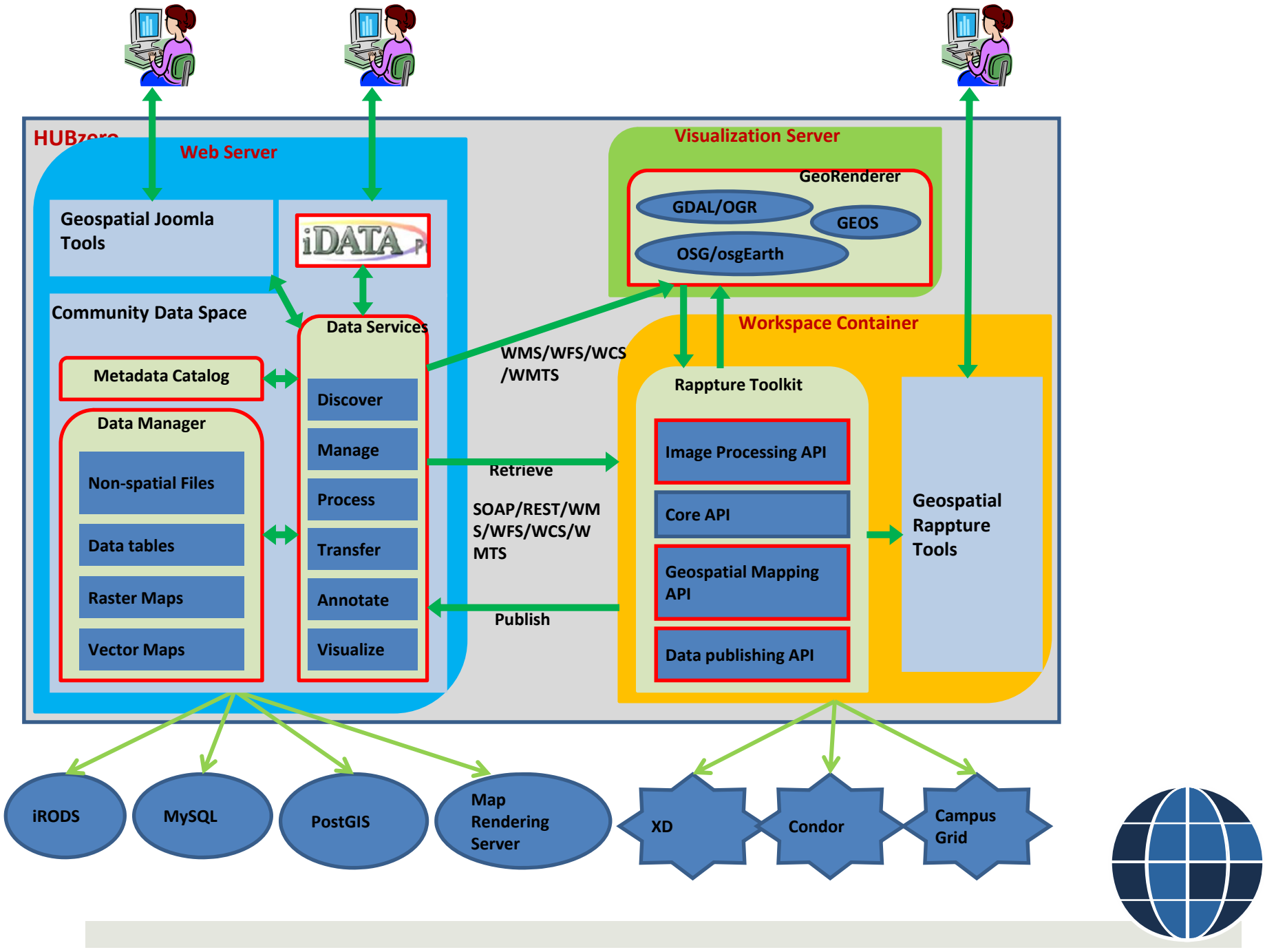
Starting point

- **HUBzero** (Rappture, graphics rendering, collaborative web tools)
- **iData** (tool for self service data publishing and management)
- **Multispec** (tool for analyzing multispectral/hyperspectral image data)
- **Geospatial hub projects** (DRINET, Geoshare, WaterHUB, U2U etc)
- Leveraging software developed elsewhere
  - iRODS
  - Globus data transfer

Multispec

- Image data analysis software application
- Developed for interactive analysis of Earth observational multispectral images
- Processors for image displays, unsupervised & supervised classification and other feature extraction techniques
- Open source
- Used by research, higher education, k-12 learning and government institutions




HUBzero
Web Server
Geospatial Joomla Tools
iDATA
Community Data Space
Data Services
Metadata Catalog
Data Manager
Non-spatial Files
Data tables
Raster Maps
Vector Maps
Discover
Manage
Process
Transfer
Annotate
Visualize
Visualization Server
GeoRenderer
GDAL/OGR
GEOS
OSG/osgEarth
Workspace Container
Rappture Toolkit
Image Processing API
Core API
Geospatial Mapping API
Data publishing API
Geospatial Rappture Tools
WMS/WFS/WCS /WMTS
Retrieve
SOAP/REST/WMS/WFS/WCS/WMTS
Publish
iRODS
MySQL
PostGIS
Map Rendering Server
XD
Condor
Campus Grid

Challenges

- Dealing with large data sets
- Seamless data/tool integration
- Map rendering in hub VM workspace
- Service interfaces
- Interfacing with other systems (Google drive, Dropbox, GIS servers)

Collaborations

- iRODS
- Globus
- DataOne
- Other DIBBs

More to come

- New hub: http://MyGeoHub.org
- HUBbub 2014 – annual HUBzero conference