



G · A · B · B · S

geospatial data analysis building blocks

Broadening Access to Geospatial Capabilities

Carol Song, Larry Biehl, Rosen Center for Advanced Computing

Venkatesh Merwade, School of Civil Engineering

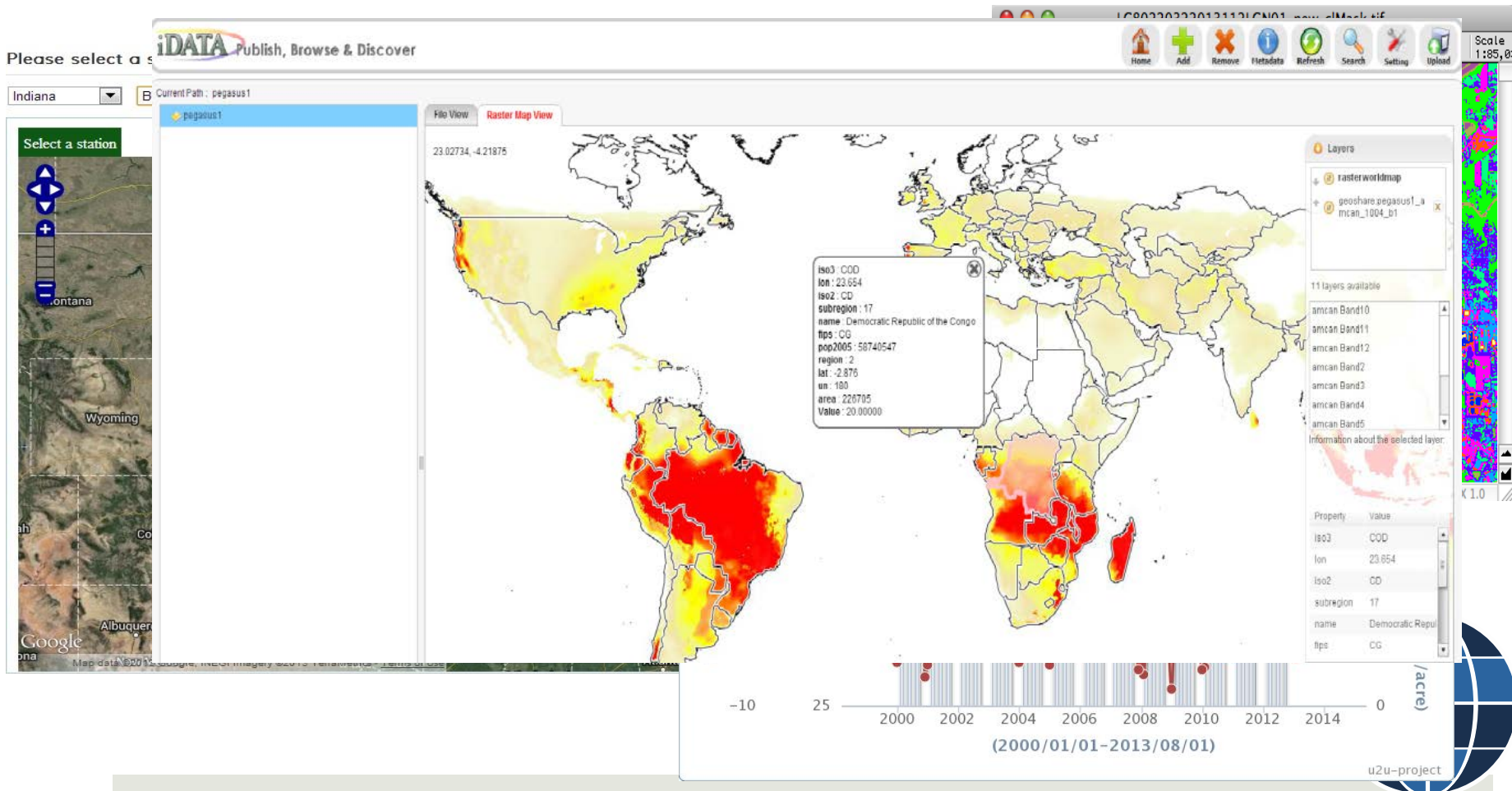
Nelson Villoria, Agriculture Economics & Center for Global Trade Analysis

Purdue University

HUBbub 2014

Driving Use Cases

- Easy deployment of geospatial tools



Driving example

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

The screenshot displays a software interface for hydrologic modeling. The main window is titled "Montgomery" and shows a simulation period of 2009-2009. The interface is divided into several panels:

- Step 2: Select variables:** A list of output variables is shown, with "SURQ(mm): Surface runoff contribution to streamf" selected. Other variables include PRECIP(mm), SNOMELT(mm), PET(mm), ET(mm), SW(mm), PERC(mm), GW_Q(mm), WYLD(mm), SYLD(t/ha), ORGN(kg/ha), ORGP(kg/ha), NSURQ(kg/ha), SOLP(kg/ha), and SEDP(kg/ha).
- Step 3: Set data range:** A date range selector is set to 1/2009 to 12/2009.
- Visualization:** A bar chart titled "Total Monthly Precipitation" shows precipitation in mm for each month from 1/09 to 12/09. Below it, a map titled "Surface Runoff (2009-11)" shows runoff in mm across a geographic area, with a color scale from 10.0 to 30.0 mm. The map is overlaid on a grid of latitude (39.8 to 40.4) and longitude (-92.6 to -92.2).
- Other Panels:** A "Value" dropdown menu is open, showing options like "tomotoso", "Upper_Iowa_River_near", "normal", "SWAT2009", "07060002", "United States", and "IA". A "My Models" list on the right includes "NorthRaccoon_Sensitiv", "North_Raccoon_River_t", "North_Raccoon_River_C", "Sangamon_Calibrated", "Sangamon_River_at_Fis", "Sangamon_Sensitivity", "SouthBranch_calibration", "SouthForkSangamon_C", "SouthFork_sensitivity", "SOUTH_FORK_SANGAM", "SpoonRiver_Sensitivity", "SPOON_RIVER_AT_LON", "SPOON_RIVER_AT_LON", "SugarRiver_Sensitivity", "SUGAR_RIVER_calibrati", "SUGAR_RIVER_NEAR_BI", and "testflatriver".

At the bottom, there is a "Download Archive" button and a note: "its contents or to download the file. Archive or all files can also be downloaded."



Enabling scientists, students and educators to create and share
**interactive tools and models for processing, analyzing
and visualizing geospatial data**

Overarching goal:

- Making it easy for scientists to share geospatial data and tools
- Reach broader user community
 - Anyone can create an online app and share
 - Anyone can share geospatial data



Outcome

- The rapid tool development library RAPPTURE will support
 - geo-referenced data objects (maps, images, etc)
 - Easy way to share geospatial data, both in raw data, and visually and interactively
 - Easy way to share interactive tools that uses, and produces geospatial data
- Tool builder that supports geospatial data to further lower the barrier of creating interactive online tools
- Service interfaces to upload and share geospatial and other types of data in HUBzero
- Service interfaces to link tools and data
- Geospatial capabilities as part of core HUBzero open source release



Funding

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



Team (11+)

Carol Song, PI & Project Director

Larry Biehl (image processing and visualization)

Venkatesh Merwade (hydrologic modeling and data, apps)

Nelson Villoria (global geospatial data, applications)

Betsy Hillery (project manager)

Michael McLennan (HUBzero architect)

Rob Campbell (sr developer, data component)

Leif Delgass (sr developer, visualization)

George Howlett (sr developer, RAPPTURE extension)

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

Rajesh Kalyanam (spatial processing, management)

Graduate students in scientific domains



Building on prior work

- **HUBzero** (Rappture, graphics rendering, collaborative tools)
- **iData** (tool for self service data sharing 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



Challenges

- Dealing with large and complex (often non-standard) data sets
- Peculiarity in data
- Extending the existing RAPPTURE model to support the new requirements of geospatial data and interactivity
- Map and image rendering in hub VM workspace
- Service interfaces
- Linking data – tools



What's to come?

- ▣ [New Super Hub](#) for your geospatial needs
- ▣ Demonstration video

