

An open-source geospatial cyberinfrastructure for interdisciplinary collaboration and broader engagement

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Award
ACI-1261727

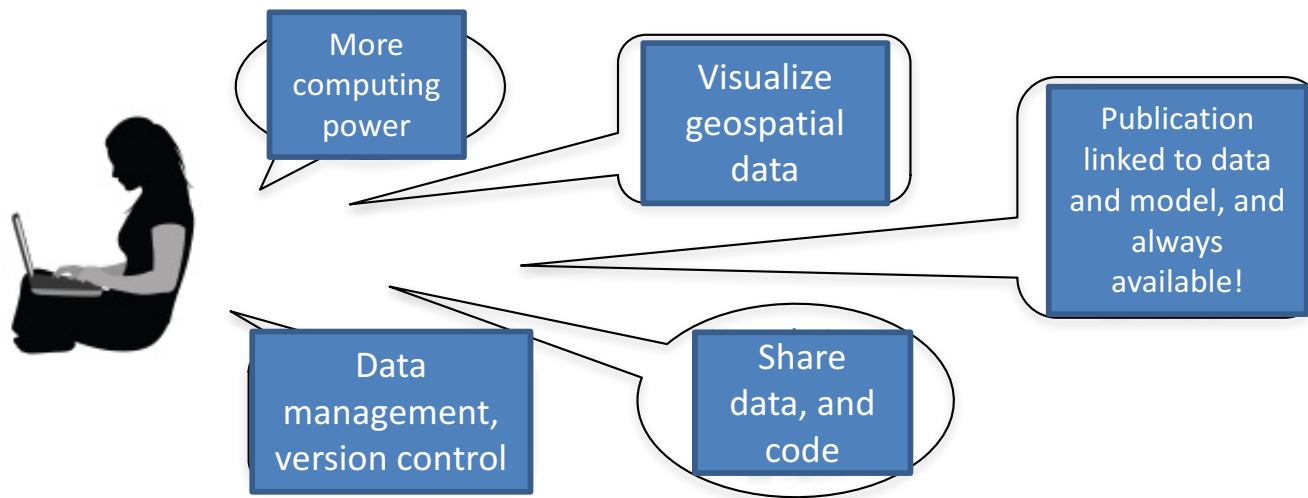
Impacts World 2017, October 11-13, Potsdam, Germany

Universities

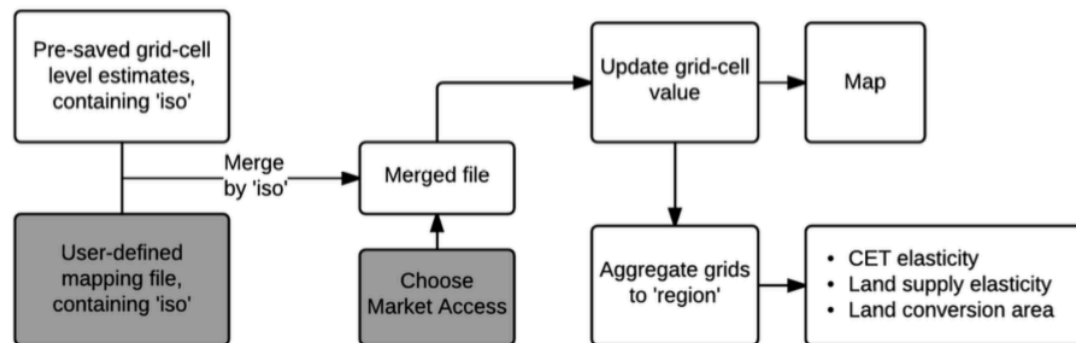
- Resources and expertise
 - + High performance computing
 - + Scientific data
 - + Scientific models
 - + Geospatial data processing, visualization
 - + Research on policy impacts
 - + Data curation
 - +
- These tend to be
 - Developed in silos
 - Do not play with each other
 - Low usability (e.g., outside small groups)
 - High learning curves
 - Sustainability challenge (funding, etc)
 -



Going beyond laptop computing

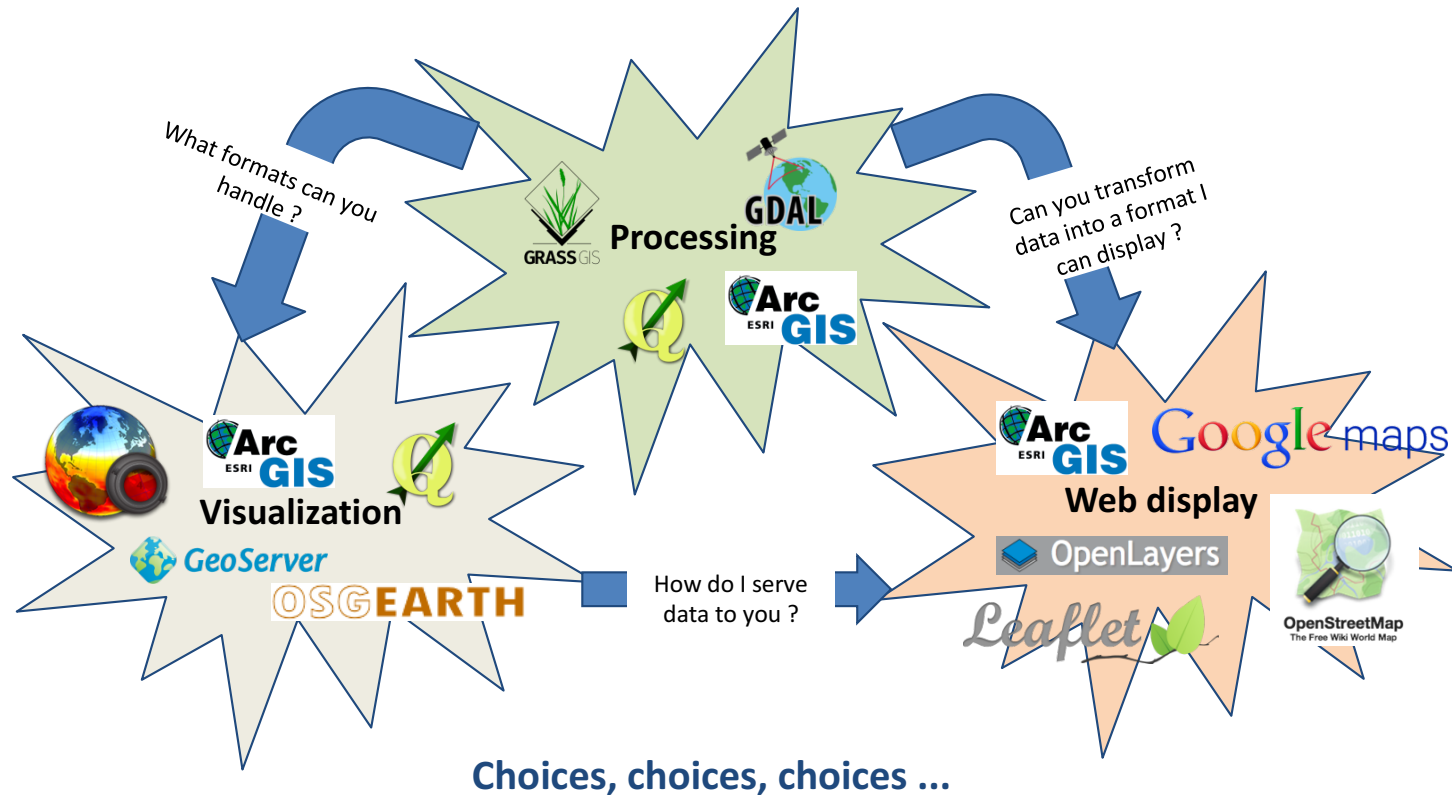


Ag economist studying cropland supply -> SIMPLE-G



Software stack for spatial data

It is definitely not trivial to deal with geospatial data
(processing, displaying, exchange/sharing, etc)



What we really need

- A seamless cyberinfrastructure that encapsulates
 - High performance computing resources
 - Data management
 - Geospatial data capabilities
 - Multi-scale data transformation and models
 - Sharing and collaboration around data
- And also
 - Easy to use
 - Open access
 - “Lights on” all the time



What is GeoHub?

MY GEO HUB

NEWS RESEARCH TEACHING RESOURCES COMMUNITY EXPLORE ABOUT SUPPORT LOGIN

FREE. FAST. POWERFUL. Search

GLASS
Global to local analysis of systems sustainability to meet the Sustainability Development Goals on a changing planet with limited land and water resources.

Useful to Usable (U2U)
Transforming Climate Variability and Change Information for Cereal Crop Producers, is an integrated research and extension project working to improve farm resilience and profitability in the North Central Region by transforming existing climate information into usable knowledge for the agricultural community.

GABBs – Geospatial Building Blocks
An NSF Data Infrastructure Building Blocks project to integrate geospatial capabilities in HUBzero and make it easy for non-GIS experts to share geospatial data, create and deploy interactive applications on the web.

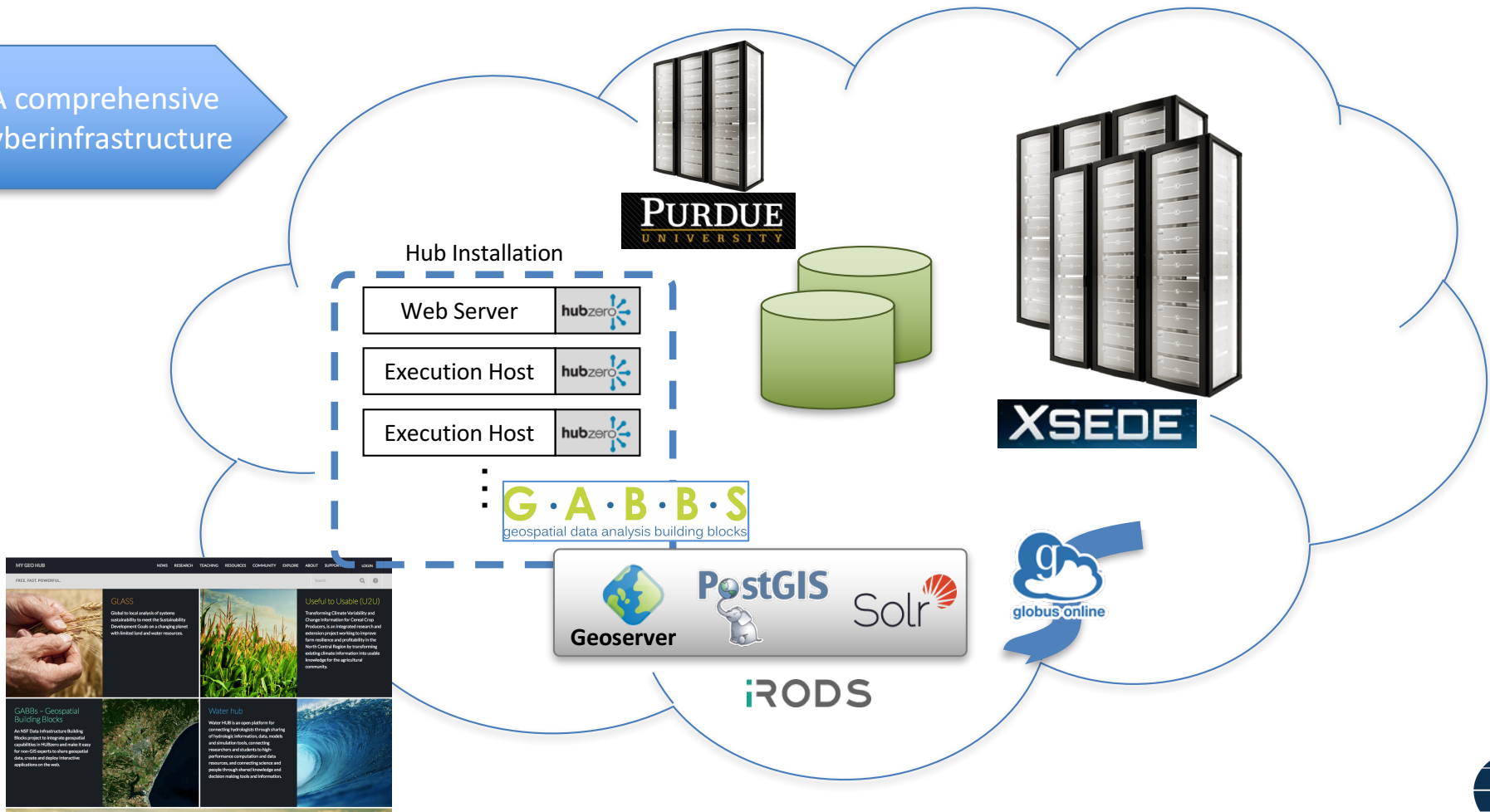
Water hub
Water HUB is an open platform for connecting hydrologists through sharing of hydrologic information, data, models and simulation tools, connecting researchers and students to high-performance computation and data resources, and connecting science and people through shared knowledge and decision making tools and information.

A web portal?

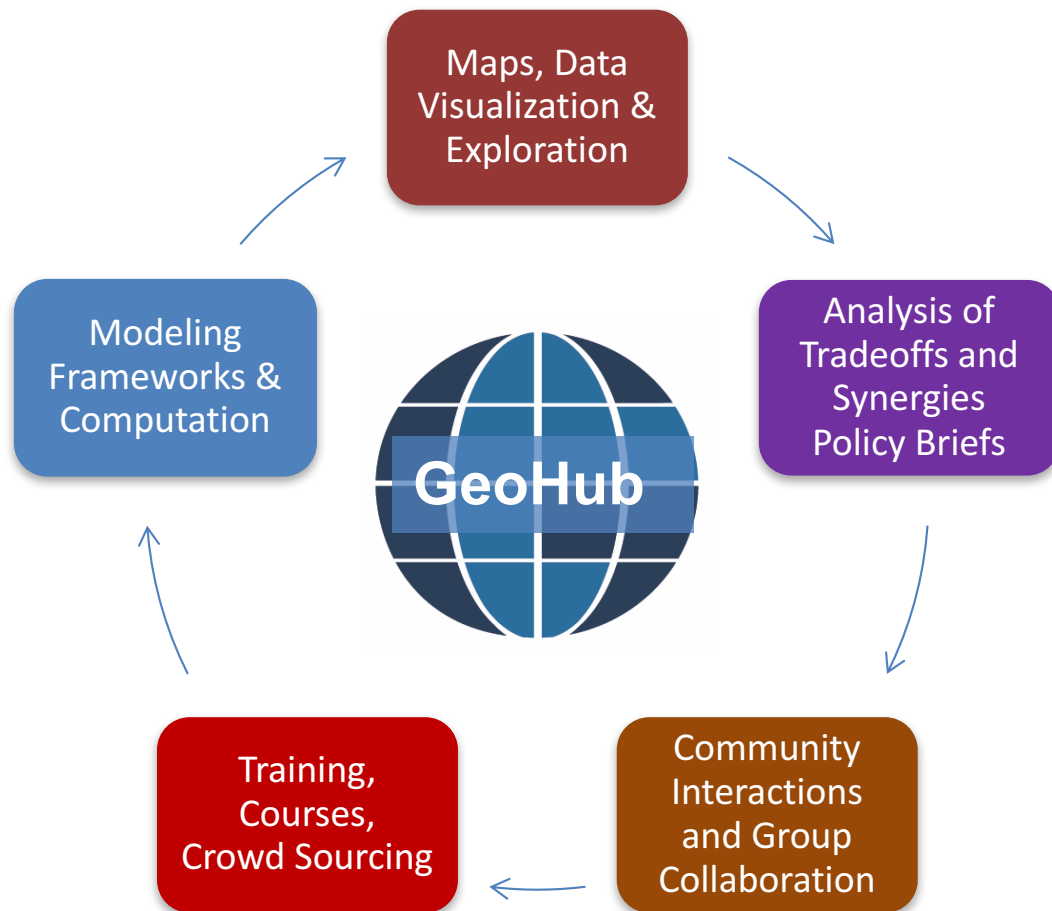


GeoHub

A comprehensive cyberinfrastructure



Role of GeoHub in GLASS



GLASS

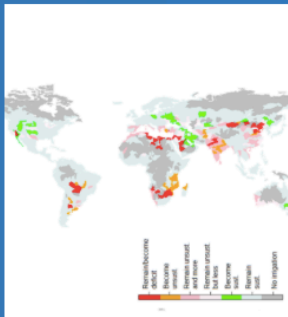


PURDUE UNIVERSITY
GLASS
Global to Local Analysis of Systems Sustainability

Meeting the Global Sustainable Development Goals on a Changing Planet with Limited Land and Water Resources
[Getting started](#)

RESEARCH HIGHLIGHTS

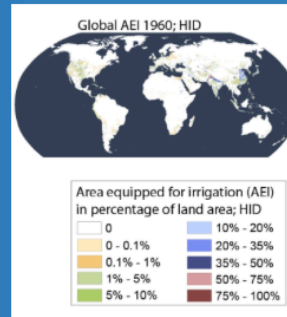
Employing Global-to-Local Analysis of Systems Sustainability Approach



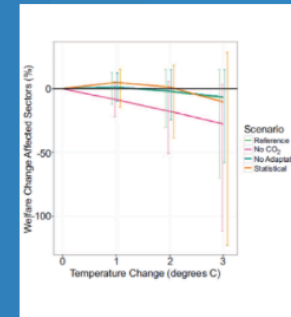
Evolution of the Irrigation vulnerability index over the period: 2006-2050



SIMPLE-on-a-Grid (SIMPLE-G) - a multi-region, partial equilibrium model of gridded cropland use, crop production, consumption and trade.



Historical Irrigation Dataset (HIT) - A global dataset of the extent of irrigated land from 1900 to 2005



Impacts of climate change on crop yields and economic welfare: meta-analysis of process-based and statistical models



SIMPLE-G – SIMPLE on a grid

SIMPLE-G Edit

By [jungha woo¹](#), [Jaewoo Shin¹](#), [Uris Lantz C Baldos¹](#), [Lan Zhao¹](#)
1. Purdue University

SIMPLE-G

[Launch Tool](#)

Version **1.1.1.2** - published on 11 Oct 2017

[Open source: license | download](#)

[View All Supporting Documents](#)

[13 users, detailed usage](#)

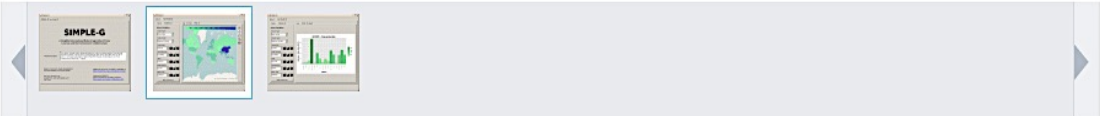
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Category: [Tools](#) Published on: 11 Oct 2017

Abstract

SIMPLE-on-a-Grid (SIMPLE-G) is a multi-region, partial equilibrium model of gridded cropland use, crop production, consumption and trade. It is an extension of the SIMPLE model that has been applied to study long run sustainability issues in the global food-water-environment nexus. Rather than looking at regions or country aggregates, SIMPLE-G divides the world into georeferenced grid-cell units. This allows SIMPLE-G to explicitly incorporate local environmental constraints in its projections, account for sub-national heterogeneity of global drivers such as climate change and water scarcity, and assess local land and water use given future trends the global farm and food system.

In SIMPLE, the world is split into sixteen economic regions. Regional consumption is disaggregated into four commodities (crops, livestock, processed foods

GLASS
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Global to Local Analysis of Systems Sustainability

[Watch resource](#)

When watching a resource, you will be notified of changes made. You may stop watching at any time.

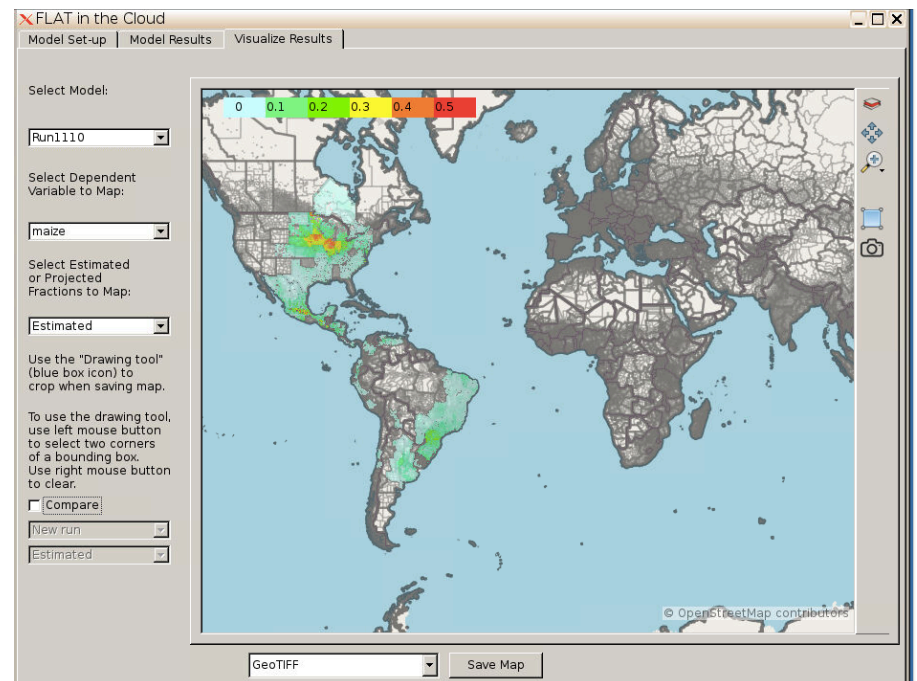
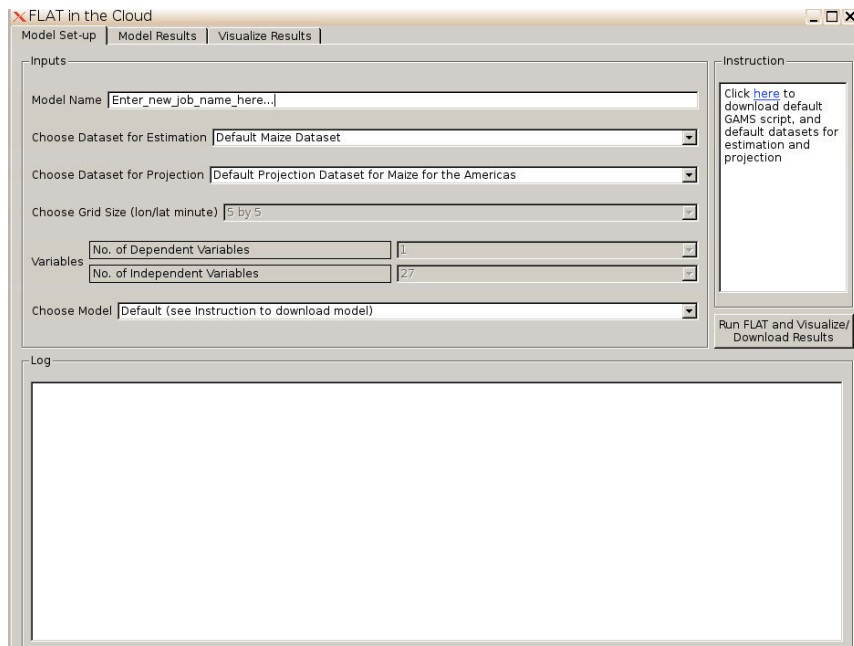


Set up, Run, & Visualize

The screenshot displays the SIMPLE-G software interface, which is used for modeling and visualizing global food security and water use. The interface is divided into several sections:

- Top Bar:** Shows the window title "SIMPLE-G (7:08 pm)" and buttons for "Terminate" and "Keep for later".
- Left Panel (Select Variables):** Contains dropdown menus for "Output type" (Percent Changes), "Output level" (Regional Output), and "Production" (QCR0Pr). It also includes sections for "Food Security" (CALORIES), "Land" (QIGLNDr), "Environment" (QEMISr), and "Water Use" (QWATERr). A "Bulk Download" button is located at the bottom of this panel.
- Right Panel (Map):** Displays a world map with a color scale legend at the top. The legend values are: -0.65, 6.08, 12.80, 19.53, 26.26, 32.98, 39.71, 46.44, 53.16. The map shows a color gradient from light green to dark blue, indicating the magnitude of the variable being visualized. The text "© OpenStreetMap contributors" is visible in the bottom right corner of the map area.

FLAT— Fine-scale Land Allocation Tool



Other relevant tools

AgMIP Data Aggregator

The screenshot displays the AgMIP Tool 1.2.4 @ GEOSHARE interface. It features a top navigation bar with 'Download', 'Aggregate', and 'Visualize' tabs. The main area is divided into sections for 'Input Files', 'Weight Map or Aggregation Function', and 'Aggregation Functions'. The 'Input Files' section includes fields for '1. AgMIP Files' and '2. Region Map'. The 'Weight Map or Aggregation Function' section includes a 'Weight Map' field and radio buttons for 'MAX', 'MIN', 'MEAN', and 'SD'. The 'Aggregation Functions' section has a checkbox for 'Enable Functions'. A 'Log' section at the bottom left shows the execution progress. A world map visualization is shown in the foreground, displaying a color-coded map of the world with a 'Download' button below it.

Climate Scenario Aggregator (CMIP5 data)

The screenshot displays the Climate Scenario Aggregator 1.1 interface. It features a top navigation bar with 'Download', 'Aggregate', and 'Visualize' tabs. The main area is divided into sections for 'Climate Data', 'GCM', and 'RCP'. The 'Climate Data' section includes radio buttons for 'Average surface air temperature', 'Maximum surface air temperature', and 'Minimum surface air temperature'. The 'GCM' section includes radio buttons for 'HadGEM2-ES', 'IPSL-CM5A-LR', 'MIROC-ESM-CHEM', 'GFDL-ESM2M', and 'NoIESM1-M'. The 'RCP' section includes radio buttons for 'Historical', 'RCP8.5', 'RCP6.0', 'RCP4.5', and 'RCP2.6'. A 'Fetch Data' section includes a 'Clear cache before fetching data' checkbox and 'Download NetCDF files' and 'Data Description' buttons. A 'Years' section includes a vertical slider for selecting years from 1980 to 2010 and a 'Download' button.



Education mission

Global Change and the Challenges of Sustainably Feeding a Growing Planet

This online resource contains materials for teaching a graduate-level course on global agricultural change and food sustainability. It heavily draws from the textbook "Global Change and the Challenges of Sustainability Feeding a Growing Planet" by Thomas Hertel and Uris Lantz Baldos including supplementary reading materials and lab assignments using the SIMPLE model.

Climate Change Impacts on Agriculture Food and Environmental Security Global Agricultural Change Global Food Sustainability



Brought to you by:
GLASS

Overview Reviews Offerings

Feeding the world's population while ensuring the environmental sustainability is one of the world's 'grand challenges'. As we look ahead to the middle of this century, will the world's agricultural resource base be up to the task of meeting the diverse demands being placed on it by growing population, rising incomes, growing biofuel production and rising demand for land-based environmental services?

This online resource contains materials based on a graduate-level course offered at Purdue University on global food sustainability. It heavily draws from the textbook "[Global Change and the Challenges of Sustainability Feeding a Growing Planet](#)" by Thomas Hertel and Uris Lantz Baldos including supplementary reading materials and lab assignments using the SIMPLE model.

The course is designed for 14 weeks with each week allotted to a topic on global agricultural change. Beginning the week with an overview lecture by a faculty member with expertise in this area, followed by student-led discussion of the readings and book chapter - leading into discussion of the lab assignments and a review of the basic principles of economics.

Half a dozen lab assignments which use the SIMPLE model are spaced out over the first 10 weeks of the semester. The labs are drawn from the empirical examples at the end of each chapter, sometimes consolidating several themes into one assignment.

For comments / questions / recommendations, please contact Uris Baldos (ucbaldos@gmail.com)

Date Modified: 07/2016



Course length: 14 weeks
Estimated Effort: 3-4 hours per week
[Go to Course](#)

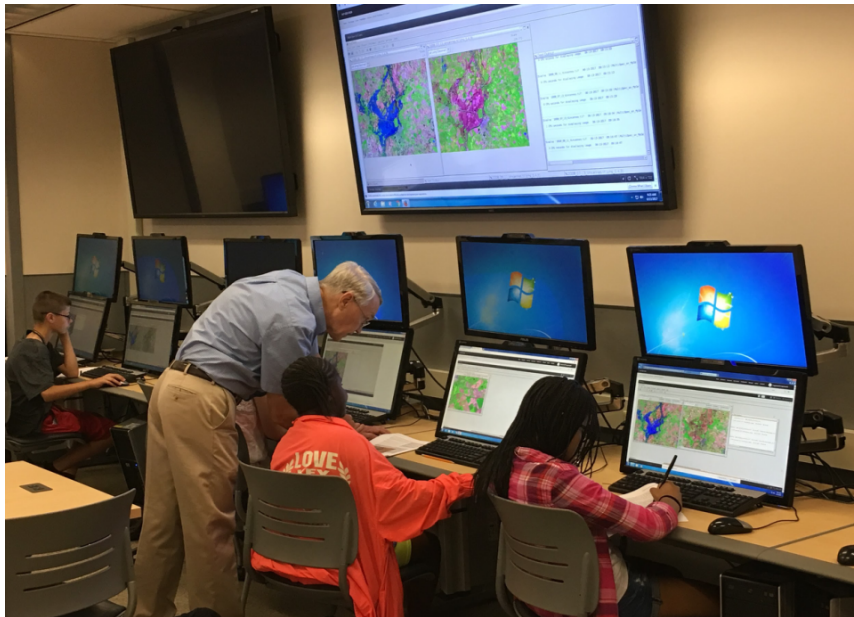
About the Instructors



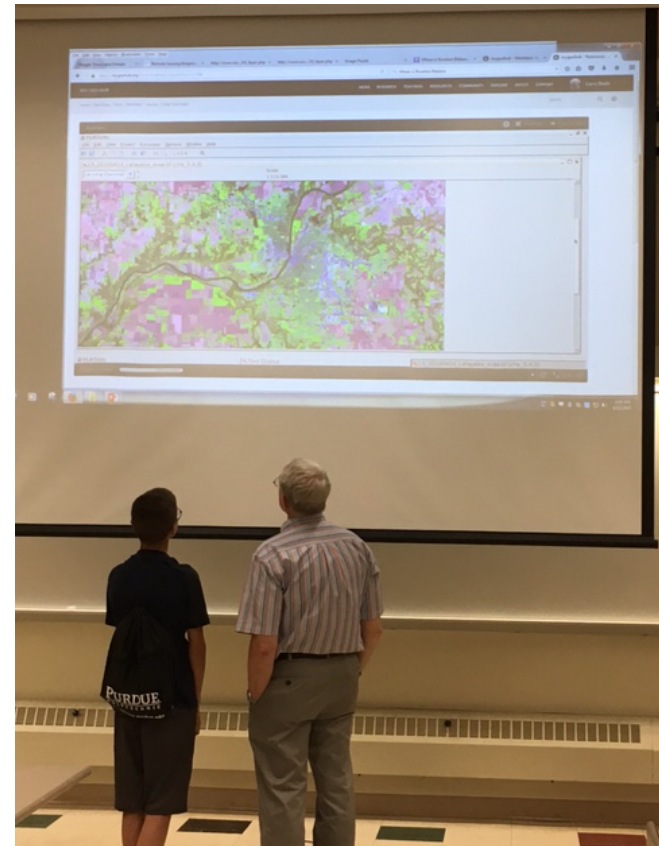
This instructor has yet to write their bio.



Geospatial data is interesting!



Middle & high school students at summer camp



GeoHub – a science gateway

In addition to common science gateway functions:

- **Integrated** data management environment with **built-in** geospatial data support
- Toolkits for rapid application development, **no GIS programming expertise** required
- Data visualization builders and tools that require **no programming**
- Production system open to research and education use, 24x7 (**all related servers, services**)

GLASS: <http://mygeohub.org/groups/glass>

