

Extending Gateways into the Field: Geospatial Extensions and Remote Data Services

Gateways 2017

Rob Campbell, Lan Zhao, Rajesh Kalyanam, Carol Song, Larry Biehl,
Rosen Center for Advanced Computing, Purdue University



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Geospatial Features

- ☐ Geospatial Data Analyses
Building Blocks
- ☐ An NSF, Data Infrastructure
Building Blocks (DIBBS)
project

- ☐ Communities
- ☐ Projects
- ☐ Tools
- ☐ Publications

- ☐ **iData**: storage with metadata
- ☐ Map viewer
- ☐ Map-based search
- ☐ Tools: GeoBuilder, MultiSpec
- ☐ pyMapLib

Annotate file » Geospatial Files » Raster Images » harvest.tif

Core Metadata

description	:	
title	:	
subject	:	maize,harvest,africa,crop
contributor	:	rajkalaya
publisher	:	iData@myGeoHub
date	:	2017-Mar-22 14:49:10.710135
identifier	:	Geospatial Files/Raster Images/harvest.tif
format	:	tif
type	:	geospatial
source	:	
creator	:	
language	:	tif

Geographic Coverage

projection	:	(null)
northlimit	:	90.000005
southlimit	:	-89.999997

Base Provider

- ☒ OpenStreetMap
- ☐ Bing
- ☐ Google
- ☐ iData

Base Layer

- ☒ OpenStreetMap Default

Overlays

- ☒ harvest_b1
- ☒ Selected Feature(s)

Legend

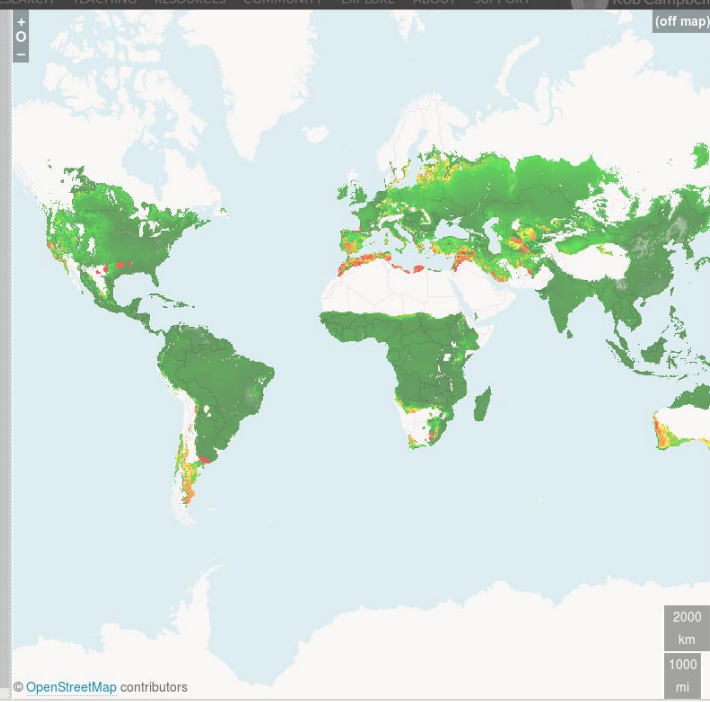
harvest_b1



Selected Features

harvest_b1

GRAY_INDEX 0.537606894969



iData: Relevant *Features*

- Metadata - storage, extraction, editing
- Maps - processing, rendering, viewing



Africa Crop Yield Prediction

Project **collaborator**

Connections » iData storage » Geospatial Files

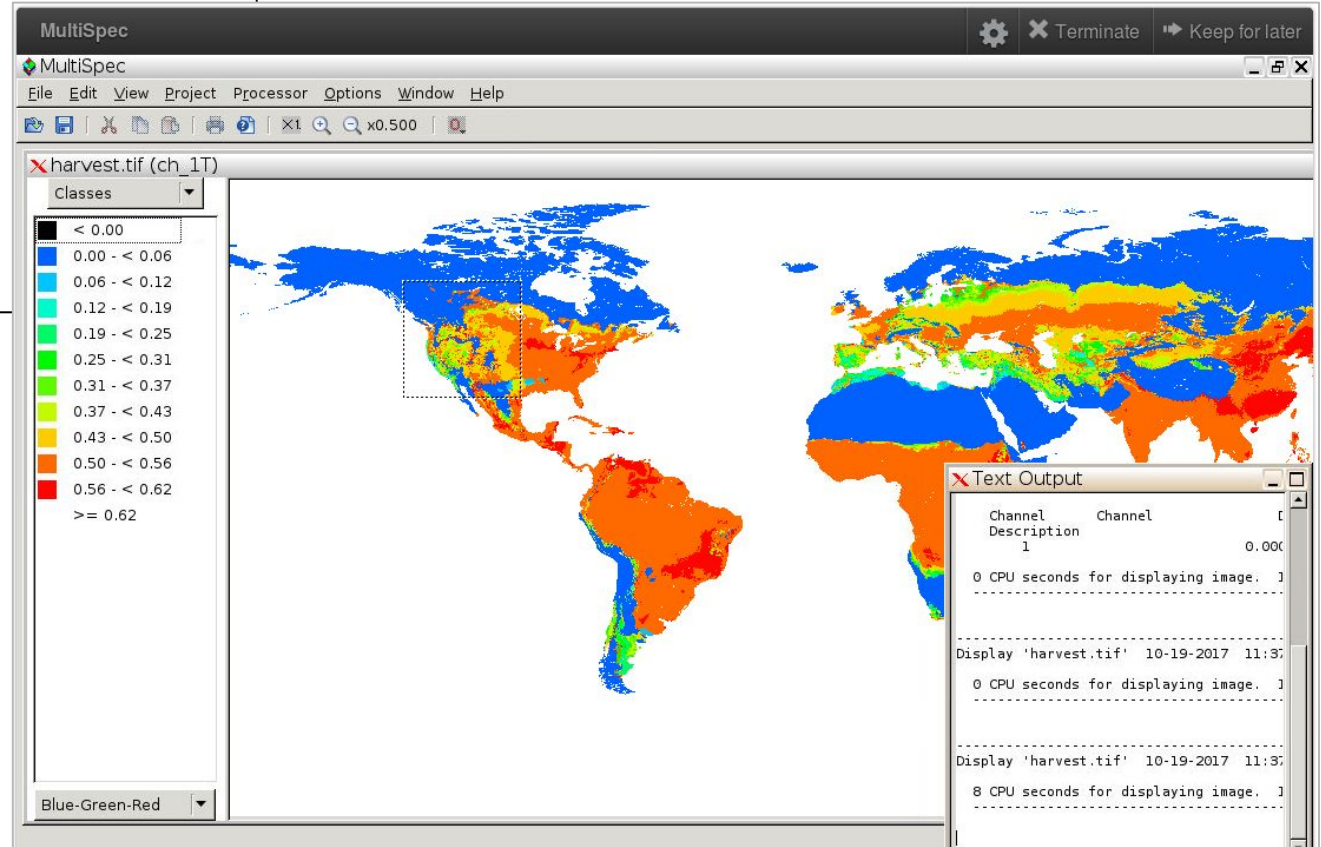
Upload											
<input type="checkbox"/>	Name ↓							Size ↓	Modified ↓	By	
	Parent folder										
<input type="checkbox"/>	Raster Images								Dec 8, 2016		
<input checked="" type="checkbox"/>	IMG_20170117_145403.jpg							24 KB	Jan 17		
<input type="checkbox"/>	loc-image.jpeg							208 KB	Dec 12, 2016		

HUBzero *Projects*

- Collaborative file storage
- Upload / download
- Preview
- Launch tools
- Create publications
- Annotate with metadata

HUBzero *Tools*

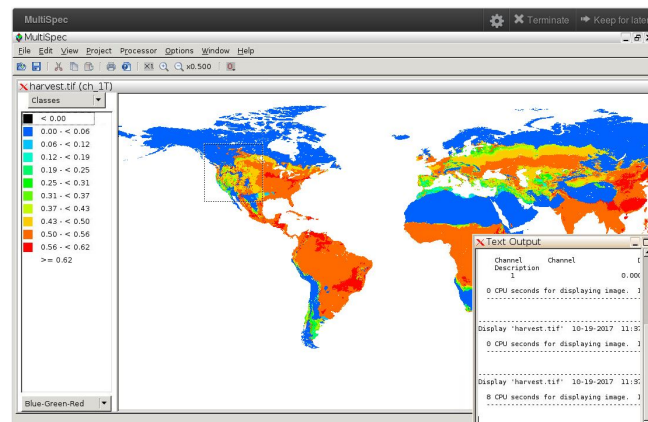
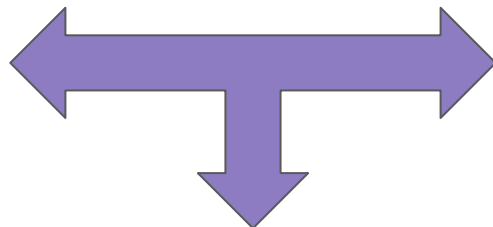
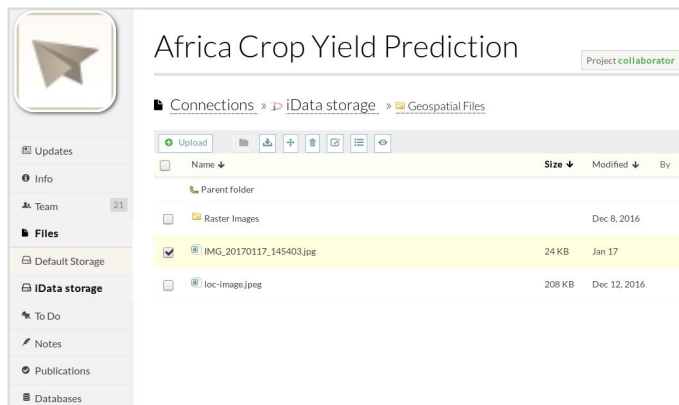
- Desktop applications
- Hosted on hub server
- Remote desktop
- Within browser



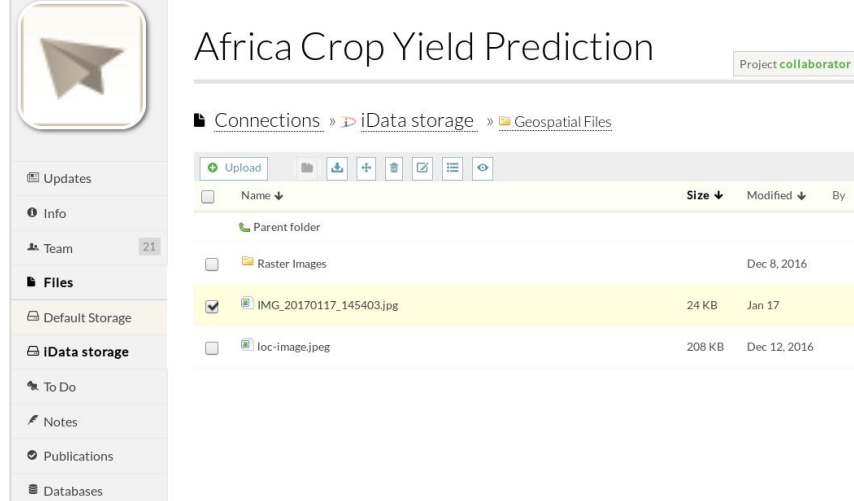


iData

- Access from projects and tools
- Files stored within iRODS, accessed via FUSE mount
- Metadata annotation
- Geospatial processing
- Tool launch from select file(s)



Opening up access...



Africa Crop Yield Prediction

Project collaborator

Connections » iData storage » Geospatial Files

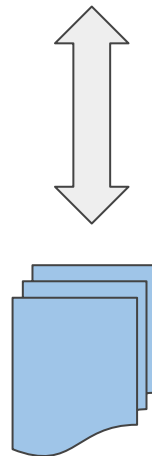
Upload

<input type="checkbox"/>	Name ↓	Size ↓	Modified ↓	By
<input type="checkbox"/>	Parent folder			
<input type="checkbox"/>	Raster Images		Dec 8, 2016	
<input checked="" type="checkbox"/>	IMG_20170117_145403.jpg	24 KB	Jan 17	
<input type="checkbox"/>	loc-image.jpeg	208 KB	Dec 12, 2016	

File Transfer:

Native HUBzero support for **HTTP** and **SFTP** extended to iData -enabled projects

- ✓ Automated metadata extraction
- ✓ Geospatial processing
- ✓ iData storage



Extending access...

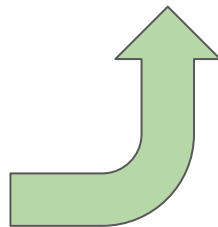
Adding methods to HUBzero's Projects REST API

Existing methods:

- List projects to which user belongs GET **.../list**
- Get project info GET **.../id**
- List project team members GET **.../team**
- List project files GET **.../files**
- Get file info GET **.../get**
- Create folder in project GET **.../makedirectory**
- Delete file or folder from project GET **.../delete**
- Insert/update a project file GET **.../insert, .../update**
- Move/rename a file or folder GET **.../move, .../rename**
- Upload/download a file GET **.../download, POST .../upload**

New API methods:

- List project-files connections GET **.../connections**
- Get file annotation GET **.../getmetadata**
- Set file annotation GET **.../setmetadata**
- Upload & combine file chunks GET,POST **.../chunkedUpload**

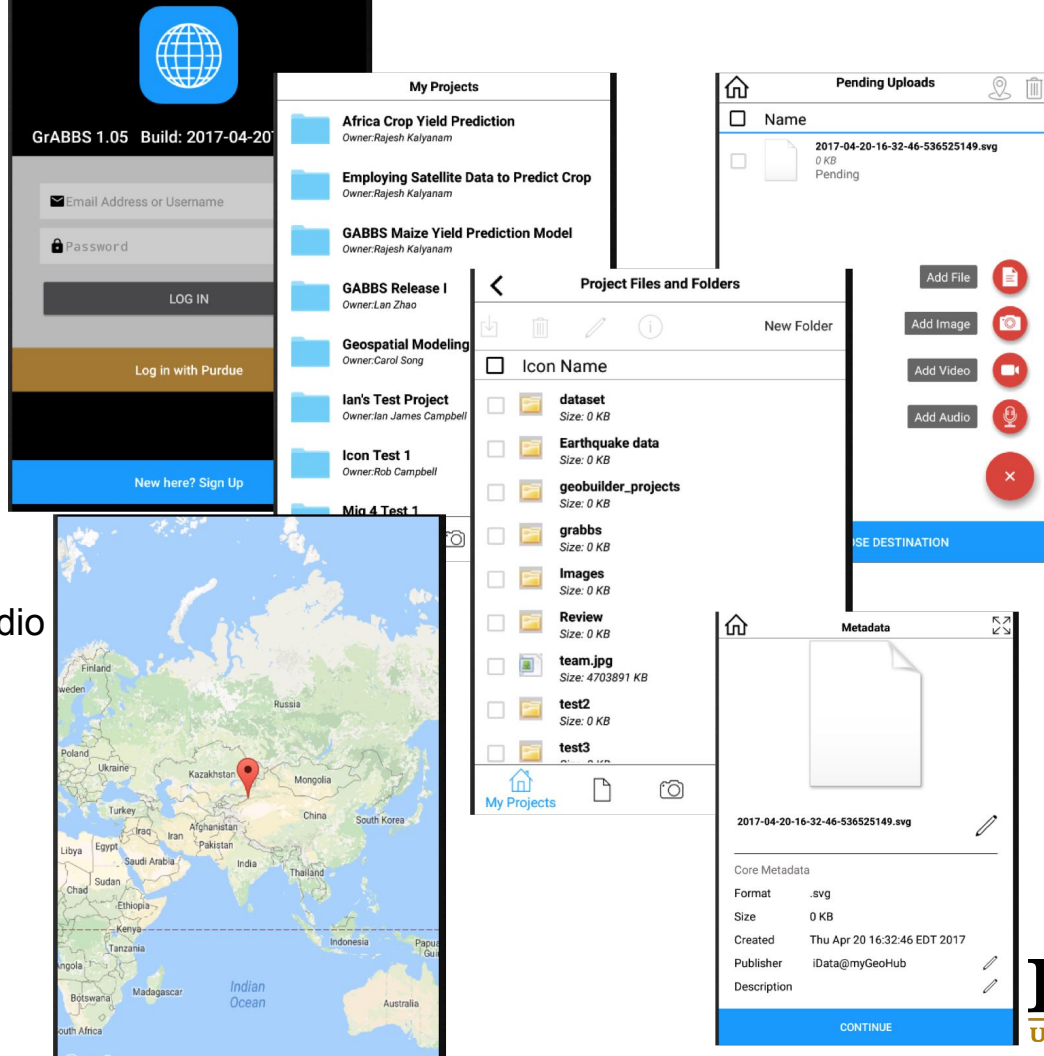


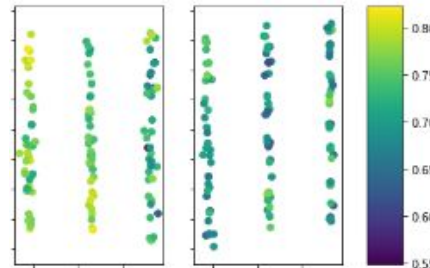
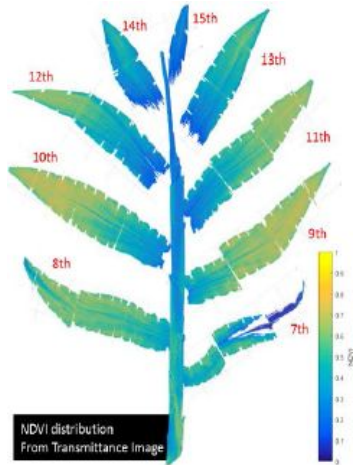
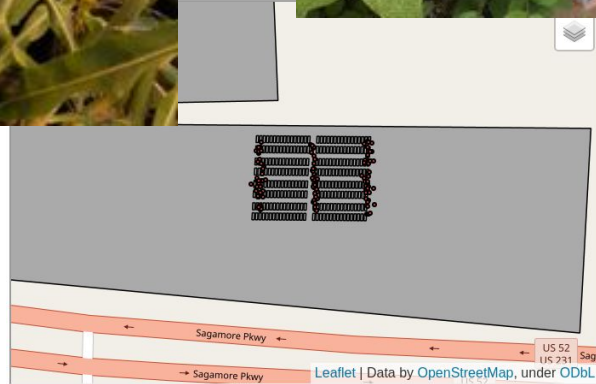
- ✓ Automated metadata extraction
- ✓ Geospatial processing
- ✓ iData storage

GrABBS

Mobile App

- API reference / demo
- Android & iOS
- Authenticate to hub
- Browse project files
- Capture images, video, audio
- File upload, download
- Plot collected data on map





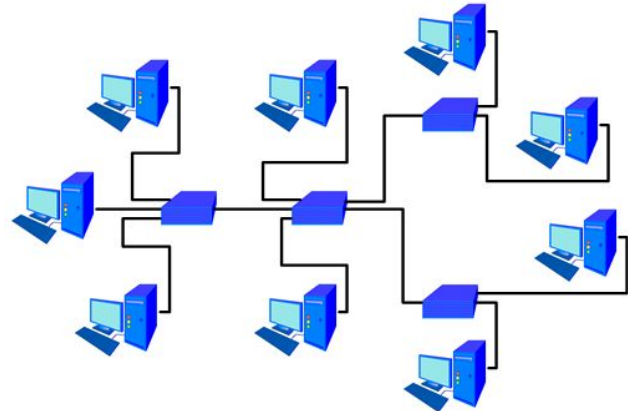
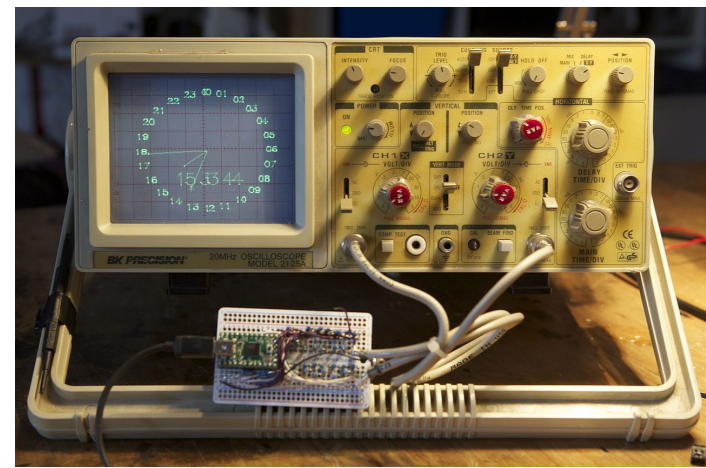
Use Case

Plant Phenotyping







- Field data collection device
- Crop assessment
- Uploads geolocated data to hub project via API
- Dr Jian Jin, Assoc. Professor of Agriculture & Biological Engineering, Purdue Univ.

Challenges

- Supporting real-time data refresh
- Scaling up to support large number of simultaneous users



Example Workflow

1. Register as a user on selected hub 
2. Create user group, add collaborators 
3. Create project, attach user group 
4. Create folder in iData storage area 
5. Collect data in the field, upload to hub 
6. Use tools to process and visualize data 
7. Assemble files into publication



G · A · B · B · S

geospatial data analysis building blocks

More Info

- <https://MyGeoHub.org>
 - Geospatial modeling
 - Data analysis
 - Visualization
 - Group hosting
- GABBs Availability
 - <https://mygeohub.org/groups/gabbs/release>
 - VM images
 - AWS CloudFormation templates
 - Linux packages - RedHat/CentOS

Acknowledgements

- NSF award #1261727
- Bekmurat Spayev
- HUBzero team
- Dr. Jian Jin and his team