

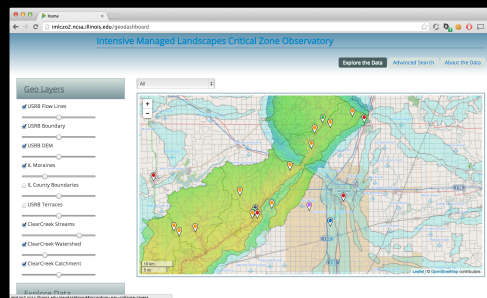
# IML-CZO Data Management

# Scalable Data Management

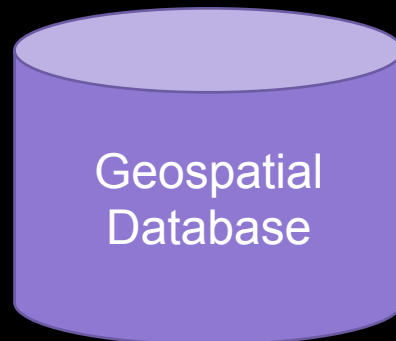
- Ability to grow in size and data types

## Geodashboard

Visualize  
Search  
Retrieve

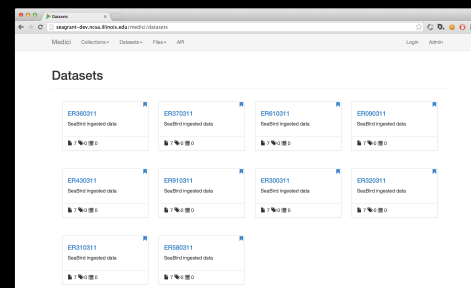


Geospatial  
Cache

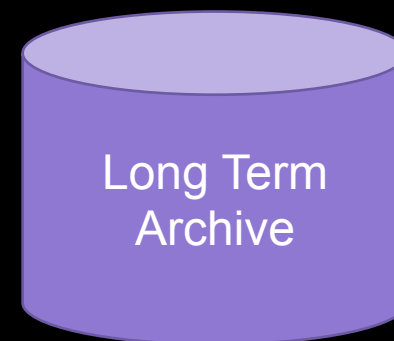


## Clowder

User Uploads



Raw Data



# Data Counts

- 773 Files
- 145 Datasets
- 70 Collections
  
- 1,134,944 Datapoints
- 101 Streams
- 96 Sensor Locations

# <http://data.imlcz.org/geodashboard/>

IMLCZO



HOME

COMPARE

SEARCH

Explore Layers

Explore by Categories

## Hydromet <sup>?</sup>

Air Temperature <sup>i</sup>

Monthly Precipitation <sup>i</sup>

PS



## Stream Water Quality <sup>?</sup>

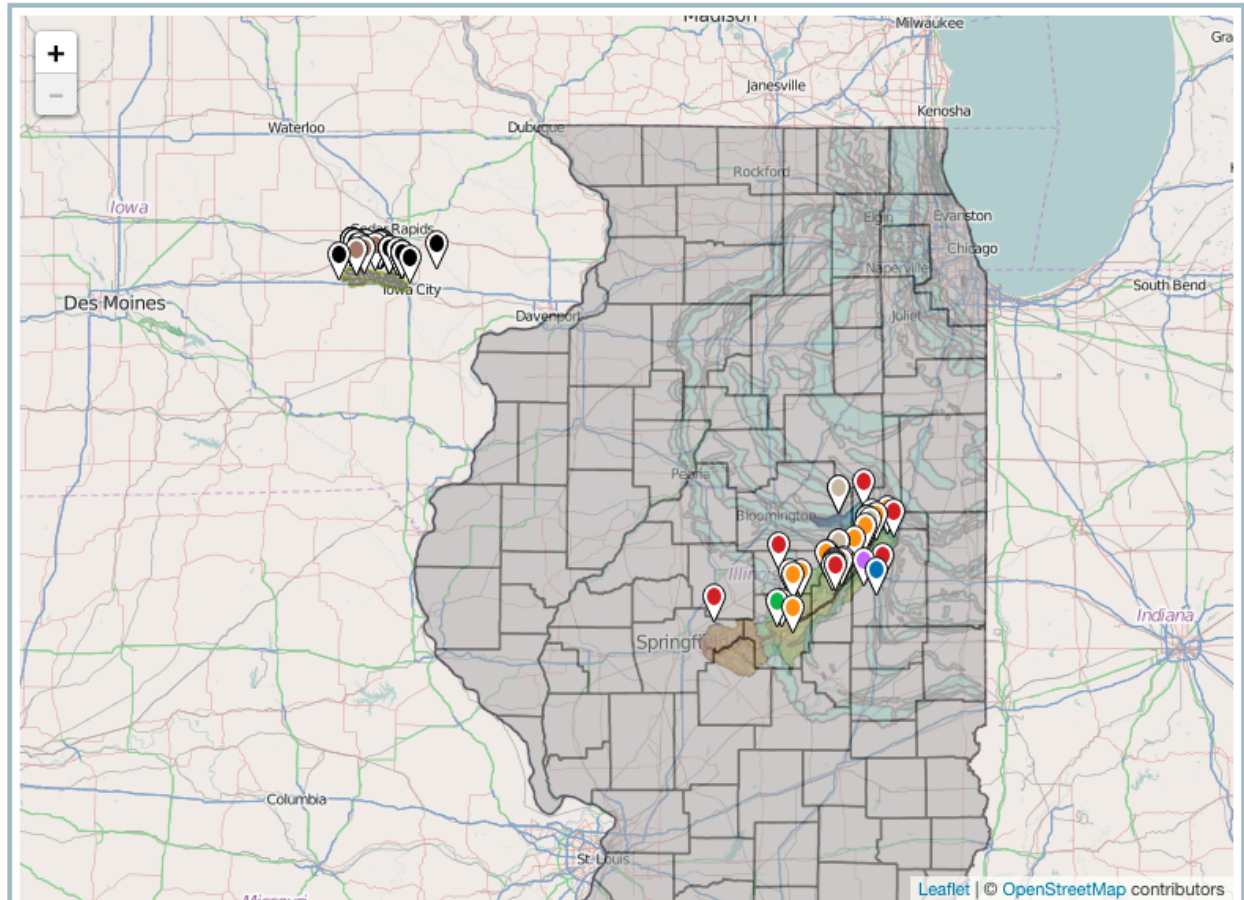
Stream Water Temperature <sup>i</sup>

ISWS



Kjeldahl Nitrogen <sup>i</sup>

ISWS



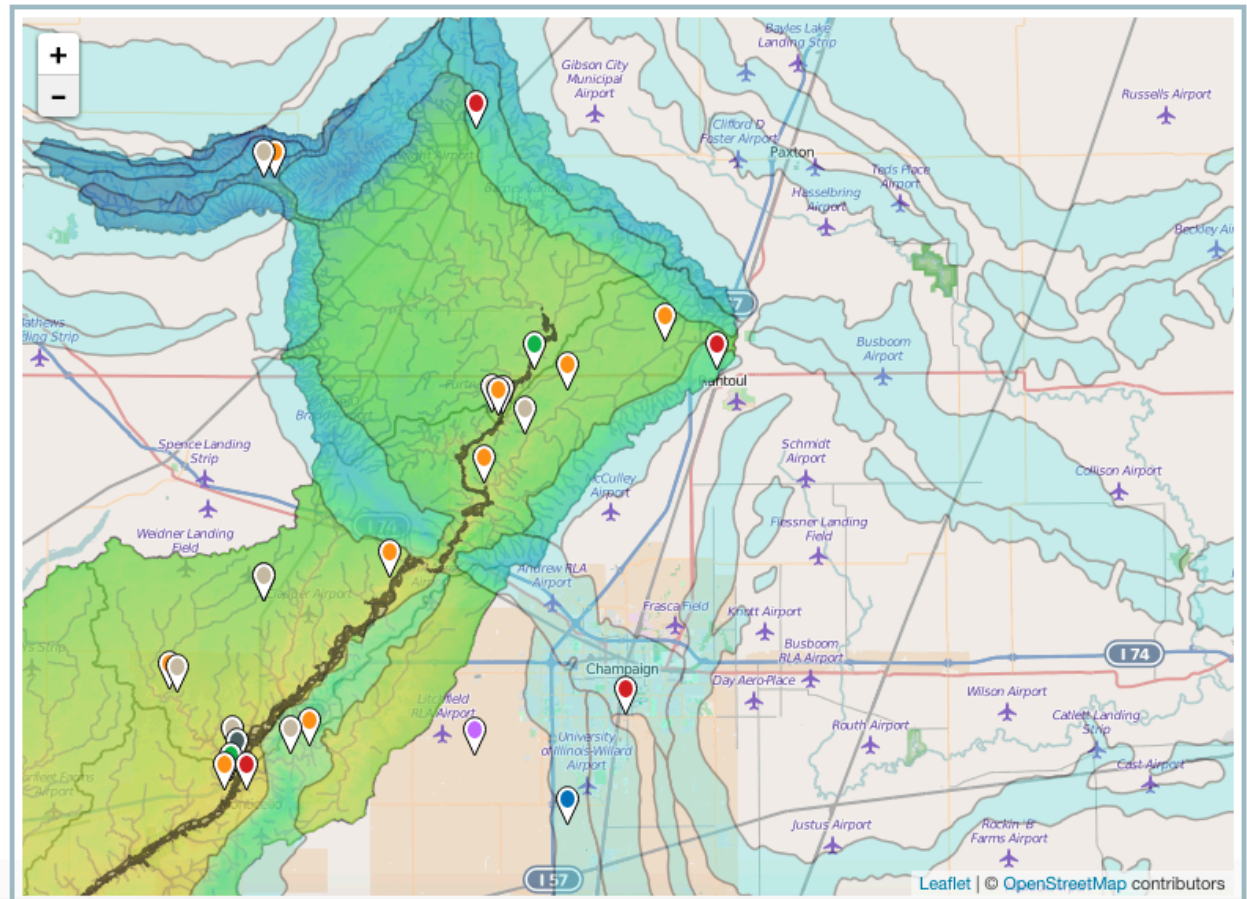


# GIS Layers Control

## Explore Layers

- ☒ USRB Flow Lines
- ☒ USRB Boundary
- ☒ USRB DEM
- ☒ IL Moraines
- ☐ IL County Boundaries
- ☒ USRB Terraces
- ☒ ClearCreek Streams
- ☒ ClearCreek Watershed
- ☒ ClearCreek Catchment

## Explore by Categories



# Sites

## Explore Layers

## Explore by Categories

### Hydromet <sup>?</sup>

Air Temperature <sup>i</sup>

Monthly Precipitation <sup>i</sup>

PS



### Stream Water Quality <sup>?</sup>

Stream Water Temperature <sup>i</sup>

ISWS

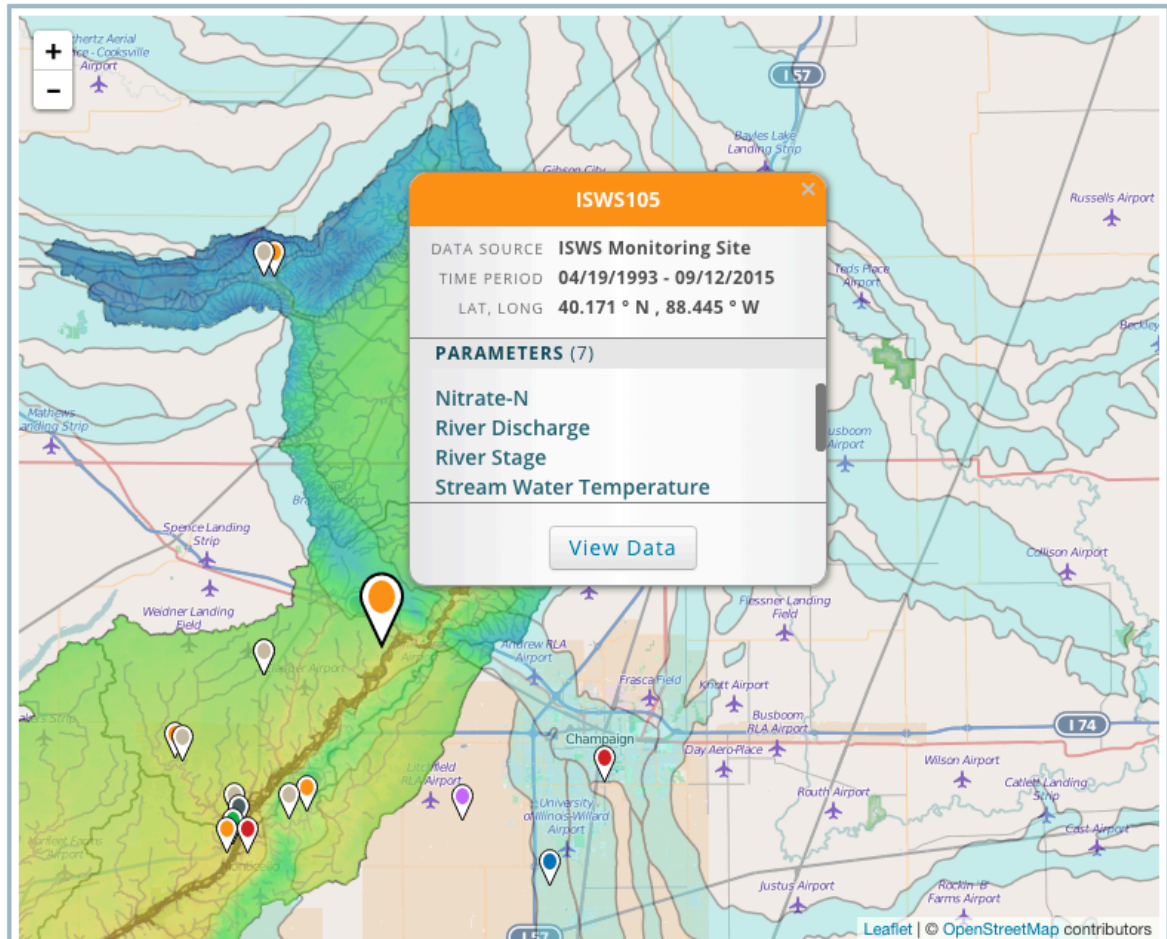


Kjeldahl Nitrogen <sup>i</sup>

ISWS




pH <sup>i</sup>



# Different Views

## Explore by Source


 Atmospheric Deposition Station (ADS)

ILLINOIS 

 Ameriflux Tower Station (ATS)

ILLINOIS 

 Flux-tower (FLUX-TOWER)

ILLINOIS 

 IFC River Sensor (IFIS)

IOWA 

 ImI-czo (IML-CZO)

CLEAR CREEK 

 Intensively Managed Landscapes - Critical Zone Observatory (IMLCZO)

ILLINOIS 

 In-field Download (IN-FIELD-DOWNLOAD)

CLEAR CREEK 

## Explore by Parameters

 Absolute Pressure (ABSOLUTE-PRESSURE-PSI) 

 Air Temperature (AIR-TEMPERATURE-F) 

 Ammonium (AMMONIUM) 

ISWS 

 Kjeldahl Nitrogen (KJELDAHL-NITROGEN) 

ISWS 

 Monthly Precipitation (MONTHLY-PRECIPITATION) 

PS 

 Nitrate-N (NITRATE-N) 

ISWS 

 River Discharge (RIVER-DISCHARGE) 

ISWS   
USGS 

## Explore by Categories


### Hydromet



Air Temperature 

Monthly Precipitation 




PS 

### Streamflow


River Discharge 

ISWS   
USGS 

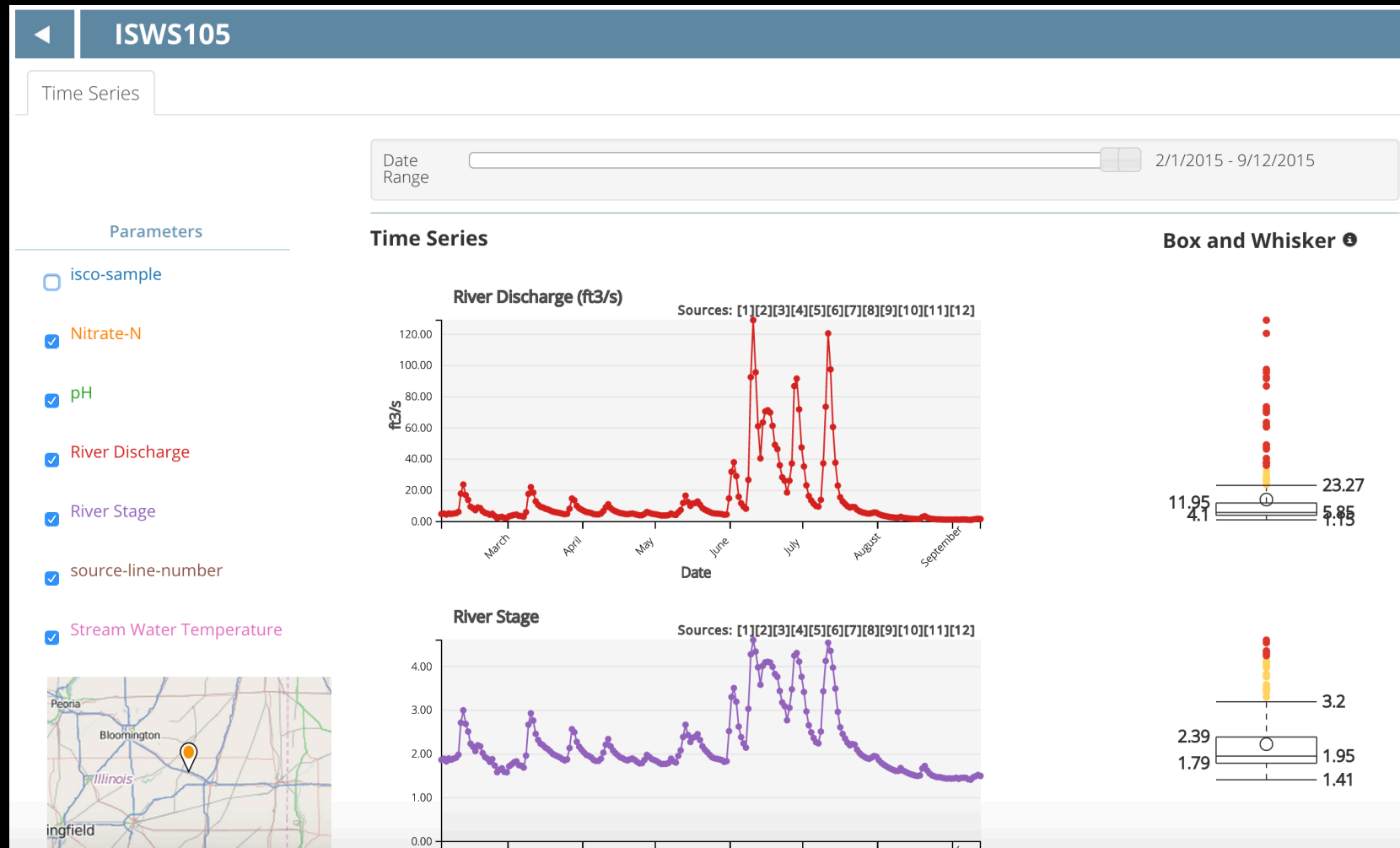
River Stage 

IFIS   
ISWS   
USGS 

Nitrate-N 


ISWS 

# Visualizations



# http://data.imlczo.org/clowder/

[IMLCZO](#) [Collections▼](#) [Datasets▼](#) [Sites▼](#) [Files▼](#) [Tags▼](#) [API](#)



[Luigi Marini▼](#) [Administration▼](#)

## Welcome to IMLCZO

The Intensively Managed Landscapes-Critical Zone Observatory (IML-CZO) aims to understand the present-day dynamics of this change in the context of long-term natural coevolution of the landscape, soil, and biota.

### Resources

Collections	70
Datasets	145
Files	773

# Clowder

# Clowder Funding

- NARA/NSF OCI – Understanding Data Intensive and CPU Intensive Services to Support Preservation and Reconstruction of Electronic Records
- NSF CDI – Groupscope: Instrumenting Research on Interaction Networks in Complex Social Contexts
- NSF EAR – Critical Zone Observatory Network for Intensively Managed Landscapes (IML-CZO)
- NIH – Immunomodulatory and Regenerative Effects of Mesenchymal Stem Cells on Allografts
- Illinois-Indiana Sea Grant – Great Lakes Monitoring
- European Commission – Linking Scientific Computing in Europe and the Eastern Mediterranean
- XSEDE – Large Scale Video Analytics
- NSF ACI – CIF21 DIBBs: Brown Dog
- NSF ACI - Sustainable Environment through Actionable Data (SEAD)
- NSF ICER EarthCube Building Blocks – A Geo-Semantic Framework for Integrating Long-Tail Data and Models

# Raw Files

IMLCZO

Collections ▾

Datasets ▾

Sites ▾

Files ▾

Tags ▾

API

Luigi Marini ▾

Administration ▾

Search

"Plot Title: 10434348"  
"#","Date Time, GMT-05:00","Abs Pres, kPa (LGR S/N: 10434348, SEN S/N: 10434348)","Temp, °C (LGR S/N: 10434348, SEN S/N: 10434348)","Coupler Detached (LGR S/N: 10434348, SEN S/N: 10434348)","Coupler Attached (LGR S/N: 10434348, SEN S/N: 10434348)","Host Connected (LGR S/N: 10434348, SEN S/N: 10434348)","Stopped (LGR S/N: 10434348, SEN S/N: 10434348)","End Of File (LGR S/N: 10434348, SEN S/N: 10434348)"  
1,04/28/15 12:10:00 PM,99.968,17.094,Logged,,,,  
2,04/28/15 12:15:00 PM,103.158,13.654,,,,  
3,04/28/15 12:20:00 PM,103.119,13.365,,,,  
4,04/28/15 12:25:00 PM,103.087,13.365,,,,  
5,04/28/15 12:30:00 PM,103.087,13.365,,,,  
6,04/28/15 12:35:00 PM,103.056,13.365,,,,  
7,04/28/15 12:40:00 PM,103.058,13.461,,,,  
8,04/28/15 12:45:00 PM,103.060,13.558,,,,  
9,04/28/15 12:50:00 PM,103.031,13.654,,,,  
10,04/28/15 12:55:00 PM,103.033,13.750,,,,  
11,04/28/15 01:00:00 PM,103.019,13.846,,,,  
12,04/28/15 01:05:00 PM,103.006,13.942,,,,  
13,04/28/15 01:10:00 PM,102.992,14.038,,,,  
14,04/28/15 01:15:00 PM,102.978,14.134,,,,  
15,04/28/15 01:20:00 PM,102.949,14.230,,,,  
16,04/28/15 01:25:00 PM,102.935,14.325,,,,  
17,04/28/15 01:30:00 PM,102.922,14.421,,,,

Download

Delete

Filename:

Wildcat\_h2o\_20150521.csv

Type:

text/csv

Uploaded on:

Jul 16, 2015 22:51:13

Uploaded by:

Brock Angelo

License

Type:

All Rights Reserved

Holder:

Brock Angelo

♥ Edit

Tags

Datasets containing the file

Wildcat-H2O



# Any file type

IMLCZO

Collections ▾

Datasets ▾

Sites ▾

Files ▾

Tags ▾


API

Luigi Marini ▾

Administration ▾

Search

Q



Download

Delete

Filename:

68.jpeg

Type:

image/jpeg

Uploaded on:

Aug 01, 2013 15:30:37

Uploaded by:

Luigi Marini

License

Type:

All Rights Reserved

Holder:

Luigi Marini

♥ Edit

Tags

• clear creek [File]

Datasets containing the file

Clear Creek Camp Cardinal

Detach

Test

Detach

+ Add

Sensors Associated with this file



# Community to upload data

Name:

Wildcat-H2O

Description:

Show file previews:

☒ Everywhere ☐ On File Page ☐ Nowhere

Reset

New Files

Existing Files

+ Add files

Create Dataset

Cancel upload

Select all

Delete selected

Wildcat_h2o_20150604.csv	189.85 KB	<div>Start</div>	<div>Cancel</div>
Wildcat_h2o_20150521.csv	310.90 KB	<div>Start</div>	<div>Cancel</div>

# Associating Datasets With Sensors

The screenshot displays the IMCZO web application interface. At the top, a navigation bar includes links for Collections, Datasets, Sites, Files, Tags, API, and user information (Luigi Marini). A search bar is located on the right. The main content area shows the details for the dataset 'ISWS105-DAILY', including tabs for Home, Files (12), and Metadata (0). Below the tabs, it states 'Created by Brock Angelo' and 'Created on Sep 01, 2015'. A modal dialog box titled 'Assign Dataset to sensor' is open in the center, featuring a list of sensors: ADS\_Bondville, ATS\_Bondville, BigDitch, CampCreek, and CCW-Z1-S2-ExpPlot. At the bottom of the dialog are 'Assign' and 'Close' buttons. The background interface also shows a 'Tag' button, a section for 'on files in this dataset', and a 'Sensors' section with an 'Add' button.

IMCZO Collections Datasets Sites Files Tags API Luigi Marini Administration Search

## ISWS105-DAILY

Home Files (12) Metadata (0)

Created by Brock Angelo  
Created on Sep 01, 2015

ISWS105 - ISWS105-DAILY

Assign Dataset to sensor

- ADS\_Bondville
- ATS\_Bondville
- BigDitch
- CampCreek
- CCW-Z1-S2-ExpPlot

Assign Close

Tag

on files in this dataset

containing the dataset

S105  
taset | Remove

d to existing collection Add

Sensors  
Add

Edit Info Edit License Delete Dataset

# Manage Sites


## Sites

ID	↕	Sensor	↕	Source	↕	Latitude	↕	Longitude	↕	Info	↕
78		ADS_Bondville		ADS		40.0527979177847		-88.3718998337983		<a href="#">Edit</a>	<a href="#">Delete</a>
79		ATS_Bondville		ATS		40.0061989813829		-88.2903994254406		<a href="#">Edit</a>	<a href="#">Delete</a>
154		BigDitch		IMLCZO		40.267336		-88.327686		<a href="#">Edit</a>	<a href="#">Delete</a>
157		CampCreek		IMLCZO		40.054314		-88.531269		<a href="#">Edit</a>	<a href="#">Delete</a>
96		CCW-Z1-S2-ExpPlot		IML-CZO		41.733333		-91.925		<a href="#">Edit</a>	<a href="#">Delete</a>
97		CCW-Z1-S2-ExpPlot		IML-CZO		41.733333		-91.925		<a href="#">Edit</a>	<a href="#">Delete</a>
94		CCW-Z1-S2-ExpPlot		IML-CZO		41.733333		-91.925		<a href="#">Edit</a>	<a href="#">Delete</a>
95		CCW-Z1-S2-ExpPlot		IML-CZO		41.733333		-91.925		<a href="#">Edit</a>	<a href="#">Delete</a>
82		CLRCRK01		IFIS		41.714222		-91.77911		<a href="#">Edit</a>	<a href="#">Delete</a>

# Define new Sites

## Site Information

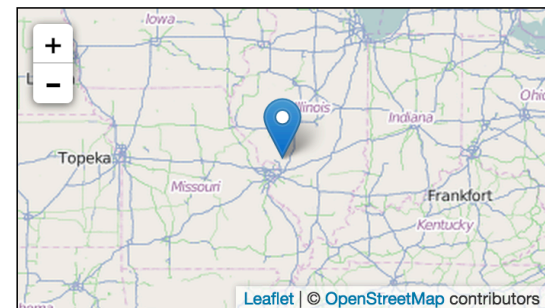
### Location Information

Descriptive Name	<input type="text" value="White River Falls in Duvall County (required)"/>
Location ID	<input type="text" value="DC105-WRF (required)"/>
Region	<input type="text" value="Illinois (required)"/>
Data Source	<input type="text" value="USGS (required)"/>
Location Type 	<input type="text" value="1"/>

Location Type 1 can have 1 instrument.

Lat / Long	<input type="text" value="latitude (required)"/>	<input type="text" value="longitude (required)"/>
------------	--	---

Location



Each location will contain at least one instrument, depending on it's Location Type.

### Instrument #1 Information

### Instrument Device Info

Instrument Name	<input type="text" value="Falls Creek Northeast Temperature Monitor"/>
-----------------	--

# Datapoint

ISO 8601  
With timezone

Open JSON  
document

GeoJSON

```
{
  "id": 1464675,
  "created": "2015-09-01T22:15:19Z",
  "start_time": "2015-07-12T20:00:00Z",
  "end_time": "2015-07-12T20:00:00Z",
  "properties": {
    "river-stage-m": 4.25,
    "isco-sample": 0,
    "discharge-cms": 84.72,
    "source": "http://data.imlcz.org/clowder/files/55e61685e4b07aec0f3d77b2",
    "qaqc": "Preliminary",
    "source-line-number": 18251
  },
  "type": "Feature",
  "geometry": {
    "type": "Point",
    "coordinates": [
      -88.4449935793094,
      40.1712060862677,
      0
    ]
  },
  "stream_id": "112",
  "sensor_id": "73",
  "sensor_name": "ISWS105"
},
```

# Data API

## Sensors/Sites

## Streams

## Datapoints

```
{
  "id": 1464675,
  "created": "2015-09-01T22:15:19Z",
  "start_time": "2015-07-12T20:00:00Z",
  "end_time": "2015-07-12T20:00:00Z",
  "properties": {
    "river-stage-m": 4.25,
    "isco-sample": 0,
    "discharge-cms": 84.72,
    "source": "http://data.imlco.org/clowder/file",
    "qaqc": "Preliminary",
    "source-line-number": 18251
  },
  "type": "Feature",
  "geometry": {
    "type": "Point",
    "coordinates": [
      -88.4449935793094,
      40.1712060862677,
      0
    ]
  },
  "stream_id": "112",
  "sensor_id": "73",
  "sensor_name": "ISWS105"
},
```

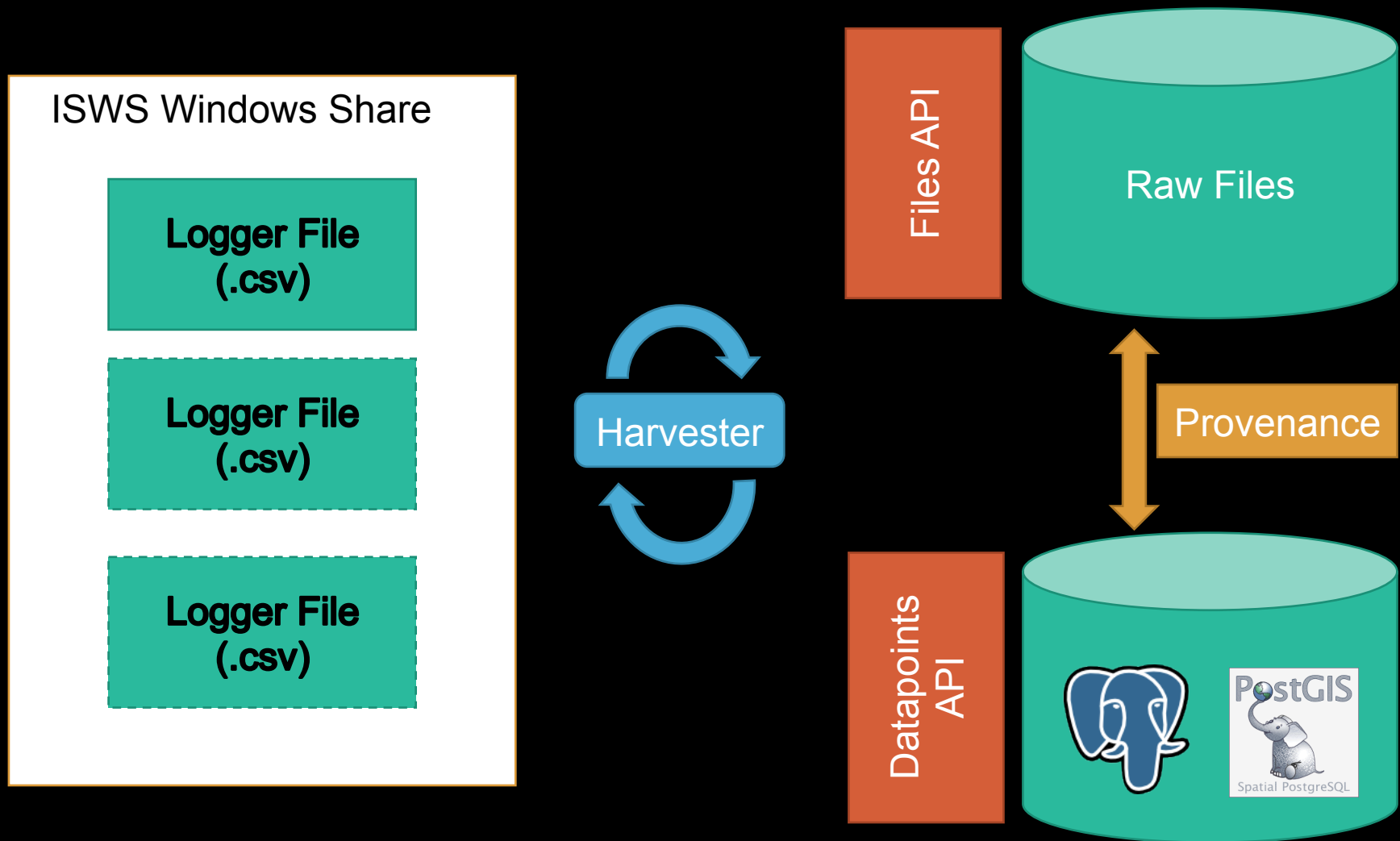
```
{
  "id": 112,
  "name": "ISWS105-DAILY",
  "created": "2015-09-01T21:20:08Z",
  "type": "Feature",
  "properties": {
    "source": "http://data.imlco.org/clowder/datasets/55e61687e4b07aec0f"
  },
  "geometry": {
    "type": "Point",
    "coordinates": [
      -88.4449935793094,
      40.1712060862677,
      0
    ]
  },
  "sensor_id": "73",
  "start_time": "2015-01-01T00:00:00-06:00",
  "end_time": "2015-09-12T23:45:00-05:00",
  "params": [
    "discharge-cms",
    "isco-sample",
    "qaqc",
    "river-stage-m",
    "source",
    "source-line-number"
  ]
},
```

```
{
  "id": 73,
  "name": "ISWS105",
  "created": "2014-03-03T18:49:42Z",
  "type": "Feature",
  "properties": {
    "region": "Illinois",
    "type": {
      "id": "isws",
      "title": "ISWS Stream and Nutrient Station"
    },
    "name": "ISWS105",
    "popupContent": "ISWS105"
  },
  "geometry": {
    "type": "Point",
    "coordinates": [
      -88.4449935793094,
      40.1712060862677,
      0
    ]
  },
  "min_start_time": "1993-04-19T05:40:00Z",
  "max_end_time": "2015-09-13T04:45:00Z",
  "parameters": [
    "discharge-cms",
    "isco-sample",
    "Nitrate-N mg/L",
    "pH",
    "qaqc",
    "river-stage-m",
    "source",
    "source-line-number",
    "Water temp F"
  ]
},
```

# Download Datapoints

[http://data.imlcz.org/clowder/api/geostreams/datapoints?  
\*\*geocode\*\*=39.095962936305504%2C-89.791259765625  
%2C40.59727063442027%2C-89.791259765625%2C40.  
59727063442027%2C-86.781005859375%2C39.0959629  
36305504%2C-86.781005859375&  
\*\*since\*\*=2013-01-01+1%3A00%3A00&  
\*\*until\*\*=2014-12-31+11%3A59%3A59&  
\*\*sources\*\*=iml-czo&  
\*\*attributes\*\*=Nitrate-N&  
\*\*attributes\*\*=River+Discharge&  
\*\*format\*\*=json](http://data.imlcz.org/clowder/api/geostreams/datapoints?geocode=39.095962936305504%2C-89.791259765625%2C40.59727063442027%2C-89.791259765625%2C40.59727063442027%2C-86.781005859375%2C39.095962936305504%2C-86.781005859375&since=2013-01-01+1%3A00%3A00&until=2014-12-31+11%3A59%3A59&sources=iml-czo&attributes=Nitrate-N&attributes=River+Discharge&format=json)

# Automatic Data Ingestion





Year 3-5

# Gather More Data

With the technology in place we will focus on:

- User training
- More data sources
- Simplify and enhance user interfaces
  - Submission
  - Visualization

# CZO Data JSON to YODA

- YAML Observation Data Archive & Exchange (YODA) Format

```
{
  "id": 1464675,
  "created": "2015-09-01T22:15:19Z",
  "start_time": "2015-07-12T20:00:00Z",
  "end_time": "2015-07-12T20:00:00Z",
  "properties": {
    "river-stage-m": 4.25,
    "isco-sample": 0,
    "discharge-cms": 84.72,
    "source": "http://data.imlcz.org/crowder/files/55e61685e4b07aec0f3d77b2",
    "qaqc": "Preliminary",
    "source-line-number": 18251
  },
  "type": "Feature",
  "geometry": {
    "type": "Point",
    "coordinates": [
      -88.4449935793094,
      40.1712060862677,
      0
    ]
  },
  "stream_id": "112",
  "sensor_id": "73",
  "sensor_name": "ISWS105"
},
```



```
CZO Display File: {Version: 2.0.0, Profile: HydroTimeSeries}

DataSet_Attributes:
  Citation_ForDataset:
    Authors:
      - {Person: Denis Newbold, OrcID: 0000-0002-1998-3479, Roles:{}}
      - {Person: Anthony Aufdenkampe, OrcID: 0000-0002-1998-3479, }
    CitationLink: http://czo.stroudcenter.org/data/hydrology/CRB_WELL_WATERLEVEL_1988_2008.csv
    PublicationYear: 2012
    Publisher: Stroud Water Research Center
  DataSetAnnotations: ''
  DataSetType: TimeSeriesTable
  DataSetUUID: abcdefg1234567
  DatasetAbstract: Groundwater levels collected from wells in the Christina River
    Basin by the Stroud Water Research Center.
  DatasetCode: CRB_WellLevels2011
  DatasetTitle: Christina Watershed Well Water Levels
  Versions: {PriorVersionDataSetUUID: 'NULL', VersionCode: 0.1.1}
```

# Project Spaces

Clowder

Spaces

Datasets

Collections

Search

Search

?

Login

## Spaces

Create

sead-open

Imported from <https://sead-open.ncsa.illinois.edu/acr>

0 0 0 10

sead-demo

Imported from <https://sead-demo.ncsa.illinois.edu/acr>

295 27 83

sead

Imported from <https://sead.ncsa.illinois.edu/acr>

433 35 47

sbdc

Imported from <https://sbdc.ncsa.illinois.edu/acr>

2624 402 19

neon

Imported from <https://neon.ncsa.illinois.edu/acr>

15 0 14

lse

Imported from <https://lse.ncsa.illinois.edu/acr>

46 4 16

imlczo-sead

Imported from <https://imlczo-sead.ncsa.illinois.edu/acr>

104 19 46

ifri

Imported from <https://ifri.ncsa.illinois.edu/acr>

0 0 6

hydroshare

Imported from <https://hydroshare.ncsa.illinois.edu/acr>

glwis

Imported from <https://glwis.ncsa.illinois.edu/acr>

erentp

Imported from <https://erentp.ncsa.illinois.edu/acr>

colombiaflood

Imported from <https://colombiaflood.ncsa.illinois.edu/acr>

# Extractor Based Data Ingestion

