



# Session 3 – Science and Outreach

Kaylin Bugbee

Leigh Sinclair

Amanda Weigel

2017 GHRC User Working Group Meeting  
Sept 26-27, 2017



GHRC focuses on a series of science and outreach efforts to accomplish the following:

1. Make GHRC data and critical resources more discoverable for users
2. Enable unfamiliar users to become more informed on GHRC data, instruments and science focus areas
3. Increase the usability of GHRC data to address user needs



# Micro Articles and Virtual Collections

Kaylin Bugbee

2017 GHRC User Working Group Meeting  
Sept 26-27, 2017



# What Are Micro Articles?

Defined as academic texts which are longer than a normal abstracts but may be one tenth the size of a normal journal article (Tero et al., 2008)

Focus on gaps in the scientific research process that are generally not documented, published or shared

GHRC has defined a micro article as an

- Short, interesting document
- Brings together data and key science concepts
- Curated by both Earth and data scientists

Tero, Heiskanen, Kokkonen Juhana, A Hintikka Kari, Kola Petri, Hintsu Timo, N Pirjo, and kki. 2008. "Tutkimusparvi: The Open Research Swarm in Finland." *Proceedings of the 12th International Conference on Entertainment and Media in the Ubiquitous Era*. Tampere, Finland: ACM. doi:<http://doi.acm.org/10.1145/1457199.1457233>.

The collage displays several components of the GHRC platform:

- Lightning Micro Article:** A page titled "LIGHTNING" under "Atmospheric Phenomenon". It includes a definition: "WHAT IS LIGHTNING? Lightning is the electrical discharge between positively and negatively charged regions within clouds..." and sections on "Why does lightning occur?" and "Where does lightning occur?". It features a diagram of a lightning cloud and a world map showing lightning frequency.
- Lightning Imaging Sensor (LIS) Dashboard:** A dashboard with sections for "INSTRUMENT PLATFORMS" (listing Earth, Space, and Tropical Rainfall Measuring Mission sensors) and "KEY DATASETS" (listing LIS data and software).
- Data Catalog Table:** A table listing datasets with columns for "DATASET NAME", "GROUP", and "DATA FORMAT".
- Associated Phenomena:** A row of icons for Severe storms, Hurricanes, Snow storms, Volcanic eruptions, and Wildfires.
- Relevant Publications:** A list of scientific papers related to lightning research.

## Instrument:

- [Earth Observations: Optical Transient Detector \(OTD\)](#)

## Phenomena:

- New Type
  - [Lightning](#)

## Event:

- [Assessing Wind and Rain in Hurricane Ingrid during Hurricane and Severe Storm Sentinel \(HS3\) Field Campaign](#)

## Publication:

- [Highlights from Albrecht et. al's 'Where Are the Lightning Hotspots on Earth?' publication](#)
- [Highlights From Peterson et. al.'s 'The Properties of Optical Lightning Flashes and the Clouds They Illuminate' Publication](#)

## GHRC Micro Articles

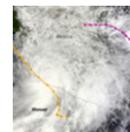
### What is a Micro Article?

Micro articles are concise and focused selections of information that allow users to quickly assess topics and locate the most useful or relevant associated data, information and tools. The GHRC Library includes four types of micro articles: specific weather events, phenomena, Earth observing instruments and summaries of scientific research publications referencing GHRC data. Each micro article includes pointers to related data, user resources and tools available from the GHRC archive.

[Weather Events](#) | [Earth Observing Instruments](#) | [Phenomena](#) | [Publications using GHRC Data](#)

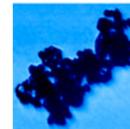


### Event Micro Articles



[Assessing Wind and Rain in Hurricane Ingrid during Hurricane and Severe Storm Sentinel \(HS3\) Field Campaign](#)

Can areas of heavy rain and wind be identified within Ingrid ahead of landfall?



[Snow Microphysics Event during GCPEX Field Campaign](#)

What is the 3-D structure of falling snow and how does its variability affect remotely sensed ret



[Lake Effect Snow Event during GCPEX Field Campaign](#)

Lake effect snow is generated when cold air moves over warm lake waters such that narrow bands of



### Instrument Micro Articles



[Earth Observations: Optical Transient Detector \(OTD\)](#)

The Optical Transient Detector (OTD), a space-based lightning imager on the Orbview-1 satellite,

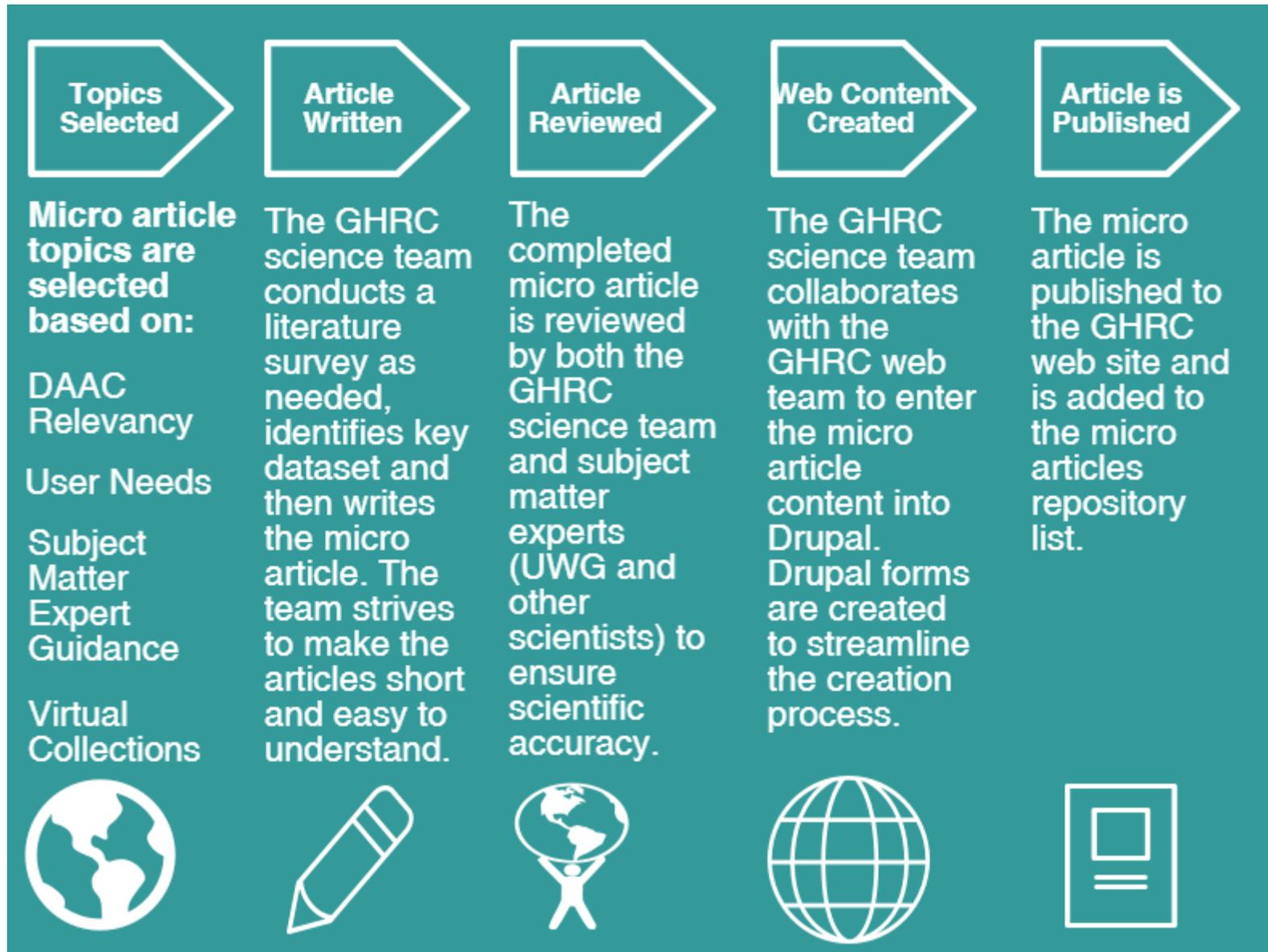


[Earth Observations: Lightning Imaging Sensor \(LIS\)](#)

The Lightning Imaging Sensor (LIS) detects total lightning (i.e.

[MORE](#)

# Micro Article Creation Process



## 1. Organic creation process

- Developed structure/content of types based on what makes sense
- Tweaked content

## 2. Writing and creating micro articles takes time

- Easy to underestimate the time needed to write micro articles
- Review by other science writers is critical
- Once the micro article is written, collaboration with the web team is needed to
  - Develop any new icons or images
  - Tweak the web form as needed



## 3. Scientists want to be involved

- GHRC UWG involvement greatly appreciated
  - Suggestion of relevant topics
  - Review of written articles
  - Adoption of the micro article for personal use
- Other scientists have reviewed relevant articles
  - Rachel Albrecht
  - Patrick Gatlin

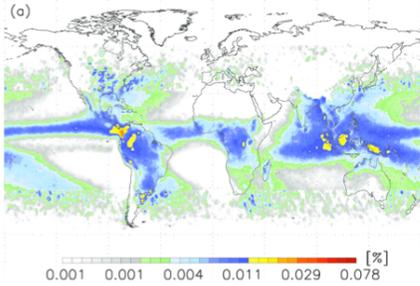
Michael J. Peterson, Ph.D.    HOME    CV    PRESS    PORTFOLIO    RESEARCH    WORKSHOP    DATA    VIDEOS    CONTACT

### A TRMM/GPM Assessment of the Temporal Variations of the Global Electric Circuit Source Current

Posted by Michael Peterson    16 March 2017

**Journal Article By:**  
M. J. Peterson, W. Deierling, C. Liu, D. Mach, and C. Kalb

**Journal:**  
Journal of Geophysical Research, UNDER REVIEW



Global GEC Current Sources. Global distribution of total mean Wilson currents from electrified weather as a fraction of the total for comparison with other metrics

Retrieved electric fields from Tropical Rainfall Measuring Mission (TRMM) and Global Precipitation Measurement (GPM) satellite observations are used to calculate the total mean Wilson current that powers the Global Electric Circuit (GEC). The long record of TRMM data is also used to examine the temporal variability of the GEC source current on time scales that range from one day to more than a decade.

The greatest source of current is the Intertropical Convergence Zone and total currents decrease towards the mid-latitudes and poles. The three tropical chimneys can be noted in the longitude distributions and differ in magnitude compared to lightning production due to the

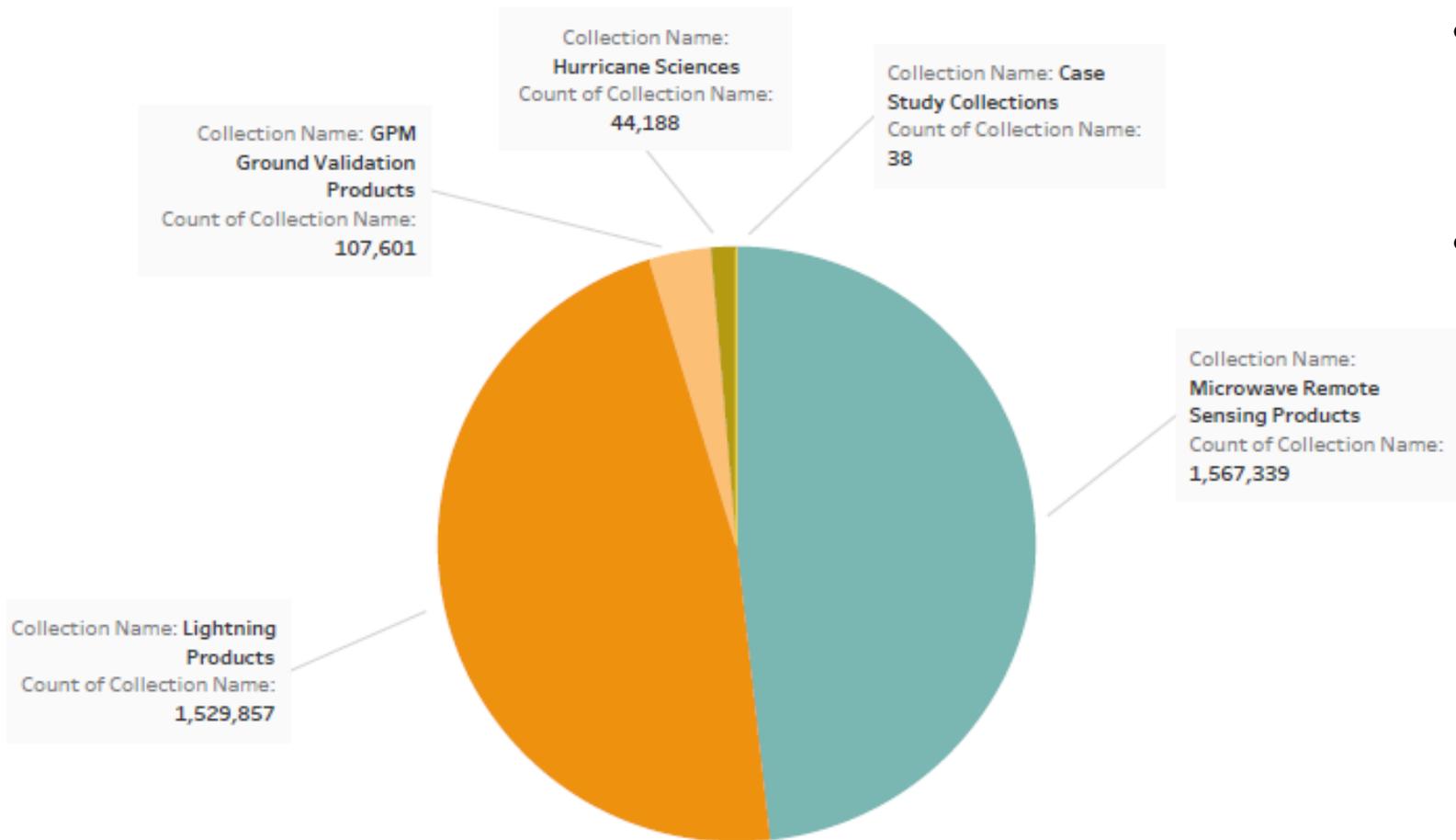
**Popular tags**

- trmm
- atmospheric electricity
- workshop
- article
- conference
- electric field
- algorithm
- jgr
- passive microwave
- retrieval
- software
- website
- atmospheric science
- lightning
- lis
- PR
- thunderstorm
- Global Electric Circuit
- TMI
- big data
- cloud computing
- data
- embedded system

- Longer view times for micro articles
  - Average time on other GHRC web pages
    - ~ 1 min
  - Average time on micro article pages
    - ~2 -3 minutes
- Within a year, micro articles (new web content) are in the **top 10** viewed pages of GHRC level 2 pages
- Further analysis is needed on the relationship between micro article page views and data download rates



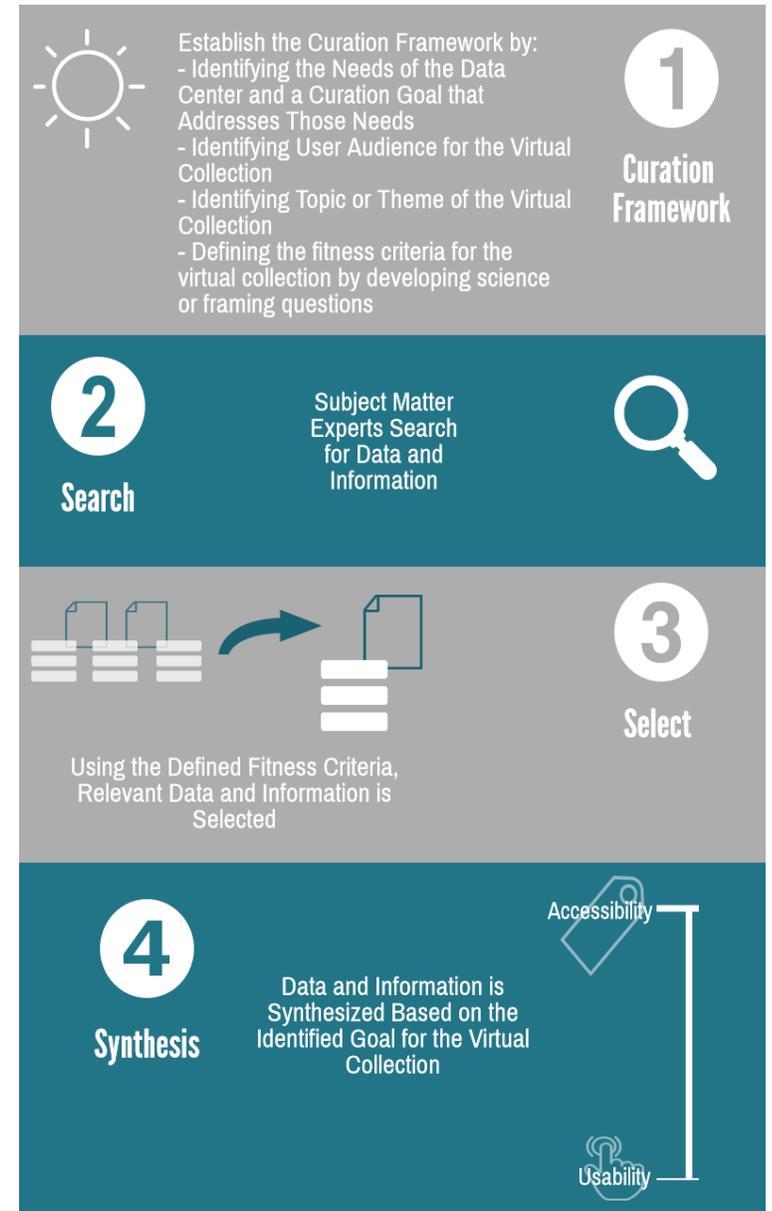
## Number of Downloads by Collection Name

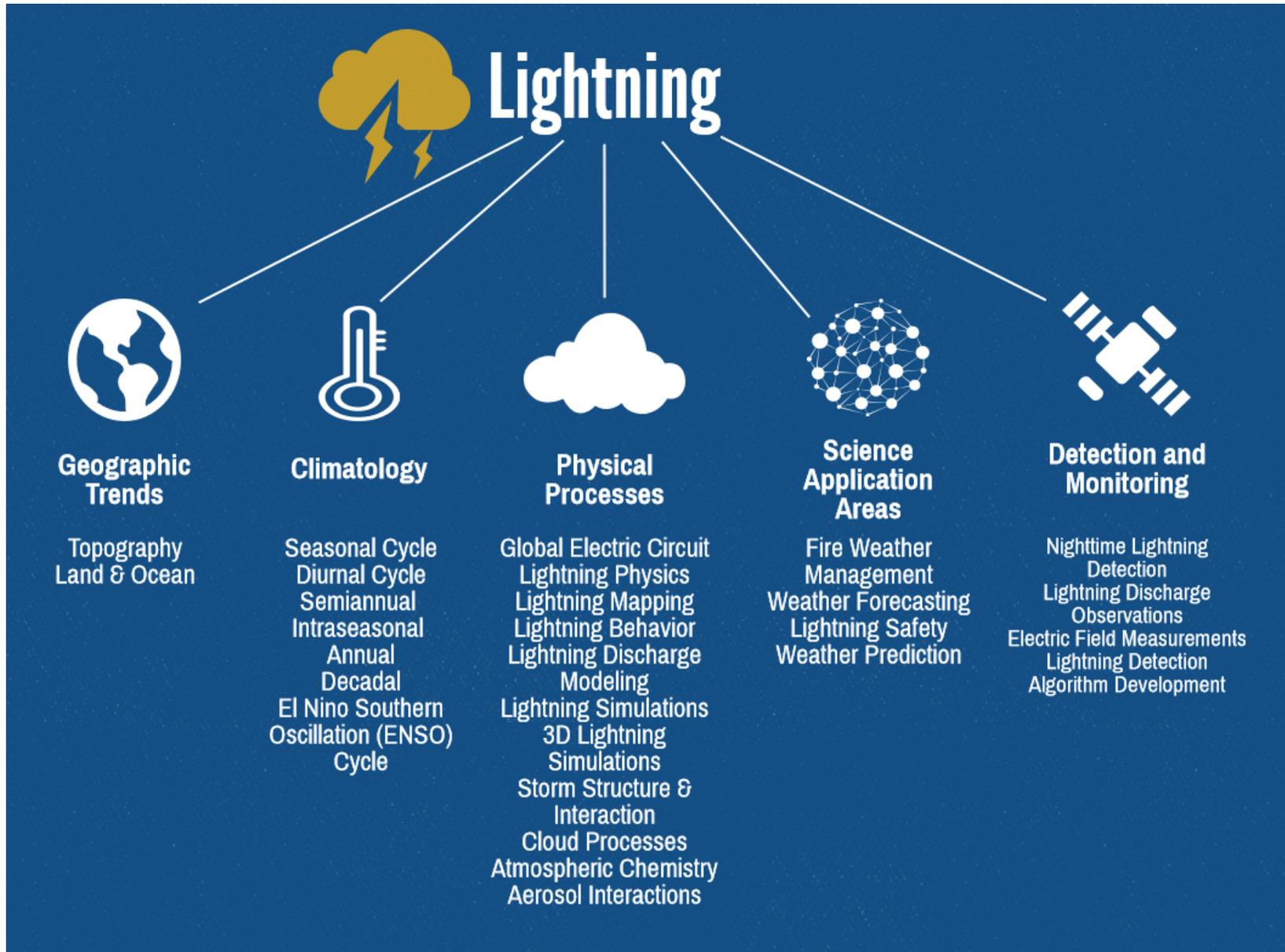


- Field campaign data makes up ~65% of GHRC's data holdings
- Want to increase usage of these data by
  - Easing discovery & accessibility
  - Lowering barriers to entry
  - Providing trustworthy data source

# What are virtual collections?

- A virtual collection is
  - Product of a **curation** activity that searches, selects and synthesizes diffuse data and information
  - Curated around a specific theme, topic or event
- A virtual collection can take different forms
  - Data bundles
  - Curated data lists
- GHRC GCPEX Virtual Collection:
  - <http://dx.doi.org/10.5067/GCPEXCS/MULTIPLE/DATA101>





- Lightning data list was shared in the UWG homework document
- Suggestions on additional data that should be included are welcome
- Are links to relevant data in a centralized location sufficient to address your data discovery needs?



# Data Recipes

Amanda Weigel

2017 GHRC User Working Group Meeting  
Sept 26-27, 2017



# What Are Data Recipes?

Step-by-step tutorials that instruct users on how to complete a task using data

There are many different types of data recipes. At GHRC, we contain the following:

**Data Visualization** - Plotting and visualizing data using software, code and Python Notebooks

**Data Format Conversion** - Re-formatting scientific data so that it is compatible with scientific software

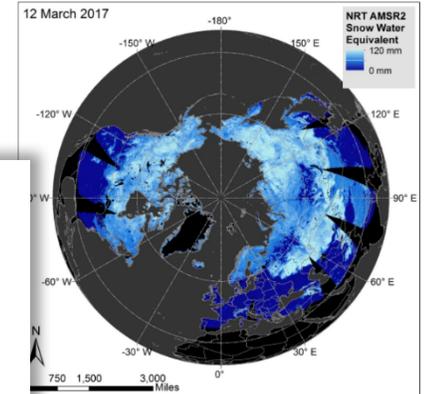
[Home](#) >> [Data Recipes](#) >> [How to Georeference and Convert NRT AMSR2 Snow Water Equivalent Polar EASE-Grid Data to GeoTIFF Format using Python and ArcGIS](#)

## How to Georeference and Convert NRT AMSR2 Snow Water Equivalent Polar EASE-Grid Data to GeoTIFF Format using Python and ArcGIS

[Description](#) | [How to Use](#) | [Dataset Information](#) | [Key Parameters](#)

### Description

The near real-time (NRT) Land Atmosphere Near real-time Capability for EOS (LANCE) AMSR2 Daily Global Snow Water Equivalent (SWE) EASE-Grids dataset contains SWE and quality assurance flag information for the Northern and Southern Hemispheres. These data are available in HDF-EOS5 format requiring georeferencing in order to display according to the NSIDC EASE-Grid format. This data recipe employs Python to



[Home](#) >> [Data Recipes](#) >> [Using ArcGIS to Convert LIS Very High Resolution Gridded Lightning Climatology NetCDF Data to GeoTIFF Format](#)

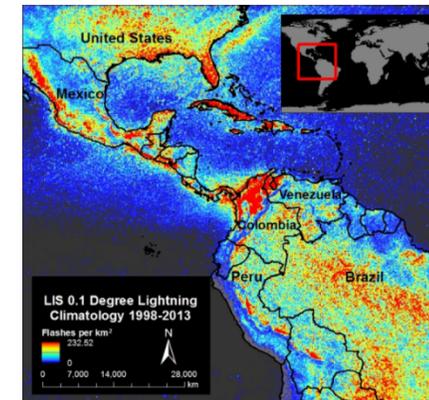
## Using ArcGIS to Convert LIS Very High Resolution Gridded Lightning Climatology NetCDF Data to GeoTIFF Format

[Description](#) | [How to Use](#) | [Dataset Information](#) | [Key Parameters](#)

### Description

The Lightning Imaging Sensor (LIS) aboard the Tropical Rainfall Measurement Mission (TRMM) satellite collected over 17 years of optical lightning observations that were used to generate a Very High Resolution Lightning Climatology dataset available in gridded netCDF format. ArcGIS software does not handle all netCDF data equally due to how the geographic and other information are formatted within datafiles, thus it is best suited for gridded netCDF files. This data recipe provides a step-by-step tutorial on how to bring these gridded netCDF data into ArcMap and create a GeoTIFF file enabling GIS analysis and map making. This data recipe requires a pre-installed version of ArcMap and a downloaded file from the LIS 0.1 Degree Very High Resolution Lightning Climatology Collection available at GHRC.

*Image created using LIS 0.1 Degree Very High Resolution Gridded Lightning Full Climatology (VHRFC) dataset in ArcMap 10.2*



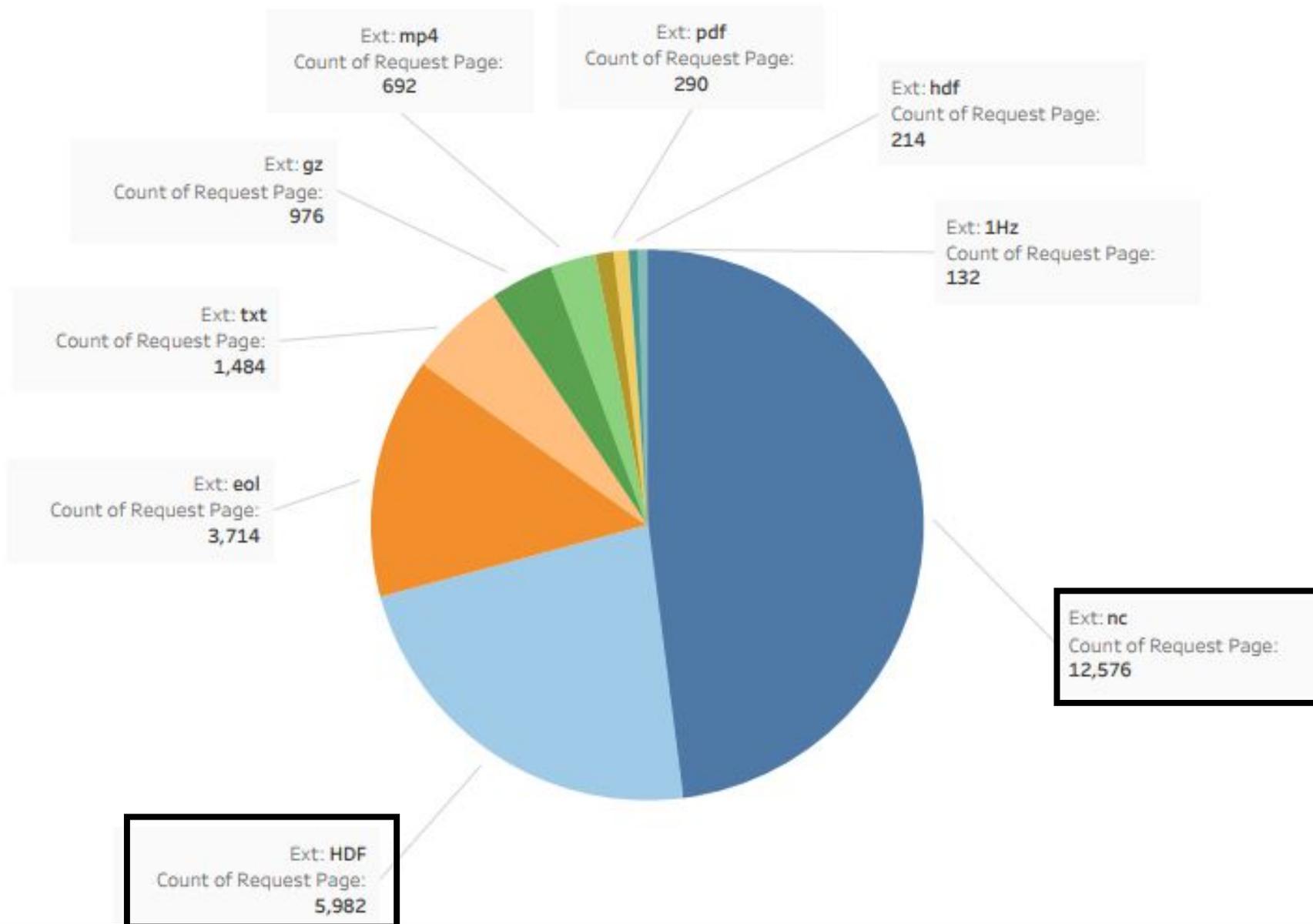
- User Questions
- User Surveys

## Earthdata Webinar Metrics

- What tools and programming languages do you most commonly use?

Tool	Use %
Panoply	25
IDL	4.17
NCL	4.17
<b>ArcMap</b>	<b>66.67</b>
Matlab	8.33
C or Fortran	8.33
R	33.33
<b>Python</b>	<b>41.67</b>
Other	8.33

# Data Recipe Content Selection

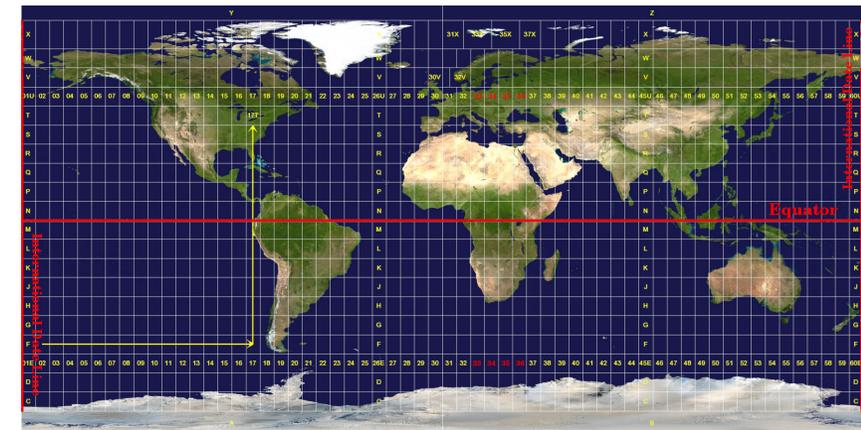
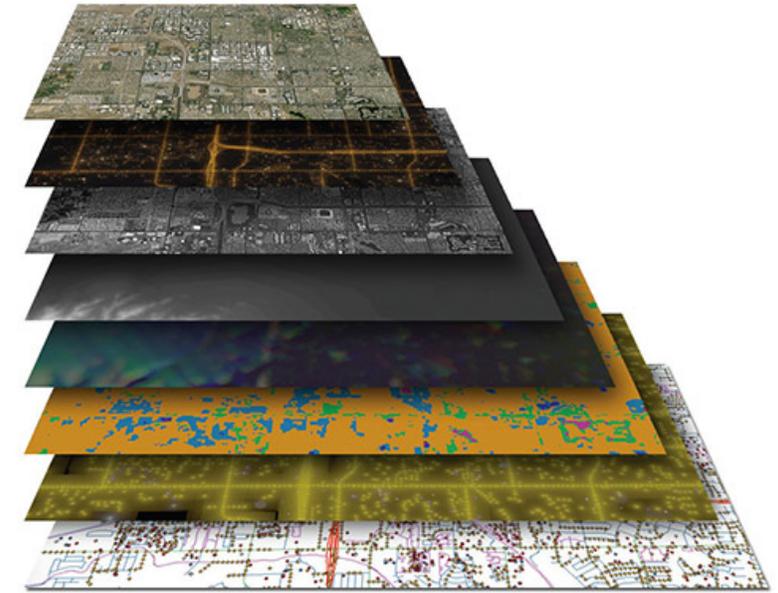


Data download metrics indicate that **netCDF** and **HDF** data formats are the most commonly downloaded

Data recipes development focuses on working with these types of data formats

## Users of Gridded Geospatial Data

- Envelops a large, diverse community untapped by GHRC
- The user needs assessments and webinar surveys determined geospatial data, tools and Python were among the top used
- User questions – Several issues working with GHRC data in GIS
- Key data type for disaster monitoring and relief efforts
- Effective for visualizing and communicating scientific data
- Federal agencies (USGS, NOAA) are investing and diverting efforts towards geospatial resources such as ESRI Story Maps and web map services



Implemented a new data recipe top page

## 5 New Data Recipes

[HS3 CPL Attenuated Total Backscatter Quickview](#)

[Infrared Global Geostationary Composite Quick View](#)

[Using ArcGIS to Convert LIS Very High Resolution Gridded Lightning Climatology NetCDF Data to GeoTIFF Format](#)

[How to Georeference and Convert NRT AMSR2 Snow Water Equivalent Polar EASE-Grid Data to GeoTIFF Format using Python and ArcGIS](#)

[SSM/I and SSMIS Gridded Ocean Product Quickview](#)

Home >> Data Recipes

## Data Recipes

### What is a data recipe?

Tutorials or step-by-step instructions have been developed by GHRC staff to help you learn to discover, visualize and use new data, information, software and techniques. These recipes cover a variety of datasets and processing languages/software.

[Data Visualization](#) | [Data Format Conversion](#)



### Data Visualization



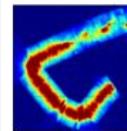
Infrared Global Geostationary Composite Quick View

The Aviation Weather Center (AWC) Infrared Global Geostationary Composite dat...



HS3 CPL Attenuated Total Backscatter Quickview

The Hurricane and Severe Storm Sentinel (HS3) airborne field campaign used th...



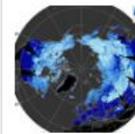
HS3 HAMSAR Radar Reflectivity Profile Data Subset Quick View

This data recipe enables users to plot temporal subsets of the HS3 HAMSAR Rada...

[MORE](#)

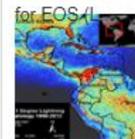


### Data Format Conversion



How to Georeference and Convert NRT AMSR2 Snow Water Equivalent Polar EASE-Grid Data to GeoTIFF Format using Python and ArcGIS

The near real-time (NRT) Land Atmosphere Near real-time Capability...



Using ArcGIS to Convert LIS Very High Resolution Gridded Lightning Climatology NetCDF Data to GeoTIFF Format

The Lightning Imaging Sensor (LIS) aboard the Tropical Rainfall

Measurement M...

[MORE](#)

## Google Analytic Metrics

- During outreach activities, increased number of page views were observed
  - The data recipe showcased during the Earthdata webinar is the most viewed
- Compared to the average web page view time, the data recipe view times fall around 2-3 minutes, 1-2 minutes longer than average
- Data recipes are among the top viewed web pages on the GHRC website

## Earthdata Webinar Metrics

Resources	Likelihood of Use %
<b>Micro Article</b>	<b>29.63</b>
Hydro 2.0	37.04
FCx	18.52
<b>Data Recipes</b>	<b>33.33</b>
All	37.04
None	14.81



# Tying it all Together

Amanda Weigel

2017 GHRC User Working Group Meeting

Sept 26-27, 2017

2017 GHRC User Working Group Meeting



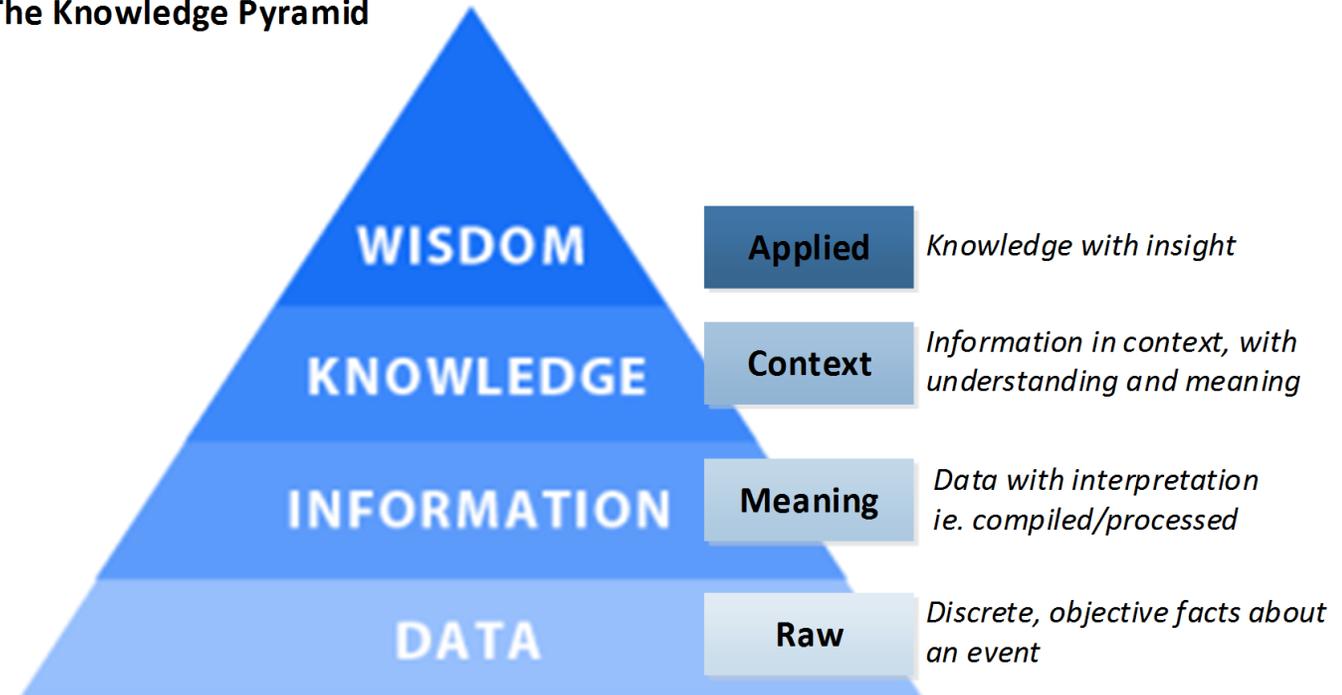
**itsc**  
INFORMATION TECHNOLOGY  
AND SYSTEMS CENTER

**UA**  
THE UNIVERSITY OF  
ALABAMA IN HUNTSVILLE

## Micro articles, Virtual Collections and Data Recipes

- Intended to address different aspects of the data use process
- The objective is to enable the use of these resources in an interconnected manner where users may:
  - Link between micro articles to learn about scientific topics
  - Use micro articles to link to data and explore it
  - Use the data recipes to better understand how the data can be handled and interpreted

The Knowledge Pyramid



## Micro articles, Virtual Collections and Data Recipes

- Through these efforts we serve as data and information curators
  - Our team learns about and communicates key scientific concepts
  - Links these concepts to relevant data
  - Allows users to learn and explore data based on weather events, atmospheric phenomenon, instruments and publications
  - Connect users to resources on how to use the data
- 2017 Earthdata Webinar



- Continue to build and refine data recipe, micro article and virtual collection material
- Interact with UWG and user community to prioritize content created
- Explore a new micro article type, such as field campaign
- Develop resources that cover a phenomenon across all micro article types: instruments, field campaigns, data and weather events
- Investigate ways to
  - Incorporate links to access resources within the dataset landing pages
  - Make the content structured to enable linkages between data and resources to be identified in an automated manner



# User Characterization and Services

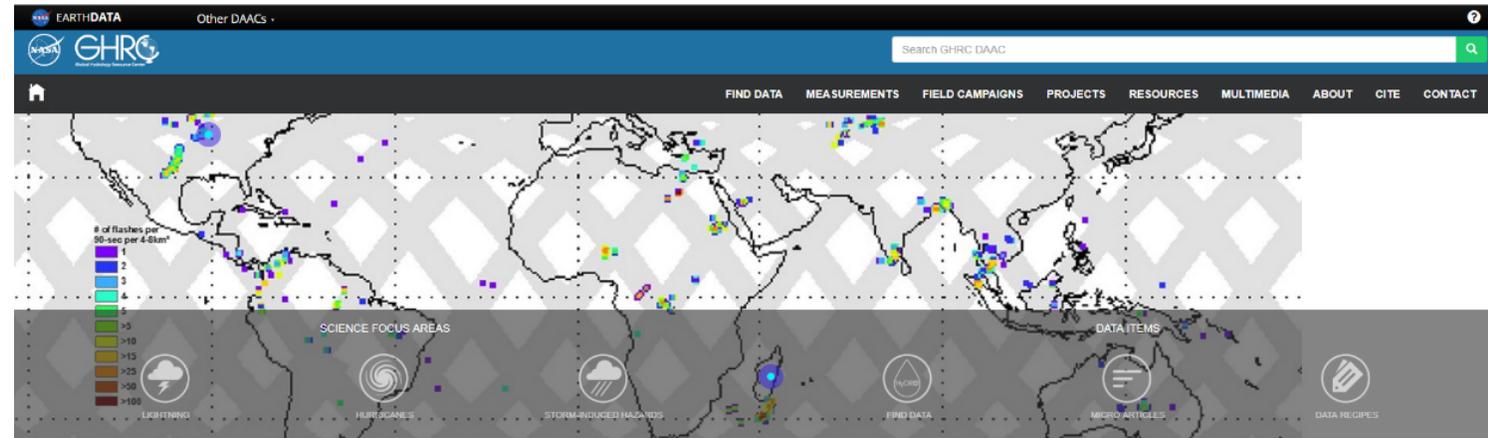
Leigh Sinclair

2017 GHRC User Working Group Meeting  
Sept 26-27, 2017



# User Feedback

- Primary way we find out about issues a user is experiencing is thru the ‘Feedback’ button on the GHRC webpage
  - Feedback is sent to us through Kayako
- Kayako is a customer service ticket portal that helps user services organize issued tickets and properly communicate with users



Home >> Feedback >> Contact

### Contact

Your name \*

Your e-mail address \*

Subject \*

Message \*

Send message

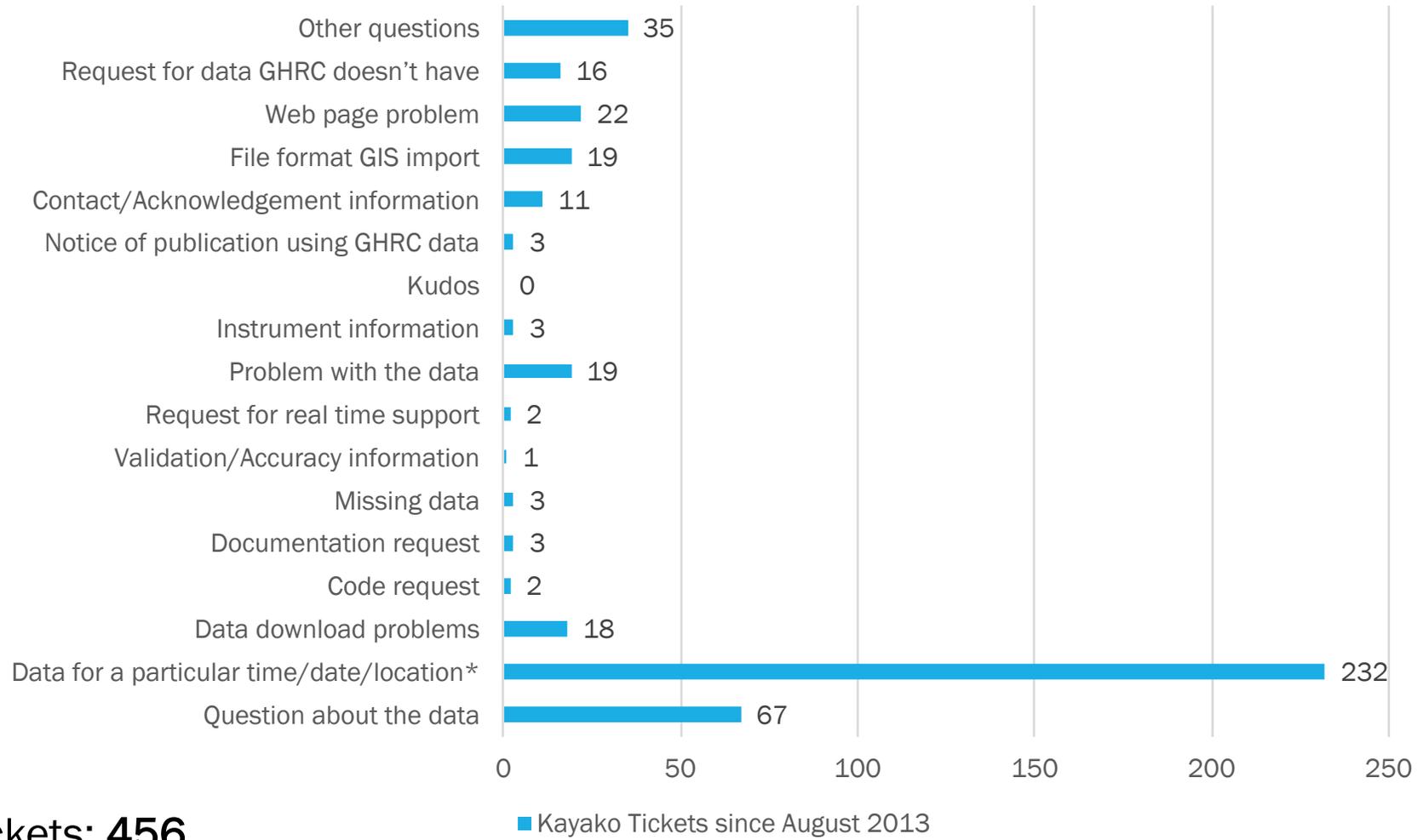


## ABOUT GHRC

The mission of the GHRC DAAC is to provide a comprehensive active archive of both data and knowledge augmentation services with a focus on hazardous weather, its governing dynamical and physical processes, and associated applications. Within this broad mandate, GHRC will focus on lightning, tropical cyclones and storm-induced hazards through integrated collections of satellite, airborne, and in-situ data sets.

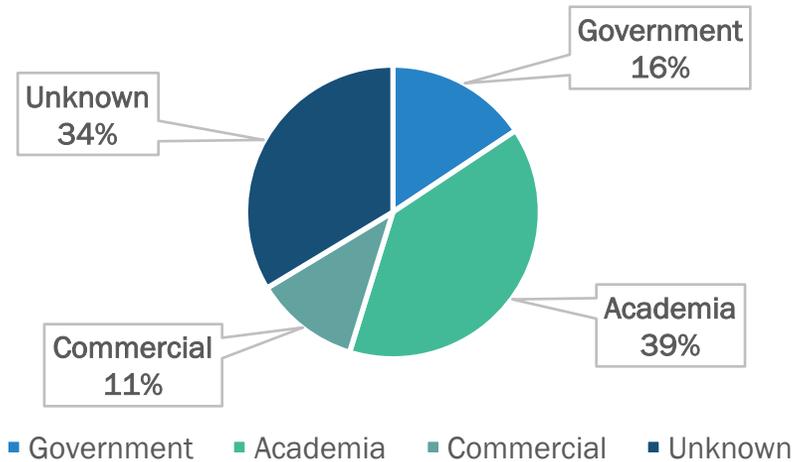


## Kayako Tickets since August 2013

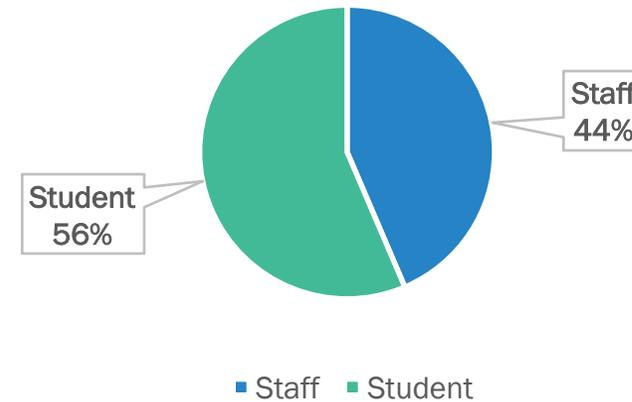


Total Kayako Tickets: **456**

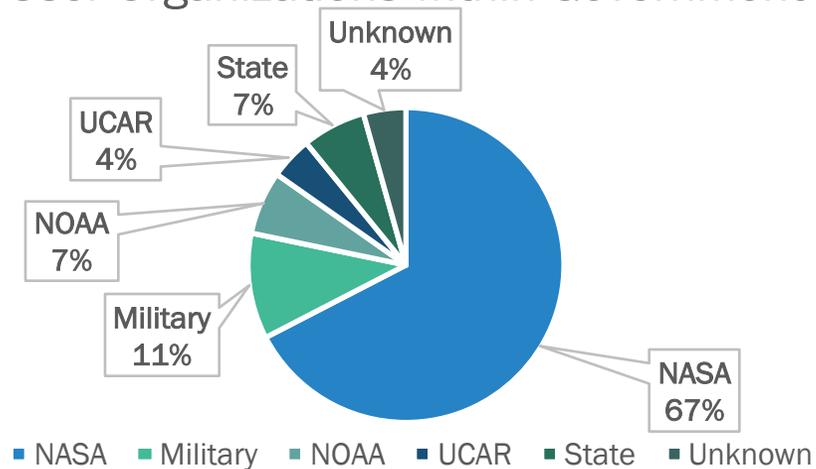
## User Organizations



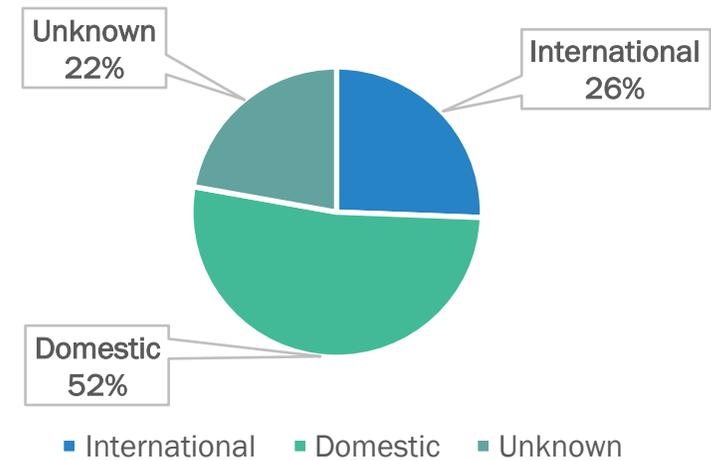
## User Organizations within Academia



## User Organizations within Government



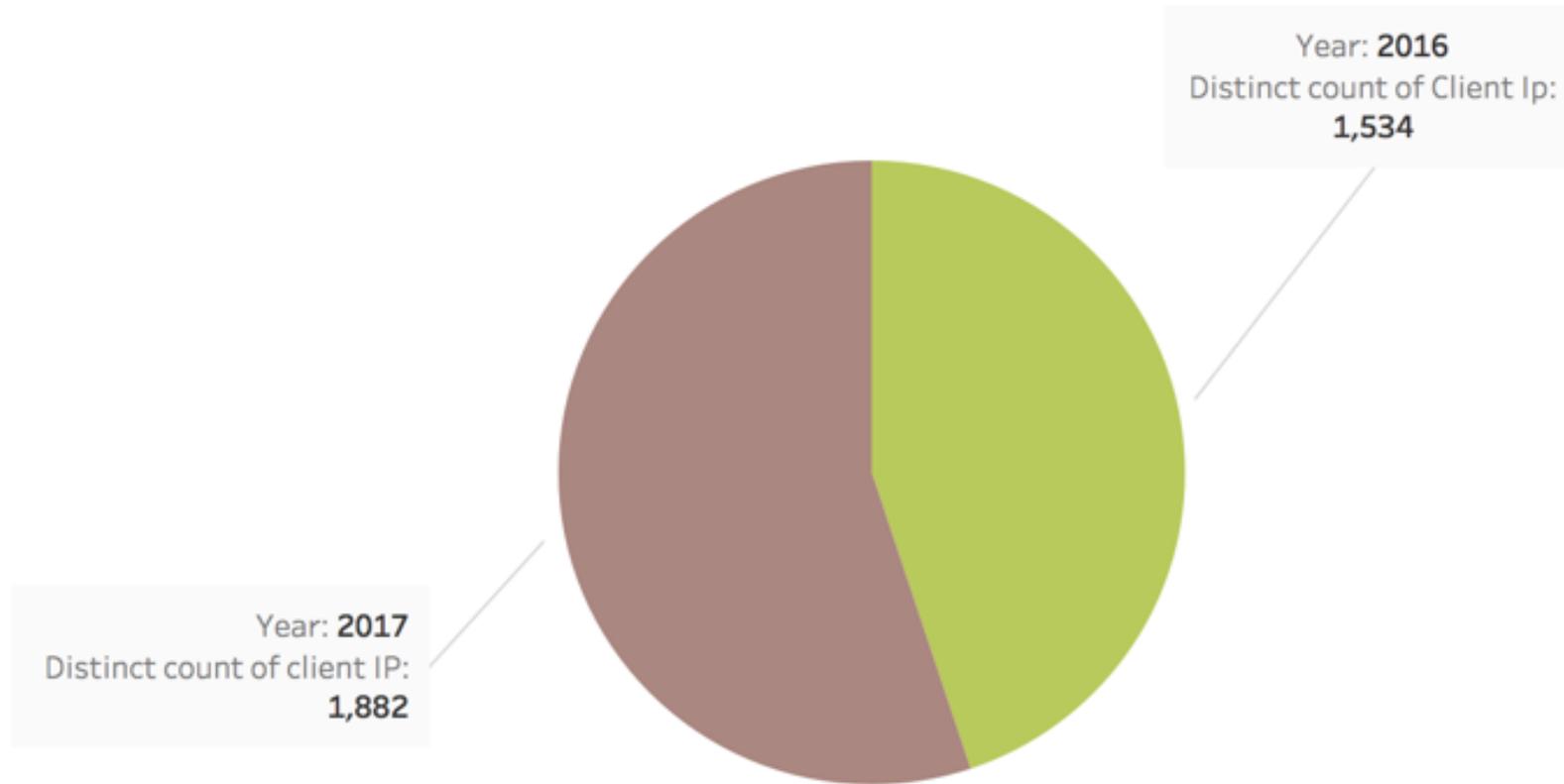
## International or Domestic Users



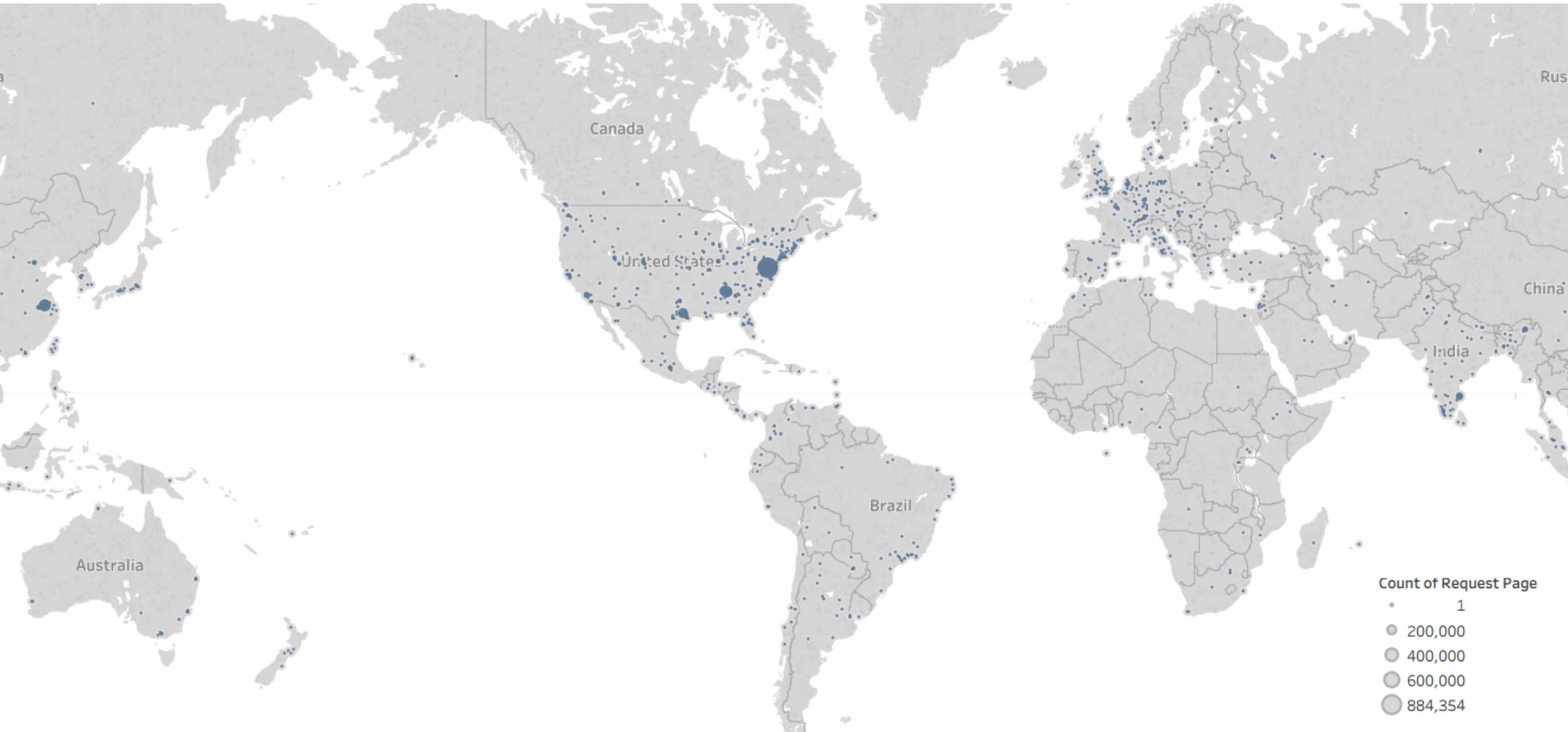
Total Unique Users: **296**

# Earthdata User Log Metrics

Distinct Users / Year



# Earthdata User Log Metrics: Downloads by Region



- In addition to Kayako and Earthdata logs, the ACSI Survey results gave a sense of who our users are, as well as who answered the survey
- Broad based users
  - Architect
  - Environment Effect Study Manager
  - Government-Water Commission Member
  - Consulting Firm/Environmental Consultant
  - Hydrogeologist
  - Hydrologist
  - Remote Sensing Scientist Mapping Water Erosion/GIS
  - Metadata Curator
  - GIS Analyst/Expert
  - Environmental or Hydraulic Engineer
  - Government Official
  - Local Government Environmental planner
  - Project Scientist
  - Geologist

- Improve documentation
  - Make it easier to locate needed documentation
  - Make documentation easier to read and understand
  - Provide more tutorials
    - We are addressing this through creating Data Recipes
- Improve product delivery
  - Improve order of dataset listings in HyDRO 2.0
    - Data within HyDRO 2.0 can be organized by collection dates and relevance to the search
  - Improve DAPPeR landing page contents and clarity
    - Implemented this last month
  - Bulk Data Download
- Improve customer support
  - Improve timeliness of responses
    - Have been addressing issues or letting users know we are investigating issue within a single business day

- Kayako and ACSI results helped us create new FAQs
  - These results also helped create new Data Recipes and content for the HyDRO 2.0 Help Page, which FAQs have also pointed to
- Updated FAQ page on GHRC website
- Incorporated FAQs to the Earthdata Forum

[Home](#) >> [About the GHRC](#) >> **Frequently Asked Questions**

## Frequently Asked Questions

- [What is a DAAC?](#)
- [What is the GHRC DAAC?](#)
- [Who do I contact for more information?](#)
- [What are the GHRC DAAC's primary data holdings?](#)
- [How do I search for data at the GHRC DAAC?](#)
- [What tools and services do you offer to work with GHRC data?](#)
- [What is the NASA Earthdata website?](#)
- [What are data set processing levels?](#)
- [How much does the GHRC DAAC data cost?](#)
- [How do I cite GHRC DAAC data?](#)
- [What is the EOSDIS Earthdata Login \(formerly called URS\) and how do I create an account?](#)
- [What is the GCMD?](#)
- [What is LANCE?](#)



# Science Collaborations

Leigh Sinclair

Amanda Weigel

2017 GHRC User Working Group Meeting  
Sept 26-27, 2017



**Objective** – To increase GHRC’s interaction with the scientific community our data serves, as well as those we hope to serve in the future

- Identify communities familiar with GHRC data, become more integrated and create working relationships
- Identify communities we would like to serve and determine their current and future projected data use and needs

**Communities of Interest** – Atmospheric science, Earth science, Earth science applications, natural disasters/hazards, and hydrology

## Program Overview

- Student-run project part of NASA's Applied Sciences Program
- Addresses environmental and public policy issues to help decision-makers

## Needs/Benefits to All

- GHRC
  - Use of data and applied science, specifically new NRT ISS LIS data
  - Creation of data recipes using ISS LIS
  - Promote a greater understanding of GHRC and the use of the data
  - Enrich the accessibility and usability of GHRC data
- DEVELOP
  - Real-world experience
  - Address environmental issues using satellite remote sensing
  - Partnering with a new organization, GHRC



# Project with NASA DEVELOP Program

- Partners: NASA GHRC, MSFC Earth Science (Patrick Gatlin – SERVIR funded research)
- Environmental Issue:
  - The Hindu-Kush Himalayan (HKH) region hosts some of the most intense thunderstorms on Earth
  - Lightning kills over 100 people per year in Nepal
- Data:
  - ISS LIS
  - LIS/OTD Climatology
  - TRMM TMI
- End Products
  - Data Recipe/Micro Article
  - Precipitation and Lightning Correlation
  - Lightning Exposure Map
  - Lightning Risk Map
- 2 Term Project
  - Spring 2018
  - Summer 2018



## Overview

- Held two meetings, one a SPoRT introduction, one a GHRC



## Opportunities Identified

Data recipe and Quick Guides, data visualization, archival of operational products, use ArcGIS services

## Accomplishments

- NASA TROPICS Applications Workshop
- NASA SPoRT Soil Moisture data on GHRC's acquisition list
- AGU session collaboration and chairing
- CUAHSI Hydroinformatics Conference collaboration with UWG member Emily Berndt

## Overview

Held an introductory meeting to become more familiar with each organization

## Opportunities Identified

Leveraging ArcGIS Restful services, data recipe collaborations, PyCMR data access capabilities

## Accomplishment

AGU session collaboration, Hurricane Harvey disaster response

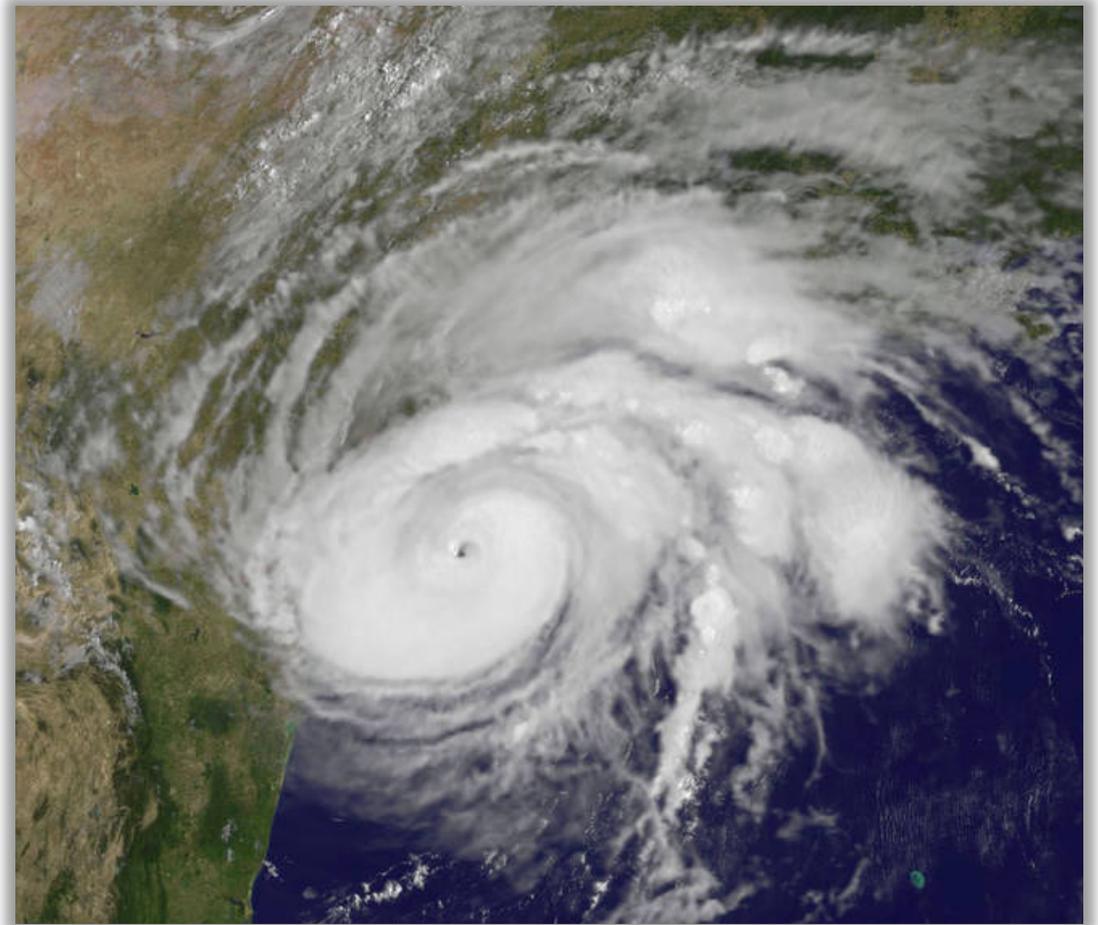


## GHRC Participation

- NASA SERVIR/SPoRT SAR Training
- NASA Disaster Program Hurricane Harvey and Irma disaster response effort

## Other Meetings

- Jason Dunion – Univ. of Miami, hurricane research, UWG Member
- Olaniyi Ajadi – Univ. Alaska-Fairbanks, SAR flood applications
- Gao Chen – NASA Langley, airborne data, field campaigns, aerosols



# Looking Forward to 2018

- Continue efforts to become integrated with current and prospective scientific communities of interest
- Develop connections with the CUAHSI Hydroinformatics efforts
- Continue conference outreach efforts





**Thank you**

Questions?

2017 GHRC User Working Group Meeting  
Sept 26-27, 2017

