Lightning Dashboard

Navaneeth Selvaraj

Team

DAAC Manager:
Aaron Kaulfus

Project Lead:
Will Ellett

DAAC Scientist:
Geoffrey Stano

Scrum Master:
Taylor Wright

Lead Developer:
Navaneeth Selvaraj

Student GRAs:
Alan Subedi

Lightning Dashboard (1/3)

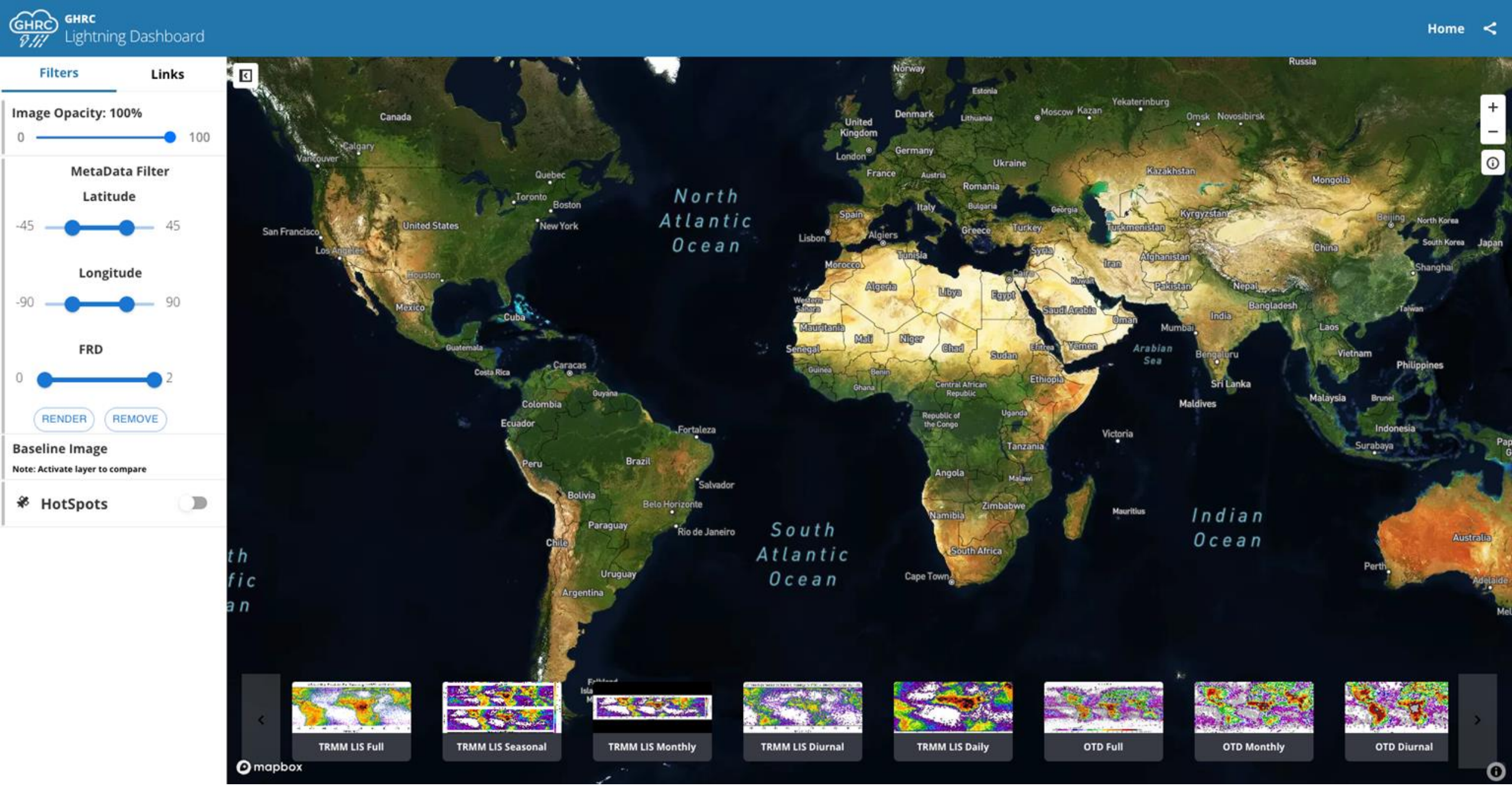
- The Lightning Dashboard offers a powerful and user-friendly platform for exploring lightning data, enabling users to conduct detailed analysis and gain valuable insights through its array of interactive features and visualization capabilities.
- The Lightning Dashboard provides 2D lightning visualization capabilities.
- Based on NASA's COVID-19 dashboard
- A tool to support the Lightning community

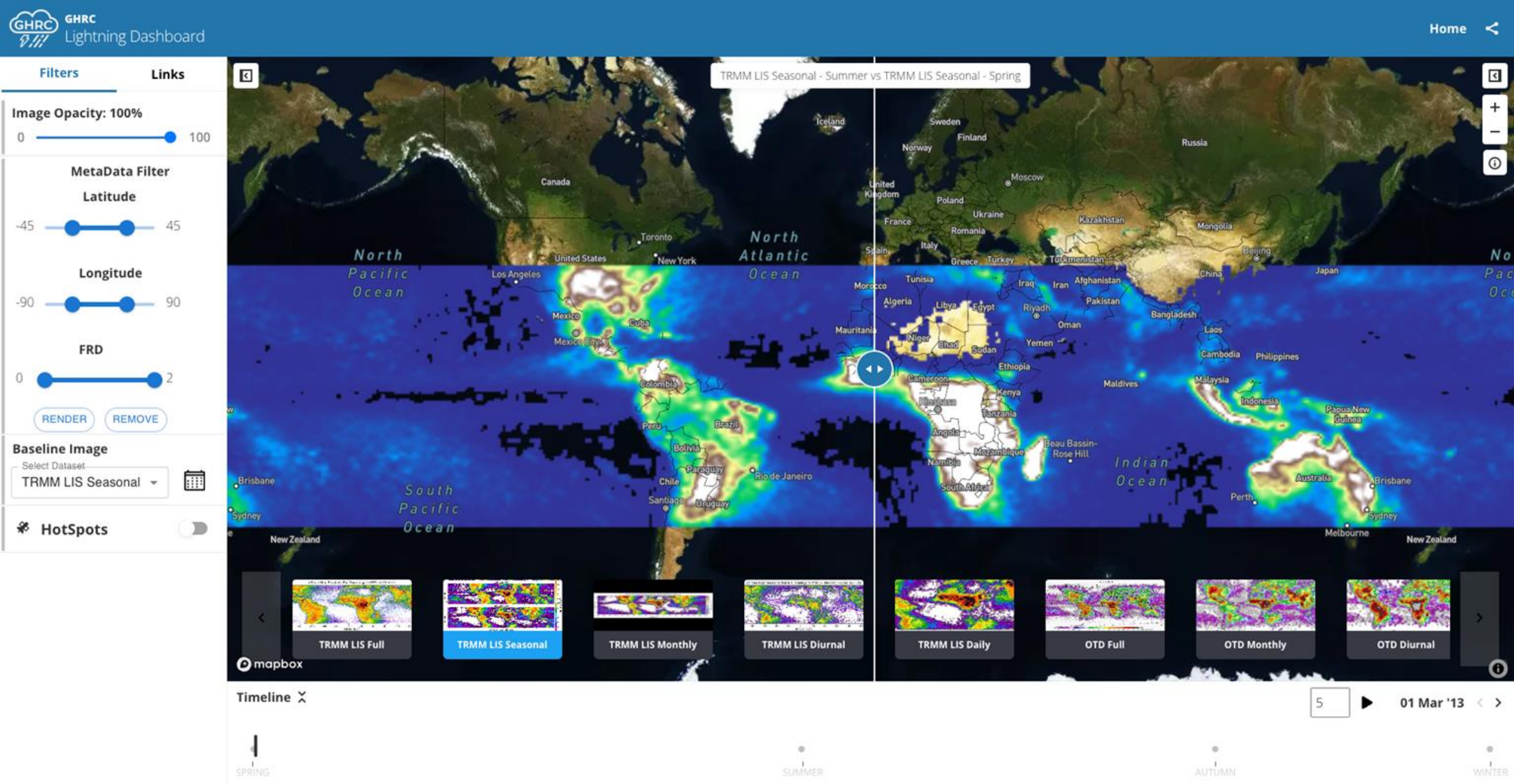
Lightning Dashboard (2/3)

- **Data Processing Workflow:**
  - Raw datasets are processed into Cloud optimized geotiff images using Python scripts.
  - Images are served through the Terracotta tile server.
- **Interactive User Interface:**
  - Users can explore Cloud optimized geotiff (COG) images on an interactive map view.
  - Options to choose from various datasets for visualization.
- **Comparative Analysis:**
  - Users can compare two datasets by visualizing images side by side.
  - Enables detailed comparative analysis of different lightning datasets.

Lightning Dashboard (3/3)

- **Advanced Visualization Features:**
  - 3D histogram plots enhance data visualization and analysis.
  - Metadata filter allows visualization of specific data points on saturated images.
  - Timeline navigation feature enables easy switching between different dates.
  - Slideshow functionality for automatic image transition, aiding seamless exploration.
- **Lightning Activity Insights:**
  - Layer manager allows users to adjust how images are displayed on the map.
  - Customizable settings for personalized viewing preferences.
  - Hotspots viewer displays the top 50 lightning activities from TRMM LIS dataset.
  - Provides valuable insights into high-intensity lightning areas.


GHRC
Lightning Dashboard
Home
Filters
Links
Image Opacity: 100%
0
100
MetaData Filter
Latitude
-45
45
Longitude
-90
90
FRD
0
2
RENDER
REMOVE
Baseline Image
Note: Activate layer to compare
HotSpots
North Atlantic Ocean
South Atlantic Ocean
Indian Ocean
Arabian Sea
TRMM LIS Full
TRMM LIS Seasonal
TRMM LIS Monthly
TRMM LIS Diurnal
TRMM LIS Daily
OTD Full
OTD Monthly
OTD Diurnal
mapbox


GHRC
Lightning Dashboard
Home
Filters
Links
Image Opacity: 100%
0
100
MetaData Filter
Latitude
-45
45
Longitude
-90
90
FRD
0
2
RENDER
REMOVE
Baseline Image
Select Dataset
TRMM LIS Seasonal
HotSpots
TRMM LIS Seasonal - Summer vs TRMM LIS Seasonal - Spring
North Pacific Ocean
North Atlantic Ocean
South Pacific Ocean
Indian Ocean
Canada
United States
Mexico
Brazil
Peru
Bolivia
Paraguay
Chile
Uruguay
Colombia
Russia
China
India
Australia
New Zealand
TRMM LIS Full
TRMM LIS Seasonal
TRMM LIS Monthly
TRMM LIS Diurnal
TRMM LIS Daily
OTD Full
OTD Monthly
OTD Diurnal
mapbox
Timeline
5
01 Mar '13
SPRING
SUMMER
AUTUMN
WINTER

A Year of Achievements: Reflecting on FY23

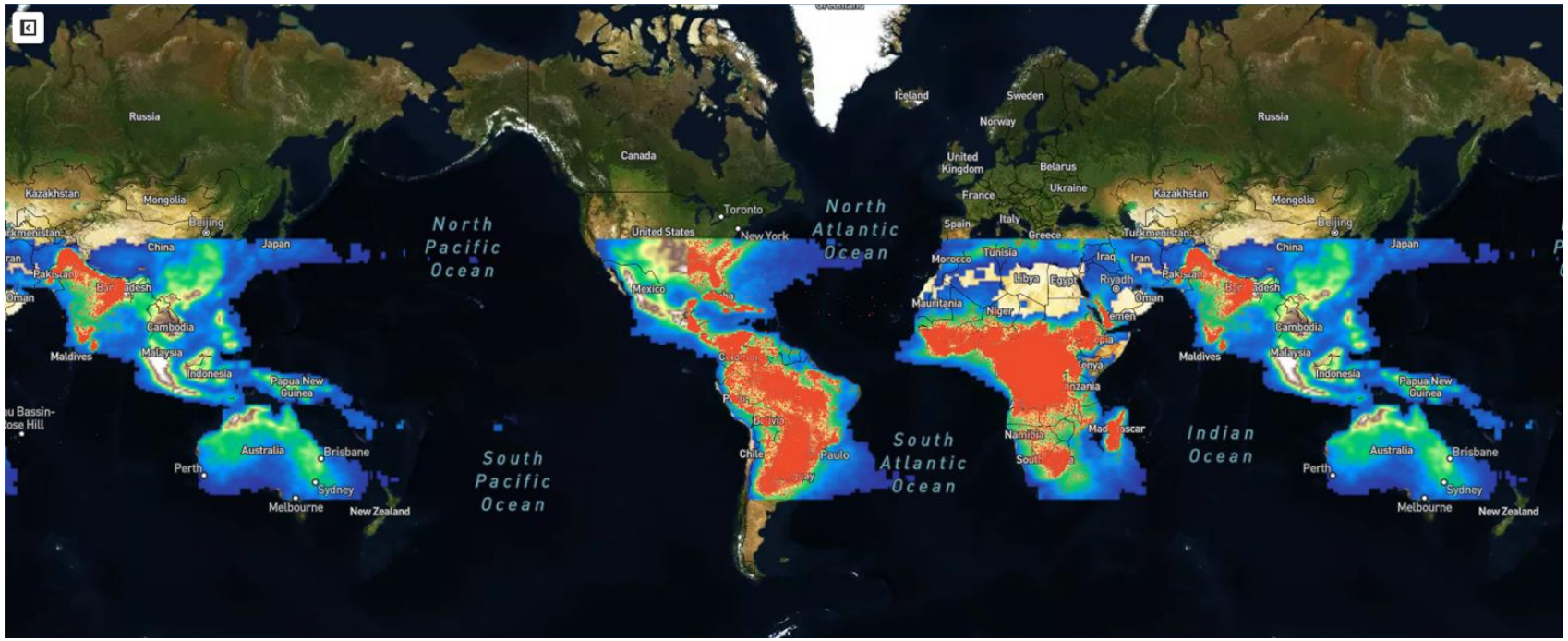
FY23 Highlights

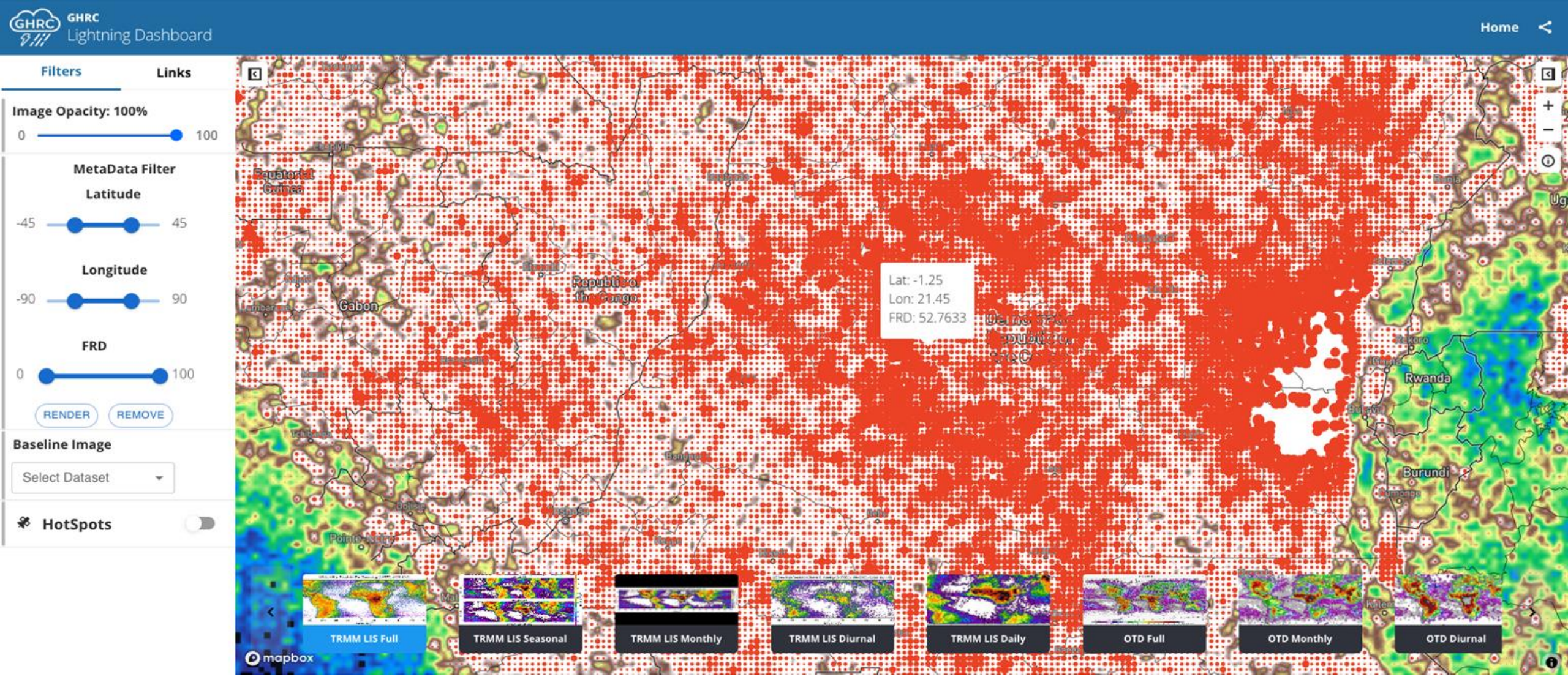
- **New Lightning Dataset**
  - NALMA
  - GLM
  - OTD (Full, Monthly, Diurnal, Daily)

- **Existing**
  - HS3
  - ISS LIS
  - TRMM LIS(Full, Seasonal, Monthly, Diurnal, Daily)

FY23 Highlights

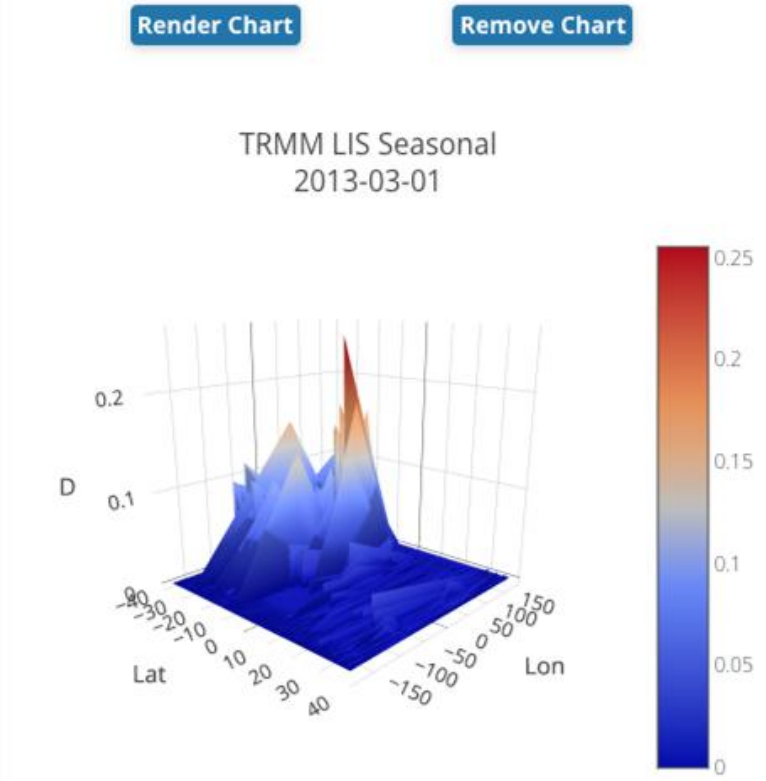
- **New Features**
  - Metadata APIs and Filter.
  - Slider to adjust Lat/Lon and FRD values.
  - Point visualization to look at saturated points




GHRC
Lightning Dashboard
Home
Filters
Links
Image Opacity: 100%
0
100
MetaData Filter
Latitude
-45
45
Longitude
-90
90
FRD
0
100
RENDER
REMOVE
Baseline Image
Select Dataset
HotSpots
Lat: -1.25
Lon: 21.45
FRD: 52.7633
Gabon
Republic of the Congo
Rwanda
Burundi
TRMM LIS Full
TRMM LIS Seasonal
TRMM LIS Monthly
TRMM LIS Diurnal
TRMM LIS Daily
OTD Full
OTD Monthly
OTD Diurnal
mapbox

FY23 Highlights

- **New Features**
  - 3D Histogram
  - Interactive viewer
  - X: Lat, Y: Lon, Z: FRD



- LayerInfo: Shows the seasonal mean flash rate density throughout 1998 to 2013.
- Scroll to Zoom In/Zoom Out
- Spin the Plot to see from different angles
- Hover over plot for specific data, where
  - x: Latitude
  - y: Longitude
  - z: FRD

FY23 Highlights

- **New Features**
  - Improved UI
  - Want to improve the User experience
  - Isolate Layer manager, dataset selection, and charts
  - More changes on the way!

FY23 Highlights

- **LMA and GLM tools - AWS Integration**
  - Deployed the **LMA and GLM tools** in **Cloud**
  - Using AWS Lambda and S3
  - Raw data stored in S3, Location passed to Lambda function
  - COGs are generated and stored in S3
  - Return the S3 Location to user
  - Also, created a Jupyter notebooks for easy access

FY23 Highlights

- **Deployment**
  - Bamboo CI/CD pipeline deployment
  - Deploys the website to S3 and creates a backup of last deployment in S3 bucket.
  - Deploys the terracotta server and backend code
  - Currently working on deploying the Jupyter notebooks to GitHub.

Current and Future Activities

- **Packaging**
  - Published our code to Python Package Index (PyPI)
  - Part of open source and ease of distribution
  - Checkout GHRC PyPI at https://pypi.org/user/ghrc/

- **Collaboration with EGIS and Openscapes**
  - Open Science, Cohort sessions, Coworking sessions on Earthdata science
  - 2I2C JupyterHub notebooks
  - ADC collaboration (ARC GIS)- TRMM LIS
  - Access to EGIS Portal

Current and Future Activities

- **Time-series Animation**
  - Currently serving static COG images.
  - Combine hourly, daily files to create animation.

- **New datasets**
  - Investigate 3D visualization.
  - Include more lightning datasets (Currently 6).
  - More tools/features to enable interactivity

Current and Future Activities

- **Utilizing GPUs for High-Resolution Visualizations:**
  - Utilize GPUs (Graphics processing unit) for generating high-resolution visualizations.
  - Initial focus on 3D lightning dataset.
  - Incorporate 3D Radars, Field Campaign instruments.
  - Current tools normalize data and extract fewer points for browser-based visualization.
  - Aim to harness the full potential of data points.
  - Enhance visualization quality and realism.
  - Enable cross-platform comparisons

Live Demo!

https://ghrc.earthdata.nasa.gov/lightdash

GHRC
Global Hydrometeorology Resource Center

THANK YOU!

QUESTIONS?

THE UNIVERSITY OF ALABAMA IN HUNTSVILLE

NASA

itsc
INFORMATION TECHNOLOGY AND SYSTEMS CENTER