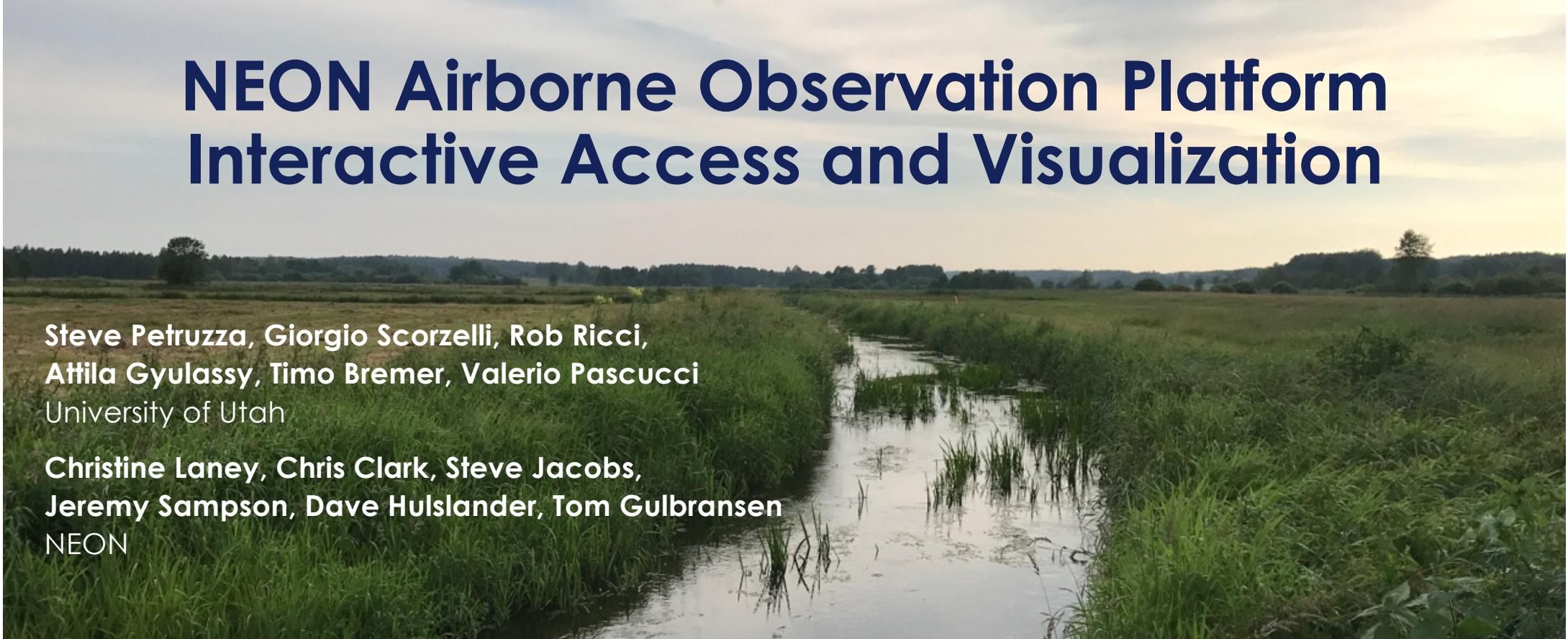


# NEON Airborne Observation Platform Interactive Access and Visualization



**Steve Petruzza, Giorgio Scorzelli, Rob Ricci,  
Attila Gyulassy, Timo Bremer, Valerio Pascucci**  
University of Utah

**Christine Laney, Chris Clark, Steve Jacobs,  
Jeremy Sampson, Dave Hulslander, Tom Gulbransen**  
NEON

# NEON AOP data access

- NEON has a large amount of data that is shared with the community through their **data portal**
- There exist **APIs** to download those data in bulk (per site, per year, per data product, now also by area)
- For some data, such as sensor measurements, the portal provides an **interactive** navigation system
- For others, like **Airborne Observation Platforms data**, there is a long list of image files...
- There is a need to present all AOP data interactively, where the users can preview, navigate, and select/access/download the data they need



Include	Filename	Site	Month	Size
<input checked="" type="checkbox"/>	2017_ABBY_1_546000_5060000_image.tif	ABBY	2017-06	13.61 MB
<input checked="" type="checkbox"/>	2017_ABBY_1_546000_5061000_image.tif	ABBY	2017-06	21.09 MB
<input checked="" type="checkbox"/>	2017_ABBY_1_546000_5062000_image.tif	ABBY	2017-06	32.95 MB
<input checked="" type="checkbox"/>	2017_ABBY_1_546000_5063000_image.tif	ABBY	2017-06	30.23 MB
<input checked="" type="checkbox"/>	2017_ABBY_1_546000_5064000_image.tif	ABBY	2017-06	32.88 MB
<input checked="" type="checkbox"/>	2017_ABBY_1_546000_5065000_image.tif	ABBY	2017-06	34.83 MB
<input checked="" type="checkbox"/>	2017_ABBY_1_546000_5066000_image.tif	ABBY	2017-06	34.44 MB
<input checked="" type="checkbox"/>	2017_ABBY_1_546000_5067000_image.tif	ABBY	2017-06	40.91 MB
<input checked="" type="checkbox"/>	2017_ABBY_1_546000_5068000_image.tif	ABBY	2017-06	38.67 MB
<input checked="" type="checkbox"/>	2017_ABBY_1_546000_5069000_image.tif	ABBY	2017-06	35.13 MB
<input checked="" type="checkbox"/>	2017_ABBY_1_546000_5070000_image.tif	ABBY	2017-06	29.52 MB
<input checked="" type="checkbox"/>	2017_ABBY_1_546000_5071000_image.tif	ABBY	2017-06	29.74 MB
<input checked="" type="checkbox"/>	2017_ABBY_1_546000_5072000_image.tif	ABBY	2017-06	32.44 MB
<input checked="" type="checkbox"/>	2017_ABBY_1_546000_5073000_image.tif	ABBY	2017-06	27.54 MB
<input checked="" type="checkbox"/>	2017_ABBY_1_546000_5074000_image.tif	ABBY	2017-06	6.68 MB
<input checked="" type="checkbox"/>	2017_ABBY_1_547000_5059000_image.tif	ABBY	2017-06	19.35 MB
<input checked="" type="checkbox"/>	2017_ABBY_1_547000_5060000_image.tif	ABBY	2017-06	57.84 MB

Showing 1 to 100 of 20,850 entries

## CiCOE data access/visualization/management efforts

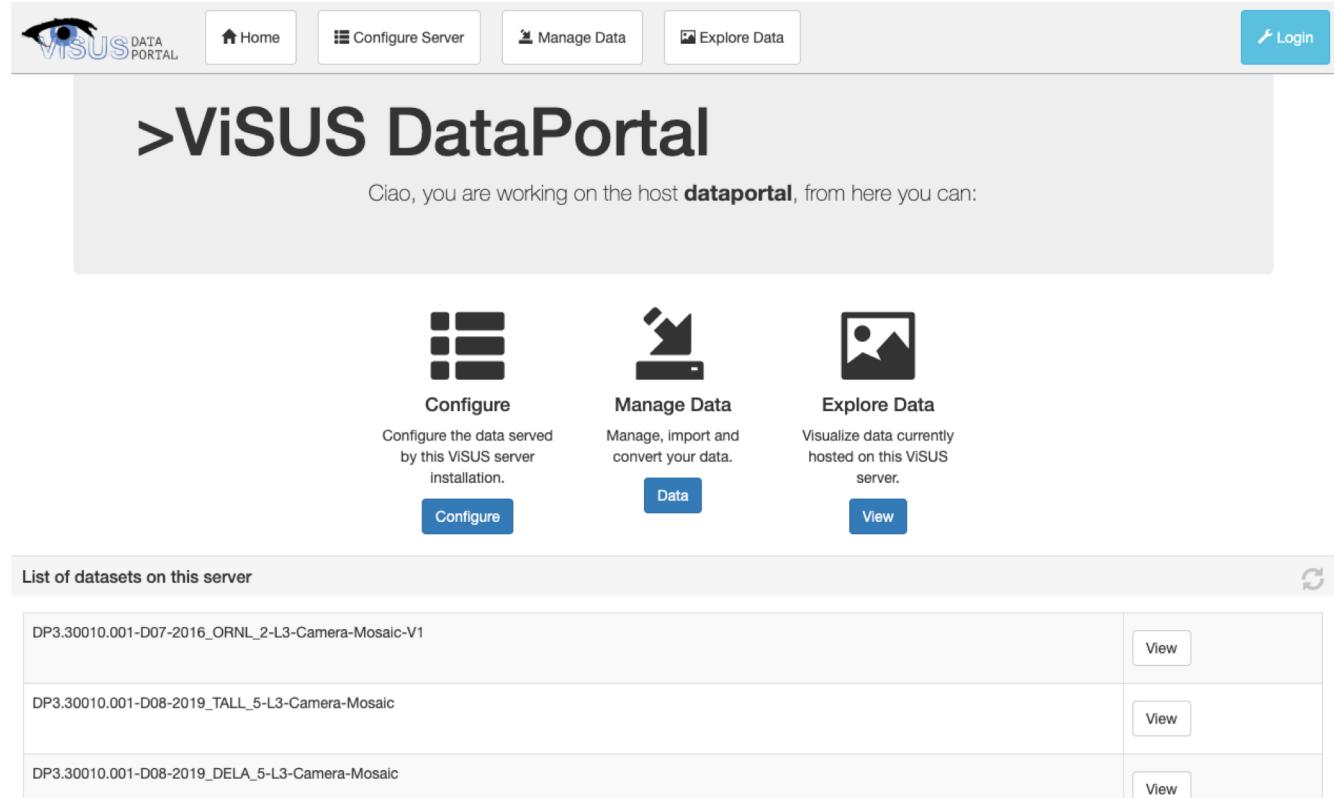
- AOP data ingestion and publication
- Multiresolution streaming data access (via javascript, python, C++)
- Experimented with time series and hyperspectral data
- Experimented with mixed tile sources (Google Earth+AOP data)
- NEON endpoint for data discovery and viewer embedding
- Deployment experiments on CloudLab

# Data ingestion and publication

- R scripts (using NEON API) to download AOP dataset
- Data processing and management:
  - extract the bounding boxes information from GeoTIFF and generate scripts to convert each dataset
  - Query NEON APIs to derive “month” value from file paths
  - Populate Utah endpoint database
  - Update the streaming server with the new datasets to make available

## Streaming server/data portal

- Apache module
- Provides streaming access to data hosted locally or remotely
- Available within a Docker container or standalone installation
- Web UI to manage and ingest new datasets



The screenshot shows the >ViSUS DataPortal homepage. At the top, there's a navigation bar with icons for Home, Configure Server, Manage Data, Explore Data, and Login. Below the navigation bar, the title '>ViSUS DataPortal' is displayed in large, bold letters. A message 'Ciao, you are working on the host **dataportal**, from here you can:' is shown. The main content area features three buttons: 'Configure' (with a server icon), 'Manage Data' (with a camera icon), and 'Explore Data' (with a mountain icon). Below these buttons is a table titled 'List of datasets on this server' containing three rows of data:

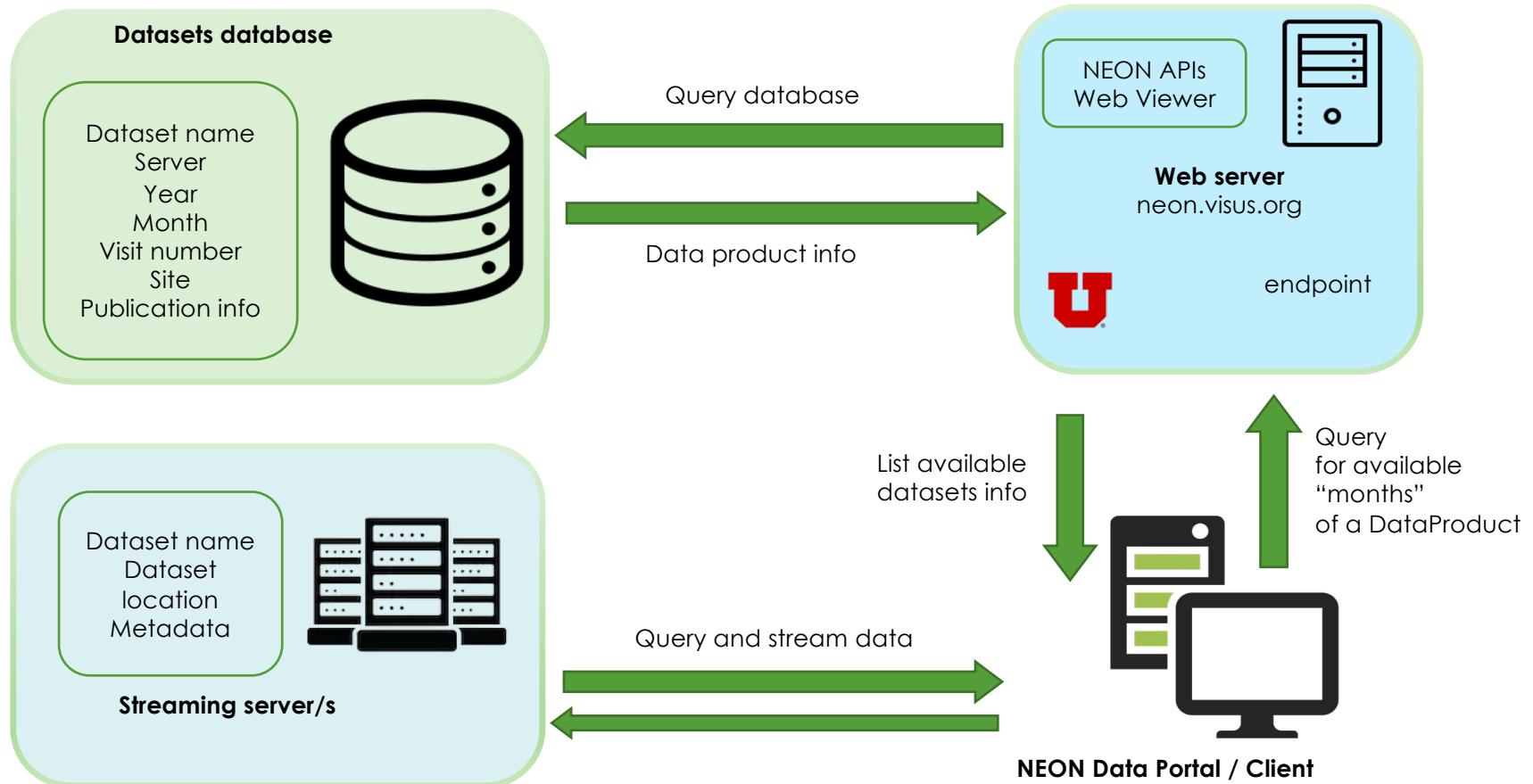
Dataset Name	Action
DP3.30010.001-D07-2016_ORNL_2-L3-Camera-Mosaic-V1	<a href="#">View</a>
DP3.30010.001-D08-2019_TALL_5-L3-Camera-Mosaic	<a href="#">View</a>
DP3.30010.001-D08-2019_DELA_5-L3-Camera-Mosaic	<a href="#">View</a>

## Utah - NEON APIs endpoint

- Handles requests to `/neonapi/products/{productCode}`
- Follows NEON APIs syntax
- Provide configuration strings to access a specific dataset
- Datasets could be relocated to other streaming servers transparently

```
// https://neon.visus.org/neonapi/products.php/DP3.30010.001

{
  "data": {
    "productCode": "DP3.30010.001",
    "siteCodes": [
      {
        "siteCode": "ABBY",
        "availableMonths": [
          "2018-07",
          "2017-06"
        ],
        "availableDataUrls": [
          "server=https%3A%2F%2Fdataportal.sci.utah.edu%2Fmod_visus%3F&dataset=DP3.30010.001-D16-2018_ABBY_2-L3-Camera-Mosaic-V01",
          "server=https%3A%2F%2Fdataportal.sci.utah.edu%2Fmod_visus%3F&dataset=DP3.30010.001-D16-2017_ABBY_1-L3-Camera-Mosaic-V01"
        ]
      },
      {
        "siteCode": "ARIK",
        "availableMonths": [
          "2017-05"
        ],
        "availableDataUrls": [
          "server=https%3A%2F%2Fdataportal.sci.utah.edu%2Fmod_visus%3F&dataset=DP3.30010.001-D10-2017_ARIK_1-L3-Camera-Mosaic-V01"
        ]
      }
    ]
  }
}
```



## First integration

- Viewer component embedded as an iframe
- Datasets and time navigation are implemented in the NEON data portal
- The parent (i.e., the NEON data portal web page) pass the dataset settings (retrieved from the endpoint) to the iframe which provides the rest of the functionalities
- Video demonstration:  
[https://www.youtube.com/watch?time\\_continue=5&v=09DWwEhUIWc](https://www.youtube.com/watch?time_continue=5&v=09DWwEhUIWc)



## Next steps

- Explored solutions to integrate in the same visualization multiple “tile” sources (e.g., Google Earth)
- New version of data format and server will allow to visualize AOP data in their geographical context
- Add new AOP data product

# References

- Utah endpoint  
<https://neon.visus.org/neonapi/products/{productCode}>
- Endpoint and web viewer source code repository  
<https://github.com/sci-visus/neon-visus>
- Video demonstration:  
[https://www.youtube.com/watch?time\\_continue=5&v=09DWwEhUIWc](https://www.youtube.com/watch?time_continue=5&v=09DWwEhUIWc)
- Documentation and other use cases of the visualization framework  
[www.visus.org](http://www.visus.org)