Web-Based Geospatial Visualization of GPM Data with CesiumJS

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Matt Lammers (matthew.r.lammers@nasa.gov)
Senior Science Data Visualization Analyst/Software Engineer
NASA Goddard Space Flight Center / SGT, Inc.
Outline

- GPM Data – What is it?
- CesiumJS – What is it? How can I use it?
- Putting the Two Together!
GPM: Global Precipitation Measurement Mission Core Satellite
- Contains Two Instruments: GPM Microwave Imager (GMI) and Dual-frequency Precipitation Radar (DPR)
- Orbits every ~90 minutes between ±67° Latitude
GPM Products

https://storm.pps.eosdis.nasa.gov

- Level 1: Raw Swath-Based Data
  - Counts from DPR
  - Brightness Temperature from GMI (and partner instruments)
- Level 2: Derived Swath-Based Data
  - Precipitation Variables from DPR and GMI (and partner instruments)
- Level 3: Aggregated Lat/Lon Gridded Data
  - Precipitation Variables from DPR and GMI (and partner instruments)
About CesiumJS

https://cesiumjs.org

- Open Source JavaScript Library for Visualizing Data On, Above, and Below the Earth's Surface
- Everything is Online
- Works with Time-Varying Data
- Moving Toward 3DTiles for Point Clouds, Vector Tiles, and 3D Shapes
https://cesiumjs.org/demos
CesiumJS Examples

https://cesiumjs.org/demos
CesiumJS Examples

https://cesiumjs.org/demos
When I came to NASA, project scientists were making decisions about data acquisition based on static images.
Putting Them Together

Near Real Time Viewer

https://storm.pps.eosdis.nasa.gov/storm/GPMNRTView.html
Putting Them Together

https://storm.pps.eosdis.nasa.gov/storm/Tools.jsp

Virtual Globe
Putting Them Together

https://storm.pps.eosdis.nasa.gov/storm/Analysis.jsp

Swath-Based Analysis Tool + Virtual Globe
Putting Them Together

Swath-Based Analysis Tool + Virtual Globe

https://storm.pps.eosdis.nasa.gov/storm/Analysis.jsp
Putting Them Together

https://storm.pps.eosdis.nasa.gov/storm/Analysis.jsp

Swath-Based Analysis Tool + Virtual Globe
Putting Them Together

https://pmm.nasa.gov/storm-viewer/EventViewer.html

Event Viewer
Putting Them Together

https://pmm.nasa.gov/storm-viewer/EVMini.html

EV Mini/EV Micro

moved from Mexico’s Yucatan Peninsula into the southwestern Gulf of Mexico’s Bay of Campeche. GPM’s Microwave Imager (GMI) and Dual-Frequency Precipitation Radar (DPR) data showed that Franklin contained a few heavy bands of convective rainfall. GPM’s DPR found rain falling at a rate of over rain 2-4 inches (62 mm) per hour in bands of intense storms moving around the southwestern side of the storm.
Putting Them Together

IMERG Time Lapse (Point Clouds)
Conclusion

- We have tons of precipitation-related satellite products from the last two decades
- Even if you don’t use precipitation information, think about how your data can be made more interactive and displayed more fully using new technologies like CesiumJS
- Happy to discuss technical details rest of week

Questions?

matthew.r.lammers@nasa.gov
https://storm.pps.eosdis.nasa.gov
https://cesiumjs.org
Conclusion

Extra Slides...
### Acquiring GPM Files

[https://storm.pps.eosdis.nasa.gov](https://storm.pps.eosdis.nasa.gov)

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#### Search Results

- **Select**
- **Data Type**
- **Algorithm**
- **Download/View**
- **Start Time**
- **Stop Time**
- **Orbit #**
- **Format**

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Total Granules selected: 16

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Acquiring GPM Files

https://storm.pps.eosdis.nasa.gov

STORM Swath-Based Analysis Tool

This tool enables comparisons between domain-aggregated values from different GPM and Partner Instruments. Select one or more instruments, a date range, and a geographic domain. The tool will display statistical values on an interactive graph, with the ability to change what statistics, what instruments, and what colors are displayed. All values are aggregated from swath pixels within the geographic domain selected.

Available Instruments:
- GPM-GMI
- GPM-GPR
- GPM-HA MS
- GPM-KU
- TRMM-TMI
- NPP-AATSR

Valid Range is between 1997/12/1 and 2018/03/06

Start Date/Time: 2018/03/01 00:00
Stop Date/Time: 2018/03/01 23:59

Geographic Domain:
Use the buttons on the top left to select a geographic area, or type the box into the inputs below.

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Acquiring GPM Files

https://storm.pps.eosdis.nasa.gov

STORM Swath-Based Analysis Tool

This tool enables comparisons between domain-aggregated values from different instruments. Select one or more instruments, a date range, and a geographic domain. The tool is interactive, with the ability to change what statistics, what instruments, and what values are aggregated from swath pixels within the geographic domain selected.

Available Instruments:

- GPM-OPR
- GPM-Hs MS
- GPM-Ku
- TRMM-TMB
- NPP-ATMS
- AQUA-AATSR2
- NOAA-18-AMS
- NOAA-19-AMS
- NOAA-17-AMS
- METOP-A
- METOP-B
- F11: SSMI
- F13: SSMI
- F18: SSMI
- AQUA-AHRS

Date Range:

Valid Range is between 1998/12/01 and 2018/05/05

Start Date/Time: 2017/01/01 00:00
Stop Date/Time: 2017/01/02 00:00

Geographic Domain:

Use the buttons on the top left to select a geographic area, or type the box into the inputs.

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RSCy 2018

March 26-29, 2018
Point Clouds