

GHRC DAAC Annual Report FY2015

Established in 1991, the Global Hydrology Resource Center (GHRC) is one of twelve NASA Distributed Active Archive Centers (DAACs), and is managed jointly by the Earth Science Department at NASA's Marshall Space Flight Center and the University of Alabama in Huntsville's Information Technology and Systems Center. The mission of the GHRC DAAC is to provide a comprehensive archive of both data and knowledge

augmentation services with a focus on atmospheric phenomena, its governing dynamical and physical processes and associated environmental applications. GHRC is a member of national and international data organizations including the Federation of Earth Science Information Partners (ESIP), NASA's Earth Science Data and Information System (ESDIS), and the International Council for Science (ICSU) World Data System (WDS).



User Working Group

The GHRC DAAC hosted its first User Working Group meeting September 25 - 26, 2014 in Huntsville, Alabama. Key scientists from GHRC's major discipline areas - the hydrologic cycle, severe weather interactions, lightning, and atmospheric convection – were invited to represent GHRC's user community. Members of the GHRC gave presentations on DAAC data holdings, operations, and services. These presentations focused on the GHRC's data stewardship activities including management of the GHRC's data assets and knowledge augmentation services such as infrastructure, tools, and user services. In addition, members of the UWG were invited to give presentations on their individual research topics in GHRC's major science areas. The UWG will provide guidance to the GHRC on topics such as pursuing new data holdings, developing new research ideas, and enhancing the overall user experience.

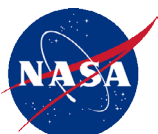
User Profile: Eric Bruning

GHRC User Working Group member Eric Bruning of Texas Tech University is featured on Earthdata's user profile page: <https://earthdata.nasa.gov/about-eosdis/news/user-profile-eric-bruning>.

Dr. Bruning works with lightning data from NASA satellite missions Microlab-1 Optical Transient Detector (OTD) and TRMM Lightning Imaging Sensor (LIS), both available from GHRC.



Image courtesy of Liz Inskip-Paulk, National Wind Institute, Texas Tech University



New Web Site

GHRC DAAC released its new website in May of 2015. The updated web site is built on the Drupal content management system, and has a clean, modern look designed in consultation with the GHRC User Working Group. The site is organized around science themes and project areas. It also features

- New menus for improved site navigation.
- Prominent links on the home page and a search box on every page to make getting to data easy.

<https://ghrc.nsstc.nasa.gov/home/>

New Datasets and Collections

Airborne Campaigns

The Hurricane and Severe Storm Sentinel (HS3), a NASA Earth Ventures – Suborbital 1 mission, completed its third season of observations in October 2014. For three hurricane seasons, unmanned Global Hawk aircraft carried instruments to monitor tropical storms and the surrounding environment in order to investigate the processes that underlie hurricane formation and intensity change in the Atlantic Ocean basin. Data from the HS3 mission is archived at and available from the GHRC DAAC. In FY2015, GHRC staff members have worked with the HS3 science team to define data and metadata formats and structures conforming to the netCDF (network Common Data Form) / CF (Climate and Forecast) data and metadata standard. Data from three of the six core instruments have been published, with a fourth in progress.

The remaining two instrument teams are reprocessing their data for delivery in FY2016. The HS3 mission was featured in *2014 Sensing Our Planet*: <https://earthdata.nasa.gov/user-resources/sensing-our-planet/profiles-in-intensity>.



60k' over Sierra's
Image courtesy of NASA

In 2015 GHRC continued its work with the Global Precipitation Measurement (GPM) mission Ground Validation (GV) team. There were no GV field campaigns to support this fiscal year – the most recent was IPHEX in 2014 – but the GV team continues to deliver datasets from past campaigns. Preparations for the next campaign, OLYMPEX, are underway. GHRC is coordinating with the University of Washington on data plans and has deployed the campaign collaboration portal for testing by the team.

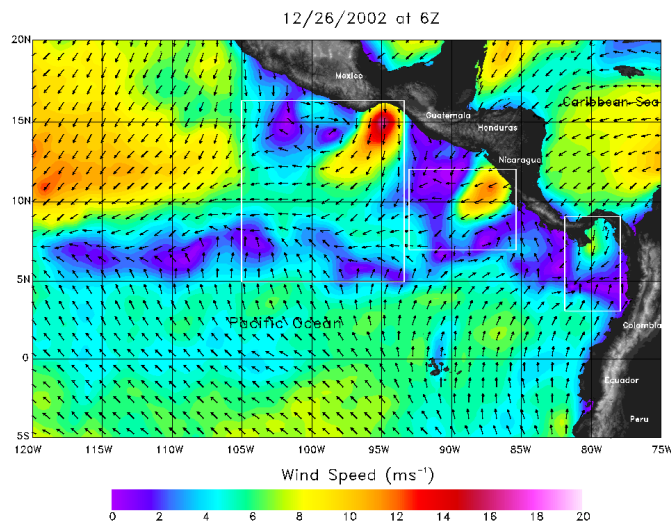
Coastal Gap Winds Climatology and Exploration Tool

In December 2014, GHRC published a set of Regional Air Sea Interactions (RASI) climatology datasets containing coastal mountain gap wind events and resulting sea surface temperature changes due to ocean upwelling. These datasets were created using an intelligent algorithm, which identified gap wind and coastal ocean upwelling events using two

satellite-based microwave datasets. The Cross-Calibrated Multi-Platform (CCMP) ocean surface wind data product was used for wind data while the Optimally Interpolated Sea Surface Temperatures (OISST) data product provided by Remote Sensing Systems (RSS) was used for sea surface temperatures. Data is available from 1998-2011 for three regions in Central America: Tehuantepec, Papagayo, and Panama. Users can explore these climatologies via the interactive online RASI application <http://ghrc.nsstc.nasa.gov/rasi/>. The RASI algorithm, datasets and application were developed by RSS and the University of Alabama in Huntsville for the DISCOVER project, funded by the NASA MEaSUREs program.

The RASI tool and data will be featured in *2015 Sensing Our Planet*.

Smith, D. K., X. Li, K. Keiser, and S. Flynn. 2014. Regional Air-Sea Interactions (RASI) climatology for Central America coastal gap wind and upwelling events. Paper presented at the OCEANS 2014 Marine Technology Society/Institute of Electrical and Electronics Engineers Conference, St. John, Newfoundland, doi: 10.1109/OCEANS.2014.7003127.



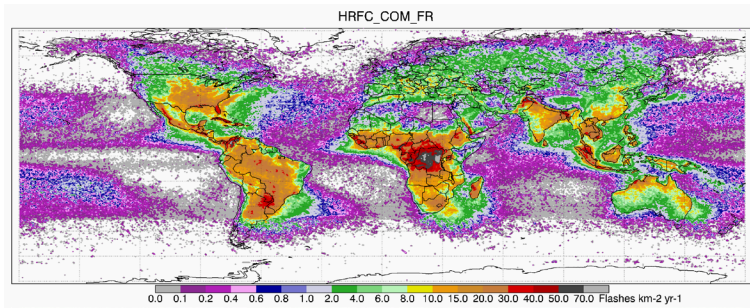
Lightning Imaging Sensor Updates

On 6 April 2015, the Lightning Imaging Sensor (LIS) on the TRMM satellite was powered off for the last time. The TRMM LIS mission had been recording both cloud-to-ground and intracloud lightning flashes from space since November 1997. LIS Level-2 lightning flash and background image datasets, as well as Level-3 climatologies, are available from GHRC.

Center to establish data ingest and processing workflows. The LIS Payload Operations Control Center (POCC), from which the Science Team will communicate with the instrument via MSFC's Huntsville Operations Support Center, is configured and ready for testing. The new processing server that will host ISS LIS product generation is now fully operational and has firewall exceptions for ISS LIS data ingest. Software integration and testing will begin soon.



Preparations continue for the deployment of a second LIS instrument to the International Space Station in early 2016. Data products from this instrument will also be hosted at the GHRC DAAC. GHRC personnel are coordinating with the LIS Science Team and the Payload Operations Integration Center (POIC) at NASA Marshall Space Flight

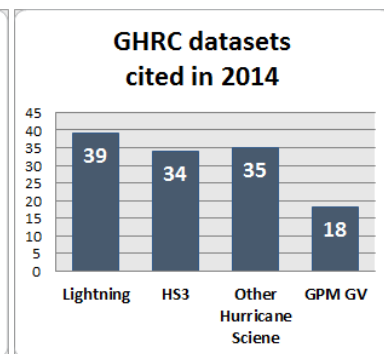
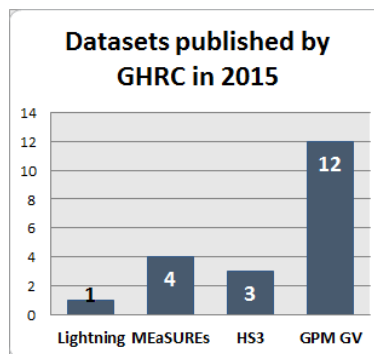


In February, the GHRC DAAC published the annual update to the suite of LIS/OTD Lightning Climatology datasets. These widely used datasets offer full, annual, monthly and diurnal climatologies of lightning observed from space from May 1995 through December 2013, including both Optical Transient Detector and TRMM Lightning Imaging Sensor, at 0.5 and 2.5 degree resolutions.

Daniel J. Cecil, Dennis E. Buechler, and Richard J. Blakeslee, 2015: TRMM LIS Climatology of Thunderstorm Occurrence and Conditional Lightning Flash Rates. *J. Climate*, 28, 6536–6547. doi: 10.1175/JCLI-D-15-0124.1

Data Stewardship Improvements

- With the NASA ESDIS project and others in the Earth science data stewardship community, GHRC has been working to encourage the practice of citing data sets in peer-reviewed literature. Progress in FY2015:
 - Completed the process of obtaining and registering a Digital Object Identifier (DOI) for each of the over 300 data sets cataloged and archived at the GHRC.
 - Began contacting all of our data providers to establish an author list for each data citation.
- As part of the Big Earth Data Initiative (BEDI), the GHRC DAAC has improved data services during FY2015; all data from two key collections – the HS3 mission and the DISCOVER MEaSUREs project – are now available via OPeNDAP and related data services.
- GHRC Operations staff completed migration of all datasets from our aging tape archive system to spinning disk in May 2015.



User Feedback

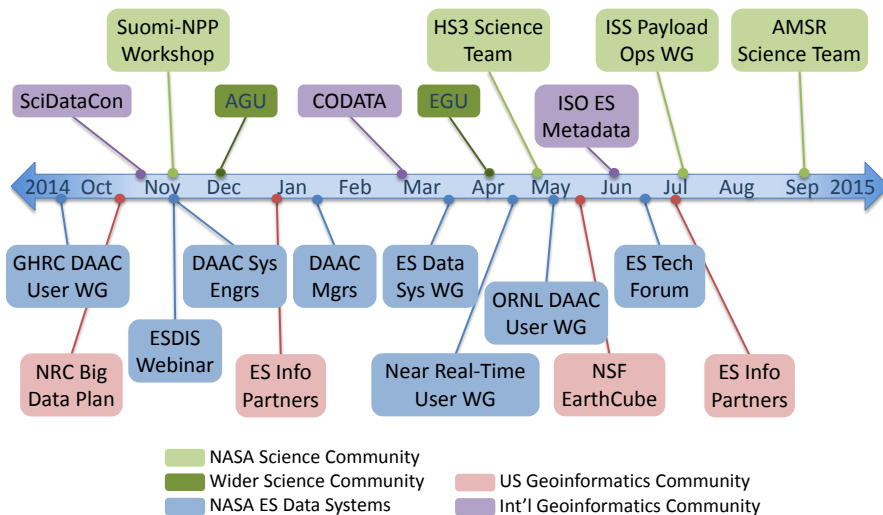
RE: Lightning Dataset
 Shery, I can't thank you and your co-workers enough. Please pass my thanks on to all concerned. It represents the true spirit of science. I look forward to hearing from you. Regards, w.

RE: GHRC DAAC data order
 Dear Shery, thank you very much for your answer. Everything is crystal clear now! Best regards, V

RE: assistance in visualizing LIS orbital data
 Thanks great news - thankyou Shery. ...and thankyou for the ghrc-support email. cheers R

RE: NLDN Stroke Data
 Hello Shery, Thanks again for your tremendous support! Take care, -S

Meetings, Workshops, Conferences



support-ghrc@earthdata.nasa.gov

Publications

Ibrahim Demir, **Helen Conover H**, Witold Krajewski, Bong-Chul Seo, Radoslaw Goska, **Yubin He**, **Michael McEniry**, **Sara Graves**, Walter Petersen. 2015. "Data Enabled Field Experiment Planning, Management, and Research using Cyberinfrastructure." *Journal of Hydrometeorology*; 16(3):1155-1170. doi: 10.1175/JHM-D-14-0163.1.

Manil Maskey, **Sara Graves**, **Michael McEniry**, **Kaylin Bugbee**, **Helen Conover**, and **Rahul Ramachandran**. 2015. "Data Systems for the HS3 Field Campaign." ESIP 2015 Winter Meeting. Washington, DC. Available from: <http://www.itsc.uah.edu/main/posters/data-systems-hs3-field-campaign-agu-2014>

Curt Tilmes, Ana Pinheiro Privette, Jeffrey Chen, **Rahul Ramachandran**, **Kaylin Bugbee**, and Robert Wolfe. 2015. "Linking from Observations to Data to Actionable Science in the Climate Data Initiative." IEEE Geoscience and Remote Sensing Symposium (IGARSS 2015), July 26-31 in Milan, Italy.

Rahul Ramachandran and Siri Jodha S. Khalsa. 2015. "Moving from Data to Knowledge: Challenges and Opportunities." IEEE Geoscience and Remote Sensing Magazine.

Rahul Ramachandran, **Ajinkya Kulkarni**, **Xiang Li**, **Roshan Sainju**, **Rohan Bakare**, and **Sabin Basyal**. 2015. "Use of Semantic Technology to Create Curated Data Albums." In *The Semantic Web in Earth and Space Science: Current Status and Future Directions*, edited by Peter Fox and Tom Norack. IOS Press. Available at: <http://www.iospress.nl/book/the-semantic-web-in-earth-and-space-science-current-status-and-future-directions/>

Peng Yue, **Rahul Ramachandran** and Peter Baumann, eds. 2015. Earth Science Informatics special issue on Intelligent GIServices. September 2015, Volume 8, Issue 3, pp 461-462. doi:10.1007/s12145-015-0237-z

Peng Yue, Peter Baumann, **Kaylin Bugbee**, and Liangcun Jiang. 2015. "Towards Intelligent GIServices." Earth Science Informatics special issue on Intelligent GIServices. September 2015, Volume 8, Issue 3. doi:10.1007/s12145-015-0229-z

Kwo-Sen Kuo, Gyorgy Fekete, Amidu Oloso, Michael Bauer, Ramon Ramirez-Linan, **John Rushing**, Thomas Clune, and **Rahul Ramachandran**. 2015. "Advances in Automated Services." IEEE Geoscience and Remote Sensing Symposium (IGARSS 2015), July 26-31 in Milan, Italy.