



National Aeronautics and
Space Administration

Earth Science Research Results Portal (ESRRP)

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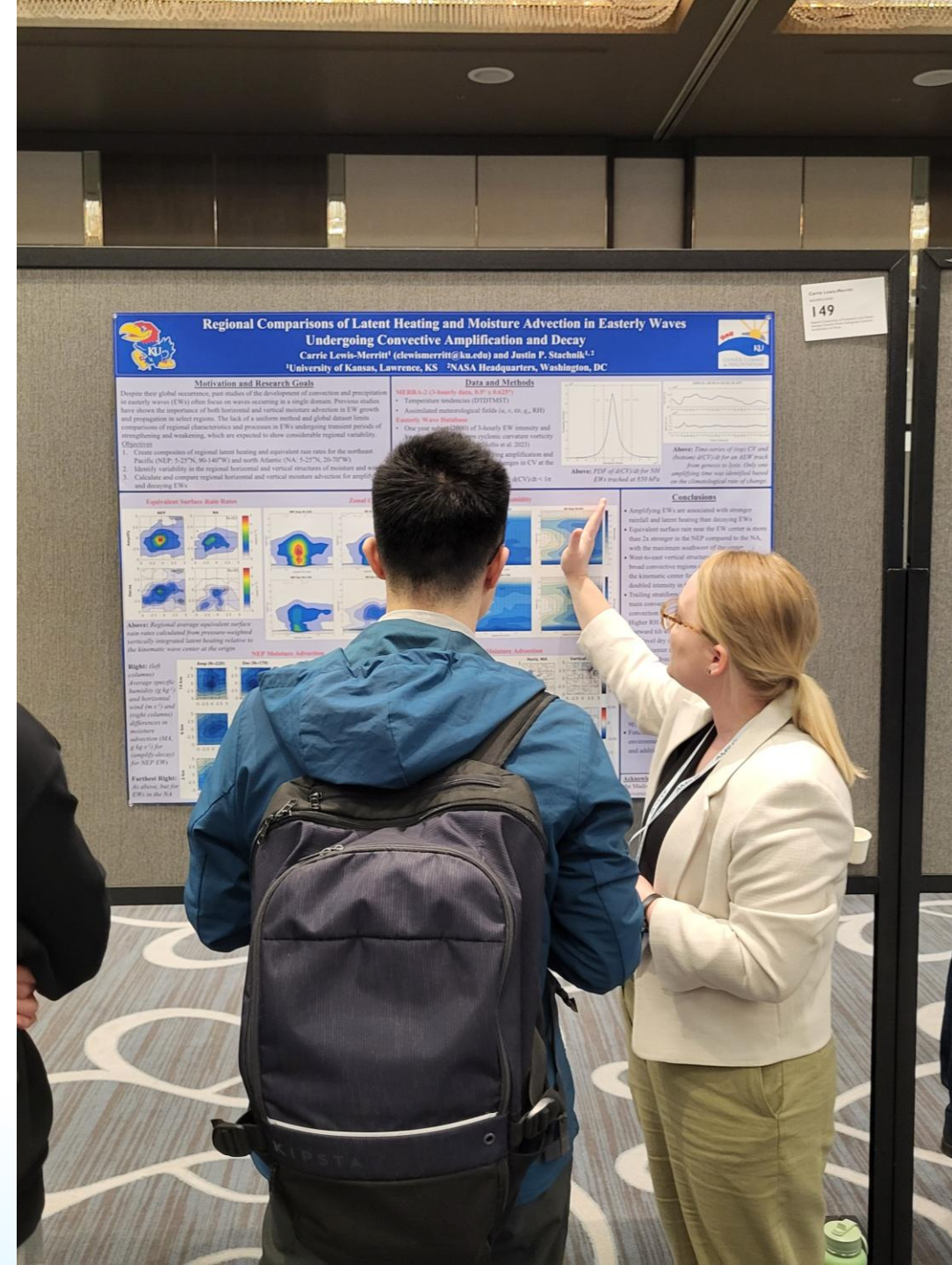
Hydrosphere Meeting – 1 September 2026



Bottom Line, Up Front

The ESSRP (i.e., the “Portal”) represents an opportunity to tell stories and share your work for research results, scientific developments, campaign highlights, meetings and events, and more

- All ESSRP staff identify weekly highlights
- Each Sphere presents one highlight per week during ESSRP staff meetings
- ESSRP leadership presents one highlight per week at ESD staff meetings
- Weekly and monthly highlights will be shared online for public dissemination
- **Help us tell your success stories and promote the work that only NASA can do!**



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Hydrosphere

Monitoring and predictive understanding of the Earth's water supply across the land, ocean, and atmosphere

SPOTLIGHT

SMAP Science Team Meeting

Summary of the 2026 SMAP Science Team Meeting

Research Results Portal

NASA-funded researchers can share project updates

About the image

Learn more about the banner visualization here

Mission

Hydrosphere improves the observation, understanding, and prediction of the distribution and movement of water in the Earth System. Specifically, NASA Hydrosphere studies water and energy cycles across land, ocean, and the atmosphere through the integration of measurements from satellites, surface networks, and airborne campaigns.

Overview

NASA Hydrosphere directs research and manages satellite and airborne missions that explore the variability, residence, and transport of oceanic, atmospheric, and terrestrial water. It supports interdisciplinary studies of the global water and energy cycle, sea-level rise and coastal impacts, air-sea interactions, and the integrated role of the hydrosphere-biosphere in the Earth system. We engage in collaborative efforts across NASA Earth Science and support a wide range of interagency and international initiatives to monitor, understand, and predict Earth's water. The program also provides scientific support for major NASA satellite missions. Finally, NASA Hydrosphere engages in work that collaborates with other elements across the research Spheres, within NASA Earth Science (Earth Action, Data Systems, and Technology) and beyond (i.e., interagency and cross-agency efforts).

Hydrosphere Peer-Reviewed Publications

Featured News

Research Drivers

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5 MIN READ

US-India Satellite Delivers Data, Reveals 'Hummingbird' in Antarctica

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ARTICLE 1 MONTH AGO



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NASA Uses Machine Learning to Enhance Flash Flood Warnings

ARTICLE 2 MONTHS AGO



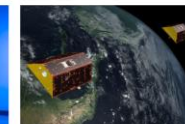
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NASA's CloudCube Pioneers Miniaturized Radar to Study Clouds, Precipitation

ARTICLE 3 MONTHS AGO



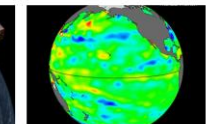
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5 MIN READ

NASA Satellites Reveal Aquifer Decline in Brazilian Breadbasket

ARTICLE 3 MONTHS AGO



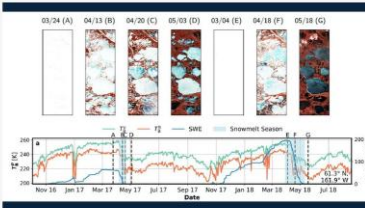
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RESEARCH HIGHLIGHT

Seasonal Snow Water using L-band Radiometry

The researchers determined that the L-band brightness temperature (Tb) response during snowmelt can distinguish between shallow and deep snowpacks. Specifically, a Soil Moisture Active and Passive (SMAP)-based deep learning model estimated peak snow water equivalent (SWE) more accurately than previous Advanced Microwave Scanning Radiometer (AMSR)-E/AMSR2 and ERA-5 methods. The new method enables more accurate critical forecasting for water supply, hydropower, crop yields, and wildfire risks using NASA data in addition to an improved monitoring of global snow from space.

Full publication



(top) Sentinel-2 satellite composite band images over Bettel, Alaska across multiple days. (bottom) Time-series of SMAP vertical (Tb-v) and horizontal (Tb-h) polarization brightness temperature and ERA5 snow water equivalent (SWE). The snowmelt season is indicated with shading, which corresponds to periods of rapid brightness temperature change. The deeper brightness temperature depression in 2018 was attributed to a deeper snowpack with more soil saturation. Saint Anthony Falls Laboratory/Diyya Kumaar

Scan the QR code or visit:
<https://science.nasa.gov/earth-science/research/hydrosphere/>



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- Streamline the process through which Earth science research results, scientific developments, and associated activities funded by Earth Science Division (ESD) Program Elements are packaged and transmitted for uptake by Earth Science Division (ESD) and the Science Mission Directorate (SMD) front offices.
- Provide ESD Program Elements the ability to identify and track published or unpublished scientific advancements related to Earth system science that are enabled through direct or indirect program investments.
- Understand and highlight the relationship of ESD Program Element investments to research, development and application outcomes for improved coordination and greater coherence.

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Latest Research Results

Result Title	Date of Submission ▼	Submitted by	Principal Investigator name	Institutional affiliation
Expanding the GPM constellation to include GOSAT-GW AMSR3	31 August, 2026	Rachael Kroodsma Email: rachael.a.kroodsma@nasa.gov	Rachael Kroodsma	NASA Goddard Space Flight Center
Expanding the GPM constellation to include WSF-M1 MWI	31 August, 2026	Rachael Kroodsma Email: rachael.a.kroodsma@nasa.gov	Rachael Kroodsma	NASA Goddard Space Flight Center
ICESat-2 reveals massive underestimations of water volume in Antarctic subglacial lakes	31 August, 2026	Aimee Neeley Email: aimee.neeley@nasa.gov	Wilson Sauthoff	Colorado School of Mines
Expanding the economic value of ICESat-2 through open access and education	31 August, 2026	Aimee Neeley Email: aimee.neeley@nasa.gov	Molly Brown	University of Maryland
TROPICS Reveals Thermodynamic Variability Associated with the Tropical Cyclone Diurnal Cycle	28 August, 2026	Patrick Duran Email: patrick.t.duran@nasa.gov	Patrick Duran	NASA Marshall Space Flight Center
New Vertical Motion Estimates in NASA Goddard CSH V8 Algorithm	28 August, 2026	Adrian Loftus Email: adrian.m.loftus@nasa.gov	Adrian Loftus	Goddard Space Flight Center
Machine Learning Enables Global, Explainable Microwave Land Surface Emissivity Estimation	27 August, 2026	Sarah Ringerud Email: sarah.e.ringerud@nasa.gov	Sarah Ringerud	NASA GSFC
Advancing IMERG Precipitation Products in GPM	27 August, 2026	GEORGE HUFFMAN Email: george.j.huffman@nasa.gov	George Huffman	NASA Goddard Space Flight Center

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https://esdresearch.nasa.gov/scientific-developments

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Latest Scientific Developments

Name of scientific development	Date of Submission ▼	Submitted by	Principal Investigator name	Institutional affiliation
Demonstration of Sea Level Pressure (SLP) retrievals with an airborne V-band differential absorption radar (DAR)	28 August, 2026	Matthew Walker McLinden Email: matthew.l.mclinden@nasa.gov	Matthew L. Walker McLinden	NASA/Goddard Space Flight Center
GloSSAC V 2.24	25 August, 2026	Mahesh Varma Mundakkara Kovilakam Email: maheshvarma.mundakkarakovilakam@nasa.gov	Mahesh Varma Mundakkara Kovilakam	ADNET Systems Inc/LaRC
GGG2020.1 TCCON data update	24 August, 2026	JOSHUA LAUGHNER Email: josh.laughner@jpl.nasa.gov	Joshua Laughner	Jet Propulsion Laboratory, California Institute of Technology
The Benefits of High Resolution Multispectral TIR Data and Its Impending Loss by NASA After Four Decades	11 August, 2026	WILLIAM TURNER Email: woody.turner@nasa.gov	Michael S. Ramsey	University of Pittsburgh
The ESA Earth System Model 3.0	10 August, 2026	JEANNE SAUBER-ROSENBERG Email: Jeanne.M.Sauber-Rosenberg@nasa.gov	Linus Shihora	GFZ
MERRA-2 Gridded Innovations and Observations	5 August, 2026	MICHAEL BOSILOVICH Email: michael.g.bosilovich@nasa.gov	Michael Bosilovich	NASA GSFC Global Modeling and Assimilation Office
Fetch AZA Ocean Bottom Pressure recorded Deployment, Nordic Seas – Cruise June 8-11, 2026	30 July, 2026	LUCIA TSAOUSSI Email: lucia.s.tsaoussi@nasa.gov	Dr. Cecilia Peralta-Ferriz	Applied Physics Laboratory, University of Washington
Developing PCRTM-based Level 2 Retrieval Algorithm for Future GEOXO GXS using IRS as Proxy Data	30 July, 2026	XU LIU Email: xu.liu-1@nasa.gov	Xu Liu	NASA Langley Research Center
Delivery of a fast and accurate Principal Component based Radiative Transfer Model (PCRTM) for OMPS Nadir Mapper (NM) and Nadir Profiler (NP) to NOAA STAR	30 July, 2026	XU LIU Email: xu.liu-1@nasa.gov	Xu Liu	NASA Langley Research Center



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Does convection in developing atmospheric rivers affect rain production downstream as they mature?

Research objectives and context:

Establish the role of convection in the production of rain in atmospheric rivers to help improve numerical models for short and long term forecasting of severe impacts at landfall.

Key research results and findings:

The analysis confirms that convective activity in atmospheric rivers affects precipitation production throughout their lifecycle. More specifically it answers the two following questions:

1. Does convection deprive ARs of moisture (thereby working against rain production)?
=> No, the moisture amounts in ARs with significant convective activity is larger throughout the AR lifecycle than in ARs with weak convective activity
2. Does convection strengthen ARs (through latent heat release as idealized models suggest), thereby enhancing rain production?

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Invite to MS Teams Chat:

Technical Officer: [Will McCarty](#)

Date of Submission:

5 August, 2026

Submission on behalf of:

Academic institution

Submitted by:

Catherine Naud

Email: cn2140@columbia.edu

Principal Investigator:

Slide Best Practices

- 1-2 key images along with a simple caption(s)
- Additional text as helpful
- Other details can be placed in the slide notes section:
 - Summary of the key discovery or advance
 - Significance to Earth system science
 - NASA assets used
 - Reference





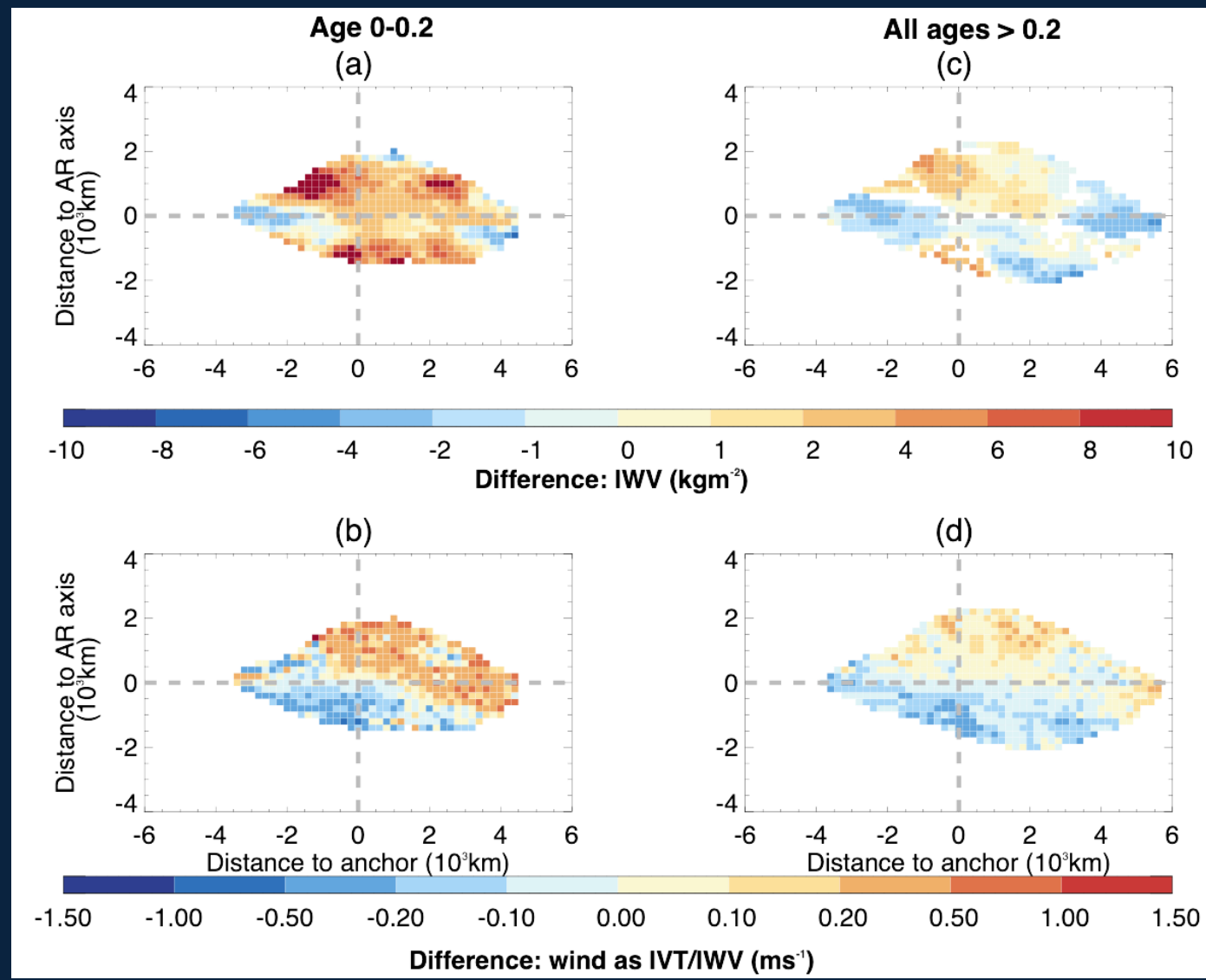
Does Convection in Developing Atmospheric Rivers affect Rain Production Downstream as they Mature?

Catherine Naud, Columbia University/NASA-GISS

Key Research Results: Significant convective activity early during the development of atmospheric rivers (ARs) has the following effects:

1. Does not deprive ARs from moisture where/when it occurs or downstream as the system matures
2. Impacts surface winds and AR strength when quantifying transport
3. Causes greater precipitation production for ARs throughout their full lifecycle

Along filament **differences in** (top) **integrated water vapor** (IWV, i.e., moisture) and (bottom) **integrated winds** between ARs with appreciable convection when first forming and those without. (left) ARs near the formation time and (right) later in life.



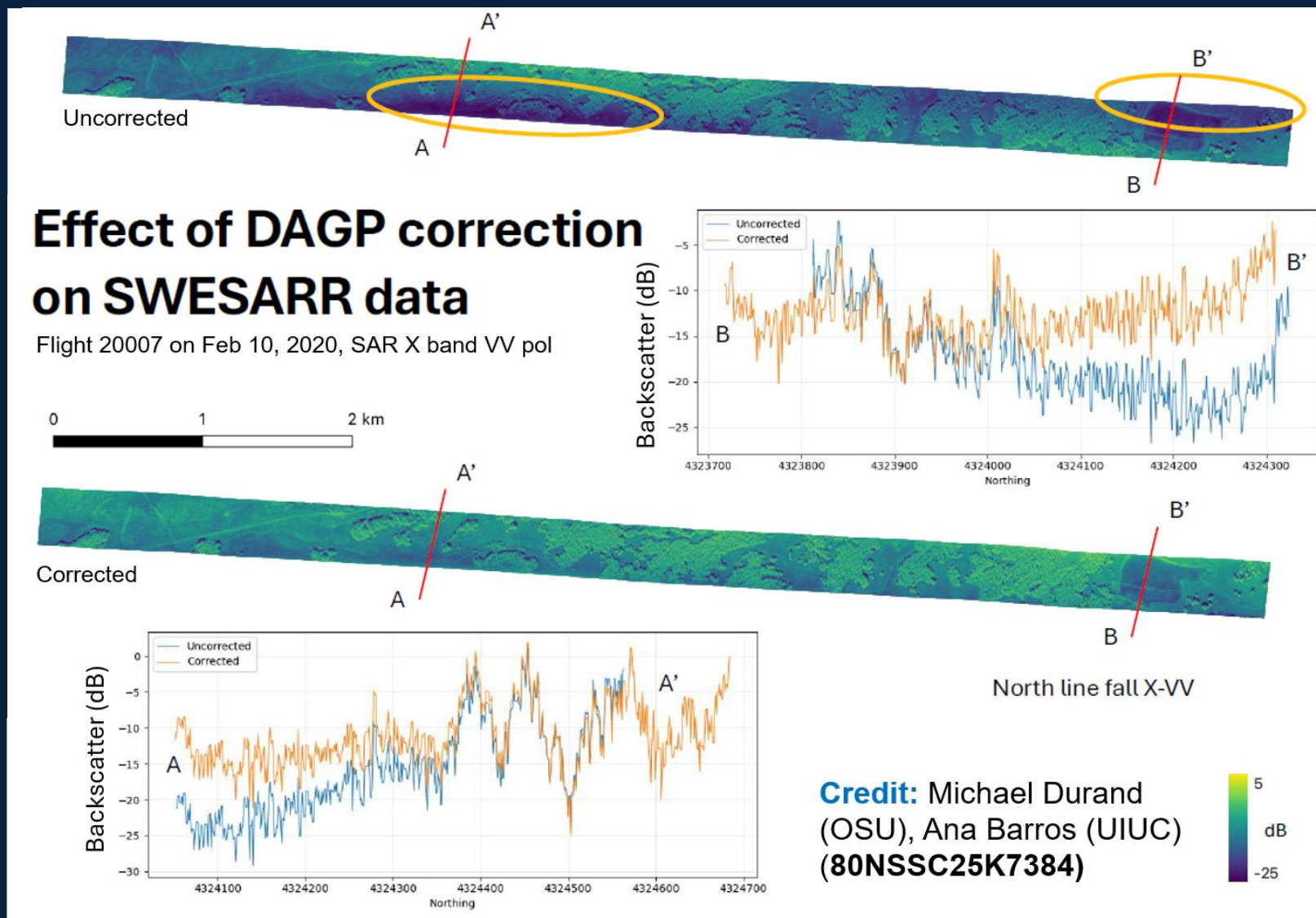


Snow Water Equivalent Synthetic Aperture Radar and Radiometer (SWESARR) Data Processing

Michael Durand, Ohio State University

Key Result: First science-ready, SWESARR data for SnowEx Grand Mesa, CO (2019-2020)--and soon-- Fairbanks and North Slope, Alaska (2023)

Significance: The SnowEx data can now be used as intended to improve multi-frequency, active/passive SWE retrieval algorithms and satellite snow mission concepts



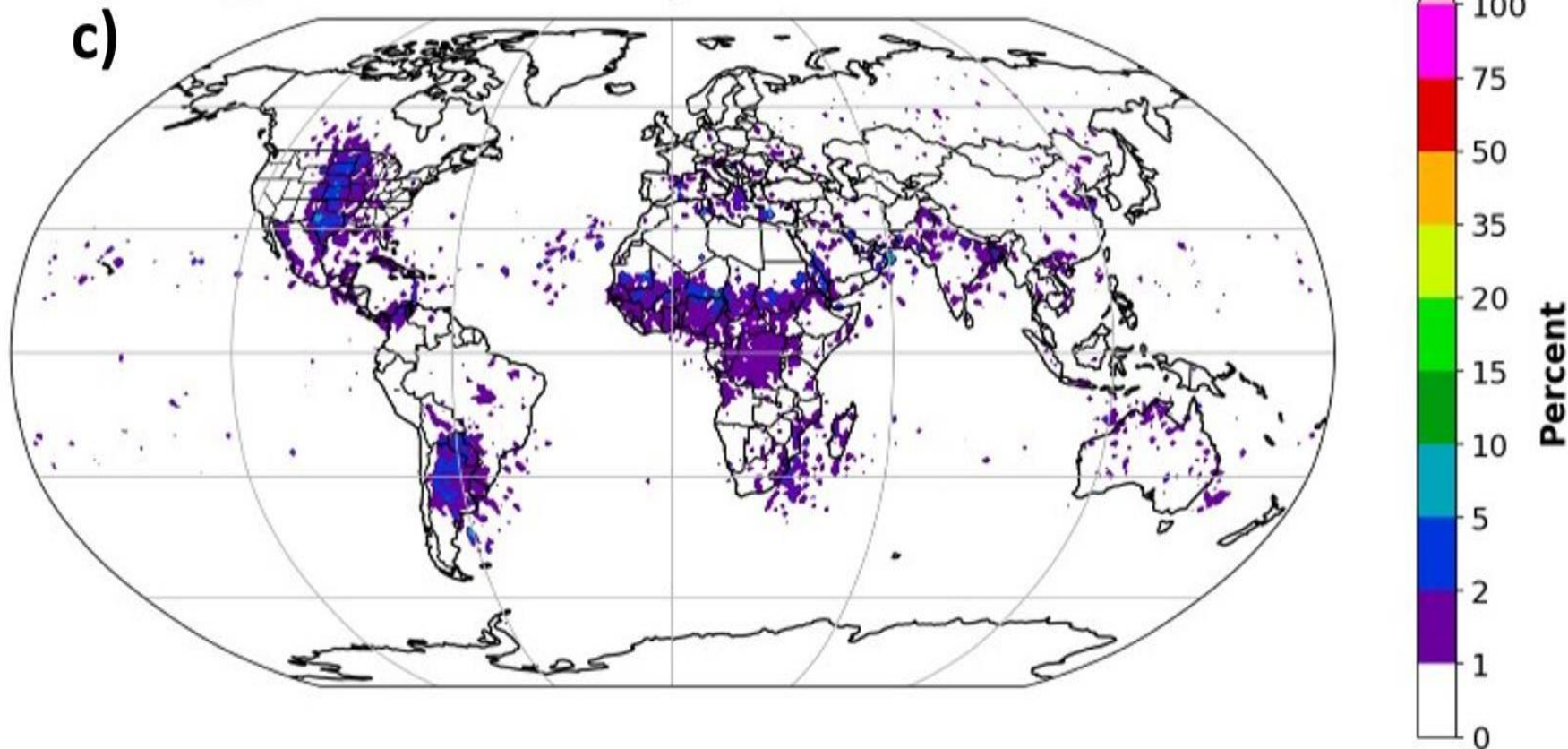


Using GMI Brightness Temperatures to Monitor Global Distribution of Hydrometeor Species

Daniel J. Cecil, NASA MSFC and Michael B. Solomon, Univ. of Alabama in Huntsville

Percentage of Annual Precip Associated with Hail Aloft

c)



Key Discovery/Advance:

An updated methodology is presented for **identifying hydrometeor species** using brightness temperatures from the Global Precipitation Measurement (GPM) Microwave Imager (GMI)

Up to 5% of precipitation is associated with hail-producing storms over continental regions associated with strong convection (vertical motions), like the Great Plains over the Central US

The percentage of precipitation associated with hail-producing storms relative to the total precipitation at a given point

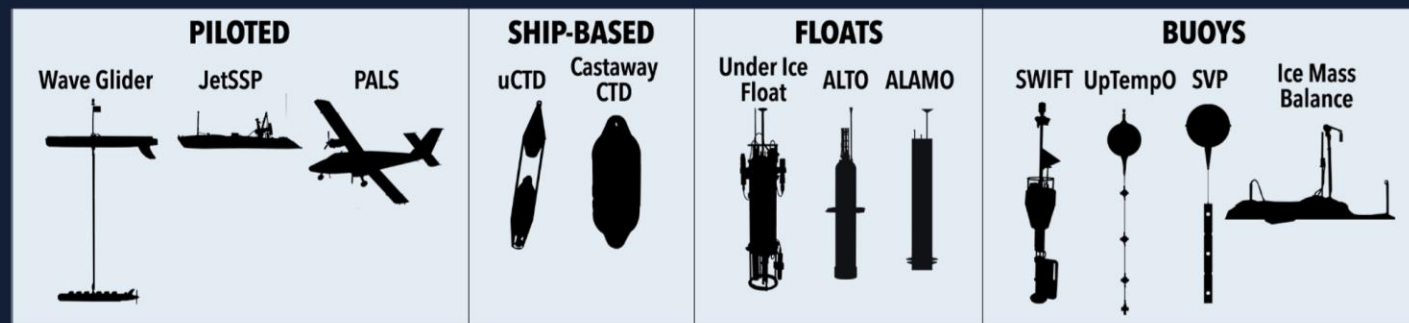
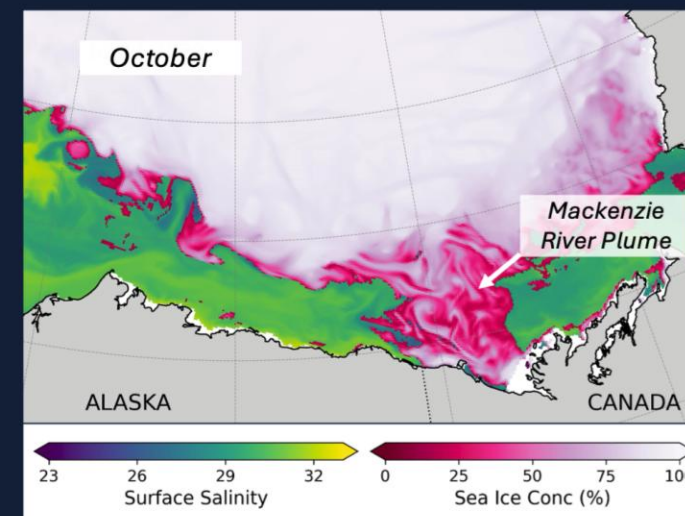
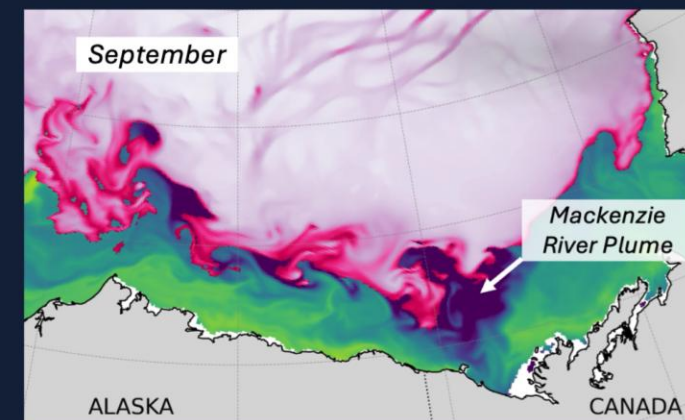
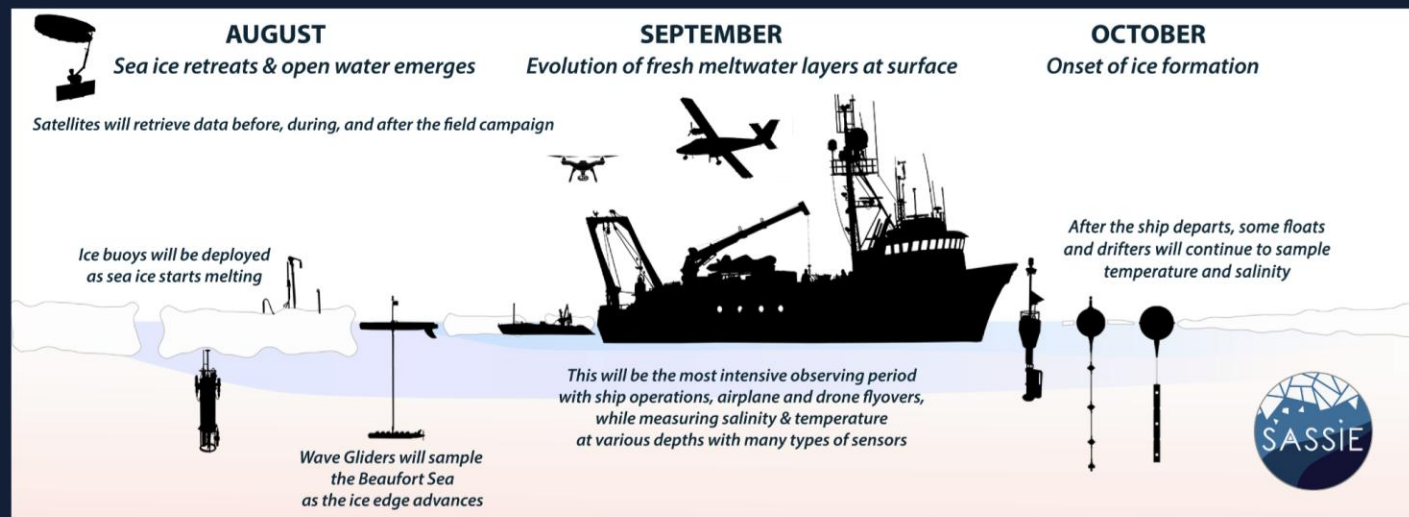


SASSIE Confirms Importance of Salinity for Arctic Sea Ice with Satellite, Suborbital Data, and Models

Peter Gaube (UW) and SASSIE Team



//
We hypothesize that sea surface salinity anomalies caused by summer sea ice melt are an important predictor for autumn ice advance. – SASSIE Project





National Ocean Science Bowl 2026 is a Wrap

Nick Rome, Center for Ocean Leadership

Description: The NOSB is an academic competition and program that has been running for 28 years. It introduces high school students to and engaging them in ocean science, preparing them for ocean science-related and other STEM careers.

This year there were 15 regional competitions with 176 teams and 874 students, with the theme “Ocean Conservation: Connecting Science and Stewardship for a Healthy Ocean”

Chesapeake Bay Bowl



Thomas Jefferson High School for
Science and Technology

Alexandria, VA



Credit: Chesapeake Bay Bowl

Penguin Bowl



Centerville High School

Centerville, OH



Credit: Penguin Bowl

Virtual Sponge Bowl



University High School

Irvine, CA



Credit: Virtual Sponge Bowl

3 of 15 teams that won regional bowls this year, that were held at George Mason University, Pittsburg, PA, and a fully virtual bowl.

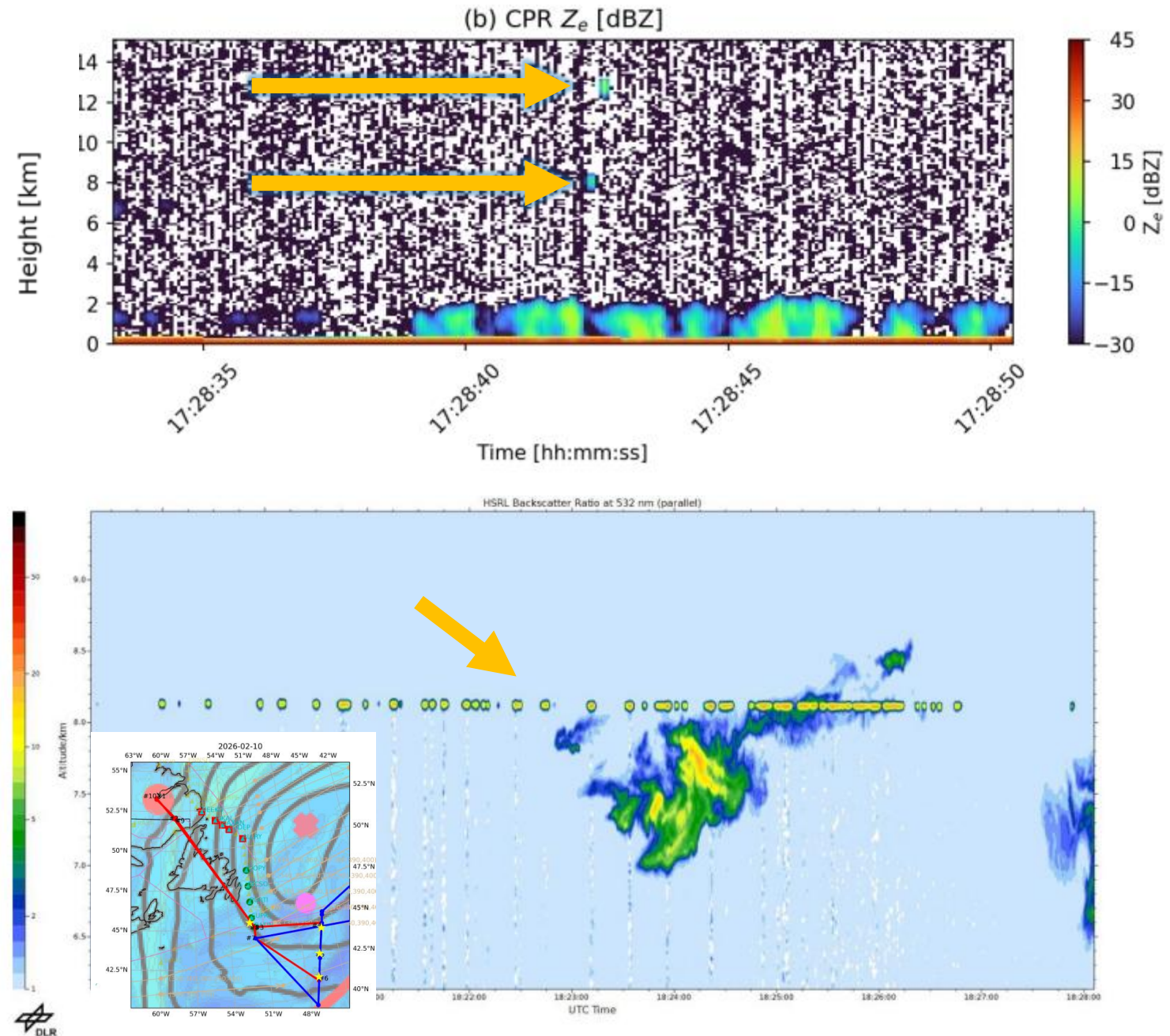
Coordinated Flights of US and European Aircraft in Support of EarthCare

NURTURE Science Team

On 10 Feb 2026, the EarthCARE satellite was underflown by the NASA LaRC Gulfstream III, based out of Goose Bay, Canada in coordination with DLR's High Altitude and Long Range Research Aircraft (HALO), based out of Shannon, Ireland. Both aircraft were visible on the EarthCARE radar, and the NASA LaRC Gulfstream contrail was visible on the EarthCARE lidar.

The High Altitude Lidar Observatory (HALO) and CloudCube instrument onboard the NASA G-III provided radar and lidar observations from the same platform for the first time.

Top: EarthCARE Cloud Profiling Radar (CPR) reflectivity indicating the HALO (~12.5 km) and NASA G-III (~8 km) along the track. Bottom: HALO sampling of G-III contrail.





Title (Verdana 24)

Principal Investigator Name and Institutional Affiliation (Verdana 16)

Key Research Result/Scientific Development:

[Replace with a high-level overview of the key result or scientific advancement. You might address 1-2 of the following using limited text:

- What did we learn and/or discover about the Earth system that we did not know before?
- Did we learn something that we already knew, but in a different way? If so, how is it new or different?
- How is the development different and/or better than what we currently have?
- What does the new knowledge, insight, method, or advance allow us to know/do that we did/could not before?]

Significance: [Replace with optional statement:

- What is the overall importance for Earth system science?]

[Additional talking points and details should be placed in the slide notes section]

[Replace with 1-2 key images that demonstrate the highlighted research result or scientific advance.

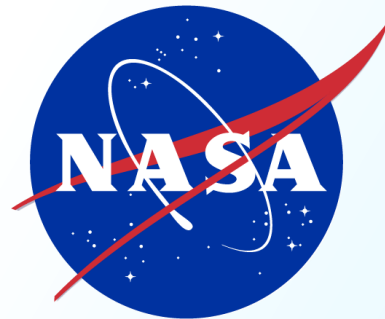
You do not need to use a 2-column layout. You can adjust the position of the summary, image(s), and caption sections if your graphics have a larger horizontal span.]

Figure caption



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