



2023 Accomplishments

2023 Summer Intern Projects

NOAA GSL hosted 14 interns this summer! Four graduate and seven undergraduate students were funded by a NOAA GSL and the Cooperative Institute for Research in Environmental Sciences (CIRES) Professional Research Experience Program (PREP-GSL/CIRES). This is the second year of PREP-GC and the first year to host interns in person! Three undergraduate students were funded through NOAA Office of Education. All interns presented their summer research on August 2.

▶ [READ MORE AT HTTPS://BIT.LY/3PCRIST](https://bit.ly/3PCRIST)

NOAA names first manager of new Fire Weather Testbed

Zach Tolby, formerly a Senior Forecaster and Incident Meteorologist (IMET), at the Reno, Nevada Weather Forecast Office, was recently selected to be the first Manager and Lead Scientist of the Fire Weather Testbed, which is housed in the Global Systems Laboratory's Boulder, Colorado offices.

▶ [LEARN MORE ABOUT ZACH: HTTPS://BIT.LY/45B1VAB](https://bit.ly/45B1VAB)

NOAA GSL delivers the prototype Advanced Quantitative Precipitation Information system to Bay Area users

Leveraging NOAA GSL's research in high-resolution forecast modeling and weather information systems, NOAA GSL's Information and Technology Services (ITS) Division was responsible for designing and developing Advanced Quantitative Precipitation Information (AQPI). AQPI provides gridded precipitation and hydrologic information to give advanced notice of rainfall, flash floods, and coastal flooding in the San Francisco Bay Area. NOAA GSL has now transitioned the experimental AQPI system to prototype operations at Colorado State University's Cooperative Institute for Research in the Atmosphere (CIRA).

▶ [FROM HTTPS://BIT.LY/3PUFCDP](https://bit.ly/3PUFCDP)

MADIS data system moves to full operations

NOAA GSL transferred the final versions of the flagship observation system, the Meteorological Assimilation and Data Ingest System (MADIS) to NOAA NWS operations on March 29, 2023. The NOAA NWS now manages all data feeds, displays, maintenance, operations, and upgrades.

▶ [FULL DETAILS AT HTTPS://BIT.LY/3PRHFZG](https://bit.ly/3PRHFZG)

Forecasters test Threats In Motion this spring

NOAA NWS forecasters are testing an experimental weather alert system called Threats In Motion (TIM). Threats In Motion lets forecasters create moving warning polygons for hazardous weather to alert the public in its path. The legacy warning system poses a challenge for forecasters when the hazardous weather appears to be continuing beyond the issued warning. Current procedures and software keep the forecaster from adjusting or moving the current warning as the storm evolves.

▶ [READ MORE AT HTTPS://BIT.LY/46RQ90F](https://bit.ly/46RQ90F)

NOAA GSL creates new visualizations of Urban Heat Islands

NOAA GSL has partnered with the NOAA Climate Program Office, the NOAA Office of Education, the U.S. State Department, NOAA Environmental Visualization Lab, and Meta (Facebook) to bring Urban Heat Island (UHI) data to the 27th Conference of the Parties of the UNFCCC (COP 27) that took place in Egypt in 2023. Meta provided the virtual reality headsets for the U.S. pavilion which included a virtual reality headsets for the U.S. pavilion.

▶ [FULL STORY AT HTTPS://BIT.LY/3PAMWON](https://bit.ly/3PAMWON)

Fire Weather Testbed

The new NOAA Fire Weather Testbed (FWT) will provide a research to operations facility to allow users to test and evaluate new and improved weather models, technologies. The testbed will address the challenges of fire weather before, during, and after fires. The FWT is a collaborative effort between NOAA's GSL, National Weather Service, and National Environmental Satellite, Data, and Information Service.

▶ [LEARN MORE AT HTTPS://BIT.LY/3RXS7ZB](https://bit.ly/3RXS7ZB)

Forecast Verification Project for Denver International Airport

A recent study, led by NOAA GSL scientists, investigated the skill of four weather models in predicting snowfall for decision-making at Denver International Airport.

Results were that the National Blend of Models had the most accurate predictions of snowfall timing. Operationally relevant verification results on timing and severity of snowfall is key to minimizing negative impacts at the airport including scheduling staff and resources, and in preparing for snow removal from runways.

▶ [LEARN MORE ABOUT THE METHODS AND CONCLUSIONS HERE: HTTPS://BIT.LY/3RDY7DY](https://bit.ly/3RDY7DY)

HRRR-Smoke supports the Alaska Inter-agency Coordination Center during Summer 2022 wildfires

NOAA's operational High-Resolution Rapid Refresh (HRRR)-Smoke model supported operations at the Alaska Interagency Coordination Center as they navigated these fires.

According to Heidi Strader, Fire Weather Program Manager at the Alaska Interagency Coordination Center, "the HRRR model was repeatedly superior to the others in showing smoke movement and comparable density and became [the] model of choice this summer."

The model forecasts were used to help fire managers determine areas of low and high visibility. When smoke is too dense in a certain airfield, firefighting resources at that location cannot be deployed. Since it is crucial to optimize the resources available, aircraft and personnel were staged at different locations depending on smoke movement. Using the forecasted smoke concentrations to create flight plans minimized the number of days in which air regions were inaccessible.

▶ [FULL STORY: HTTPS://BIT.LY/3TEZ6AO](https://bit.ly/3TEZ6AO)

NOAA GSL completes first research to education transition with Science On a Sphere®

Science on a Sphere® (SOS) was invented and built by NOAA GSL in 2005 and received a US patent. As SOS continued development within the NOAA GSL, and its outreach expanded, the NOAA Office of Education (OEd) became the SOS transition partner. The transition began in Fall 2021, and was completed in December 2022.

The Department of Commerce recognized the SOS project team's work by awarding them the Bronze Medal, "for the Department's first research to education transition that secured NOAA's ability to deliver data products to a vast network with global reach." The SOS team is now positioned to leverage the cloud tools in AWS and pursue technical innovation in new ways.

▶ [MORE AT HTTPS://BIT.LY/3RI7IDR](https://bit.ly/3RI7IDR)

The future of Impact-based Decision Support Systems (IDSS)

NOAA GSL and the NOAA NWS released an upgraded decision support tool, DESI 2.0, on October 28, 2022. The Dynamic Ensemble-based Scenarios for Impact-based Decision Support Services, known as DESI, is a prototype application to slice, dice, and visualize meteorological ensemble data. DESI was created for the NOAA NWS to calculate customized scenarios, statistics, thresholds, and timing information, because each forecaster and partner has unique needs. DESI is built using the most advanced web and storage technologies - including WebGL, D3, and Zarr - to give end users the best experience possible.

▶ [READ MORE HTTPS://BIT.LY/3RDHGLR](https://bit.ly/3RDHGLR)

The METexpress Visualization Suite

The NOAA GSL and the Developmental Testbed Center (DTC) have collaboratively developed METexpress, a lightweight, quick-start visualization suite used to retrieve and view data from the advanced Model Evaluation Tools (METplus). METplus is a unified verification system for community model development efforts, and marks a major advancement of the Unified Forecast System Research-to-Operations (UFS-R2O) project.

▶ [READ MORE AT HTTPS://BIT.LY/467KV5C](https://bit.ly/467KV5C)

NOAA's NWS and GSL successfully rebuild experimental model on the Cloud

Computing capacity is crucial for advances in data processing in weather and climate models, but as newer model versions have increased data resolution, on-site capacity may not be sufficient. On September 21st, 2022, the NOAA National Weather Service and NOAA GSL development teams were able to demonstrate that NOAA's Rapid Refresh Forecast System (RRFS) could be run on Amazon Web Services (AWS) cloud. The RRFS is the next-generation, ensemble-based assimilation, and forecast system. The cloud-based experiments were successful and taught important lessons for future cloud use with high-resolution modeling.

▶ [READ MORE AT HTTPS://BIT.LY/48ZHJQA](https://bit.ly/48ZHJQA)

GSL advances software visualization and display system for use by forecasters

The Weather Archive and Visualization Environment (WAVE) is an online tool used by NOAA National Weather Service (NWS) forecasters to create consistent, understandable graphics for use in decision support, on social media, and in presentations. WAVE is being developed in partnership with the NWS, and can be accessed with NOAA credentials.

GSL provided the expertise to modernize the WAVE software to make the code cloud-native, and coding practices secure.

▶ [READ THE FULL STORY AT HTTPS://BIT.LY/3PVF7UX](https://bit.ly/3PVF7UX)

GSL hosted a showing of the film *This Is [Not] Who We Are on the DOC Boulder Labs campus*

The documentary weaves together the recent lived experiences of Black residents in Boulder with a historical overview of the challenges faced by Boulder's Black community, exposing issues faced by cities across the country that struggle to reconcile their inclusive ideals with the reality of their communities and encouraging a dialogue on those struggles. The film was produced by the Boulder-based Landlocked Films and Blackat Video Productions, and winner of numerous awards, including People's Choice Award at the 2022 Boulder International Film Festival, Best Feature Documentary at the 2022 Hamilton Black Film Festival, and Best Picture at the March 2022 Los Angeles Film Festival.

▶ [READ MORE HERE HTTPS://BIT.LY/46BZ3IX](https://bit.ly/46BZ3IX)

NOAA GSL-NOAA National Hurricane Center experiment for Hurricane Ian

The NOAA National Hurricane Center (NHC) invited the NOAA GSL to collaborate in the first use of the Hurricane and Ocean Testbed during a live event. Researchers performed real-time evaluations of new and improved experimental products in a cloud-based test environment outside of operations. The cloud-based infrastructure also provides flexibility to use more computational power only when necessary.

Storm Surge Watch/Warnings in Hazard Services were generated for the first time at full resolution— on the order of 20-30 meters, or neighborhood scale. This more precise resolution could help support more focused decision-support services in the future.

The NHC/GSL collaboration also delivered the first-ever live access to drone observations and enhancements to tail-borne Doppler radar data provided by our Hurricane Hunter Crews (Office of Marine and Aviation Operations) into a cloud-based NHC operational display.

▶ [LEARN MORE ABOUT THIS EXPERIMENT AT HTTPS://BIT.LY/3Q4REWJ](https://bit.ly/3Q4REWJ)

NOAA GSL's Machine Learning Tropical Cyclone Detection System

NOAA GSL scientists, in collaboration with scientists from the European Centre for Medium-Range Weather Forecasts (ECMWF) and NVIDIA, investigated the use of machine learning (ML) and artificial intelligence (AI) to extract information for tropical cyclone (TC) forecasting. The goal of the collaboration was to develop the infrastructure for ML workflows into time-critical operations at ECMWF and to assess the feasibility of an operational product that uses ML to detect tropical cyclones.

▶ [READ MORE AT HTTPS://BIT.LY/46DWKHQ](https://bit.ly/46DWKHQ)