

Earth System Research Laboratory Global Systems Division Research to Operations

Putting Tools in the Hands of Users



How Does ESRL's Global Systems Division Research to Operations Work Benefit the Nation?

The Global Systems Division (GSD), part of NOAA's Earth System Research Laboratory (ESRL) provides the National Weather Service (NWS) and the nation with environmental observing, prediction, computer, visualization, and information systems. These systems deliver forecasts, after being transferred to operations and predictions of weather, including severe weather events within the next few minutes to weeks away.

www.esrl.noaa.gov/gsd/

Research to Operations Highlights:

Advanced Weather Interactive Processing System (AWIPS): Providing a corner-stone to NWS operations.

For more than 30 years, GSD researchers have been developing AWIPS, the weather forecasting, display, and analysis package used by the NOAA National Weather Service (NWS). Forecasters at more than 130 NWS forecast offices use AWIPS to produce, analyze and disseminate weather forecasts and time-sensitive, high-impact warnings.

In collaboration with the NWS and Raytheon Technical Services, GSD continues to develop and extend AWIPS technology and provide critical mission services required to meet the NWS Weather Ready Nation objectives. The upcoming version of AWIPS II (to be delivered to NWS forecasters in September 2015) will include a new tool, known as Hazard Services, that will revolutionize and streamline NWS operations.

Current software tools will be integrated into a common interface for issuing timely and accurate weather hazard information. In addition, this technology provides a two-way communication platform for collaboration among forecasters, emergency managers, and the public.

Meteorological Assimilation Data Ingest System (MADIS): Providing observations to NOAA and the greater meteorological community.

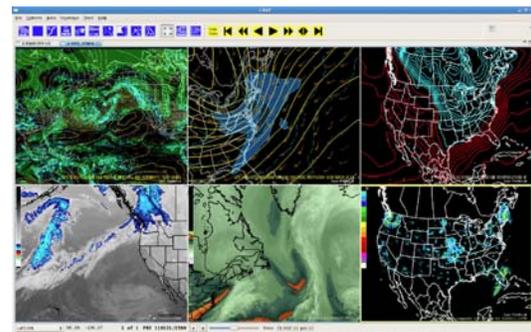
MADIS collects, integrates, quality controls, and distributes high-frequency weather data from NOAA sources and non-NOAA providers. The observations come from surface networks, profiler sites, aircraft, instrumented balloons, radiometers, and satellites, producing 13 million observations per day.

The goal of MADIS is to create a more usable, complete, accurate, timely, and higher density observational infrastructure for use in local weather warnings and products, numerical weather prediction, and use by the greater meteorological community by partnering with non-NOAA providers.

MADIS was transferred into NWS operations in January 2015. MADIS subscribers have access to an integrated, reliable, and easy-to-use database containing real-time and archived observations. MADIS runs operationally at the NWS and the data is provided to the weather community. GSD continues to advance MADIS through the development and testing of innovative technologies.



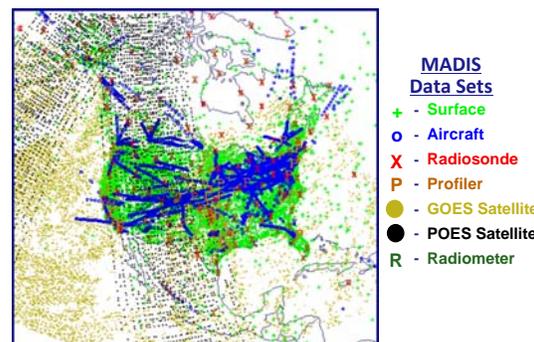
AWIPS-II Workstation – Source: NOAA



AWIPS-II can display many types of weather data and information. Source: NOAA



MADIS Logo by John Osborn/GSD



MADIS observations covering North America

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More GSD Research-to-Operations Highlights:

Rapid Refresh (RAP) Weather Model and Data Assimilation System

The RAP is NOAA's high resolution hourly updating weather model and data assimilation system that provides weather forecasts for North America. The RAP was made for decision makers who need frequent forecast updates of high-impact weather, including those in the aviation, energy, and severe weather forecasting communities. RAP Version 2 was transitioned to NWS operations in February 2014. GSD continues to improve the RAP and provide yearly updates to NWS. The RAP provides the initial conditions for the HRRR and covers a larger geographic domain.

High Resolution Rapid Refresh (HRRR) Model

GSD's High Resolution Rapid Refresh (HRRR) model was transferred into NWS operations in September 2014. The model uses weather observations from a network of ground and satellite-based sensors, radar, and aircraft to produce a high resolution weather forecast every hour at storm scale resolutions. The HRRR also supports the development of a new rapidly updating high-resolution forecast used to identify severe weather more quickly. The HRRR is the only hourly updated, radar-initialized, storm-resolving model running over the United States. GSD researchers continue improving the HRRR with yearly transitions of upgrades planned for NWS.

Local Analysis and Prediction System (LAPS) Model

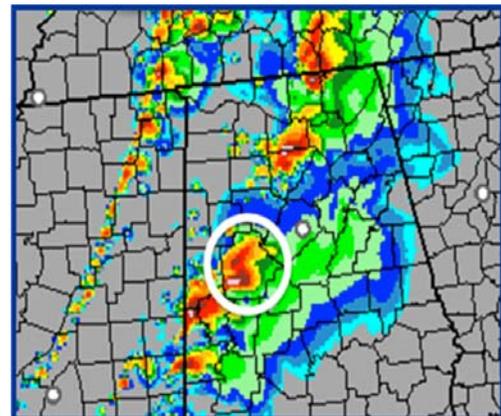
LAPS is a numerical weather prediction tool that provides detailed descriptions and customizable 3D analyses of current and imminent local high-impact weather.

- LAPS uses observations from local surface observing systems, Doppler radars, satellites, wind, temperature, radiometric profilers, and aircraft.
- LAPS can be used as a real-time situational awareness tool to assist with local fire, aviation, marine, and other short-term weather prediction.

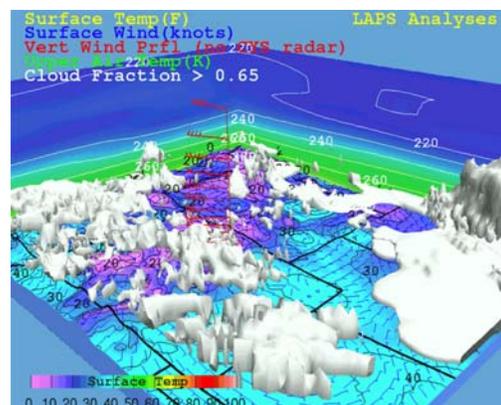
LAPS software is being run by a broad clientele of government and military entities, universities (University of North Dakota), international weather agencies (Taiwan [CWV], China [CMA], Korea [KMA]), federal and state agencies (NWS, USAF, California Dept. Water Resources), private sector companies (Greenpower Labs), and other international organizations.

Science On a Sphere® Global Display System

GSD's Science On a Sphere® (SOS) global display system uses computers and video projectors to display animated data on the outside of a six foot diameter sphere. When combined with narration and supporting educational material, SOS visualizations provide a unique/powerful teaching tool. NOAA uses SOS to support its educational initiatives. SOS systems are now in 117 locations in 21 countries, and have been seen by over 33 million viewers. GSD continues to develop SOS both technically and as an education tool to explain Earth system science in an intuitive and captivating way to people of all ages and educational backgrounds.



HRRR (High Resolution Rapid Refresh) 9-hour forecast of thunderstorms for April 27, 2011 in the southeast U.S. The Tuscaloosa tornadic storm, indicated by the white circle, was predicted with county-scale accuracy. Source: NOAA ESRL



3-D display of the atmospheric winds with height (red barbs), surface temperatures (blue surface), and clouds (white images) from GSD's Local Analysis and Prediction System (LAPS), another research to operations success. Source: NOAA



Elementary school students are treated to the SOS® display. Source: NOAA/Will von Dauster

For more information on the Global Systems Division,
visit <http://esrl.noaa.gov/gsd/>