Earth System Research Laboratory
Global Systems Division

fact sheet

The Global Systems Division (GSD) of the Earth System Research Laboratory (ESRL) is a leader in the applied research, directed development, and technology transfer of environmental data, models, products, and services. This work enhances environmental understanding with the outcome of supporting commerce, protecting life and property, and promoting a scientifically literate public.

About GSD

GSD has three branches:
- Environmental Modeling
- Evaluation and Decision Support
- Advanced Technology and Outreach

GSD has two new research programs:
- Atmospheric Science for Renewable Energy
- Global Observing Systems Analysis

GSD's strategic partnerships:
- CU-Boulder's Cooperative Institute for Research in Environmental Sciences (CIRES)
- Colorado State University's Cooperative Institute for Research in the Atmosphere (CIRA)

GSD research partners include:
- National Weather Service
- Federal Aviation Admin.
- Department of Interior
- Department of Energy
- National Science Foundation
- Naval Research Lab
- National Center for Atmospheric Research
- Private sector
- Other academic and research institutions worldwide

GSD has a staff of 184 and is located in Boulder, Colorado.

Fun fact! Weather and forecast systems developed by GSD provide the foundation data for most smart-phone weather apps!

Environmental Modeling

GSD develops storm-scale to global-scale environmental prediction models used in National Weather Service (NWS) forecast operations. These modeling systems predict flash flood, lightning, and tornado parameters for more accurate severe weather watches and warnings, visibility and ceilings for the aviation industry, and wildfire smoke plumes to support air quality advisories.

Recent successes include developing the first storm-scale models to give forecasters and decision-makers fast and local weather guidance. Rapid Refresh (RAP) and the High-Resolution Rapid Refresh (HRRR) weather models are now used in NWS operations. GSD's modeling team received a Department of Commerce Gold Medal, and the prestigious Colorado Governor's Award for High Impact Research for the development and implementation of the HRRR.

Evaluation and Decision Support

GSD develops state-of-the-art environmental forecast, decision support, visualization and evaluation systems, and scientifically robust forecast assessment tools that support the weather decision-making process.

The cornerstone of each NWS Forecast Office--the Advanced Weather Interactive Processing System (AWIPS)-- grew from GSD work to integrate all weather infor-

GSD develops and evaluates decision support systems for the NWS, FAA, and other users.

mation into one system. This system revolutionized how NWS forecasters viewed and used weather data. GSD continues to work with the NWS and the private sector to improve AWIPS.

GSD is developing early prototypes of high-impact weather decision support systems known as "Hazard Services." Hazard Services integrates all NWS watch, warning, and advisory-related services into one common interface to streamline the forecaster workflow. Hazard Services can be customized for each office, region, or type of weather.

GSD also develops quality assessment tools that use innovative verification techniques and technologies to identify strengths and weaknesses in forecasts. Developers use assessment results to improve forecast quality, and users can incorporate this information into their decision making process.

Advanced Technology and Outreach

GSD identifies, investigates, and develops high-performance computing methods, products, systems, and tools and transforms them into innovative and valuable forecast and analysis systems that ingest, manage, analyze, and display environmental data.

GSD developed Science on a Sphere®, a (SOS) six-foot diameter animated globe used to display more than 500 Earth science datasets. Recently, GSD released a downloadable, flat-screen version—SOS Explorer—that allows any classroom or museum with a computer to examine SOS datasets.

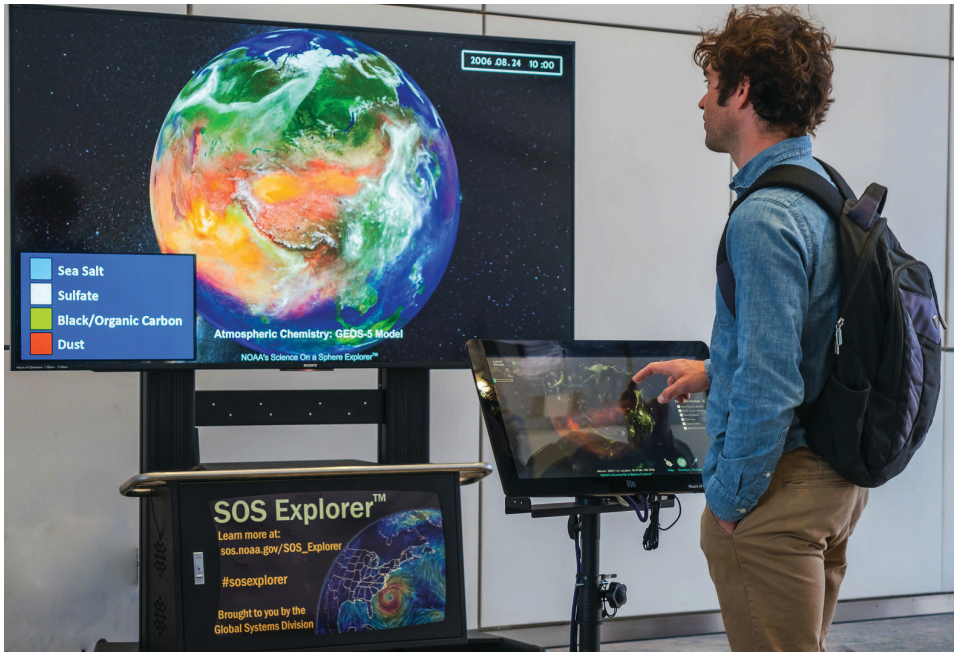
GSD researches and develops revolutionary computing technology to support the next-generation of global weather prediction models that are run on supercomputers. This work helps NOAA manage and process the increasing amounts of weather data and complex math equations used to produce accurate high-resolution weather forecasts on small scales.

Atmospheric Science for Renewable Energy

The Atmospheric Science for Renewable Energy (ASRE) program leverages in-house expertise in atmospheric science, weather observations, modeling, and technology transfer to support our nation's effort to build and optimize wind and solar power.

Global Observing Systems Analysis (GOSA)

GSD's GOSA Group helps NOAA cost-effectively identify and prioritize current and future observing system solutions to improve the skill of NOAA's weather prediction models. GOSA research includes Observing System Experiments, Observing System Simulation Experiments, Unmanned Aircraft Systems, Radio Occultation Technology, and Ground-Based Global Positioning Systems (GPS-Met).



An exhibit version of Science on a Sphere Explorer™ users control the globe using a mouse or an iPad to explore a variety of datasets.