

## NOAA In Your State

# Colorado

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**NOAA** is an agency that enriches life through science. Our reach goes from the surface of the sun to the depths of the ocean floor as we work to keep citizens informed of the changing environment around them. From daily weather forecasts, severe storm warnings, and climate monitoring to fisheries management, coastal restoration and supporting marine commerce, NOAA's products and services support economic vitality and affect more than one-third of America's gross domestic product. NOAA's dedicated scientists use cutting-edge research and high-tech instrumentation to provide citizens, planners, emergency managers and other decision makers with reliable information they need when they need it.

The following is a summary of NOAA facilities, staff, programs, or activities based in, or focused on, your state or territory. The entries are listed by statewide, region, and then by congressional districts and cities or towns.

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### CO

#### Statewide

#### **National Marine Fisheries Service (NMFS) and National Ocean Service (NOS) - [Damage Assessment, Remediation, and Restoration Program](#)**

NOAA's Damage Assessment, Remediation, and Restoration Program (DARRP) assesses and restores habitat, fisheries, protected species and recreational uses that have been harmed by oil spills, chemical releases, and ship groundings. Working with federal, state, and tribal entities, and responsible parties, we have recovered \$10.4 billion for restoration of critical habitats, fisheries, protected species and recreational uses nationwide. These projects promote recovery of the ecosystem and provide economic benefits from tourism, recreation, green jobs, coastal resiliency, property values and quality of life.

#### **National Ocean Service (NOS) – [Regional Geodetic Advisor](#)**

The Regional Geodetic Advisor is a National Ocean Service (NOS) employee that resides in a region and serves as a liaison between the National Geodetic Survey (NGS) and its public, academic and private sector constituents within their assigned region. NGS has a Regional Geodetic Advisor stationed in Denver, Colorado serving the Rocky Mountain region – Colorado, Montana, and Wyoming. The Geodetic Advisor provides training, guidance and assistance to constituents managing geospatial activities that are tied to the National Spatial Reference System (NSRS), the framework and coordinate system for all positioning activities in the Nation. The Geodetic Advisor serves as a subject matter expert in geodesy and regional geodetic issues, collaborating internally across NOS and NOAA to ensure that all regional geospatial activities are properly referenced to the NSRS.

**National Weather Service (NWS) - [Automated Surface Observing Systems Stations](#)**

The Automated Surface Observing Systems (ASOS) program is a joint effort of the National Weather Service (NWS), the Federal Aviation Administration (FAA), and the Department of Defense (DOD). ASOS serves as the Nation's primary surface weather observing network. ASOS is designed to support weather forecast activities and aviation operations and, at the same time, support the needs of the meteorological, hydrological, and climatological research communities. ASOS works non-stop, updating observations every minute, 24 hours a day, every day of the year observing basic weather elements, such as cloud cover, precipitation, wind, sea level pressure, and conditions, such as rain, snow, freezing rain, thunderstorm, and fog. There are 22 ASOS stations in Colorado.

**National Weather Service (NWS) - [Cooperative Observer Program Sites](#)**

The National Weather Service (NWS) Cooperative Observer Program (COOP) is truly the Nation's weather and climate observing network of, by and for the people. More than 10,000 volunteers take observations on farms, in urban and suburban areas, National Parks, seashores, and mountaintops. The COOP was formally created in 1890 under the NWS Organic Act to provide observational meteorological data, usually consisting of daily maximum and minimum temperatures, snowfall, and 24-hour precipitation totals, required to define the climate of the United States and to help measure long-term climate changes. The data are also used by other federal (including the Department of Homeland Security), state and local entities, as well as private companies (such as the energy and insurance industries). In some cases, the data are used to make billions of dollars' worth of decisions. For example, the energy sector uses COOP data to calculate the Heating and Cooling Degree Days which are used to determine individuals' energy bills monthly. There are 278 COOP sites in Colorado.

**National Weather Service (NWS) - [NOAA Weather Radio All Hazards Transmitters](#)**

NOAA Weather Radio All Hazards (NWR) is a nationwide network of radio stations broadcasting continuous weather information directly from the nearest National Weather Service (NWS) forecast office. NWR broadcasts official NWS warnings, watches, forecasts and other hazard information 24 hours a day, 7 days a week. Working with the Federal Communication Commission's (FCC) Emergency Alert System, NWR is an "All Hazards" radio network, making it the single source for comprehensive weather and emergency information. In conjunction with federal, state, and local emergency managers and other public officials, NWR also broadcasts warning and post-event information for all types of hazards – including natural (such as earthquakes or avalanches), environmental (such as chemical releases or oil spills), and public safety (such as AMBER alerts or 911 Telephone outages). Known as the "Voice of NOAA's National Weather Service," NWR is provided as a public service by the NWS. NWR includes 1,100 transmitters covering all 50 states, adjacent coastal waters, Puerto Rico, the U.S. Virgin Islands, and the U.S. Pacific Territories. There are 28 NWR transmitters in Colorado.

**National Weather Service (NWS) - [Incident Meteorologists](#)**

The NWS, as mandated by Congress, provides fire weather forecast products and services to the fire and land management community for the protection of life and property, promotion of firefighter safety, and stewardship of America's public wildlands. Since 1927, this effort has included providing critical on-scene support to wildfire managers via specially-trained NWS forecasters called Incident Meteorologists (IMETs). When a fire reaches a large enough size, IMETs are rapidly deployed to the incident and set-up a mobile weather center to provide constant weather updates and forecast briefings to the fire incident commanders. IMETs are very important members of the firefighting team, as changes in the fires are largely due to changes in the weather.

## CO-1

### Denver

#### **Office of Oceanic and Atmospheric Research (OAR) - [Science On a Sphere at Museum of Nature and Science](#)**

Science On a Sphere (SOS) is a room-sized global display system that uses computers and video projectors to display planetary data onto a six-foot diameter sphere, analogous to a giant animated globe. Researchers at NOAA developed Science On a Sphere® as an educational tool to help illustrate Earth System science to people of all ages. Animated images of atmospheric storms, climate change, and ocean temperature can be shown on the sphere, which is used to explain complex environmental processes, in a way that is simultaneously intuitive and captivating.

#### **NOAA Office of Education - [Environmental Literacy Program](#)**

NOAA's Environmental Literacy Program (ELP), administered by the Office of Education, provides grants and in-kind support to build the capacity of institutions and networks to advance NOAA's mission through formal (K-12) and informal education at national, regional, and local levels. In Colorado, ELP supports the Denver Museum of Nature and Science, Space Foundation (Colorado Springs), Fiske Planetarium (Boulder) and University of Colorado South Denver (Parker), all of which have permanent exhibits featuring NOAA's Science On a Sphere and are members of NOAA's SOS Users Collaborative Network. The SOS Network has more than 100 institutions worldwide, reaching over 60 million people, and shares best practices in using the sphere to bring the latest global forecasts and models to the public. ELP supports the Trout Bowl in Colorado, one of 25 regional competitions of the National Ocean Sciences Bowl (NOSB). The NOSB is an academic competition that engages high school students in learning about ocean sciences and related STEM careers while helping them become knowledgeable citizens and environmental stewards. ELP also supports the AMS DataStreme courses for K-12 educators through a grant and in-kind support. Local implementation teams in the state offer DataStreme courses that use weather, climate, and the ocean as contexts for teaching science and improving understanding about the Earth system.

## CO-2

### Boulder

#### **Acquisition and Grants Office (AGO) - [Boulder Office](#)**

The Acquisition and Grants Office provides financial assistance and acquisition services for NOAA by overseeing and implementing all processes related to contracts and grants.

#### **National Ocean Service (NOS) – [National Geodetic Survey Boulder Office](#)**

The David Skaggs Research Center in Boulder, CO houses Federal and contract employees in support of NOAA's absolute, relative, and superconducting, gravimetry and GNSS programs. These personnel are involved in field work and validation measurements at TMGO and around the country, and in support of the Gravity for the Redefinition of the American Vertical Datum (GRAV-D) Project.

#### **National Environmental Satellite, Data, and Information Service (NESDIS) - [National Centers for Environmental Information](#)**

NOAA's National Centers for Environmental Information (NCEI) are responsible for hosting and providing access to one of the most significant archives on earth, with comprehensive oceanic, atmospheric, and geophysical data. From the depths of the ocean to the surface of the sun and from million-year-old tree rings to near real-time satellite images, NCEI is the Nation's leading authority for environmental information. By preserving, stewarding, and maximizing the utility of the Federal government's billion-dollar investment in high-quality environmental data, NCEI remains committed to providing products and services to private industry and businesses, local to international governments, academia, as well as the general public. NCEI headquarters are located in Asheville, North Carolina with other major locations in Boulder, Colorado; Silver Spring, Maryland; and Stennis Space Center, Mississippi.

**National Environmental Satellite, Data, and Information Service (NESDIS) - [Comprehensive Large Array-data Stewardship System \(CLASS\)](#)**

The Comprehensive Large Array Storage System (CLASS) is NOAA's premiere on-line facility for the distribution of NOAA and US Department of Defense (DoD) Polar-orbiting Operational Environmental Satellite (POES) data, NOAA's Geostationary Operational Environmental Satellite (GOES) data, and derived data. This data is also backed up at another site located in Asheville, NC.

**NOAA Office of Education - [Environmental Literacy Program](#)**

NOAA's Environmental Literacy Program (ELP), administered by the Office of Education, provides grants and in-kind support to build the capacity of institutions and networks to advance NOAA's mission through formal (K-12) and informal education at national, regional, and local levels. In Colorado, ELP supports the Denver Museum of Nature and Science, Space Foundation (Colorado Springs), Fiske Planetarium (Boulder) and University of Colorado South Denver (Parker), all of which have permanent exhibits featuring NOAA's Science On a Sphere and are members of NOAA's SOS Users Collaborative Network. The SOS Network has more than 100 institutions worldwide, reaching over 60 million people, and shares best practices in using the sphere to bring the latest global forecasts and models to the public. ELP supports the Trout Bowl in Colorado, one of 25 regional competitions of the National Ocean Sciences Bowl (NOSB). The NOSB is an academic competition that engages high school students in learning about ocean sciences and related STEM careers while helping them become knowledgeable citizens and environmental stewards. ELP also supports the AMS DataStreme courses for K-12 educators through a grant and in-kind support. Local implementation teams in the state offer DataStreme courses that use weather, climate, and the ocean as contexts for teaching science and improving understanding about the Earth system.

**National Environmental Satellite, Data, and Information Service (NESDIS) and Office of Oceanic and Atmospheric Research (OAR) - [U.S. Climate Reference Network](#)**

The U.S. Climate Reference Network (USCRN) is an operationally viable research network of 135 climate stations that are deployed nationwide. Data from the USCRN are used in various climate monitoring activities and for placing current climate anomalies into an historical perspective. The USCRN provides the United States with a reference network that contributes to an International network under the auspices of the Global Climate Observing System (GCOS).

**National Weather Service (NWS) - [Space Weather Prediction Center](#)**

Space weather refers to the variable conditions on the Sun and in the space environment that can influence the performance and reliability of space-borne and ground-based technological systems, as well as endanger life or health. The NWS Space Weather Prediction Center (SWPC), one of nine NWS National Centers of Environmental Prediction, is the national and world warning center for space weather events. The SPC provides the Nation with critical space weather forecasts, warnings and alerts to protect life and property in space, in the air, at sea, and on the land. Industries and activities impacted by space weather include aviation, satellite operations, electric power grids, radio communications, navigation (including GPS users), and manned space flight. SWPC serves a large customer base that covers a broad spectrum from the private sector to the Department of Defense and other government agencies. SWPC is also the primary warning center for the International Space Environment Service, and works with many national and international partners to share data, products, services and other interests.

**National Weather Service (NWS) - [Weather Forecast Office](#)**

Located at the NOAA Boulder complex, this NWS Weather Forecast Office (WFO) is staffed around-the-clock every day, and provides the best possible weather, water, and climate forecasts and warnings to residents of north-central Colorado. Highly trained forecasters issue warnings and forecasts for events, including severe thunderstorms, tornadoes, winter storms, floods, and heat waves. This essential information is provided to the general public, media, emergency management and law enforcement officials, the aviation and marine communities, agricultural interests, businesses, and others. Information is disseminated in many ways, including through dedicated government channels, satellite, the Internet, and NOAA Weather Radio All Hazards. Forecasters also provide Impact-based Decision-Support Services (IDSS), both remotely and on-site, during critical emergencies, such as wildfires, floods, chemical spills, and for major recovery efforts. The WFO collects and disseminates precipitation, river, and rainfall data, and prepares local climatological data. Each WFO has a Warning Coordination Meteorologist who actively conducts outreach and educational programs, which helps build strong working relationships with local partners in emergency management, government, the media and academic communities. The WFO operates Automated Surface Observing Stations (ASOS), as well as the local Doppler Weather Radar, which provides critical information about current weather conditions. The radar data enables forecasters to issue warnings for tornadoes, severe thunderstorms, and flash floods.

**Office of Oceanic and Atmospheric Research (OAR) - [National Integrated Drought Information System](#)**

The National Integrated Drought Information System (NIDIS) provides dynamic and easily accessible drought information for the Nation. Among the decision makers who are benefitting from this source of authoritative, reliable information are farmers making decisions about crops, forestry professionals planning ahead for the next fire season, and urban water managers preparing for high-demand seasons. NIDIS provides data that help decision makers assess the risk of having too little water and prepare for and mitigate the effects of drought. NIDIS is continually developing more robust services and regional decision support resources.

**Office of Oceanic and Atmospheric Research (OAR) - [Western Water Assessment](#)**

The Regional Integrated Sciences and Assessments' Western Water Assessment (WWA) was established as a cooperative agreement between NOAA's Climate Program Office and University of Colorado. WWA conducts innovative research and engagement aimed at effectively and efficiently incorporating knowledge into decision making, in order to advance the ability of regional and national entities to manage climate impacts. In addition to conducting user-driven research projects to explore emerging climate vulnerabilities, we produce synthesis and assessment products to make existing knowledge more accessible. By providing useful products for stakeholders in our region, we also serve to prototype, for NOAA, the delivery of regional climate services. Stakeholders in the Intermountain West (Colorado, Utah, and Wyoming) have long faced challenges from climate variability and extreme events. We work with water resource managers, ecosystem managers, natural hazard planners, and other decision makers to understand, anticipate, and prepare for these challenges.

**Office of Oceanic and Atmospheric Research (OAR) - [Cooperative Institute for Research in Environmental Sciences](#)**

The Cooperative Institute for Research in Environmental Sciences (CIRES) was established at the University of Colorado in September 1967, and serves as a key mechanism to promote collaboration between scientists at nine university departments and NOAA. CIRES' chief collaborator is the Earth System Research Laboratory within OAR. CIRES employees also work with other NOAA facilities located in Boulder, including the National Centers for Environmental Information, and the Space Weather Prediction Center. CIRES conducts research in six theme areas: advanced modeling and observing systems; climate system variability; geodynamics; integrating activities; planetary metabolism; and regional processes.

**Office of Oceanic and Atmospheric Research (OAR) - [Earth System Research Laboratory](#)**

The Earth System Research Laboratory (ESRL) is based in the David Skaggs Research Center. It employs approximately 400 scientists, technicians, and support personnel, and maintains a number of facilities and programs locally and globally in order to execute NOAA Research missions. ESRL is organized as four divisions - Global Monitoring, Physical Sciences, Chemical Sciences, and Global Systems. The work of these Divisions includes monitoring atmospheric constituents, understanding climate processes and trends, providing climate information related to water management decisions, improving weather prediction, understanding the recovery of the stratospheric ozone layer, and developing air quality forecast models. ESRL scientists serve in leadership positions for local, national and international climate and air quality science assessments. These research products provide long-term state-of-the-science references for local, regional and global policy makers. The vital work of scientists contributing to the IPCC was recognized with the awarding of the Nobel Peace Prize.

**Office of Oceanic and Atmospheric Research (OAR) - [Tunable Optical Profiler for Aerosol and Ozone Lidar](#)**

The Tunable Optical Profiler for Aerosol and oZone lidar (TOPAZ), operated since 2006 by the NOAA Earth Systems Research Laboratory's Chemical Science Division, measures tropospheric, or ground-level, ozone to provide high quality data to OAR's Weather and Air Quality Program. Tracking tropospheric ozone is important because prolonged exposure to it can impact human health. The TOPAZ system can be toured and discussed at its normal site in Boulder, CO, where it is mounted on a box truck.

**Office of Oceanic and Atmospheric Research (OAR) - [Tropospheric Ozone Lidar Network](#)**

The Tropospheric Ozone Lidar Network (TOLNet) is a research partnership between NASA and NOAA's Earth Systems Research Laboratory's Chemical Science Division, which collects measurements of tropospheric, or ground-level, ozone from profilers in six different locations. Tropospheric ozone is tracked because it is a known pollutant that can cause human health impacts with increased exposure. The data collected is publicly available and housed on the TOLNet Website.

**Office of Oceanic and Atmospheric Research (OAR) - [Science On a Sphere® at NOAA's Earth System Research Laboratory](#)**

Science On a Sphere (SOS) is a room-sized global display system that uses computers and video projectors to display planetary data onto a six-foot diameter sphere, analogous to a giant animated globe. Researchers at NOAA developed Science On a Sphere® as an educational tool to help illustrate Earth System science to people of all ages. Animated images of atmospheric storms, climate change, and ocean temperature can be shown on the sphere.

**Office of Oceanic and Atmospheric Research (OAR) - [Science On a Sphere Explorer™ at David Skaggs Research Center](#)**

Science on a Sphere Explorer™ (SOSx) is a portable, flat-screen virtual globe based on NOAA's 6-foot diameter Science On a Sphere® display system. This ground-breaking software uses video game technology to make SOS datasets interactive and more accessible to schools and small museums. SOSx currently has more than 115 space, ocean, and atmospheric datasets that can be used to explore complex environmental processes.

**Office of Oceanic and Atmospheric Research (OAR) - [SkyWisp UAS](#)**

Unmanned Aircraft Systems (UAS) are used by NOAA to monitor and understand the global environment and bridge the gap measurements made on Earth's surface and on satellites.

**Office of Oceanic and Atmospheric Research (OAR) - [Ozone Measurements](#)**

NOAA's Earth System Research Laboratory Global Monitoring Division (ESRL/GMD) conducts long-term monitoring of stratospheric ozone with balloons. Stratospheric ozone measurements provide data relevant to: surface pollution events, lower and upper atmosphere mixing dynamics, boundary layer stability, ozone trend studies (vertical distribution), and temperature and pressure profiles.

**Office of Oceanic and Atmospheric Research (OAR) - [Water Vapor Measurements](#)**

NOAA's Earth System Research Laboratory Global Monitoring Division (ESRL/GMD) operates a stratospheric water vapor program using balloon-borne, chilled mirror hygrometers flown monthly at Boulder, CO and Hilo, HI and as part of campaigns at other locations to obtain water vapor profiles in the upper troposphere and lower stratosphere (to ~28 km). The 30-year record at Boulder is a unique record of measurements showing changes in stratospheric water vapor. These ongoing observations are essential for improving our understanding of stratospheric ozone and climate processes.

**Office of Oceanic and Atmospheric Research (OAR) – Surface Atmosphere [Ozone Measurements](#)**

NOAA's Earth System Research Laboratory Global Monitoring Division (ESRL/GMD) conducts long-term monitoring of ozone at the surface, with aircraft, and with balloons, through cooperative relationships with local partners. The ESRL/GMD tropospheric ozone aircraft measurement program is being done in conjunction with the Carbon Cycle and Greenhouse Gas (CCGG) group's existing aircraft sampling network. Aircraft based in-situ tropospheric ozone measurements provide data relevant to: pollution events, lower atmosphere mixing dynamics, boundary layer stability, ozone trend studies, and the validity of other samples collected in-flight. Near ground level, ozone is currently monitored using ultraviolet absorption photometers at eight sites that are generally representative of background conditions. These sites, four of which have records exceeding 25 years in length, provide information on possible long-term changes in tropospheric ozone near the surface and support air quality research.

**Office of Oceanic and Atmospheric Research (OAR) - [Stratospheric Aerosol Lidar Measurements](#)**

NOAA's Earth System Research Laboratory Global Monitoring Division (ESRL/GMD) operates three stratospheric lidar systems to measure atmospheric aerosol profiles. The Boulder system went online in 1999. Stratospheric lidar systems measure aerosol light for monitoring stratospheric aerosols from volcanic origins. Volcanic aerosols in the stratosphere from future eruptions could act as catalysts for large-scale stratospheric ozone depletions until anthropogenic stratospheric halocarbon concentrations decrease to lower levels by mid-century. These ongoing observations are important for monitoring the recovery of the stratospheric ozone layer, which protects us from the sun's ultraviolet radiation.

**Office of the Chief Administrative Officer (CAO) - [Real Property, Facilities, and Logistics Office](#)**

The Office of the Chief Administrative Officer (CAO) provides building management at the David Skaggs Research Center, including warehousing, storeroom operations, graphic arts, and health clinic operations.

**Office of the Chief Information Officer (OCIO) - [High Performance Computing and Communications](#)**

The Office of the Chief Information Officer manages research and development high performance computing for weather and climate modeling, research, and predictions, supporting improvements in areas such as the prediction of severe weather, seasonal prediction of temperature and precipitation, and forecasting the next Sandy-like storm.

**Office of Oceanic and Atmospheric Research (OAR) - [Information Resource Division](#)**

The DOC Boulder Laboratories Library provides information services and resources in support of the research of the Department of Commerce Boulder Laboratories agencies including NIST, NOAA, and NTIA. Services are also provided to DOC components in a nine state region. The Library provides circulation, interlibrary loan, reference, and literature searching services in support of the research. The Library also acquires, maintains and makes accessible information resources to support the scientific missions of the Boulder Laboratories.

**Office of the Chief Information Officer (OCIO) - [Service Delivery Division](#)**

The Service Delivery Division provides a suite of IT services to support NOAA's mission. Our work includes IT infrastructure design and maintenance, network and server management and administration, desktop configuration and maintenance, application and system design and implementation, and IT security.

**Office of the Chief Information Officer (OCIO) - [NOAA Cyber Security Center Back-up Site](#)**

The Boulder, Colorado location serves as a geographically diverse location for the NOAA Cyber Security Center (NCSC). In case the primary site of the NCSC at Fairmont, WV becomes isolated or unavailable, the Boulder location is a fully functional failover site with which the Fairmont site maintains peered information technology systems. By having a peer site, encompassing 100% of the functionality of the primary NCSC site, services can be switched seamlessly between Boulder and Fairmont, meaning routine maintenance and upgrades can be performed at one location while the other location remains continuously functional, better serving and protecting the NOAA IT mission. As a disaster recovery site, Boulder provides vital backup in case of an outage at Fairmont, and can perform the mission until the Fairmont site is reconstituted.

**Office of the Chief Information Officer (CIO) - [N-Wave NOAA Enterprise Network](#)**

Boulder, CO, hosts the N-Wave Program Office, which is responsible for managing and operating NOAA's cutting-edge enterprise network which supports both operations and research. The office also manages and operates all five of NOAA's Trusted Internet Connection Access Points which provide the security analytics required to ensure secure communication between NOAA networks and the greater internet. TICAPs are NOAA's first line of defense for protecting NOAA's mission from external cyber-attacks and the N-Wave network supports all NOAA's access to and from the Internet and public peering services. N-Wave enterprise network services are provided at multiple locations and, at many sites, is the main communications provider. N-Wave spans from Hawaii, to Alaska, and across the continental United States with international peering at the Washington D.C. TICAP.

Boulder, CO, is also one of the five NOAA Trusted Internet Connection Access Points (TICAPs). The information the TICAPs provide is invaluable for determining the nature and scope of cyber threats. NOAA is also able to offer this as a service to other government agencies, eliminating the requirement for them to build and manage their own TICAPs.

**Workforce Management Office (WFMO) - [Boulder Office](#)**

The Workforce Management Office employees in the Boulder Office are comprised of the Payroll and Timekeeping and Records teams servicing all of NOAA. The Payroll and Timekeeping team ensures accurate payroll and WebTA records, and processes payroll actions as appropriate. The team manages employee payroll functions for non-recruitment actions to include error corrections, as well as resolutions to pay errors. They provide support to customers for time and attendance issues, advisory and training services to customers, while also administering NOAA's Leave Share Program. The Records team maintains and manages eOPF records for the NOAA workforce. The team ensures accurate and up-to-date information is filed and indexed in each record, and ensures records are closed upon employee separation.



### ***Boulder, Longmont, and Niwot Ridge***

#### **Office of Oceanic and Atmospheric Research (OAR) - [Total Column Ozone Measurements](#)**

NOAA's Earth System Research Laboratory Global Monitoring Division (ESRL/GMD) makes measurements of the column amounts of ozone between the earth's surface and the top of the atmosphere at a number of locations around the United States. The observations are obtained with ground-based spectrometers that measure the attenuation by ozone of ultraviolet light. This integrated ozone amount is critical in determining the amount of ultraviolet radiation reaching the earth's surface. Excess ultraviolet radiation is responsible for human skin cancer and is also harmful to other biogenic organisms. Column ozone measurements monitor changes in the stratospheric ozone layer resulting from human-produced chlorine and bromine compounds that destroy ozone. With controls now in place on the manufacture and use of these ozone-destroying compounds, it will be important to monitor the ozone layer for the expected recovery and determine whether other factors such as long-term climate change are influencing this recovery.

#### **Office of Oceanic and Atmospheric Research (OAR) - [Ultraviolet Radiation Monitoring Network](#)**

The Earth System Research Laboratory Global Monitoring Division (ESRL/GMD) operates an ultraviolet radiation (UV) monitoring network in Colorado, with sites in Boulder, Niwot Ridge, and Longmont. These measurements are done as part of ESRL/GMD's research on the Earth's surface radiation budget. Research efforts are devoted to the extent and cause of observed variations in long-term radiation and meteorological measurements, using satellite observations and climate model calculations. In addition, observations of spectral solar radiation are made for the purpose of remote sensing of certain atmospheric constituents and spectral solar UV is measured for the investigation of the interaction of ozone and solar radiation. ESRL/GMD also provides essential instrument calibration services for national and worldwide partner UV monitoring networks.

### ***Boulder and Nationwide***

#### **Office of Oceanic and Atmospheric Research (OAR) - [Citizen Weather Observer Program](#)**

The Citizen Weather Observer Program (CWOP) is a private-public partnership with three main goals: to collect weather data contributed by citizens; to make these data available for weather services and homeland security; and to provide feedback to the data contributors so that they have the tools to check and improve their data quality. There are over 8,000 registered CWOP members worldwide. CWOP members send their weather data by internet alone and internet-wireless combination to the findU server and then every 15 minutes, the entire data set is sent from the findU server to the NOAA MADIS server at NOAA's Earth System Research Laboratory (ESRL). The data are checked for quality and then redistributed to users. There are over 500 different user organizations of the CWOP mesonet data including government agencies, private industry and academia.

### ***Denver***

#### **National Weather Service (NWS) - [Center Weather Service Unit](#)**

Housed in the Federal Aviation Administration's Denver Air Route Traffic Control Center (ARTCC), the NWS Center Weather Service Unit (CWSU) provides forecasts and other weather information to ARTCC personnel for use in directing the safe, smooth flow of aviation traffic. The area covered includes most of Colorado and parts of Wyoming, Utah, Arizona, New Mexico, Kansas, Nebraska and South Dakota.

### ***Niwot Ridge***

#### **Office of Oceanic and Atmospheric Research (OAR) - [Cooperative Global Air Sampling Network](#)**

NOAA's Earth System Research Laboratory Global Monitoring Division (ESRL/GMD) operates a Cooperative Global Air Sampling Network to measure the distribution and trends of carbon dioxide (CO<sub>2</sub>) and methane (CH<sub>4</sub>), the two gases most responsible for human-caused climate change, as well as other greenhouse gases and volatile organic compounds. Samples are collected weekly at fixed locations and on several commercial ships. The air samples are delivered to ESRL/GMD, located in Boulder, CO. The observed geographical patterns and small but persistent spatial gradients are used to better understand the processes, both natural and human induced, that underlie the trends. Air samples have been collected at 3475-meter elevation on Niwot Ridge, Colorado since 1968. The samples are collected by researchers at the Mountain Research Station operated by the University of Colorado's Institute for Arctic and Alpine Research. Samples collected at Niwot Ridge represent free tropospheric air that has passed over the western U.S. and possibly Canada. These measurements help determine the magnitude of carbon sources and sinks in North America.

#### **Office of Oceanic and Atmospheric Research (OAR) - [Halocarbon Measurements](#)**

NOAA's Earth System Research Laboratory Global Monitoring Division (ESRL/GMD)) operates a sampling network to measure the distribution and trends of the gases most responsible for human-caused depletion of the stratospheric ozone layer. Weekly samples are collected in high-pressure flasks at fixed locations. The air sample flasks are delivered to ESRL/GMD, located in Boulder, CO for analysis. Some locations conduct continuous surface measurements on site. Halocarbon measurements help determine the effectiveness of efforts to protect and restore the ozone layer - so it can protect us from the sun's ultraviolet radiation.

#### **Office of Oceanic and Atmospheric Research (OAR) - [Ozone Measurements](#)**

NOAA's Earth System Research Laboratory Global Monitoring Division (ESRL/GMD) conducts long-term monitoring of ozone at the surface, with aircraft, and with balloons, through cooperative relationships with local partners. The ESRL/GMD tropospheric ozone aircraft measurement program is being done in conjunction with the Carbon Cycle and Greenhouse Gas (CCGG) group's existing aircraft sampling network. Aircraft based in-situ tropospheric ozone measurements provide data relevant to: pollution events, lower atmosphere mixing dynamics, boundary layer stability, ozone trend studies, and the validity of other samples collected in-flight. Near ground level ozone is currently monitored using ultraviolet absorption photometers at eight sites that are generally representative of background conditions. These sites, four of which have records exceeding 25 years in length, provide information on possible long-term changes in tropospheric ozone near the surface and support air quality research.

### ***Fort Collins***

#### **Office of Oceanic and Atmospheric Research (OAR) and National Environmental Satellite, Data and Information Service (NESDIS) - [Cooperative Institute for Research in the Atmosphere](#)**

The Cooperative Institute for Research in the Atmosphere (CIRA) was established in September 1980 at Colorado State University's Department of Atmospheric Science. CIRA's research vision is to improve interdisciplinary research in the atmospheric sciences by entraining skills beyond the meteorological disciplines, exploiting cutting-edge advances in engineering and computer science, facilitating transitional activity between pure and applied research, and assisting the nation through the application of its research. CIRA facilitates collaborative research between NOAA's Office of Oceanic and Atmospheric Research; National Environment Satellite, Data, and Information Service National Weather Service, as well as other federal agencies such as the National Aeronautics and Space Administration, the National Park Service, the National Forest Service, and the Department of Defense. The Institute's research is concentrated in five theme areas: satellite algorithm development, training and education; regional to global scale modeling systems; data assimilation; climate-weather processes; and data distribution.

## **National Environmental Satellite, Data, and Information Service (NESDIS) - [Regional and Mesoscale Meteorology Branch](#)**

The Regional and Mesoscale Meteorology Branch (RAMMB), within the Center for Satellite Applications and Research (STAR) in the National Environmental Satellite, Data, and Information Service (NESDIS), is physically collocated with the Cooperative Institute for Research in the Atmosphere (CIRA) on the Colorado State University foothills campus in Fort Collins CO. The RAMMB conducts research and development activities in collaboration with university scientists within CIRA on the broad theme of regional and small scale meteorological studies related to weather and climate with emphasis on applications of meteorological satellite data to those studies. The relationship between the university and RAMMB enables NOAA to adopt demonstrated research techniques for deriving atmospheric information from remote sensing data for broader distribution to the science community. In particular, CIRA collaborates with NOAA in the checkout (calibration and validation) of new satellite instruments; in the development of techniques to derive and apply visible, infrared, and microwave satellite imagery and other parameters from available satellite measurements; and in the assessment of the impact of new remote sensing data and products on weather analyses and forecasts. Colorado State University, the scientific community, and the nation benefit from this arrangement through the training of students and the support of research in atmospheric science.

### ***CO-3 Cortez***

## **National Environmental Satellite, Data, and Information Service (NESDIS) and Office of Oceanic and Atmospheric Research (OAR) - [U.S. Climate Reference Network](#)**

The U.S. Climate Reference Network (USCRN) is an operationally viable research network of 135 climate stations that are deployed nationwide. Data from the USCRN are used in various climate monitoring activities and for placing current climate anomalies into an historical perspective. The USCRN provides the United States with a reference network that contributes to an International network under the auspices of the Global Climate Observing System (GCOS).

### ***Dinosaur***

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### ***Grand Junction***

## **National Weather Service (NWS) - [Weather Forecast Office](#)**

Located at Walker Field Airport in Grand Junction, this NWS Weather Forecast Office (WFO) is staffed around-the-clock every day, and provides the best possible weather, water, and climate forecasts and warnings to residents of western Colorado and eastern Utah. Highly trained forecasters issue warnings and forecasts for events, including severe thunderstorms, tornadoes, winter storms, floods, and heat waves. This essential information is provided to the general public, media, emergency management and law enforcement officials, the aviation and marine communities, agricultural interests, businesses, and others. Information is disseminated in many ways, including through dedicated government channels, satellite, the Internet, and NOAA Weather Radio All Hazards.

Forecasters also provide Impact-based Decision-Support Services (IDSS), both remotely and on-site, during critical emergencies, such as wildfires, floods, chemical spills, and for major recovery efforts such as those following the Joplin and Moore tornadoes and Hurricanes Katrina and Sandy. The WFO collects and disseminates precipitation, river, and rainfall data, and prepares local climatological data. Each WFO has a Warning Coordination Meteorologist who actively

conducts outreach and educational programs, which helps build strong working relationships with local partners in emergency management, government, the media and academic communities. The WFO operates Automated Surface Observing Stations (ASOS), as well as the local Doppler Weather Radar, which provides critical information about current weather conditions. The radar data enables forecasters to issue warnings for tornadoes, severe thunderstorms, and flash floods.

### ***Montrose***

#### **National Environmental Satellite, Data, and Information Service (NESDIS) and Office of Oceanic and Atmospheric Research (OAR) - [U.S. Climate Reference Network](#)**

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### ***Steamboat Springs***

#### **Office of Oceanic and Atmospheric Research – [Surface Aerosol Monitoring](#)**

NOAA's Earth System Research Laboratory Global Monitoring Division (ESRL/GMD) operates surface-based aerosol monitoring sites in seven states and one territory (Puerto Rico). ESRL/GMD's aerosol monitoring capabilities include continental sites in response to the finding that human activities primarily influence aerosols on regional/continental scales rather than on global scales. Aerosols create a significant perturbation of the Earth's radiative balance on regional scales. The measurements made include aerosol optical properties (how the particles absorb and scatter solar radiation), aerosol number concentration and chemical composition of the aerosol particles. The site is a partnership with Desert Research Institute.

### ***Pueblo***

#### **National Weather Service (NWS) - [Weather Forecast Office](#)**

Located at the Pueblo Memorial Airport, this NWS Weather Forecast Office (WFO) is staffed around the clock every day, and provides the best possible weather, water, and climate forecasts and warnings to residents of southeast Colorado. Highly trained forecasters issue warnings and forecasts for events, including severe thunderstorms, tornadoes, winter storms, floods, and heat waves. This essential information is provided to the general public, media, emergency management and law enforcement officials, the aviation and marine communities, agricultural interests, businesses, and others. Information is disseminated in many ways, including through dedicated government channels, satellite, the Internet, and NOAA Weather Radio All Hazards.

Forecasters also provide Impact-based Decision-Support Services (IDSS), both remotely and on-site, during critical emergencies, such as wildfires, floods, chemical spills, and for major recovery efforts. The WFO collects and disseminates precipitation, river, and rainfall data, and prepares local climatological data. Each WFO has a Warning Coordination Meteorologist who actively conducts outreach and educational programs, which helps build strong working relationships with local partners in emergency management, government, the media and academic communities. The WFO operates Automated Surface Observing Stations (ASOS), as well as the local Doppler Weather Radar, which provides critical information about current weather conditions.

## CO-4

### *Briggsdale*

#### **Office of Oceanic and Atmospheric Research (OAR) – [Carbon Cycle Gases and Halocarbons Measurements](#)**

NOAA's Earth System Research Laboratory Global Monitoring Division (ESRL) operates a small aircraft-based North American network of sampling sites to measure vertical profiles of important greenhouse gas concentrations. Air is sampled above the surface up to approximately 25,000 feet above sea level using a relatively small, light, and economical automated system developed by ESRL/GMD researchers. These air samples are delivered to ESRL/GMD in Boulder, Colorado for measurements of CO<sub>2</sub>, CH<sub>4</sub>, and other greenhouse gases. This data will improve understanding and models of the global carbon cycle. Sampling is conducted bi-weekly. Some air samples from the small aircraft program are also analyzed for halocarbon gases that can destroy the stratospheric ozone layer. Halocarbon measurements help determine the effectiveness of efforts to protect and restore the ozone layer so it can protect us from the sun's ultraviolet radiation. These flights are part of the multi-year INFLUX campaign led by Purdue University.

### *La Junta*

#### **National Environmental Satellite, Data, and Information Service (NESDIS) and Office of Oceanic and Atmospheric Research (OAR) - [U.S. Climate Reference Network](#)**

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### *Longmont, Table Mountain*

#### **National Ocean Service (NOS) - [Absolute and Superconducting Gravimetry Programs](#)**

The Table Mountain Geophysical Observatory (TMGO) near Longmont houses equipment for NOAA's absolute, relative, and superconducting gravimetry programs. Local and worldwide gravity data are collected in conjunction with latitude, longitude, height, and velocity to increase the reliability, accessibility, and accuracy of the National Spatial Reference System.

#### **Office of Oceanic and Atmospheric Research (OAR) - [Surface Radiation Measurement Network](#)**

NOAA's Earth System Research Laboratory Global Monitoring Division (ESRL/GMD) operates seven stations as part of its surface radiation measurement network (SURFRAD). The station measurements support regional and global weather and climate research with accurate, continuous, long-term measurements of the surface radiation budget over the United States. Solar radiation is the driving energy for geophysical and biological processes that control weather and affect planetary life; understanding the global surface energy budget is therefore key to understanding climate and the environmental consequences to agriculture and other statewide concerns. Because it is impractical to cover the whole earth with monitoring stations, the answer to global coverage lies in reliable satellite-based observations. Accurate and precise ground-based measurements across a range of climate regions are essential to refine and verify the satellite observations. One of these stations is located near Boulder. These ground-based measurements also support special research projects on radiation and climate processes in the Colorado region and serve as important verification for weather forecasts.

## ***Nunn***

### **National Environmental Satellite, Data, and Information Service (NESDIS) and Office of Oceanic and Atmospheric Research (OAR) - [U.S. Climate Reference Network](#)**

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## ***Parker***

### **Office of Oceanic and Atmospheric Research (OAR) - [Science On a Sphere® at The Wildlife Experience](#)**

Science On a Sphere (SOS) is a room-sized global display system that uses computers and video projectors to display planetary data onto a six-foot diameter sphere, analogous to a giant animated globe. Researchers at NOAA developed Science On a Sphere® as an educational tool to help illustrate Earth System science to people of all ages. Animated images of atmospheric storms, climate change, and ocean temperature can be shown on the sphere, which is used to explain in a way that is simultaneously intuitive and captivating what are sometimes complex environmental processes.

### **NOAA Office of Education - [Environmental Literacy Program](#)**

NOAA's Environmental Literacy Program (ELP), administered by the Office of Education, provides grants and in-kind support to build the capacity of institutions and networks to advance NOAA's mission through formal (K-12) and informal education at national, regional, and local levels. In Colorado, ELP supports the Denver Museum of Nature and Science, Space Foundation (Colorado Springs), Fiske Planetarium (Boulder) and University of Colorado South Denver (Parker), all of which have permanent exhibits featuring NOAA's Science On a Sphere and are members of NOAA's SOS Users Collaborative Network. The SOS Network has more than 100 institutions worldwide, reaching over 60 million people, and shares best practices in using the sphere to bring the latest global forecasts and models to the public. ELP supports the Trout Bowl in Colorado, one of 25 regional competitions of the National Ocean Sciences Bowl (NOSB). The NOSB is an academic competition that engages high school students in learning about ocean sciences and related STEM careers while helping them become knowledgeable citizens and environmental stewards. ELP also supports the AMS DataStreme courses for K-12 educators through a grant and in-kind support. Local implementation teams in the state offer DataStreme courses that use weather, climate, and the ocean as contexts for teaching science and improving understanding about the Earth system.

## ***Platteville***

### **Office of Oceanic and Atmospheric Research (OAR) - [Wind Profiler Observing System](#)**

The NOAA Earth System Research Laboratory's Physical Sciences Division installed a wind profiler observing system to test and evaluate new signal processing and data algorithms to improve the quality and reliability of real-time wind and temperature profile data collected by these instruments. A side benefit of this project is to provide these data to the Denver/Boulder Weather Forecast Office to support weather and terminal aerodrome forecasts.

## ***CO-5***

### ***Colorado Springs***

### **Office of Oceanic and Atmospheric Research (OAR) - [Science On a Sphere® at The Space Foundation](#)**

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## *NOAA In Your State*

# Colorado

**NOAA** NATIONAL OCEANIC AND  
ATMOSPHERIC ADMINISTRATION  
UNITED STATES DEPARTMENT OF COMMERCE

