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NOAA NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
UNITED STATES DEPARTMENT OF COMMERCE

Oklahoma

***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: Starting with highlights, then by congressional districts and cities or towns, and then statewide programs.

Highlights of NOAA in Oklahoma

Arkansas-Red Basin River Forecast Center	Tulsa	OK-1
Lightning Mapping Array	El Reno, Yukon, Altus, Granite, Olustee, Mangum, Duke, Mountain Park	OK-3,4,5
Storm Prediction Center	Norman	OK-4
Cooperative Institute for Severe and High-Impact Weather Research and Operations	Norman	OK-4
National Severe Storms Laboratory	Norman	OK-4
Bipartisan Infrastructure Law (BIL) / Inflation Reduction Act (IRA) Projects	Project Specific	OK

The state of Oklahoma also has one Cooperative Institute, two Weather Forecasting Offices, one Labs and Field Offices, and one Science on a Sphere® exhibition.

Weather Forecast Offices

Tulsa OK-1

Norman OK-4

National Weather Service (NWS) Weather Forecast Offices (WFO) are staffed 24/7/365 and provide weather, water, and climate forecasts and warnings to residents of Oklahoma. There are 122 WFOs nationwide of which two are in Oklahoma. Highly trained forecasters issue warnings and forecasts for weather events, including severe thunderstorms, tornadoes, hurricanes, winter storms, floods, and heat waves 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 wireless emergency alerts, social media,weather.gov, and NOAA Weather Radio All Hazards. Each WFO has a Warning Coordination Meteorologist who actively conducts outreach and educational programs that strengthen working relationships with local partners in emergency management, government, the media and academic communities. Forecasters provide Impact-based Decision Support Services (IDSS), both remotely and on-site during critical emergencies such as wildfires, floods, chemical spills, and major recovery efforts. To gather data for forecasting and other purposes, NWS WFO staff monitor, maintain and use Automated Surface Observing Stations and Doppler Weather Radar. In addition to the WFOs, NWS operates specialized national prediction centers and regional headquarters throughout the U.S. for a total of 168 operational units. Over 85% of NWS' workforce is in the field. For current Oklahoma weather, visit www.weather.gov and, on the national map, click on the relevant county or district.

Science On a Sphere®

Norman OK-4

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. It is located at the National Severe Storms Laboratory in Norman.

OK-1

Tulsa

National Weather Service (NWS) - Arkansas-Red Basin River Forecast Center

Co-located with the NWS Weather Forecast Office in Tulsa, the NWS Arkansas-Red River Forecast Center (RFC) performs continuous river basin modeling and provides hydrologic forecast and guidance products for rivers and streams in a 208,000 square mile area that covers the entire state of Oklahoma and parts of Texas, New Mexico, Colorado, Kansas, Missouri, and Arkansas. These products include forecasts of river stage and flow, probabilistic river forecasts,

reservoir inflow forecasts, gridded precipitation estimates and forecasts, spring flood outlooks, and flash flood and headwater guidance. Some of the RFCs in the western and central U.S. also provide water supply forecasts. RFCs work closely with local, state and federal water management agencies, including the U.S. Army Corps of Engineers, U.S. Bureau of Reclamation, and U.S. Geological Survey, to provide water and flood information for critical decisions (aka Impact-based Decision-Support Services or IDSS).
National Weather Service (NWS) - Weather Forecast Office- See Page 2 for details.

OK-3
Goodwell
Office of Oceanic and Atmospheric Research (OAR) - U.S. Climate Reference Network
The US Climate Reference Network (USCRN) is an operationally viable research network of more than 138 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). ARL/ATDD manage the USCRN in partnership with NOAA's NESDIS/NCEI.

Lamont
Office of Oceanic and Atmospheric Research (OAR) - Greenhouse Gas Reference Network
NOAA’s Global Monitoring Laboratory (GML) operates the Greenhouse Gas Reference Network to measure the distribution and trends of carbon dioxide (CO2) and methane (CH4), the two gases most responsible for human-caused climate change, as well as other greenhouse gases and volatile organic compounds. Samples are collected weekly in specially designed flasks each week and delivered to GML in Boulder, CO for analysis. 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. These measurements help determine the magnitude of carbon sources and sinks in North America.

Ponca City
Office of Oceanic and Atmospheric Research (OAR) - Global Greenhouse Gas Reference Network; Halocarbon Measurements
NOAA's Global Monitoring Laboratory (GML) operates a small aircraft-based North American network of sampling sites to measure vertical profiles of important greenhouse gas concentrations. Air is sampled bi-weekly above the surface up to approximately 25,000 feet above sea level using a relatively small, light, and economical automated system developed by GML researchers. These air samples are delivered to GML in Boulder, Colorado for measurements of CO2, CH4, other greenhouse gases, and ozone depleting substances. These data improve our understanding of the distribution of greenhouse gases and models of the global carbon cycle. The measurements of ozone depleting substances help determine the effectiveness of efforts to protect and restore the ozone layer, which protects the surface from the sun’s ultraviolet radiation.

Stillwater
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OK-3, 4, 5

El Reno, Yukon, Altus, Granite, Oluslee, Mangum, Duke, Mountain Park

Office of Oceanic and Atmospheric Research (OAR) - Lightning Mapping Array

The National Severe Storms Laboratory's Oklahoma Lightning Mapping Array (OKLMA) provides three-dimensional mapping of lightning channel segments over west central Oklahoma and two-dimensional mapping of all lightning over most of Oklahoma.

OK-4

Norman

National Weather Service (NWS) - Storm Prediction Center

Located within the National Weather Center building on the University of Oklahoma South Research Campus and co-located with the NWS Weather Forecast Office in Norman and NOAA's National Severe Storms Laboratory, the NWS Storm Prediction Center (SPC) is staffed around-the-clock everyday to issue forecasts/outlooks and watches specifically for severe thunderstorms and tornadoes over the contiguous United States. The SPC also monitors fire weather threats across the U.S. and issues national-level fire weather outlooks. SPC is one of the nine NWS National Centers for Environmental Prediction.

National Weather Service (NWS) - Warning Decision Training Branch

The NWS Warning Decision Training Branch (WDTB) in Norman develops and delivers training on the integrated elements of the warning process within a NWS Weather Forecast Office. Part of the National Weather Service Training Center, the WDTB training activities provide basic and advanced weather radar operator proficiency, with an emphasis on the integrated data environment, warning methodology and situational awareness. The WDTB's goal is to increase expertise among NWS personnel in order to better serve the public in warning situations.

National Weather Service (NWS) - Radar Operations Center

The Radar Operations Center (ROC) provides centralized meteorological, computer software, maintenance, and engineering support for all 159 NEXRAD Doppler radar (WSR-88D) systems deployed worldwide. Supported by the Departments of Commerce, Transportation and Defense, the ROC is responsible for modifying and enhancing the WSR-88D systems during their operational life to meet changing requirements, technology advances and improved understanding of the application of these systems to real-time weather operations. The ROC also operates WSR-88D test systems for the development of hardware and software upgrades to enhance maintenance, operation and provide new functionality. The facility houses a help desk (open 24 hours, seven days a week) that assists radar sites with technical support more than 12,000 times each year.

National Weather Service (NWS) - Weather Forecast Office- See Page 2 for details.

Office of Oceanic and Atmospheric Research (OAR) - Cooperative Institute for Severe and High-Impact Weather Research and Operations (CIWRO)

The Cooperative Institute for Severe and High-Impact Weather Research and Operations (CIWRO) is housed at the University of Oklahoma (OU). CIWRO provides a mechanism to link the scientific and technical resources of OU and NOAA to create a center of research excellence in mesoscale meteorology, regional climate studies, and related subject areas. CIWRO scientists and students conduct research in mesoscale dynamics, atmospheric electricity, severe storms, cloud microphysics, boundary layer studies, and radar research, development, and analysis with increasing emphasis on the climatic effects of and controls on mesoscale processes, the socioeconomic impact of such phenomena, and climate change monitoring and detection. CIWRO conducts research across five themes: weather radar and observations, mesoscale and stormscale modeling research and development (R&D), forecast applications improvements R&D,

subseasonal to seasonal predictions for extreme weather events, and social and socioeconomic impacts of high impact weather.

Office of Education - **Science On a Sphere®** at the National Severe Storms Laboratory. See Page 2 for details.

Office of the Chief Information Officer (CIO) - N-Wave NOAA Science Network
N-Wave is NOAA's science network connecting NOAA, academic, and state research network communities to data and resources needed to advance environmental science.

Office of Oceanic and Atmospheric Research (OAR) - Hazardous Weather Testbed
NOAA's Hazardous Weather Testbed (HWT) is a joint facility managed by the Weather Program Office, the National Severe Storms Laboratory, the Storm Prediction Center, and the NWS Oklahoma City/Norman Weather Forecast Office within the National Weather Center building on the University of Oklahoma South Research Campus. The HWT emphasizes developing, testing and evaluating severe weather forecast and warning techniques throughout the U.S. The HWT accelerates the transition of new meteorological insights and technologies into advances in forecasting and warning for hazardous weather events like tornados, large hail, damaging wind, and lightning. The HWT allows researchers to identify and validate concepts and techniques to improve NOAA models. Its aim is to create skillful and reliable thunderstorm and severe hazard threat forecast guidance for 1-hour to 8-days in advance. This testbed also allows researchers to identify and analyze in-situ and remotely-sensed observation datasets and their impact on the forecast as well as integrate relevant social and behavioral science methodologies.

Office of Oceanic and Atmospheric Research (OAR) - National Severe Storms Laboratory
The NOAA's National Severe Storms Laboratory (NSSL) serves the nation by working to improve the lead-time and accuracy of severe weather warnings and forecasts in order to save lives and reduce property damage. NSSL scientists are committed to their mission to understand the causes of severe weather and explore new ways to use weather information to assist National Weather Service forecasters and Federal, university and private sector partners. The NSSL is located in the National Weather Center on the University of Oklahoma research campus.

Office of Oceanic and Atmospheric Research (OAR) - National Weather Radar Testbed
The NOAA National Weather Radar Testbed (NWRT) supports testing and development of new radar technology in Norman, Oklahoma. Currently, the radar housed at the facility, dubbed the Advanced Technology Demonstrator (ATD) is the first full-scale, S-band, dual-polarization phased array radar built from the ground up and designed specifically for use as a weather radar. The NWRT also includes a research WSR-88D co-located with the ATD to perform intercomparison studies.

Office of Oceanic and Atmospheric Research (OAR) -Climate Adaptation Partnerships (CAP) Program
The Southern Climate Impacts Planning Program (SCIPP) is a cooperative agreement between NOAA's Climate Program Office (CPO) and the University of Oklahoma. It is one of several Climate Adaptation Partnerships (CAP), formerly Regional Integrated Sciences and Assessments (RISA), that contribute to the advancement of equitable climate adaptation through sustained regional research and community engagement. From severe storms, flooding, drought, hurricanes and storm surge, heat waves, wildfires, to winter storms, the South experiences among the nation's most extensive collection of climate-related hazards, with many southern states ranking at or near the top of the lists in disaster declarations and billion-dollar disasters. SCIPP examines communities in the South through multiple lenses: climate-informed planning, developing governance and collaborative capacity, extreme events in a changing climate, and climate justice.Core partners of SCIPP include the University of Oklahoma, the Oklahoma Climatological Survey, the South Central Climate Adaptation Science Center, the Cooperative Institute for Mesoscale Meteorological Studies, Louisiana State University , the Southern Regional Climate Center , the University of Nebraska - Lincoln, the University of Kansas, and Texas Sea Grant.

Statewide

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 Corpus Christi, Texas serving the Southern Plains region – Oklahoma and Texas. 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 - **NEXRAD (WSR-88D) Systems**

NEXRAD is used to warn the people of the United States about dangerous weather and its location. This radar technology allows meteorologists to warn the public to take shelter with more notice than ever before. The NEXRAD network provides significant improvements in severe weather and flash flood warnings, air traffic safety, flow control for air traffic, resource protection at military bases, and management of water, agriculture, forest, and snow removal. NEXRAD radar has a range of up to 250 nautical miles, and can provide information about wind speed and direction, as well as the location, size, and shape of precipitation. There are 159 operational NEXRAD radar systems deployed throughout the United States and overseas, of which five are in Oklahoma.

National Weather Service (NWS) - Automated Surface Observing Systems Stations

The Automated Surface Observing Systems (ASOS) program is a joint effort of NWS, the Federal Aviation Administration, and the Department of Defense. The 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, 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 16 ASOS stations in Oklahoma.

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, and to provide observational meteorological data in near real-time to support forecast, warning and other public service programs of the NWS. There are 117 COOP sites in Oklahoma.

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 office. NWR broadcasts official Weather Service 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 1100 transmitters covering all 50 states, adjacent coastal waters, Puerto Rico, the U.S. Virgin Islands, and the U.S. Pacific Territories. There are 20 NWR transmitters in Oklahoma.

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 1928, 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.

National Ocean Service (NOS) - Students for Zero Waste Week
Students are inviting their local communities to "Go Green and Think Blue" by joining them in the annual *Students for Zero Waste Week campaign*. During this campaign led by the Office of National Marine Sanctuaries, students focus on reducing land-based waste in order to protect the health of local marine environments. These young leaders are raising awareness of how single-use plastic and other types of litter affect the health of local watersheds, national marine sanctuaries, and the ocean. In addition, some schools are looking at ways to reduce their energy use on campus with hopes of raising awareness of how the burning of fossil fuels also impacts the health of the ocean.

National Ocean Service (NOS) - NOAA Ocean Guardian Youth Ambassador Program
Youth aged 13-18 from across the United States and its territories that are committed to ocean conservation and stewardship of our blue planet can apply to become a NOAA Ocean Guardian Youth Ambassador. This year-long program looks for enthusiastic youth with new ideas and a unique perspective who want to learn more about America's underwater treasures and share their passion with others. Youth learn how to become a leader at their school or in their local community to make a difference in the conservation of the ocean through marine protected areas.

Bipartisan Infrastructure Law (BIL) / Inflation Reduction Act (IRA) Projects
The National Oceanic and Atmospheric Administration (NOAA) was entrusted with billions of supplemental federal funding dollars with passage of the Bipartisan Infrastructure Law on November 15, 2021 and the Inflation Reduction Act on August 16, 2022. This historic infrastructure funding has been invested in communities across the nation to build resilience in the face of climate change. NOAA distributed funding to communities, tribal, state and local governments, higher education programs, businesses, non-profit organizations, and facilities in need. NOAA funded billions of dollars in grants and cooperative agreements across the country to fund projects that enhance climate resilience, restore coastal and marine habitats, improve safety, and create jobs. For an interactive map of NOAA BIL and IRA investments in your state, visit https://www.noaa.gov/bil-ira-awards-explorer.

BIL
ACME/SHMET Weather Proposal, $1,000,000
The primary goal of this funding granted to the University of Oklahoma is to improve the science and scientific computer programming underlying the Multi-Radar/Multi-Sensor (MRMS) system as related to BIL Provision 5: Wildfire. In general, this will be accomplished by pursuing two primary objectives: 1) Increase the robustness of the MRMS computer code to

take advantage of new radar volume scan strategies both current and in the future and to develop robust capabilities for running the MRMS within a cloud environment, and (2) Utilize new data sets of opportunity to further improve the accuracy and robustness of MRMS hydro-meteorological products.

ACME/SHMET Weather Proposal, $1,350,000
Funding was provided to the University of Oklahoma related to BIL Provision 3: Flood Inundation Mapping. The project tasks listed below will improve the science underlying the Multi-Radar/Multi-Sensor (MRMS) system to: 1) Increase the robustness of the MRMS computer code to take advantage of new radar volume scan strategies, (2) continue to mature robust capabilities for running MRMS within a cloud environment, and 3) use other data sets of opportunity to further improve the accuracy and robustness of MRMS hydro-meteorological products.

Fire Weather Observations Analysis, $446,026
The aim of the fire weather observation analysis project is to 1) increase understanding and improve predictions of the structure, behavior, and downstream impacts of both plume- and wind-driven wildfires in the United States, 2) better characterize land surface conditions post-wildfire and 3) improve our understanding of hydrological response to flash-floods/debris flows post-wildfire. This project will result in the collection of unique observations of active wildfires and in post-wildfire environments using deployable radar and Uncrewed Aerial Systems (UAS). These data will also be used for detailed case analyses of wildfire and post-wildfire related events.

Multiscale Data Assimilation for RRFS, $783,999
This project will support the development of an advanced data assimilation system to effectively analyze the current meteorological state and its uncertainty across multiple scales. This project will advance multiscale data assimilation within the Joint Effort for Data Assimilation Integration (JEDI) Rapid Refresh Forecast System (RRFS), the next-generation convection-allowing operational data assimilation and modeling system.

Probabilistic Fire Weather Guidance, $906,945
This project aims to provide quantitative information regarding potential impacts of fires to augment ongoing impact-based decision support services within the National Weather Service (NWS). This will be achieved by building statistical relationships between historical NWS forecasts and observed wildfire occurrence. An interactive web tool will be developed to allow partners to interrogate this information in a timely manner.

Integrating social and meteorological data to assess the dynamics of flood hazards and impacts: An interdisciplinary approach leveraging AI, risk communication, and data sciences, $1,034,942
This project consists of three research activities that integrate research in artificial intelligence (AI), risk communication, and data sciences to advance scientific methods for learning about the dynamics of flood events and to illustrate societal data insights.*This award supports work in CA, WA, CO, and OK.*

Investigating the Seasonal Total Water Level Projections Informed by a Coupled Coastal Modeling System and Bias-Corrected Seasonal to Sub-seasonal (S2S) Precipitation Forecasts, $590,000
This project aims to investigate the effects of seasonal to sub-seasonal (S2S) time scales on the compound flooding and inundation in coastal regions. Much progress has been made in the area of coupling hydrologic, hydraulic, and coastal (hydrodynamic and wave) models to more holistically represent the coastal compound flooding problem and estimate its potential risks across different temporal scales, especially in the low relief coastal plains of the U.S. eastern seaboard and the gulf coast. Because of the complex fluid interactions in this zone, flooding in such areas is hard to predict with standalone models that are optimized for one type of flooding , and thus represents a NOAA service gap.

Navigating Compound Flood Risks: Enabling a Weather-Ready Nation through Longitudinal Societal Data Collection and Analysis, $1,442,344
The aim of this work is to develop a numerical forecast model able to incorporate both the complex hydrodynamics in the form of tidal and tsunami waves and sophisticated morphodynamics as sediment transport. This model should be able to run operationally at the Tsunami Warning Centers to increase our understanding of the coastal hazards with climate change, such as sea level rise and the ensuing effect on inundation. This project will support a postdoc with skills in numerical modeling of tsunamis and sediment transport.

IRA

Bridging Predictions and Projections: Understanding Predictability from Initialized Multi-Year to Decadal Predictions for High-Impact Climate Futures, $364,816
Building collapse due to the weight of settled snow, or snow load, is dangerous. These collapses are sometimes due to rain on snow (ROS) events, which can cause a surge in the weight of the snowpack immediately preceding the melting phase or ponding on the structure during the melting phase. Climate change is anticipated to increase the threat of extreme, short-term snow loads and/or ROS events in certain regions of the United States.The proposed work will improve our understanding of how the statistical distributions describing extreme snow load accumulation and ROS occurrence evolve in a changing climate across the Conterminous United States (CONUS).

Hail Climatology Development, $650,000
This project will develop a radar-based hail climatology that will leverage NOAA data sets and machine learning. Hail causes an average of $15 billion in damage to the United States each year, and this increased understanding of historical hail events will help industry and the public better understand future hail risks. Work will be performed by the Cooperative Institute for Severe and High-Impact Weather Research and Operations (CIWRO).

A Multi-University Consortium for Advanced Data Assimilation Research and Education (CADRE), $2,131,890
The next-gen NOAA Unified Forecast System Data Assimilation (DA) faces significant challenges associated with earth system modeling and observations. Serious gaps in DA inhibit addressing these challenges. A Multi-University Consortium for Advanced Data Assimilation Research and Education will partner closely with NOAA to advance DA education and research. Supported will be 12 DA research thrusts and their implementation to the UFS. The projects will deliver improvements to DA, the workforce, and improve short range to S2S forecasts.