U.S. HOUSE OF REPRESENTATIVES
COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY
SUBCOMMITTEE ON ENVIRONMENT

HEARING CHARTER

Advancing Commercial Weather Data: Collaborative Efforts to Improve Forecasts

Wednesday, May 20, 2015
10:00 a.m. – 12:00 p.m.
2318 Rayburn House Office Building

Purpose

The Environment Subcommittee will hold a hearing titled *Advancing Commercial Weather Data: Collaborative Efforts to Improve Forecasts* on Wednesday, May 20, 2015, at 10:00 a.m. in room 2318 of the Rayburn House Office Building. The purpose of this hearing is to examine weather data policies and acquisition strategies of the National Oceanic and Atmospheric Administration (NOAA). Robust data streams from multiple observing systems are essential to maintaining up-to-date information to predict weather accurately and with timeliness, especially for extreme weather events like tornadoes and severe storm systems. Sources available for weather data include U.S. government-, international-, and commercially-owned and operated satellite-, aviation-, and surface-based observing systems. This hearing will examine NOAA's policies and partnerships for integrating these myriad data sources into weather predictions.

Witnesses

- **Dr. Scott Pace**, Director, Space Policy Institute, George Washington University
- **Mr. Scott Sternberg**, President, Vaisala Inc.
- **Ms. Nicole Robinson,** Chair, Hosted Payload Alliance
- **Dr. Bill Gail**, Chief Technology Officer, Global Weather Corporation
- **Dr. Thomas Bogdan**, President, University Corporation for Atmospheric Research

Background

With a high potential for coverage gaps from NOAA's planned geostationary and polar orbiting satellite systems, it is critical to ensure continuous and robust streams of weather data to protect citizens, property, and safeguard the American economy. A report by the National Research Council in 2003 estimated that 80% of the data assimilated into numerical weather models comes from satellites.[1] This figure has not demonstrably changed since then. NOAA's Global Data Assimilation System also uses observations from various land-based sensors like radar or sound wave wind profilers, balloons, aircraft, and buoys to formulate the Global Forecast System model.[2] NOAA relies upon different technologies, observing systems, and partnerships for data that is constantly available for use in formulating forecasts and predicting weather events to protect lives and property.

Satellite Observing Systems

NOAA operates two main types of satellites that provide weather data. The geostationary satellite program, called Geostationary Operational Environmental Satellites (GOES), constantly monitors the Earth. The geostationary satellite fleet is comprised of three satellites: One satellite monitors the western United States (GOES-WEST), one satellite monitors the eastern United States (GOES-EAST), and one spare satellite sits in orbit to provide backup duties in the event of satellite failures. NOAA's next geostationary satellite is planned for launch in 2016.

The polar satellite program, called the Polar Operational Environmental Satellites, monitors the Earth from 500 miles above, traversing the globe 14 times daily between the north and south poles as the Earth spins.[3] The current polar orbiting fleet consists of three satellites operating in the afternoon orbit, NOAA-15, NOAA-18, and NOAA-19, all with various degrees of age and performance.[4] NOAA's next polar orbiting satellite is planned for launch in 2017.

International Satellite Agreements and Cooperation

In addition to U.S. government-owned satellites, NOAA has partnerships to ensure robust data streams. The European Organization for the Exploitation of Meteorological Satellites (EUMETSAT) operates polar orbiting satellites that add coverage of the Earth in the mid-morning orbit.[5] These satellites comprise the Initial Joint Polar System Agreement (IJPS) between EUMETSAT and NOAA to share polar-orbiting satellite data.[6]

Likewise, there is historical context for geostationary satellite cooperation. EUMETSAT and NOAA now have formal collaboration to perform backup agreements in the event of a satellite failure. In 1985, Meteosat-2 (a European satellite) failed and was replaced by GOES-4

[1] National Research Council, "Fair Weather Report: Effective Partnership in Weather and Climate Services," 2003, available at: http://www.nap.edu/catalog/10610/fair-weather-effective-partnerships-in-weather-and-climate-services
[2] National Oceanic and Atmospheric Administration, "Global Data Assimilation System," 2012, available at: https://www.ncdc.noaa.gov/data-access/model-data/model-datasets/global-data-assimilation-system-gdas
[3] National Oceanic and Atmospheric Administration, "Polar-orbiting Operational Environmental Satellites," 2014, available at: http://www.ospo.noaa.gov/Operations/POES/
[4] National Oceanic and Atmospheric Administration, "POES Operational Status," 2014, available at: http://www.ospo.noaa.gov/Operations/POES/status.html
[5] EUMETSAT, "Metop," 2015, available at: http://www.eumetsat.int/website/home/Satellites/CurrentSatellites/Metop/index.html
[6] Ibid.

to cover the operational gap over Europe.[7] In 1989, a NOAA satellite, GOES-6 failed and was aided by European satellite Meteosat-3 to cover the U.S. and Western Atlantic.[8]

NOAA also has relationships with other government organizations for weather data, including the Japan Meteorological Agency (JMA), Japan Aerospace Exploration Agency (JAXA), French Space Agency CNES), National Space Organization Taiwan (NSPO), Indian Space Research Organization (ISRO), Canadian Space Agency (CSA).[9]

Surface Observing Systems

NOAA also conducts observations and ingests datasets from surface-based observing systems. According to NOAA, "knowing the current state of the weather is just as important as the numerical computer models processing the data."[10]

NOAA operates land-based stations to collect data as part of its Automated Surface Observing System. Ground-based observing systems are located throughout the United States and collect data on various aspects of the atmosphere including ground temperature, humidity, precipitation, and wind speed.[11] NOAA also collects data from weather balloons with instruments called radiosondes that ascend through the atmosphere to collect data, which is then received by ground stations. The data from radiosondes are used for input into computer-based prediction models, local severe storm forecasts, and weather research.[12]

NOAA also acquires data on lightning through a partnership with Vaisala, a private sector company that uses ground based sensors to track lightning activity in the United States.[13] Of note, the raw data from this partnership is freely available throughout the U.S. government, and several derived products are openly available to all users.[14]

Aviation Observing Systems

NOAA also collects weather data from aviation-based observing systems. NOAA receives Aircraft Communications Addressing and Reporting System data (ACARS), as well as Aircraft Meteorological Data Relay (AMDAR). These systems provide data from commercial

---

[7] European Space Policy Institute, "EUMETSAT – NOAA Collaboration in Meteorology from Space," 2013, available at: http://www.espi.or.at/images/stories/dokumente/studies/ESPI_Report_46.pdf
[8] Ibid.
[9] National Oceanic and Atmospheric Administration, "Developing Partnerships," 2015, available at: http://www.nesdisia.noaa.gov/developingpartnerships.html
[10] National Oceanic and Atmospheric Administration, "Numerical Weather Prediction," 2015, available at: https://www.ncdc.noaa.gov/data-access/model-data/model-datasets/numerical-weather-prediction
[11] National Oceanic and Atmospheric Administration, "Land-Based Station Data," 2015, available at: https://www.ncdc.noaa.gov/data-access/land-based-station-data
[12] National Oceanic and Atmospheric Administration National Weather Service, "Radiosonde Observations," 2015, available at: http://www.ua.nws.noaa.gov/factsheet.htm
[13] National Oceanic and Atmospheric Administration, "Lightning Products and Services," 2015, available at: https://www.ncdc.noaa.gov/data-access/severe-weather/lightning-products-and-services
[14] Ibid.

aircraft during flight. According to NOAA, "the participating airlines retain a proprietary interest in their data and therefore set the rules regarding to whom and how it may be redistributed." [15] Both data from ACARS and AMDAR are assimilated into NOAA's National Center for Environmental Prediction models.[16]

Ocean Observing Systems

Ocean activities relating to weather at NOAA are conducted under the Integrated Ocean Observing System (IOOS), a partnership between federal, regional, private sector, and the academic community to track, predict, manage, and adapt to changes in marine environments.[17] The primary technologies deployed for ocean observing systems are oceanographic buoys, sensors, and coastal radars. The various data from these systems include air temperature, water temperature, wind direction and speed, and wave heights.[18]

Data Policy

With the multiple observing systems in use by NOAA to collect environmental data, an understanding of NOAA's data policies is crucial as the Agency evolves in the future to take advantage of more data sources and methods of collection. NOAA's Office of Technology, Planning, and Integration of Observation (TPIO) is responsible for "identifying and documenting all current and planned observation systems providing data to meet NOAA observational requirements and conducting analyses to aid in the development of an integrated observing system portfolio."[19] This office is also responsible for assessing NOAA's observation requirements for current, planned, and conceptual observational capabilities, as well as the prioritization of requirements.[20]

The Agency relies on multiple documents to outline its policy on sharing environmental data. NOAA advocates the use of full and open data policies that allow for the sharing of important environmental data.[21] NOAA provides data to the world and receives data in return. According to NOAA's partnership policy website, the agency adheres to the policies contained in the Paperwork Reduction Act, the Government Paperwork Elimination Act, and OMB

---

[15] National Oceanic and Atmospheric Administration National Weather Service, "ACARS/AMDAR Data," 2006, available at: http://www.nco.ncep.noaa.gov/sib/restricted_data/restricted_data_sib/acars+amdar/
[16] Ibid.
[17] National Oceanic and Atmospheric Administration National Ocean Service, "Integrated Ocean Observing System," 2014, available at: http://oceanservice.noaa.gov/programs/ioos.html
[18] NERACOOS, "About Ocean Observing Systems," 2014, available at: http://www.neracoos.org/about/ocean_observing
[19] National Oceanic and Atmospheric Administration Technology, Planning, and Integration for Observation, "NOAA Observing Systems," 2015, available at: https://www.nosc.noaa.gov/tpio/main/aboutosa.html
[20] Ibid.
[21] National Oceanic and Atmospheric Administration Satellite and Information Service, "Satellite and Data Policy," 2012, available at: http://www.nesdisia.noaa.gov/policy.html

Circular No.A-130.[22] The Agency is also guided by the National Space Policy of the United States of America, released in 2010.[23] In addition, the World Meteorological Organization's Resolution 40 established standards of sharing meteorological data openly, which is used by NOAA today.[24]

Additional Reading

- National Research Council. *Fair Weather: Effective Partnerships in Weather and Climate Services*. Washington, DC: The National Academies Press, 2003. Available at: http://www.nap.edu/catalog/10610/fair-weather-effective-partnerships-in-weather-and-climate-services
- National Research Council. Observing Weather and Climate from the Ground Up: A Nationwide Network of Networks. Washington, DC: The National Academies Press, 2009. Available at: http://dels.nas.edu/Report/Observing-Weather-Climate-from/12540
- Committee on Science, Space, and Technology. *To Observe and Protect: How NOAA Procures Data for Weather Forecasting.* Washington, DC. 2012. Available at: http://science.house.gov/hearing/subcommittee-energy-and-environment-hearing-how-noaa-procures-data-weather-forecasting

[22] National Oceanic and Atmospheric Administration, "Policy on Partnerships in the Provision of Environmental Information," 2015, available at: http://www.noaa.gov/partnershippolicy/
[23] White House, National Space Policy of the United States of America," 2010, available at: https://www.whitehouse.gov/sites/default/files/national_space_policy_6-28-10.pdf
[24] World Meteorological Organization, "Resolution 40," 2015, https://www.wmo.int/pages/about/Resolution40_en.html