Statement of

Neil A. Jacobs. Ph.D.
Chief Atmospheric Scientist - Panasonic Weather Solutions
Panasonic Avionics Corporation

Before the

Subcommittee on Environment
Science, Space, and Technology Committee
U.S. House of Representatives

Hearing on

"Leading the Way: Examining Advances in Environmental Technologies"

June 21, 2017

Good morning, Chairman Biggs, Ranking Member Bonamici, and Members of the Subcommittee. My name is Neil Jacobs, and I serve as the Chief Atmospheric Scientist for Panasonic Weather Solutions, a division of Panasonic Avionics Corporation. I am honored to be invited to participate in today's hearing to examine the advancement and progress that has been made on environmental technologies.

Panasonic is very pleased to continue our long-standing public-private partnership to provide TAMDAR data to the National Oceanic and Atmospheric Administration's National Weather Service through the National Mesonet Program, which is an example of a successful and sustainable business model for commercial atmospheric data acquisition.

TAMDAR, which stands for Tropospheric Airborne Meteorological Data Reporting, provides real-time observations of wind, temperature, moisture, pressure, icing, and turbulence. These atmospheric data are downlinked through either Iridium's low-Earth orbiting satellite network or Panasonic's high throughput geostationary satellite Ku-band network. Once received, the data are decoded, quality controlled, and passed on to the National Weather Service with a total latency of less than 20 seconds.

The aircraft-based weather observations are assimilated into the National Weather Service's forecast models, and numerous studies have been conducted to document the substantial positive impact on predictive skill. Visualization of the raw observations can also be used to manually adjust regional forecasts for convective activity and precipitation type issued by National Weather Service forecast offices.

The icing and turbulence observations, while not assimilated into the models, can be used to enhance aviation situational awareness for both commercial and general aviation pilots. These observations are also used by the National Transportation Safety Board as a routine part of many aviation accident investigations.

The TAMDAR network is rapidly expanding overseas, and many airlines are utilizing both the real-time observing systems and forecast model output to enhance both safety, as well as operational efficiency. In addition to passenger and crew safety, significant fuel savings are realized by the airlines, which has the added benefit of greatly reducing the carbon footprint of commercial aviation.

A miniaturized version of the TAMDAR sensor has also been developed for unmanned aerial vehicles. It is currently in operation on a number of platforms, including NASA's Ikhana, which is a non-weaponized Predator drone used for scientific research. The UAV probe functions identical to the commercial aviation version. It also has the capacity to do additional sensing, such as various air quality metrics.

In addition to the airborne sensing network, Panasonic is in the initial stages of deploying ship-based marine and atmospheric sensing capabilities through ITC Global, which a Panasonic Avionics-owned company that supplies broadband satcom to the maritime industry.

Panasonic is the only private entity in the world with a custom-developed, end-to-end global weather-modeling platform initialized from raw observations, and completely independent from National Weather Service-produced global model data. This prediction system includes an 80-member model ensemble in addition to a high-resolution deterministic model. The global model is designed to assimilate both conventional observations, as well as satellite radiances and other remotely-sensed data sources including commercial GNSS-radio occultation measurements. Panasonic also runs limited area regional models and air quality

dispersion models, which are initialized internally from the boundary conditions provided by the Panasonic global model.

The next-generation Panasonic global model will employ the capability to run various dynamic cores, some of which are being co-developed between public, private, and academic sectors. Further advancements are also being made to the data assimilation system, as well as two-way coupling of an ocean model.

As part of the global model development initiative, Panasonic has established a very successful academia-private partnership business model with multiple universities and academic institutions including University of Maryland, North Carolina State University, and the National Center for Atmospheric Research. Panasonic funds several programs at these institutions, which support faculty and students in the atmospheric modeling, environmental science, and related STEM fields.

While commercial restrictions are placed on the redistribution of Panasonic data and intellectual property, we routinely grant research-only license agreements to universities, so that faculty and students have free access to our data for educational purposes.

At Panasonic, we believe it is critical to structure public-private partnership models such that industry is incentivized to collaborate with federal agencies, as this is more conducive to the mutual success of both sectors. A thriving private sector in the weather enterprise can not only provide data products and services to enhance the mission of various federal agencies, but it can also fast-track applied research and innovation through partnerships with the academic sector.

Since its founding in 1998, Panasonic Weather Solutions has worked cooperatively with federal agencies by providing its TAMDAR data to NOAA and the FAA, and -- many times at no cost. While we are a commercial company responsible to our shareholders -- we at Panasonic also have another responsibility – to help share our technological expertise with national meteorological agencies around the world.

Mr. Chairman, Ranking Member Bonamici, and Members of the Subcommittee, thank you again for inviting me to participate today. I would be pleased to answer any questions you may have about Panasonic Avionics Corporation.