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BEFORE THE HOUSE APPROPRIATIONS SUBCOMMITTEE
COMMERCE, JUSTICE, SCIENCE AND RELATED AGENCIES

ADDRESSING PROGRAM OVERRUNS AND THE LOOMING GAP IN WEATHER AND CLIMATE DATA FROM SPACE UTILIZING A COMPETITIVE, COMMERCIAL DATA PURCHASE APPROACH

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Chairman Wolf, Congressman Fattah and distinguished members of the Subcommittee: It is an honor for me to provide testimony to you today on the nation's looming gap in weather and climate data from satellites, and on a promising solution to this impending dilemma—a commercial data purchase model that is both cost-effective and creates jobs. I'll be speaking to you today about NOAA and the National Weather Service's requirements for data collection. We are not seeking funding, but need the Committee's leadership in supporting innovative alternatives to monolithic government satellites—alternatives that have a stunning track record of success in the nation's intelligence community.

First, I want to thank the committee for your leadership in addressing this national crisis. Chairman Wolf, under your guidance, the executive branch is hearing and heeding the message that weather data from space is vital to our very existence. Ranking member Fattah, your efforts to increase spending on weather forecasting, making it an urgent priority, are no doubt going to make a difference when this country faces the super storms in our future.

The well-documented delays and cost overruns that have plagued our nation's satellite programs have led to a likely gap in satellite data that threatens to leave the U.S. vulnerable to catastrophic weather events and insufficient climate monitoring at a critical juncture. A recent report by the Government Accountability Office estimates this gap at 17 to 53 months in duration, starting as soon as 2014.

Today I am here to present to you a solution to the nation's unprecedented loss of environmental data already underway, a solution that has precedent, provides an immediate relief valve to squeezed federal budgets, rapidly addresses the short-term shortage of satellite data, and in the long term assures an affordable and continuous source of high-quality observations.

The importance of satellite data to weather forecasts and early warnings cannot be overstated, especially at a time when extreme weather events with severe human and economic impacts are becoming more frequent.

Without observations from satellites that orbit our planet from pole to pole, we now know that the computer model which predicted Hurricane Sandy would slam into the Northeast U.S. five

days in advance would have instead showed the storm staying out to sea. As devastating as Sandy was, with many of our citizens just now starting on the long road to recovery, imagine for a moment how much worse it would have been without adequate advanced warning.

Sandy is not an isolated case. Many will remember the massive "Snowmageddon" storm in February 2010, which paralyzed a large portion of the eastern U.S. with 20 to 35 inches of snow. Here, too, satellite data played a crucial role in predicting the severity of the storm. According to one study, without the benefit of polar-orbiting satellite data, model forecasts five days out would have underestimated snowfall by 10 inches or more.

Weather forecasting, of course, is still an inexact science. But forecast misses, like last week's "Snowquester" no-show in Washington, D.C., have become fewer and farther between. Weather forecasts have improved dramatically in the past few decades thanks in large part to hard work by the dedicated professionals in the National Weather Service, advances in the science of modeling, improved scientific understanding of the Earth's atmosphere, and faster computers.

However, even the most powerful and sophisticated models are only as good as the observational data fed into them. There is no hope of producing an accurate weather forecast for tomorrow, let alone several days from now, without precise and detailed measurements of temperature, pressure, humidity and other variables around the globe and from the Earth's surface to the top of the atmosphere.

The advent of satellites revolutionized our ability to observe the three-dimensional atmosphere day and night. Today, more than 90% of the observational data that goes into weather models comes from satellites, and satellite data is a major reason that today's five-day weather forecast is as good as a three-day forecast 20 years ago, and that today's five-day hurricane track forecast is as good as a two-day forecast 30 years ago.

Yet our failure to ensure an uninterrupted supply of satellite observations threatens to roll back the accuracy and advanced warning we have come to depend on for protecting lives, properties, economies and critical infrastructure. Budget constraints, shifting priorities, scope creep, schedule delays and satellite program mismanagement have gotten us into this situation. It will take an innovative approach to get us out.

Fortunately, there is already a blueprint to follow. It was 10 years ago that the U.S. government, facing a growing need for a reliable and sustainable source of satellite imagery, embraced the data purchase model as an alternative to government-built-and-operated satellites. At that time, the nation was trying to build the next generation of intelligence satellites for satellite imagery called FIA (Future Imagery Architecture); they were dramatically over budget and behind schedule, threatening our nation with a gap in satellite imagery coverage to support the war fighter and other interest of the US government abroad.. The National Geospatial-Intelligence Agency's ClearView contracts, which later evolved into NextView and then EnhancedView, provided a steady stream of revenue for commercial satellite imagery companies in exchange for an affordable and consistent supply of high-quality imagery for both civilian and military purposes. In this action the Intelligence community mitigated the risk of "flying blind" and the

nascent commercial imagery industry gained a foot hold, in what is now a robust international market.

It is ironic that today's national weather satellite systems are in the same posture as those of the intelligence community over a decade ago. Years later, we now know that the solution of investing in and fostering development of commercial data sources is a proven model of success.

Given the impending data gap resulting from government-built constellations, and the current economic climate where cost-effective solutions that create jobs are paramount, the data purchase model once again offers an attractive approach. Encouraging government agencies to purchase commercial satellite data where possible would:

1) Relieve the pressure on existing satellite programs that are grossly over budget and dramatically behind schedule;
2) Mitigate the risk of catastrophic gaps in satellite data;
3) Serve as an effective mechanism for reining in programmatic spending; and
4) Create new high-tech, high-paying jobs in the private sector in the US.

All with a predictable, sustainable and lower cost to the government in the long run.

Let me be clear: We are not proposing the government get out of the weather satellite business. Starting with TIROS-1 in 1960, the U.S. government has led the world in the development, launch and operation of Earth-observing satellites, and there are many valid reasons to maintain that capability. Instead, where possible, we suggest shifting the burden of some data requirements to the commercial sector.

Already the data purchase model has proven successful for the US Government in the areas of satellite imagery and satellite communications. In a budget environment which dictates cuts across the board, and where every dollar and man-hour matters, the data purchase model spreads satellite development and launch costs among private investors and user nations, while allowing an agency like NWS to focus more of its money and time on the crucial work of improving its modeling capabilities, which have fallen behind the Europeans and other countries, and on advancing forecast research.

Furthermore, the data purchase model represents a lower-risk alternative to traditional government-funded satellite programs that build and launch massive spacecraft with numerous sensors, where a delay in any one sensor creates a ripple effect that has expensive consequences for the program, agency and the country. Disaggregation using alternative sources—commercial data is one—allows a satellite program to better achieve its broader objective, which is to get the bulk of the sensors in space in a timely manner that avoids data gaps.

Moving away from the large, all-in-one satellite approach would also soften the blow of launch failures or in-orbit mishaps, which are a real and present danger despite the best intentions. History is dotted with satellite launches gone awry, and just recently we learned it was space debris that suddenly destroyed a Russian satellite earlier this year..

Incentivizing industry to respond to targeted data requirements brings small, agile and fast solutions to the problem, with lower costs and reduced risk. Ultimately, adoption of the data purchase model would secure a sustained flow of satellite data vital to the safety, well being and economic security of our nation.

When it comes down to it, we are going to pay for the satellite data required for accurate forecasts one way or another. On the current track, pushed off-course by delays that have resulted from the all-or-nothing approach to large satellite development, we are destined for an increased dependency on foreign data. The data purchase model features the dual benefits of saving the government money and stimulating job growth, while at the same time making sure the data is supplied by the U.S. space industry and emerging atmospheric data companies.

Make no mistake, a business-as-usual strategy not only will tilt the odds toward a longer and more harmful satellite data gap this decade, but also will lead to similar or worse gaps in the decades to come. Continuing to throw more money at the same problem in the same manner is not risk mitigation. Only a fundamental shift in the procurement model that leverages the technical expertise and nimbleness of the private sector can reverse this troubling trend in the timeframe needed to mitigate this impending gap.

Our request of the Appropriations Committee is to encourage the NWS to utilize cost-effective commercial data purchases from U.S. industry at every opportunity, and encourage the use of Anchor Tenancy legislation already in law for 20 years, the same approach that jumpstarted the commercial satellite imagery industry and was key to technology successes such as Google Earth and the explosion of online mapping. NOAA should follow this lead and facilitate growth of a commercial weather data sector, much as NASA has helped nurture a burgeoning commercial spaceflight industry in recent years.

Providing annual, competitive funding for U.S. weather data ventures—companies just like mine—will lower government costs, promote uninterrupted data streams, and spur private sector growth and competition in an emerging global market. Private capital is ready and waiting, but the government's inability to commit is what's holding back these job-creating funds.

My company, for example, is poised to launch a network of small satellites that will provide vital weather data to both government and private users in the U.S. and abroad, which will lower everyone's costs for this kind of information. We will use a technique called GPS Radio Occultation, which looks at the bending of GPS satellite signals as they pass through the atmosphere. The bending angle is directly related to the density of the atmosphere, from which we can calculate high-resolution soundings of temperature, pressure and humidity.

This is a highly precise type of data already ingested by U.S. and international weather models. In fact, this data has been shown to have the biggest positive impact on forecast accuracy for the least cost. Unfortunately, the satellite system that currently supplies this data is approaching the end of its lifetime, while planned replacements have been delayed, are insufficient to meet the stated needs of users around the world, will be flown by a foreign government as a science and research mission, and will cover only a small sliver of the United States.

Our data can be used to support a variety of federal mission requirements including more accurate forecasts of day-to-day weather, hurricanes, flood events and winter storms, as well as improved climate monitoring, increased data collection over oceans, and better space weather forecasts for the U.S. Air Force. In particular, because it is so precise, GPS radio occultation data from PLANETIQ satellites can be used by NOAA to calibrate its own satellites and improve their performance.

Especially noteworthy is the impact of GPS Radio Occultation data on hurricane forecasts. The high accuracy, resolution and frequency of this data has shown the ability to significantly improve hurricane track and intensity forecasts at the lead times required to efficiently and cost-effectively evacuate coastal areas. In addition to saving lives and protecting property, the cost-savings potential is tremendous, as the average annual cost of false-alarm evacuations (that is, evacuating areas that do not ultimately experience hurricane-force winds) is roughly over $1 billion dollars.

We are exploring with NOAA obtaining an anchor tenancy contract, a special federal contracting authority granted to NOAA under the Space Commercialization Act that Congress passed in 1993 for situations exactly like ours. If we obtain such a contract from NOAA in fiscal year 2014, which would commit NOAA to purchasing weather data from us in the future, then at no upfront cost to the government we will have an operational constellation of 12 satellites in space providing full global coverage by 2016.

Again, there would be zero cost to NOAA during the next 2 years, and then a competitive annual subscription cost for NOAA to purchase the weather data we provide to all our customers around the world going forward for the term of the contract. Meanwhile, NOAA and other federal agencies like the Air Force would be assured access to these critical data years earlier, and at a much lower total cost, than if the government continues to rely solely on its monolithic satellites which continue to suffer from launch delays and cost overruns.

There are companies other than mine which also can provide specific advanced capabilities to NOAA on a commercial basis. So while I am telling you about what my company can do my main message to you today is that Congress, through its oversight of NOAA and the NWS specifically, has an opportunity to spark a new American industry of commercial sources for weather that can work in service to NWS to support their weather forecast mission.. Collectively we are an eager industry ready for takeoff, if you let us go forward.