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Government Ministers Set Global Observation Plan

Staff Work, Cooperation, Political Support Are Keys to Success

—By Dane Konop

Government ministers from 60 nations and the European Commission and representatives of 40 organizations agreed at a summit in Brussels, Belgium, Feb. 16, to a ten-year plan for a Global Earth Observation System of Systems that will improve mankind's ability to manage natural resources and reduce the impact of natural disasters. They also commited to accelerating progress to establish an international tsunami detection and warning system.

The "system of systems" would integrate environmental observations made on land, in the atmosphere, in the oceans and from space in a planned, unified way so that the data could be readily available and useful to environmental decision makers worldwide.

Many countries do currently share weather and other environmental data and information. But until now, there wasn't an internationally agreed to plan to find ways to link all existing observing systems, share all data currently being collected, determine gaps in needed environmental information and create new, integrated observing systems.

Commerce Secretary Carlos M. Gutierrez led the U.S. summit

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Joan Rolf/NASA

Delegates to the Earth observation summit in Brussels (left to right) Peter Meister of NASA, Helen Wood of NOAA, Bruce O'Donnell of Canada and NOAA contractror Peter Colohan join other delegates at a dinner after the summit celebrating the adoption of a ten-year plan.

Enormous Iceberg Threatens South Pole Researchers

—By John Leslie

It was an epic showdown. A mammoth iceberg, about the size of Long Island, N.Y., was headed for a collision in January with the Drugalski Ice Tongue, a massive glacier off the coast of Antarctica.

The iceberg, perhaps the largest-ever, was closely monitored by the National Ice Center in Suitland, Md., which is staffed by five NOAA civilians, one NOAA Corps officer, 37 Navy officers and enlisted personnel, 11 Navy civilian employees and one Coast Guard petty officer.

The movement of this gigantic iceberg, named "B-15A," posed at least one troubling scenario. Would it block U.S. ships from bringing critical food and medical supplies to scientists working at Antarctic research bases, especially McMurdo Station, the largest post on the frigid continent?

Tucked away on the second floor of Federal Building No. 4 in the sprawling Suitland Federal Center campus in a darkened room of computer terminals displaying colorful satellite images, a small team of analysts studied the momentum of iceberg B-15A as they had countless others before it.

But this was no ordinary iceberg. A blockage by an iceberg of this magnitude would have disastrous consequences, since McMurdo

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Recycled Paper

NOAA Warns Motorists: Turn Around, Don't Drown

—By Chris Vaccaro

Each spring, the American public is witness to televised news scenes of cars and trucks being swallowed by high water as helicopters pluck stranded passengers from danger, then ferry them to safety. Despite the rescues, more than 100 people are killed, on average, by flood waters each year and more than half of those deaths occur in automobiles.

This month, NOAA's National Weather Service in collaboration with government and private sector partners will launch a public safety campaign to combat the potentially fatal decision to drive across flooded roads.

Flash floods, often occurring with little or no warning, are the deadliest danger.

Torrential rain from slow-moving tropical systems, such as hurricanes and their remnants, have also proved fatal, especially inland away from the coastal area where the storm came ashore. Under flash-flood conditions, drainage systems can become overwhelmed and turn roads into rivers.

Drivers incorrectly assume that their vehicles, which can weigh several thousand pounds, can move across high water. In fact, most cars begin to float and lose contact with the road in only 18 to 24 inches of water. Moving water can roll vehicles over. Passengers are often left with only seconds to escape or risk drowning. As little as six inches of water can sweep people off their feet.

As with all life-threatening weather events, advance warning of the onset of flooding is only one part of the larger effort to keep people safe.

"An effective flood warning system comprises three primary components," said Thomas Graziano, acting chief of the Weather Service's Hydrologic Services Division in Silver Spring, Md. "One—observe, monitor and predict flooding. Two—communicate the threat through the dissemination of a flood warning. And three—ensure the people and communities threatened take appropriate action to minimize their risk and mitigate flood impacts."

Empowering people with the information needed to take the appropriate action to stay safe when floods are a threat is the goal of the first annual Flood Safety Awareness Week. From March 21-25, topics related to protecting life and property from floods will be featured on Weather Service Web sites and distributed to the news media. This outreach effort follows a similar format used to raise awareness throughout the year on other weather hazards, such as lightning, hurricanes, winter storms, thunderstorms and tornadoes.

The awareness week is the culmination of the shared interest among several offices within NOAA and outside organizations to educate drivers to turn around when approaching a flooded road.

Its key campaign message is "TADD," short for "Turn around. Don't drown."

This catchy phrase was developed nearly two years ago by the Weather Service's southern region in conjunction with the Federal Alliance for Safe Homes. It has since been increasingly used by news media outlets, including The Weather Channel.

With assistance from the other supporting agencies, the slogan that sprouted from a local Weather Service forecast office will soon gain greater prominence where it matters most—on the road.

"While reviewing a brochure on TADD, we noticed an artist's rendition of a TADD sign," said Bobby Jackson, senior vice president of the National Safety Council. "We have a long-standing working relationship with the National Weather Service and led the facilitation between the Department of Transportation and the Weather Service to make the artist's image a real sign."

Much like the standard red and white stop sign at intersections, rectangle signs bearing the TADD slogan posted ahead of a flooded road will immediately let people know how to react.

"We use numerous ways to get the right message to the right people at the right time so they don't put themselves at risk when flooding is occurring," said Paul Pisano of the Department of Transportation's Federal Highway Administration. "This starts with accurate weather information from the National Weather Service, which state and local agencies then convey to the traveling public via fixed and variable message signs, road weather Websites and phone-based services such as 511."

Malcolm Gaylord

Lafaele Silao.

Lafaele Silao Is the Team Member of the Month

—By Jana Goldman

The Samoa governor's office considers NOAA's baseline observatory in American Samoa "the consistently best kept property on the island," and groundskeeper Lafaele Silao, the March Team Member of the Month, wasn't going to let a cyclone diminish that distinction.

The observatory is one of five operated by NOAA around the globe, sampling and monitoring the atmosphere. Measurements taken at the observatories can tell scientists how pollutants travel, where they come from and where they are going.

NOAA Lt. (j.g.) Daniel Simon, a former station chief of the Samoa observatory now at the South Pole baseline observatory in Antarctica, wrote in an email, "One of the things that I liked hearing while I was on the island was that everyone who had been to the observatory commented how we had the nicest property on the entire island. That was due primarily to Lafaele, who tirelessly worked, day after day, week after week to make the grounds of the observatory look so beautiful. To me, that is not an easy task when the temperature typically hovered around 90 degrees Fahrenheit and the humidity was typically over 90 percent."

Jan. 4, 2004, was far from a typical day. Cyclone Heta lashed the island with winds up to 185 miles per hour and sent sea swells up to 60 feet.

"This combination of high winds and waves sent sheets of water across the observatory property that washed through one observatory out-building that sits 118 feet above sea level on a point of land jutting into the ocean," said Russell Schnell, director of the baseline observatory program at NOAA's Climate Monitoring and Diagnostics Laboratory in Boulder, Colo.

For the past 17 years, Silao has been the groundskeeper for the 10-acre observatory, responsible for trimming and sculpting the encroaching jungle and grass and continuously maintaining the observatory buildings.

In an email, Silao wrote that one of the things he likes best about his job is the opportunity to use his bush knife to improve the property.

"With a machete, Lafaele is a surgeon," noted Mark Cunningham, station technician at the Samoa Observatory. "He can trim stuff better with a knife than you or I can with a power tool."

Silao said Heta was a slow cyclone that stayed over the island for a long time. It left devastation in its wake, damaging more than 4,600 homes, including his house, pulling the roof off and allowing heavy rains to enter.

The Samoa observatory is located in Cape Matatula on the northeastern tip of Tutuila Island, on a ridge overlooking the South Pacific

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Karen Owen/NOAA

William Angel.

William Angel Is the Employee of the Month

—By John Leslie

When William Angel, NOAA's March Employee of the Month, makes up his mind, he really makes up his mind.

In the early 1970s, when he was just a fourth grader in western North Carolina, Angel knew he wanted to forecast the weather.

Today, thanks to his steely determination, he has not only realized his dream of being a meteorologist, he's also a skilled computer programmer at NOAA's National Climatic Data Center in Asheville, N.C. At this virtual hub of America's weather history, Angel manages the heavy volume of climate readings from the NOAA National Weather Service network of 11,000 volunteer cooperative weather observers around the country.

More than 100 years ago, volunteers began taking temperature and precipitation measurements from various locations, called "co-op stations," around the U.S. Those

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Focus On...

Killer Whales in Antarctica

—By Jim Milbury

A team of NOAA researchers recently got a rare, close-up look at what may be a new species of killer whales in the frigid waters off Antarctica.

"There is currently only one species of killer whale recognized in the world," said lead scientist Robert Pitman, a marine ecologist at NOAA's Southwest Fisheries Science Center in La Jolla, Calif. "We were looking into the possibility that there might be more than one species of killer whale in Antarctica."

Killer whales, which can grow to lengths of 30 feet, often travel in packs and are the only species of whales that regularly eat marine mammals and birds. They even attack other whale species, which is how they derived their transposed nickname of "whale killers."

The killer whales in Antarctica are thought to be somewhat different in their behavior and physical size.

"In Antarctica there are three distinct types of killer whales," Pitman said. "They feed on different things, they have different types of habitat requirements and we think that the ones that live in the ice are smaller."

Pitman and his research team, Wayne Perryman, a fishery biologist also from the Southwest Fisheries Science Center, and Don LeRoi, a private contractor from Old Lyme, Conn., arranged a trip for the Antarctic summer months of December and January to McMurdo Station, a U.S. research facility about 700 miles from the South Pole.

"We were interested in doing two things," Pitman said. "We wanted to get measurements of whales and also collect tissue samples from killer whales for genetic analysis."

The researchers wanted to measure the size of the whales by taking photographs of the animals from a helicopter. Accurate measurements can only be derived if each photograph also has the altitude of the aircraft from which it was taken. LeRoi, a retired military reconnaissance expert who has worked with NOAA for over 30 years on adapting military technology to wildlife sampling, came up with an innovative way to do this.

"We built an interface with a camera that the aircraft's altimeter plugs into," LeRoi said. "It captures the altitude and the position of the airplane using GPS coordinates and correlates it to each picture frame through a laptop computer."

Obtaining tissue samples for genetic analysis is more difficult. Researchers need to get close enough to a whale to shoot a miniature dart into the animal to recover a small tissue sample of skin and blubber for their biopsies. The scientists' solution to this problem hinged on what has become a migration ritual for these southernmost killer whales.

Each year, the U.S. Coast Guard forges a path through the thick ice so merchant vessels can re-supply McMurdo Station with all the goods necessary to operate a small

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Don LeRoi for NOAA

NOAA fishery biologist Wayne Perryman (far right) and a Coast Guard helicopter flight crew observe killer whales as they surface for air after diving under an ice bridge in Antarctica.

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town in the middle of a sea of ice.

Scientists and support staff look forward to the arrival of the Coast Guard vessel that signals the arrival of new supplies. But the humans are not the only mammals eagerly waiting for the Coast Guard.

"We know that every year when the ice breaker comes in to break the ice into McMurdo Station there are usually killer whales that follow the ship in, and this gets them into some feeding situations that they didn't have to begin with," Pitman said. "They seem to be pretty regular, so that's why we started going down there to work on killer whales."

The channel the ice-breaker forms allows the whales access to leads, or cracks in the ice, with narrow channels and abundant schools of fish to prey upon.

"Sometimes [the leads] will be five feet across. Sometimes they'll be 15 or 20 feet across. But they go for miles," Pitman said. "The whales will come in on the channel the ship breaks open and then they find these leads and they'll swim down these leads looking for food."

Once they got to McMurdo Station, the researchers planned for Pitman to ride the Coast Guard vessel to retrieve biopsy samples while Perryman and LeRoi flew in a Coast Guard helicopter to take aerial photographs of the whales. But the aging ice-breaker developed mechanical problems and was unable to get underway. It appeared they would not get their tissue sample.

Disappointed but still upbeat, Pitman instead accompanied his colleagues on the helicopter overflights. On one flight, the scientists noticed that the killer whales had swum up a particularly narrow lead in the ice. The scientists had the helicopter crew set them down on the thick ice beside the lead, just arms' lengths from the surfacing marine mammals.

"It was a dramatic experience," Perryman said. "You don't get that close to one of the biggest predators that ever lived very often."

LeRoi watched from an ice-bridge over the lead as killer whales swam directly towards him and then dove under the ice he stood on. "It was fantastic," LeRoi said. "I could feel the whales shake the ice as they swam underneath me. It was like going to a carnival."

The close proximity of the whales also allowed Pitman to collect the biopsy samples needed for analysis.

Over the next month, the research team collected 15 biopsies and used aerial photographs to measure over 100 of the killers. As suspected, the team documented that Antarctic killer whales are indeed quite a bit smaller than whales in other ocean areas—more evidence that they may in fact be a different species. In the process, the scientists also got a view of the killers that they won't soon forget.

Wayne Perryman/NOAA

A killer whale repeatedly tossed a piece of ice into the air. When one ice chunk broke up, the whale found another one about the same size and continued the performance.

Don LeRoi for NOAA

NOAA marine ecologist Robert Pitman shoots a small, harmless dart into a killer whale to collect a tissue sample for genetic analysis.

Earth Observations

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delegation that included NOAA Administrator Vice Adm. Conrad C. Lautenbacher, Jr., U.S. Navy (Ret.), and other NOAA officials and staff, plus Capitol Hill staff and representatives of other government science agencies, the White House Office of Science and Technology Policy, and the State and Defense Departments. They were joined by their counterparts from many of the world's other nations.

In an interview for this story, Lautenbacher called the summit "a triumph in getting people to agree."

The ministerial-level summit, held at the Palais d'Edgmont, an elegant, former royal residence, was preceded by a two-day meeting of the international *ad hoc* Group on Earth Observations at offices of the European Commission. Co-chaired by Lautenbacher and made up of about 200 representatives of government agencies from the U.S. and around the world, the group hammered out final points of agreement and set the stage for the summit that followed.

The summit capped an intense, 18-month period of meetings and negotiations between science administrators from both developed and developing countries.

Lautenbacher convened the first Earth observing summit in Washington, D.C., in July 2003 to reach agreement on the need for a 10-year plan from the representatives of the 33 nations and the European Commission who attended. At a second summit in Tokyo in April 2004, the nations agreed to a framework for developing the 10-year plan.

Because of the detailed planning and steady negotiations that preceded the third summit in Brussels, propelled by the high level of political support from the White House and other governments for its goal, the summit's success was never in doubt, Lautenbacher said.

"The real surprise was that we were been able to get this far in a year and a half. First of all, to get people to come to Washington just out of the blue to talk about it. Then a year and a half later to deliver a 10-year plan and get agreement from more than 60 nations and 40 international groups, double the amount that we had at the original summit, to come and say, 'This is a really good idea and we want to support it.' That was incredible."

After the first summit, the participating nations and organizations formed a Group on Earth Observations made up of teams of science administrators from the U.S. and other countries that met regularly to move the process forward and prepare for the ministerial level summits. The NOAA members included representatives from the NOAA line offices, with guidance from the NOAA Observing Systems Council.

The international group also established a GEO secretariat, staffed full-time by four NOAA employees and part-time by one NASA and one U.S. Geological Survey employee, to manage the group's day-to-day operations and carry out summit mandates.

To prepare for the planned second summit, Lautenbacher named Helen Wood, a mathematician and computer scientist at NOAA's Satellite Service, to head the *ad hoc* Group on Earth Observations' secretariat. "Their task," she said, "was to provide for a smooth transition to some kind of longer-term mechanism. Basically, we were helping everything get off the ground."

In the meantime, as word spread through the world science community, the Group on Earth Observations drew in more nations.

"To be able to have meaningful summits, a lot of work had to be done in between, while at the same time the number of countries and organizations interested in GEO and in joining in the GEO activity was growing," Wood said. "You almost have a moving train here. You've got to jump on and figure out what you need to keep it going. The train keeps adding cars, and tracks are being built right in front of you. But you do know where you have to get to ultimately." That goal was an integrted global observation system.

The secretariat had to keep the GEO group functioning with representatives from a multitude of countries spread around the world.

"I ended up running a weekly teleconference of up to 40 people across almost every time zone in the world for two hours," Wood said. "You're trying to agree. What are the priorities of the organization? What is the work we need to do to prepare for the next meetings so that they are productive? What are the documents that need to be prepared? How should we go about drafting them? Who handles the reviews?

"After a few of these teleconferences, when we finally came together in our first face-to-face meeting, we'd close our eyes and listen to the voices and say, 'I know who you are.'"

But the work of the GEO group and secretariat is not just administrative or only about observing systems, Wood said.

"It's about achieving high-priority societal benefits for disaster reduction, for sustainable development, for better understanding climate change, for water resource management, energy management," Wood said. "In each of these areas, Earth observations are a

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Earth Observations

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recognized priority. You need the data in order to come up with the information to make informed decisions."

Carla Sullivan, a senior policy advisor to Lautenbacher who also attended the summit and the GEO meetings that preceded it, said, "The GEO meetings are where all the documents are prepared and negotiated before they're presented to the ministers for adoption."

Although many of the details had been worked out before the GEO delegates arrived, there were some surprises. "We had several countries join just before the meeting. And there was concern that not all of the negotiated text that we had come into the meeting with would be accepted. There were some pretty intense negotiations," Sullivan said.

This made the summit's communique to accelerate an international tsunami warning system even more gratifying to the delegations. "We were able to negotiate from scratch a resolution on building a tsunami warning system for the world in a day and get it approved by the world's governments in a day," Lautenbacher said.

Lautenbacher said he now has two immediate goals: to make the transition to a permanent organization to manage and follow through with the summit's commitments and to actually start delivering pieces of systems. "I think that is within reach within the next couple of years," he said.

"This is a NOAA initiative that has been pushed, staffed, managed and sorted out by a large number of talented people within our organization," he said. "It's something all NOAA employees should be proud of and [is] an extension of their ability to contribute to helping the world's environment."

Icebergs

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Station supplies and supports almost all U.S. Antarctic operations. It was unclear whether B-15A would slam into the ice tongue glacier, or be stopped in its tracks by a tall, undersea ridge.

"The satellite images were able to tell us where the iceberg was, and we used computer models and other research to try to project where it may go," said center meteorologist Sean Helfrich.

Eventually, B-15A ran aground just three miles from the Drugalski Ice Tongue, blocking the path to open ocean of thousands of penguins and threatening about 50,000 penguin chicks with starvation.

Days later, two powerful icebreaker ships cut a path through parts of B-15A, which was up to 10 feet thick.

Three weeks later, another huge iceberg, this one the size of Dallas, Texas, and named A-53, broke off the Larsen Ice Shelf, a large sheet of glacial ice and snow near the Antarctic land mass in the Weddell Sea.

"Some icebergs of this size that have broken off from the Larsen Ice Shelf have stayed in the area for a while. Others have moved north," Helfrich said. "A-53 will likely not leave the Weddell Sea this year and pose another collision problem. It may even break off into additional icebergs later this year.

"Iceberg formation is a natural occurrence on the Antarctic coastline," Helfrich said. "Right now, we are engaged in the study of why they occur frequently."

Icebergs form when large chunks of ice break off from even larger glaciers. Glaciers are created by years of snow accumulation, which is compacted into ice over time. The glaciers that create icebergs normally flow downhill to sea level, which helps launch them into the ocean. Once spotted, an iceberg is named to reflect the lettered quadrant of ocean where it originated. Iceberg A-53, for example, was the fifty-third iceberg to form in that area of ocean.

On average, Antarctica experiences more iceberg activity than its northern counterpart, the Arctic. The reason for the greater number of southern icebergs, Helfrich said, is because Antarctica is a continent covered by tremendous amounts of snow and ice, which is key to producing an iceberg. The Arctic is mainly an ocean covered by sea ice, which is why most Arctic icebergs originate from Greenland. Arctic icebergs also form in Alaska and off Arctic Ocean islands.

The U.S. Navy began providing global ice sea services in the early 1950s. In 1956, an interagency agreement between the U.S. Weather Bureau and the U.S. Navy Fleet Weather Central established the National Ice Center. The staff was headquartered in the Suitland Federal Center, where it remains today.

The main users of the National Ice Center products and services include NOAA, U.S. Coast Guard icebreakers, the U.S. Navy submarine force, the U.S. Army and Air Force, the Military Sealift Command, the National Science Foundation and NASA, along with commercial transport and fishing fleets.

While Helfrich has yet to travel to either Antarctica or the Arctic, he said the improved satellite imagery has almost eliminated the need to send personnel to either place for ice observation.

"I'd like to get down [to Antarctica] someday and see everything up close," Helfrich said. But for now, he said, he's comfortable monitoring the iceberg action on screen from the security and warmth of the ice center's offices.

Silao

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Ocean. A staff of three operates the observatory: two who commute 25 miles from Tafuna, and Silao, who lives in Tula, a village about a mile from the observatory.

Heta also seriously damaged the observatory. It washed away four stories of a 12-story-tall stairway used to access instruments mounted near sea level, destroyed the station's power generator and either blew away or damaged every exterior-mounted atmospheric measurement instrument. Heta's rains damaged computer components and its winds ripped off a rooftop device that measured surface ozone and aerosols, twisted the mountings for temperature-sensing equipment and destroyed a cylinder on the solar power generator.

The palm trees and other exotic flora that lure visitors to the island were littered along the half-mile of steep road that leads up to the observatory. Silao's usually tidy observatory grounds were covered by piles of shredded vegetation.

Despite a Samoa-wide power and telephone outage that lasted for weeks, Silao walked to the observatory and began the Herculean task of clearing the access road of the felled trees and other vegetation so vehicles could reach the facility.

"He spent the next three months working long hours, assisting in repairing the observatory buildings, trimming and removing fallen trees, clearing debris and replanting sections of his beloved property," Schnell said.

Even though Heta damaged his well-kept observatory grounds, Silao said he likes the observatory even better now.

"Heta forced us to clear much jungle away from the observatory," he said. "Now it is much clearer and cleaner."

Angel

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records are sent to Weather Service forecast offices, and eventually make their way to NCDC.

Each day, Angel manages about 82,000 records. In an average month, he manages about 250,000 weather reports. "The demand for climate records is definitely growing, especially as the awareness of NCDC has grown over the years," Angel said. "One of the biggest challenges of my job is to make sure everyone can get to these data, with as little trouble as possible."

Angel is the focal point and technical guru for addressing public inquiries about data in NCDC's archives. He answers questions, researches problems and takes the right steps to solve them. "One of my top goals is processing the best [weather and climate] data possible—consistently and accurately," Angel said. "The National Weather Service is depending on it, as are others who need these statistics to be reliable, including everyone from farmers to attorneys."

Angel began his weather and climate career in March 1987 while a student at the University of North Carolina—Asheville. Nearly three years later, he became a full-fledged meteorologist. Over the years, Angel's job has evolved to include oversight of several data streams, ensuring the data are handled quickly and correctly, and to look for better ways to provide quality control for the data.

He also oversees "Storm Data," a publication describing storm paths, deaths, injuries and property damage, and the "Monthly Climatic Data of the World," a database of monthly averages of meteorological elements for approximately 2,000 international surface stations and 500 international upper atmospheric-observing sites.

Among Angel's biggest fans at NCDC are staff of the busy Climate Monitoring Branch. "William makes an extremely valuable contribution to our climate monitoring activities every month, providing much of the *in situ* data we use in monitoring climate conditions across the globe," said branch head Jay Lawrimore. "Without William's contribution, our monthly state of the climate reports and accompanying press releases would not be as comprehensive or timely."

Angel said his meteorology background helps him make sense of the data. "It helps immensely, especially in developing and enhancing the quality control routines and using a data source to help verify another," he said. "Being a meteorologist also helps me understand the data values and what they represent."

Away from the job, Angel enjoys coaching a softball team of NOAA employees and contractors. He said he brings a coach's mentality to the office. "You have to have an ability to work with everybody and get them to play—or work—together and maintain cohesiveness. Those same attributes are very important when dealing with large data sets and ensuring an easy data flow and process."

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