Researchers at NASA work to solve forecasting's toughest problems

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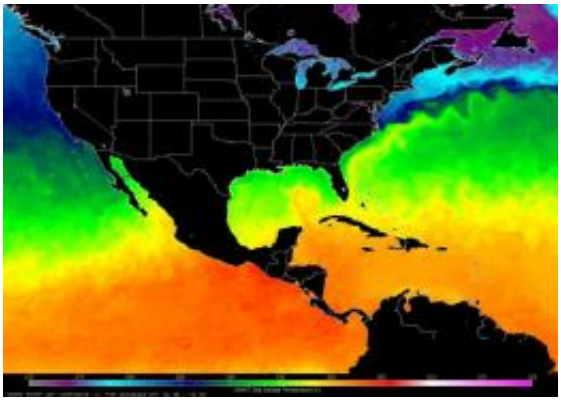

Enhanced sea-surface temperature data captured by NASA's Short-term Prediction Research and Transition, or SPoRT, project, to be provided to weather offices to improve forecasts. Image Credit: NASA/MSFC

Late January 2010. Powerful storms blow into Huntsville, Ala. Forecasters at the National Weather Service move to monitor nearly 20 storms developing over the land that stretches from northern Alabama to southern Tennessee. Data floods their computer screens -- radar, satellite, ground observations, balloon observations. As the storm worsens, NASA scientists Dr. Geoffrey Stano and Dr. Kevin Fuell rush to join their fellow meteorologists.

They don't need to walk far. Stano and Fuell are part of NASA's Short-term Prediction and Research Transition team, or SPoRT. They use

SPoRT to significantly enhance meteorologists' short-term weather forecasts. The SPoRT office at NASA's Marshall Space Flight Center in Huntsville, Ala., is just a few steps away from a National Weather Service office in the same building.

Stano and Fuell come through the Weather Service's door and go to the bustling room packed with forecasters. Most are flipping between computer screens, examining data as quickly as they can. They monitor the big screen TVs in the background to make sure local stations are getting the severe storm warnings out to a public who need the information. Decisions are made in seconds. Is that area in danger? Do we issue a warning? The environment can be tense, and the NASA meteorologists watch the situation closely, hoping to learn how to improve a weather forecasting system they've worked on.

Rewind nine years. NASA engineers and climatologists prepare to launch a series of satellites designed to study Earth's climate. Engineers designed the satellites to study long-term variations of humidity, temperature, precipitation, cloud cover as well as a host of other climate characteristics.

Dr. Gary Jedlovec, a 25-year veteran of NASA, partnered with two of his NASA colleagues to propose a novel idea to improve short-term weather forecasts. When Gary was a kid, his 4th grade science teacher, Mr. Kabinski, had helped him build a barometer. The tool fascinated the 4th grader. That Christmas, he begged his parents for weather tools, and was elated to receive an anemometer, a wind vane and an outdoor thermometer. He was hooked.

The group of three NASA weather and climate researchers each had a different specialty: one was an expert in electricity and thunderstorms, one in models and forecasting and one, Jedlovec, worked on how to use satellite data to predict the weather. If these satellites could study the

long-term climate, they could also help predict the kinds of short-term changes weather forecasters have come to rely on.

Jedlovec knew the SPoRT project had big potential. Most forecasters have access to just a limited amount of traditional, coarse-resolution data. With SPoRT, they could have access to additional, unique, high-resolution observations of weather features available nowhere else. And with such high-resolution satellite data available, there was immense potential to improve forecasters' predictions. They proposed the project and NASA gave them the green light. They got to work right away, but a series of challenges quickly surfaced.

Forecasters needed access to the data, and they needed it fast. If they could use the data from cutting-edge NASA satellites, it would tremendously improve their ability to predict the weather. But when a thunderstorm rolls through, time is short. Forecasters watch their radars, trying to craft forecasts and making split-second decisions that affect thousands of people. The team faced the challenge of getting data from NASA satellites, processing it and piping it to meteorologists already overwhelmed with information.

Jedlovec knew he'd have to make the data available immediately after the satellites collected it. He and his colleagues directed the SPoRT team to work with the National Weather Service offices in Birmingham and Huntsville to figure out how they could get the information to the meteorologists.

Slowly, a paradigm developed. If SPoRT could make NASA data available in just one or two clicks, the forecasters could access it in just seconds. The team worked to develop training modules to use the unique NASA data. They constantly consulted with local meteorologists to determine the kinds of forecasting challenges they experienced in their regions. By tailoring SPoRT to fit the needs of individual offices and by

integrating the NASA data seamlessly with their current figures, forecasters quickly learned that SPoRT greatly expanded their capabilities.

As the years passed, SPoRT has grown into an impressive operation. The team has expanded the SPoRT capabilities from just Birmingham and Huntsville to 15 National Weather Service offices, one in Montana and the rest throughout the Southeastern United States. They're currently looking at how to bring the unique capabilities of SPoRT to places as diverse as Alaska and Hawaii.

To Jedlovec, it's no surprise. He's on the cutting edge of meteorology, and he loves every second of it. When he meets with local forecasters they often greet him with excitement. Farmers need to know when it will freeze to protect their crops, and when it will rain so they don't waste money on unnecessary irrigation. Pilots need to know where the most dangerous winds and thunderstorms are so they can avoid them. Ordinary people need to know when it might flood. The team even has the ability to help fight wildfires by seeing through the smoke to identify hotspots on the ground. There's little doubt among NASA researchers that SPoRT team is saving hundreds of lives and hundreds of thousands of dollars each year.

When Jedlovec first envisioned SPoRT, he didn't want to make it useful to just one part of the country. What makes SPoRT so widely practical is that it's not making predictions, but instead is helping weather forecasters do the forecasting. The SPoRT paradigm developed over the last nine years is to identify the local needs of the office, and work with the office start to finish to tackle the area's unique challenges. The challenges of coastal Alabama are different than those of more hilly regions -- and both are very different from the cold conditions of Montana. The team has worked to keep SPoRT dynamic enough to help offices across the country.

Jedlovec and the team are optimistically pushing forward. They've divided the United States into six regions, plus Alaska and Hawaii, and brought representatives from each of those regions to Huntsville to show them SPoRT's capabilities. Of course, the SPoRT team is too small to train and work with all 122 National Weather Service offices across the United States, but that hasn't stopped them from strategizing on how to get their weather products out. They'll soon travel to Alaska and Hawaii to discuss SPoRT's potential in some of the world's most interesting forecasting regions.

For now, Jedlovec and the rest of the team are focusing on helping weather forecasters get their predictions out. They're just ordinary people helping ordinary people, and at the end of the day, that's what it's all about.

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