Tempest news

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TEMPEST NEWS | APRIL 2022

UNITED NATIONS REPORT URGES ACTION

On April 4th the United Nation's Intergovernmental Panel on Climate Change released the final installment of their sixth assessment of climate science with an overarching message: we have the tools to fight global greenhouse gas emissions, and now we need to use them. In previous installments, the IPCC assessment connected our changing climate to extreme weather events worldwide and explained that human adaptation alone wouldn't suffice in shielding people from the effects of increased extreme weather events and climate change.

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MANY SCHOOLS AREN'T BUILT TO WITHSTAND SEVERE WEATHER

Just as students at a small-town middle/high school in northeastern New Jersey were preparing for their first year of back to school in person, seven inches of rain from Hurricane Ida flooded the school in only a few hours. Facing an estimated $21 million to replace, students and families in this district are not alone. According to the U.S. Government Accountability Office, nearly 1 in 5 students in the country attend schools in districts affected by federally-declared natural disasters.

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SCIENTISTS PREDICT ANOTHER ACTIVE HURRICANE SEASON

Following the third most active season on record, the 2022 hurricane season is predicted to be above the norm. An average season will see around seven hurricanes, with three major hurricanes and 14 named storms. Scientists from Colorado State University anticipate at least 19 named storms for 2022 and nine hurricanes.

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FINALLY, SOME CLIMATE OPTIMISM

Groups of young people from 10 different countries participated in a climate-change survey last year, with 75% of them responding that they felt the future was frightening. Climate change and its impact on our planet have been a growing subject in news reporting, education, business operations, and household conversations. But it's not all bad news, and there is climate optimism if you know where to look.

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let's talk about the weather

...with retired educator Sheryl Sotelo! Sotelo came up on our radar after pioneering the use of Tempest Weather Systems across Alaska to teach kids engineering and environmental concepts using weather data.

We caught up with Sotelo in Chicago, Illinois, where she is recovering after a serious car accident involving a drunk driver. Sotelo is still energetic and upbeat, even after almost two months of hospitalization!

Q: SHERYL, THANK YOU SO MUCH FOR TALKING TO US. HOW ARE YOU DOING?

A: I'm doing okay. I'm in a good place at the Shirley Ryan AbilityLab in Chicago. The therapists are amazing, and I feel really lucky to be here. Once in a while, the reality is overwhelming. But, what's the option other than to keep going forward? I'll recover.

Q: WHY CHICAGO? DON'T YOU LIVE IN ALASKA?

A: I do, but both rehab hospitals there have waiting lists. I had been in a hospital in Anchorage, Alaska, since the day of the accident on January 25th. I was on my way to deliver some school supplies to teachers and was broadsided by a drunk driver.

Q: WOW - YOU'RE LUCKY TO BE ALIVE. DO YOU REMEMBER THE ACCIDENT?

A: I didn't see the truck that hit me. My car scooted over an embankment and tumbled to the bottom of a ravine. I remember coming to in my seat, hanging upside down in the car. The paramedics pulled me out, then I lost consciousness and woke

up three days later in ICU. I broke ten bones, punctured a lung, broke two lumbar vertebrae in my back, and had a concussion. Thankfully there was no cognitive impairment or spinal cord injury, and I expect a full recovery.

Q: WHAT WERE YOU WORKING ON BEFORE THIS HAPPENED?

A: I am a retired educator - I taught science in middle schools for 32 years. In 2013-2014, I was accepted as an **Einstein fellow**. I went to DC and lived there for a year and worked for the National Science Foundation. Twenty-five teachers from around the country are chosen for this fellowship. So you are surrounded by a network of amazing educators. Your role as a fellow is to contribute the wisdom of your practice, influence policy, gain a bigger view of education, and learn how the wheels turn. You just have to decide what you want to learn about!

Q: WHAT DID YOU WANT TO LEARN ABOUT?

A: While I have always been involved in environmental science, I wanted to learn more about engineering, so I could help kids from a younger age start innovating. Instead of just being consumers of technology, I wanted them to be producers of technology. This is where I learned about the maker movement and maker education.

Q: CAN YOU EXPLAIN THIS IDEA AND HOW YOU EVENTUALLY FOUND YOUR WAY TO WEATHER?

A: In DC, I went to some of my first maker fairs. Kids were so excited about what they had created. They had tools and safety goggles on and were taking apart a computer and different appliances, seeing and learning about all the electrical components.

A little girl asked, "Is there something for me to take apart?" And they gave her an old alarm clock and a toaster. Another little boy said, ‘I wish school was this much fun.’ And I thought, 'Why isn’t it? Why can’t we capture that joy and discovery for kids at school?' It is irresistible to see kids getting that much joy out of investigation. A light bulb went off for me.

Q: WHAT DID YOU DO WITH THAT INSIGHT?

A: I came back after that year, and my school district didn’t know what to do with me! I’d been drinking from a firehose of professional development and wanted to do all kinds of things. I asked, “Let me be a mentor to the students. Let me get out there and help other teachers learn about this. Free me up from the classroom.” They did not get it!

Q: THAT MUST HAVE BEEN FRUSTRATING.

A: Yes, but I was eligible to retire, so I retired and hung out my own shingle! I would make appointments with superintendents, take in my Mary Poppins bag of things, and explain what we could do. They would hire me for a week to work with teachers; I've been doing this since 2014. I now work for one district part-time and write grants to fund my position and the materials. Right now, I'm on year 4 of ½ million NOAA grant that I wrote.

Q: TELL ME ABOUT THAT NOAA GRANT AND WHAT YOU'RE DOING THERE?

A: The grant is sunsetting, and it was due the day of my accident. I thought I should read it through one more time to make sure it was perfect, but it was due that night, so I decided to go ahead and submit it. I'm SO glad I did!

Q: WHAT IS THE PROJECT?

A: This grant, funded through NOAA with supplemental funding through Battelle, paid to help early career teachers get weather stations into their schools. They can use them to advance learning in writing, science, and language arts. Weather is a big deal everywhere in Alaska. It dictates the ability to travel to small villages and determines whether you get mail, groceries, and supplies. For kids to be able to not just look on The Weather Channel but to have their own weather stations that are already reporting automatically to NOAA, it personalizes their ability to get that information.

Q: SO THIS PROJECT HAS YOU BACK TEACHING ENVIRONMENTAL SCIENCE, BUT A HANDS-ON VERSION OF IT?

A: Yes, this NOAA grant is an environmental literacy grant around climate literacy. The Arctic is being impacted at an escalating rate by climate change; it's already impacting things like food security and travel. If people can't get out to hunt on frozen rivers, and if rivers are thawing early, it's a safety issue. Lifestyle is being impacted by those climate changes.

Q: ENTER TEMPEST WEATHER SYSTEMS!

A: Yes, because while there are several ways to track erratic storm patterns happening all over the country, with a Tempest, kids can look at what's happening around them and bring in traditional ecological knowledge from what their elders have seen and noticed changing throughout their lifetime.

Q: HOW DID YOU FIND OUT ABOUT TEMPEST?

A: I saw WeatherFlow's weather stations at a science conference. I thought it was perfect to have weather data that you can access remotely. That was really appealing!

I think we have around 15 at different locations across Alaska. And NOAA likes that the data is reported to them automatically. The first NOAA grant was awarded to just seven people out of 700 applicants. We had a 1% chance of making it, and we got it! I've never worked in this league of money before. But when you're paying salaries and travel in Alaska, that money doesn't go far. Battelle came through with supplemental funding and bought a lot of extra weather stations, which was helpful so we could involve more kids.

Q: HOW DO YOU USE THE TEMPEST DATA WITH THESE STUDENTS?

A: Remember those old-fashioned composition notebooks? The black and white ones with a cardboard backing? We will use those notebooks and build the cardboard out so it's thicker on the back. Then we'll put a microcontroller that hooks up via Bluetooth to the internet.

Then, the kids will put LED stickers with flat light bulbs so that their notebook taps into the weather API. (We use copper tape to connect to the microcontroller, with alligator clips coming off the page and hook that up to a battery pack.) Once your notebook is powered, you can get the live feed of weather data. You can see windspeed or get readings from wherever you have coded your microcontroller to access data from.

Q: THAT IS THE COOLEST THING I'VE EVER HEARD OF! I WANT A MICRO-CONTROLLED NOTEBOOK!

A: It's a great way to learn to code and hack a notebook and make it interactive so that you can access environmental information pertaining to your life! So that's what our new grant is about.

Q: WILL YOU PUT THIS ON YOUTUBE AND SCALE THE INFORMATION SO MORE PEOPLE CAN TRY IT? OTHER TEACHERS, OTHER STUDENTS ALL OVER THE WORLD?

A: Yes, we will create lessons and directions and put the materials on the internet, so it's accessible to a wider audience. And teachers can find funding themselves - it

works out to $50 per kid - so it's not impossible.

Q: HOW DID YOU THINK OF THIS?

A: During my Einstein fellowship, I met a young engineer, Deron Guler, who was making these chips in her garage and selling them. Now she has a company called **Teknikio** that makes the microcontrollers called bluebirds. She is helping us bridge the API data stream with, for example, NOAA tide tables which is another useful API to use in Alaska.

We realize that we need more help on the interactive part, and we are experimenting with having the kids build a box out of Pop-Tarts, and put in LEDs and things so that when the wind speed is more than a certain velocity, then your alarm that you build blinks or if you have a buzzer, it buzzes.

Q: WHAT ABOUT THE NOTEBOOK IDEA? WHERE DID THAT COME FROM?

A: The idea for the interactive notebook came from another man I met in DC who did a hack-a-notebook challenge. That's where I first saw it and thought it would be great to merge that with weather system data. Then kids could present to their tribal council about the changes they are seeing. Data and technology, combined with Indigenous knowledge, contribute to resilience efforts. Having that indigenous knowledge melded with technology? It makes that cultural connection to the kids and helps bridge western science and traditional knowledge. Having that come together honors both and makes sense to the student.

Q: SHERYL, I'M SO IMPRESSED WITH ALL THAT YOU ARE DOING. NO WONDER YOU WANT TO GET OUT OF THIS HOSPITAL BED! WHAT WILL YOU DO FIRST WHEN YOU GET HOME?

A: We were supposed to go to Costa Rica and teach in a local school in the cloud forest. I'm hoping I can still get there if I'm strong enough. I will help the kids do science in their school. It's been a big carrot in my recovery. I'd like to take a Tempest to that little school so they could get one on the map too!

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