Tempest news

MENU

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Cloud seeding is a relatively new weather alteration technique that could potentially have extreme benefits for precipitation systems all over the world. Scientists have been studying and experimenting with cloud seeding since the 1940s, with popularity in the idea slowly gaining momentum over the past several decades after somewhat

scrutinous beginnings. We sat down with Katja Friedrich, a principal investigator on the SNOWIE (Seeded and Natural Orographic Wintertime Clouds: The Idaho Experiment) Project, which ran for 3 months starting January 7th, 2017 in the Payette Basin of southwestern Idaho to learn more about the technique and current research efforts.

Q: CAN YOU EXPLAIN WHAT CLOUD SEEDING IS AN HOW IT CREATES PRECIPITATION?

A: Cloud seeding can be applied to a variety of clouds. For instance, you could seed thunderstorm clouds to prevent hail. We can seed cumulus clouds in the summer to extract more precipitation. With the SNOWIE Project, we are seeding orographic winter clouds. These are clouds that occur in the winter over mountainous terrain. They're pretty homogeneous, so there's not a lot of turbulence (and I will explain why turbulence actually messes things up shortly). We want to increase the snowpack in the Rocky Mountains because the snowpack is a very cheap and easy way of storing water that we can then distribute throughout the river basin during the year. So that's why our focus is on orographic wintertime clouds.

We are trying to extract water out of these clouds that would otherwise not fall down as any kind of precipitation. So these are tiny supercooled liquid cloud droplets. 'Supercooled' means they're below freezing, and they're really, really tiny. And because they're so small, they don't fall onto the ground. So what we are doing with cloud seeding is we are putting silver iodide into the cloud, which is similar to ice. And what that substance does is basically act as ice-forming nuclei, attracting the supercooled liquid droplets until they grow large and heavy enough to fall to the ground as precipitation. So overall, it's primarily always trying to extract more water in a cloud that otherwise would not fall down as any kind of precipitation.

Q: HOW IS THE SILVER IODIDE RELEASED INTO THE CLOUD?

A: There are two ways you can release the iodide. The most efficient way is to take an aircraft and fly on top of those clouds or through those clouds, disbursing silver iodide particles. This enables us to gauge how much moisture is in the cloud because these aircraft usually have instrumentation to measure how much liquid is in the clouds. And you can put the seeding material directly into the cloud, where it has the greatest chance of success.

The second method is seeding from the ground. It basically uses the same method, taking flares of silver, and generating silver iodide by burning these flares. And then you hope that the silver iodide will be picked up by an updraft and reach the cloud that way. This method is relatively cheap because you just need to have the stations,

and you just need to burn the silver iodide. The problem is you don't really know whether the material will be transported to where you need it the most.

Q: CAN YOU EXPLAIN THE SNOWIE EXPERIMENT AND WHAT YOUR ROLE WAS?

A: Cloud seeding has been very controversial since the beginning. There's no question whether it works, as we have seen that it does in the lab, and the physics is pretty clear about this. The questions around this really are, “Can I efficiently get the seeding material into the area where I need it?” And the second biggest question is, “How much precipitation can be produced?”

When cloud seeding started in the 40s and 50s, people were overly enthusiastic and basically conveyed the message that it was going to solve any kind of drought problem. So people basically seeded the heck out of any kind of clouds, and then realize that we don't really have scientific proof that this is really working. There were new experiments in the 60s and 70s. But this was a lot of controversy because even scientists couldn't really quantify just how much precipitation could really be generated. The problem with that is that clouds are pretty efficient in seeding themselves. So for us, it's really difficult to distinguish the natural precipitation from the seeded precipitation.

In the 90s into the 2000s, we really improved on American models, where we can simulate these kinds of scenarios. The nice thing about the models is that you can simulate different scenarios, you can say I'm taking this weather system and my simulators with seeding and without seeding, and the difference basically generates what is the added contribution from seeding. The caveat with models is that they have a certain error bar. And we don't really know, they're not 100%, what they should be. So that's why we actually designed the SNOWIE Project because we just wanted to go out and collect a lot of data so we can validate our numerical models so we can actually do these kinds of experiments with confidence.

We were piggybacking on an operational seeding operation that the Idaho Power Company runs every winter. As they release the silver iodide, it moves through the cloud and generates precipitation. And then, we fit the data into our model to validate the model. So as we started this experiment, we had clouds, but they were not yet precipitating. So when we started to seed, we could actually see that as we were seeding, we were generating snowfall, and the snowfall was falling on the ground. As we flew, the precipitation fell in zigzag lines, which followed the exact path of the seeding aircraft. That was something that really doesn't occur naturally, so it was clearly being generated. So that's why we knew actually we could these are what we are precipitation that we could generate. And that basically revolutionized

this entire cloud seeding business. Because for the first time, we could actually sh[illegible] the entire process, from when we put the silver into the cloud to when the seed precipitation fell to the ground. But we were also able to quantify it, saying, “We can generate X amount of snowfall,” which people before could not really do.

Q: IS THERE ANY DANGER OR RISK IN USING SILVER IODIDE?

A: All these companies who are doing the cloud seeding have to follow Environmental Protection Agency (EPA) guidelines. So they have to take water samples, they have to take snow samples, and they do have to measure the silver that is in the groundwater. The levels cannot exceed the limitations that the Environmental Protection Agency sets. Yes, you’re putting silver iodide or silver into the cloud. But you don't you don't really put that much silver iodide into one location, because you are distributing it over a large area over a relatively short flight, usually about 2 hours long.

Q: HAVE YOU ENCOUNTERED ANY COMMON MISCONCEPTIONS ABOUT CLOUD SEEDING?

A: Yeah, I think everyone has an opinion. You hear people that say, “Oh, cloud seeding generates drought, because you're taking moisture out of the cloud,” or you have others that say, “Cloud seeding basically causes flooding.” But cloud seeding is pretty well regulated. For instance, if the snowpack reaches a certain depth, the Idaho Power Company actually has to stop seeding. So when we did this in 2017, that was also a very snowy winter, so we actually had to stop like two-thirds through the project, and we were not permitted to seed it anymore, because the snowpack was just so deep. When people make the argument that you're really reducing the moisture in the cloud, I always say it's difficult really to pinpoint because we don't know whether these cloud droplets would fall down as precipitation. They could evaporate and not produce any precipitation. Or they could actually fall down as precipitation, but we don't really know where and how. So, yes, we are taking moisture out of these clouds. There's no question about it. But I also think we also showed that the amount is relatively small that we're taking out.

Q: YOU MENTIONED THAT YOU TEACH ANYTHING TO DO WITH CLOUDS. IS THIS A TOPIC THAT HAS ALWAYS INTERESTED YOU? HOW DID YOU GET INTO THIS?

A: It was more coincidence. In my research, I’m primarily using weather radars, whether ground-based or airborne, to understand processes that occur in clouds. So I'm looking at how hail forms, I'm looking at how heavy precipitation events forms,

how snow forms. So basically, my colleagues that have been doing that, asked me if I could oversee the entire Weather Radar Operations of the Snowy Experiment. Cloud seeding is really interesting from a teaching perspective because once you know basic concepts, you can start learning how to manipulate the clouds to do what we want them to do.

Q: AS TEMPERATURES INCREASE, DO YOU THINK THAT CLOUD SEEDING WILL BECOE MORE OF A PRIORITY FOR UNIVERSITIES AND COMMUNITIES?

A: That is a really good question. The problem with clouds is the way we do cloud seeding, you need to have sub-freezing conditions, and you need to have a certain temperature range. So what we see now with winters getting warmer, is that the cloud seeding time gets shorter over the year. So we can't really efficiently seed it the same way that people did five or six years ago. So this was definitely changed. But on the other hand, there are a lot of engineering companies that look into ways to do it differently. Again, that then goes back to okay, how do we store the water because we don't necessarily want to have it as rain, we would like to have it as snow, and we can store it higher up? Or maybe we're just seeding mountain ranges that are higher up that are not as affected as lower-elevation ranges. We need to have a moist system coming through. So we need to in the Rocky Mountains, we need to have these Pacific systems coming through that have a lot of moisture; otherwise, we can't seed it. So if we ended up having a very stable high-pressure system over the entire winter, we could not cloud seed it. So there are a lot of bits and pieces that people need to think about how we should cloud seed in the future with a changing climate.

Tempest innovators

Lexington City Schools has had a weather station viewable by the students since Weatherbug's inception in 1993. Throughout the years, it was used by many of Caywoods teachers to supplement science and math curriculum as well as being featured on local news stations for "The weather at Caywood." As with any technology, the equipment used began to become antiquated and fail. In 2004 Michael Crewse, Technology Coordinator, started working as a computer technician, and as an avid weather enthusiast himself, made it his mission to get it back to a fully functional state.

In 2023, Caywood's weather station was deemed incompatible with the Weatherbu network. While looking for a new weather station solution, Nicholas Bradford, Network Administrator, (also a weather enthusiast) suggested we look at Tempest. We knew that we wanted an interactive weather display as well as the ability to access the data from the web. Because of the price, we were able to add a weather station, giving us data from both of our schools. From day one, the weather stations at both schools has generated excitement about the weather.

"We push the link to our student's Classlink page for each respective weather station, and will be linking our weather stations to our District websites this summer. Currently the data is used by our Science and Math Teachers, and we are playing with the idea of coding utilizing the API from Tempest in our STEAM classes. We have even recently used the lightning data to substantiate lighting damage claims with the insurance company."

- OTHER WEATHER NEWS -

THE 2023 ATLANTIC HURRICANE SEASON IS HERE

June 1st marks the official start of the 2023 Atlantic hurricane season. With currently an expected 12 to 17 named storms this year, the National Oceanic and Atmospheric Administration has predicted a 40% chance of 2023 being a "near-normal" hurricane season.

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NEW HURRICANE FORECASTING COULD BETTER IDENTIFY INTENSIFICATION POINTS

With a new model three years in the making, scientists at NOAA have made groundbreaking advancements in hurricane forecasting that brings us closer to understanding and preparing for the extreme intensity of these natural disasters. Rapid storm intensification has been somewhat of a mystery to scientists but equipped with the potential to predict "explosive intensification" in hurricanes, this development could help us better anticipate and respond to the devastating impacts of these storms.

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CALIFORNIANS CAN NO LONGER APPLY FOR STATE FARM HOMEOWNERS INSURANCE

State Farm, a once leading insurance company in the state of California, has decided to stop accepting homeowner insurance applications from the state. Citing growing risks from weather disasters like wildfires along with rising construction costs, the decision went into effect later last month. This is another development in the longstanding issue of California homeowners being dropped by insurers due to rising wildfire risk.

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Gardening is well known as an environmentally positive endeavor as plants pull carbon dioxide from the air around them to store and turn into energy, bring pollinators and other beneficial insects, and support soil health. Learn about some tools and methods you can use to create a more climate conscious garden this year.

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