Explaining weather balloons and predicting their future use in light of recent events

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Aggie students preparing to launch a weather balloon. Credit: Andrew Vernon/Texas A&M University College of Arts & Sciences

U.S. officials are certain a balloon shot down Feb. 4 off the South Carolina coast was a Chinese spy balloon, but three subsequent flying objects shot over Alaska, the Yukon and Lake Huron are as yet

unidentified and scientists are speculating those three were likely weather balloons.

Texas A&M Today checked in with Erik Nielsen, instructional assistant professor in the Department of Atmospheric Sciences, to learn more about weather balloons and his predictions for their future use in light of recent events.

How do weather balloons work?

Weather balloons—or radiosondes—are a means to lift a small instrument package through the atmosphere to measure wind, temperature, humidity and pressure. They are usually about 4–5 feet across and made of latex. The larger the balloon, the higher it rises. The package includes GPS and a radio so we can keep track of where it is and receive data as it drifts in the wind. The data collected, in addition to what we receive from radar and satellites, make weather forecasting possible. Weather balloons are one of the more cost-effective ways of gathering upper-atmospheric data for use in forecasting.

How many balloons are launched every day?

Weather balloons are launched by meteorologists twice each day from more than 500 locations all around the globe in a coordinated effort. In the U.S., the National Weather Service (NWS) is the main organization that is launching balloons twice a day in designated spots around the country. In addition, balloons may be launched any time there is a severe weather threat, for teaching purposes or for a specific research project, such as TRACER (Tracking Aerosol Convection Interactions Experiment). So, there can often be hundreds of balloons floating through the atmosphere at any one time.

Do hobbyists launch weather balloons?

Not usually, no. Although they are cost-effective as compared to satellites, each balloon costs around $350, so it would be an expensive hobby. Plus it takes significant expertise to use weather balloons, so they are being launched by experts. Outside of weather, some hobbyists do launch balloons for radio or other citizen science objectives.

How do the balloons come down and are they retrieved?

Radiosondes rise vertically and drift in the wind up to about 20,000 feet above the Earth. Some balloons are for high-altitude research, rising almost into space. Eventually pressure causes the balloons to expand and they will pop and fall to the Earth. They are not usually retrieved, but the NWS does provide instructions for people who find a balloon to mail it back so it can be recycled.

Do we launch weather balloons from campus?

Yes, although we've been limited recently due to a helium shortage. Our faculty launch balloons for teaching purposes, and we collect the data and can share it with NWS, NOAA and others to help with forecasting. Our students, through the Student Operated Upper-Air Program (SOUP), are very involved with launching balloons and analyzing the data—it's a great learning experience for aspiring meteorologists. Radiosondes are critical to understanding the weather; they provide high-resolution, vertical 4D pictures of the atmosphere, giving us data every second. They also give us a firm record of what has happened. You can never have too much data, so having multiple ways of getting information only improves forecasting.

What did you think when you heard of the first balloon floating over the US that was causing concern and how do you think these recent events will affect future radiosonde launches?

My first thought was that was probably not a weather balloon based on how far it traveled and how large it was. As far as what will happen in the future, there are already FAA rules regarding radiosondes. For example, if you're within the airspace of an airport, you have to call the tower to confirm it's safe to launch. Here at Texas A&M before we launch, we call the tower at Easterwood. Also, there are rules governing the size of the package attached to the balloon. I wouldn't expect recent events to prohibit balloon launches, but they could certainly make the rules stricter. But as of now, I'm not too concerned.

Provided by Texas A&M University

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