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February 16, 2023

The US Airforce may have shot down an Amateur Radio Pico Balloon over Canada

Since the famous takedown of a suspected Chinese spy balloon, US jets have shot down a total of three more unidentified balloon objects, now confirmed to have been 'commercial or benign'. There is speculation that at least one these three objects may have been an amateur radio 'pico' balloon.

One part of the amateur radio hobby is launching high altitude balloons with various radio and other payloads. Larger amateur radio balloons launched in the USA require FAA clearance, need a radar reflector attached, and usually continually transmit APRS telemetry before naturally popping and falling back to earth after a few hours, just like a weather balloon.

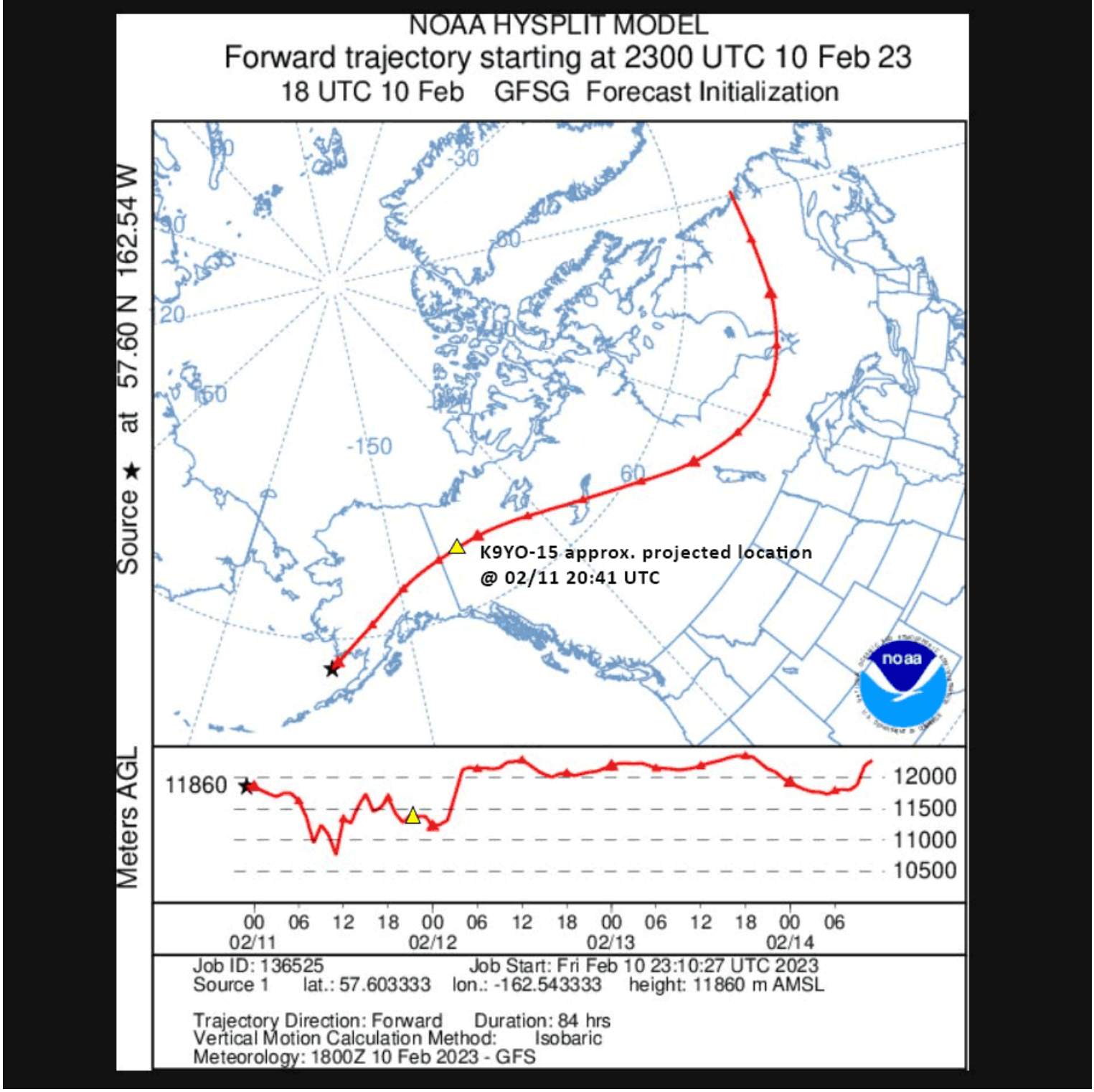
However there is also the simpler 'pico' ballooning hobby, which involves the launch of small solar powered payloads that are only a few grams in weight. They typically transmit low power WSPR on HF and only whenever there is sufficient solar power available. Amateur radio stations around the world can pick up these transmissions, and report them on amateur.sondehub.org and/or wsprnet.org.

While considered 'pico', these balloons can still be roughly a meter in size on the ground, potentially expanding to the size of a car at high altitudes due to the low atmospheric pressure. These balloons can be launched from anywhere in the world and due to their tiny payload, there is no FAA clearance required to launch them in the USA. Well built balloons can totally circumnavigate the globe several times over several months before degrading.

32" Silver Orb Shaped Mylar Balloon used for Pico Ballooning

There is speculation that at least one of the objects shot down over Canada, Yukon by US Airforce jets may have been an amateur radio pico balloon. Amateur radio pico balloon K9YO was launched from Illinois in October 10 2022 and has circumnavigated the globe seven times. The launch blog post indicates that the K9YO-15 balloon was flying a silver mylar 32" sphere SAG balloon which appears to be this one. It's unknown how large these balloons expand in the low pressure of high altitudes. A pentagon memo notes that the object shot down over Canada was a "small metallic balloon with a tethered payload" which fits the description of the pico balloon exactly.

K9YO-15 was projected to have been over Yukon on Saturday Feb 11 when the US Airforce shot down the unknown balloon object at Feb 11 20:41 UTC (3:41 PM EST according to Canadian Defense Minister Anand). Since Feb 11 00:18 UTC the balloon has ceased all WSPR telemetry transmissions and has recently been declared as missing in action by the launch group. Reports put the altitude of the shot down object at approximately 40,000ft (~12000 meters), which matches the projected ~11500 meters of K9YO.



K9YO projected location at the time the object was shot down.

Over on Twitter @ikluft (KO6YQ) has been reporting on this speculation, and has been keeping an eye on K9YO, awaiting telemetry transmission after having been declared as missing in action.

Ian Kluft ✈️ @ikluft@avgeek.social · Feb 16, 2023
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As we monitor if K9YO #HamRadio #balloon had a data dropout or was Saturday's Yukon "unknown object", keep in mind: harsh cold & Arctic low sun angle for solar panels can cause days-long data gaps. Tracking info from NIBBB club who launched it: nibbb.org/links-to-locat… #aviation

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Locate and Track
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NIBBB #HamRadio club of Illinois🇺🇸 declared K9YO #balloon "missing in action" after no telemetry was received for 5 days. It was projected to be over Yukon Saturday when NORAD🇺🇸🇨🇦 shot down an "unknown object", close enough to raise questions. nibbb.org/2023/02/14/feb… #aviation

nibbb.org
February 14th, 2023, K9YO, Missing in Action, KD9UQB, 7th Circumna…
Pico Balloon K9YO last reported on February 11th at 00:48 zulu near Hagemeister Island after 123 days and 18 hours of flight. Hagemeister …

1:38 AM · Feb 16, 2023

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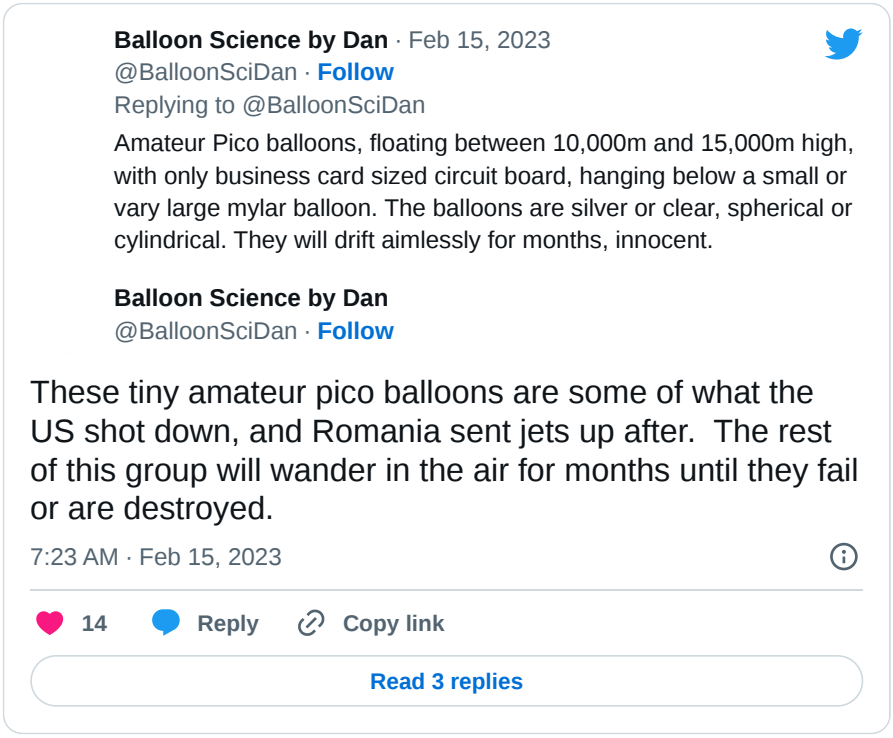
Read more on Twitter

Twitter User @BalloonSciDan has also speculated that the objects shot down may have been pico balloons.

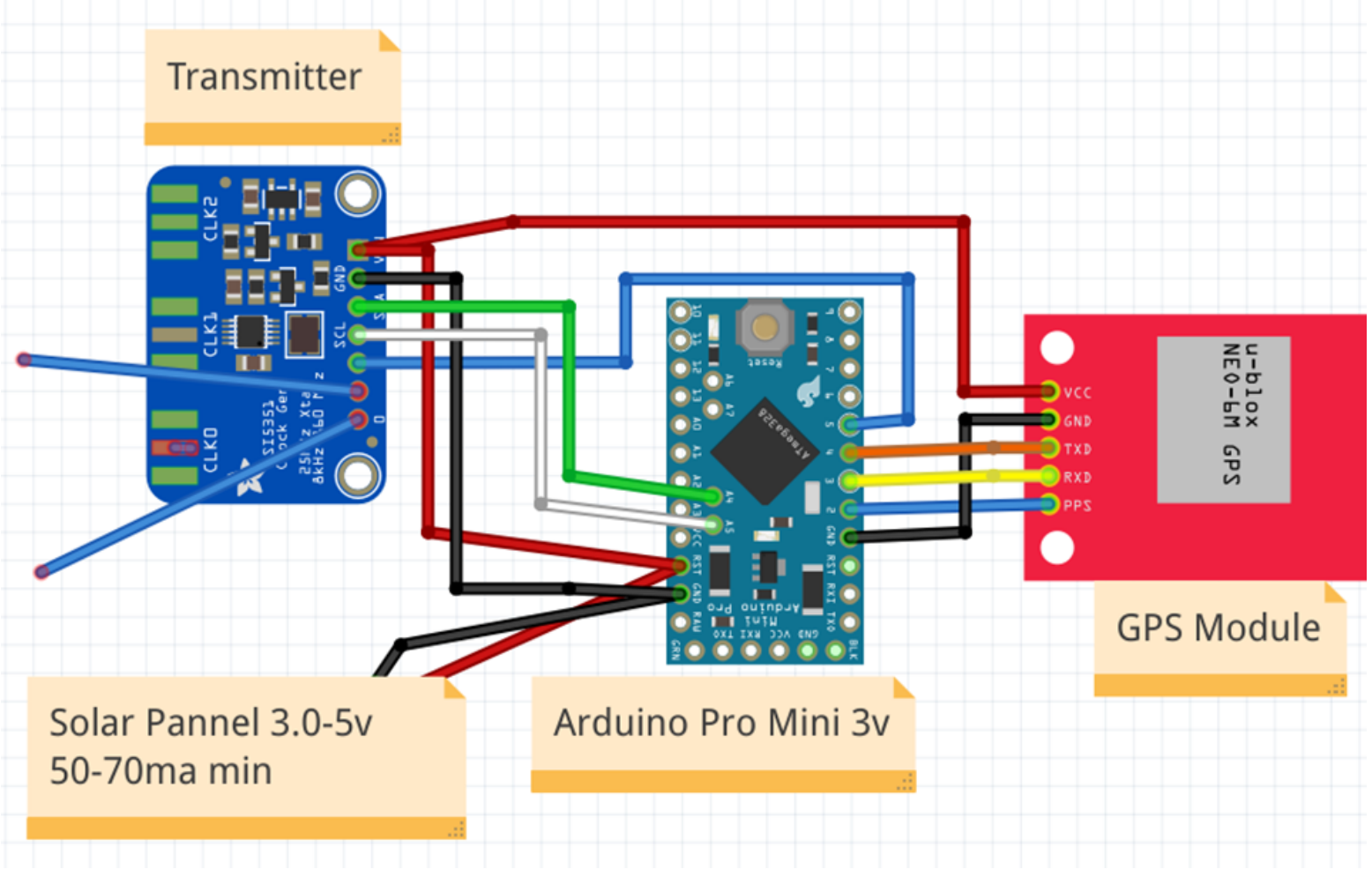


Over on Reddit @ikluft (KO6YQ) has also written some insightful information:

> I see you're all talking about my tweet. Yes, we are still watching to see if K9YO-15 transmits any telemetry today.
>
> So far K9YO-15 has not sent any new telemetry since Friday before sunset over Alaska. Some have misread confusing data presentation on Sondehub which lists last known telemetry as covering a time range from then to now. Currently the last we've heard from K9YO-15 was Friday Feb 10 before sunset over Alaska (00:48 GMT Feb 11). But the map on Sondehub does show the last reported position.
>
> These floater balloons often use only solar panels, no batteries. Batteries were dropped from the projects early on because they have limited charging cycles before they stop accepting a charge, especially in the harsh temps at altitude, -40F/-40C or worse. When the battery stops accepting a charge, it ends telemetry from the mission. So they only report telemetry during daylight, when the sun is at a high enough angle to illuminate the tiny solar panels. In the Arctic winter, the days are short and the sun might not get high enough to wake up the electronics. So it stays dormant for one or more days until it drifts back down to lower latitudes where there's more sunlight. So K9YO-15 was in a period where watchers didn't expect to hear from it for a few days. But we expected it today. So far nothing. As I write this, daylight is almost done way up there for Tuesday, Feb 14.
>
> We (the Amateur Radio balloon community) only expect any telemetry from it today would be via WSPR, none via APRS. WSPR uses HF and can be received at long distances, where it's relayed to Internet map sites. APRS is (usually) on VHF and UHF, only received by line of sight. There are no relay stations in range of today's projected flight course in northern Ontario and James Bay, Canada. So APRS-fed sites wouldn't show updates today anyway.
>
> The club in Illinois that built the balloon has tracking links at https://nibbb.org/links-to-locate-and-track/ - you'll have to scroll down to find K9YO-15.
>
> For an introduction, I'm Ian KO6YQ. I was involved in the first Ham Radio balloons that circumnavigated the globe starting in 2016, launched from San Jose, California. I had roles on them including tracking analyst and social media spokesman. I also organized and led the Ham Radio tracking teams which recovered the Civilian Space eXploration Team (CSXT) first amateur rocket to (suborbital) space in 2004.

Explaining a discrepancy with time reporting on Sondehub, KO6YQ notes:

> Time has run out for solar power to provide any telemetry on Wednesday, February 15. So far, no new data. For those who were confused by it, remember that Sondehub has problematic data presentation so don't use it for anything other than mapping the last known position. A reliable place to check for K9YO on WSPR is the WSPR Spots: https://www.wsprnet.org/olddb?mode=html&band=all&limit=200&findcall=k9yo&findreporter=&sort=date



The K9YO Pico Balloon Payload

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Written by admin Posted in Amateur Radio, Applications, RTL-SDR, Security Tagged with amateur radio, APRS, high altitude balloons, WSPR

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The RTL-SDR is an ultra cheap software defined radio based on DVB-T TV tuners with RTL2832U chips. The RTL-SDR can be used as a wide band radio scanner. It may interest ham radio enthusiasts, hardware hackers, tinkerers and anyone interested in RF.

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