NASA completes balloon technology test flight, sets flight duration record

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View of Peru's coastline as seen from NASA's Super Pressure Balloon July 2. NASA completed the 2016 super pressure balloon flight over Peru at 3:54 p.m. EDT Saturday, July 2. The balloon flew for a record mid-latitude flight of 46 days, 20 hours, and 19 minutes. Credit: NASA

NASA's Balloon Program Office successfully completed the second test flight of its Super Pressure Balloon (SPB) at 3:54 p.m. EDT, Saturday, July 2, setting a new flight duration record for a mid-latitude flight of a large scientific research balloon.

The mission, which began at 7:35 p.m. EDT, May 16 (11:35 a.m., May 17, in New Zealand time), launched from Wanaka, New Zealand, and ran a total of 46 days, 20 hours, and 19 minutes.

"We're extremely pleased with the flight time we achieved with this mission, far and away the longest mid-latitude flight of a NASA heavy-lift balloon to date," said Debbie Fairbrother, NASA's Balloon Program Office chief. "We'll continue to strive for even longer duration flight, 100 days or more, and what we learn from this year's mission will help take us there."

Having identified a safe landing area over the southern tip of Peru, balloon operators from NASA's Columbia Scientific Balloon Facility in Palestine, Texas, sent flight termination commands at 3:14 p.m. EDT, July 2. The 18.8-million-cubic-foot (532,000-cubic-meter) balloon then separated from the payload rapidly deflating, and the payload floated safely to the ground touching down in a mountainous area about 20 miles north of Camana, Peru. NASA coordinated with officials in Peru prior to ending the balloon mission; recovery of the payload and balloon is in progress.

The decision to conclude the mission came after NASA's balloon operators noted altitude variations during the last few weeks of the flight over the Pacific Ocean. The variance occurred at night and especially when flying over cold storms, with temperatures dropping as low as negative 80 degrees Celsius.

"Balloons are thermal vehicles, and some altitude variance isn't

uncommon during periods of extreme cooling and heating," said Fairbrother. "Given the occasional periods of altitude variation we noted, and at times the magnitude we observed, we're eager to retrieve the balloon and payload so we can analyze the flight data and balloon."

Engineered to fly at 110,000 feet through the day/night cycle, at times the balloon dropped as low as 80,000 feet with the lowest drop nearing 70,000 feet when flying over a severe cold storm. However, at sunrise, the balloon always ascended back to 110,000 feet and repressurized.

One possible explanation for the greater degree of variance seen in this year's flight, according to program officials, is that the balloon may have bled off some helium during one of the initial, harsher cold storms and then resealed itself. More data is needed, however, to determine the cause of the variance, underscoring the importance of recovering the balloon and payload for analysis.

"At its core, this was always a test flight," said Fairbrother. "We're looking forward to the this next phase of analysis. We'll apply any lessons learned to future missions as we continue to eye our 100-day duration goal."

A number of "firsts" were marked by this year's SPB flight. It was the first time SPB carried a science payload, the Compton Spectrometer and Imager (COSI), during a mid-latitude flight. The science team from the University of California, Berkeley, detected their first gamma ray burst May 30. Gamma ray bursts are comprised of the most energetic form of light and can last anywhere from milliseconds to several minutes. The phenomenon is associated with many types of deep space astrophysical sources, such as supernovas and the formation of black holes. The COSI gamma ray telescope observed the burst for nearly 10 seconds.

Also, the balloon is the first to complete a mid-latitude

circumnavigation, doing so in just 14 days, 13 hours, and 42 minutes. In addition, for NASA's Balloon Program overall, it was the first time in nearly 25 years the team operated balloons in the northern and southern hemispheres concurrently, with SPB flying in the southern hemisphere and then with balloon flight operations in Palestine, Texas. The Texas flight, known as the Balloon-borne Imaging Telescope (SuperBIT), launched June 30 and ran for just over 10 hours.

"This mission marked the most rigorous test yet of a super pressure balloon and brings the NASA and the Orbital ATK Columbia Scientific Balloon Facility (CSBF) team even closer to setting a longer flight duration record in the future," said John Pullen, vice president and general manager, Technical Services Division of Orbital ATK's Space Systems Group. "Our Orbital ATK CSBF team is proud to have reestablished the CSBF facility as a launch site by successfully conducting the second mission on June 30 that contained the Balloon-borne Imaging Telescope. All of these accomplishments point to future growth for NASA's scientific balloon program, which continues to offer reliable and affordable options for exploring the universe."

This was NASA's second mid-latitude super pressure balloon flight in the southern hemisphere. The first, in 2015, flew for 32 days. The overall flight duration record for an SPB is 54 days of flight, set in 2009 with a 7-million-cubic-foot SPB. The overall flight duration record of any NASA heavy-lift scientific balloon is 55 days, set by the Super-TIGER flight over Antarctica in 2013.

NASA's Wallops Flight Facility in Virginia manages the agency's scientific balloon flight program with 10 to 15 flights each year from launch sites worldwide. Orbital ATK, which operates NASA's Columbia Scientific Balloon Facility in Palestine, Texas, provides mission planning, engineering services and field operations for NASA's scientific balloon program. The CSBF team has launched more than 1,700

scientific balloons in the over 35 years of operation.

More information: For more information on NASA's Balloon Program, visit: www.nasa.gov/scientificballoons

Provided by NASA