NASA's Kepler spacecraft recovers from emergency mode, but what triggered it?

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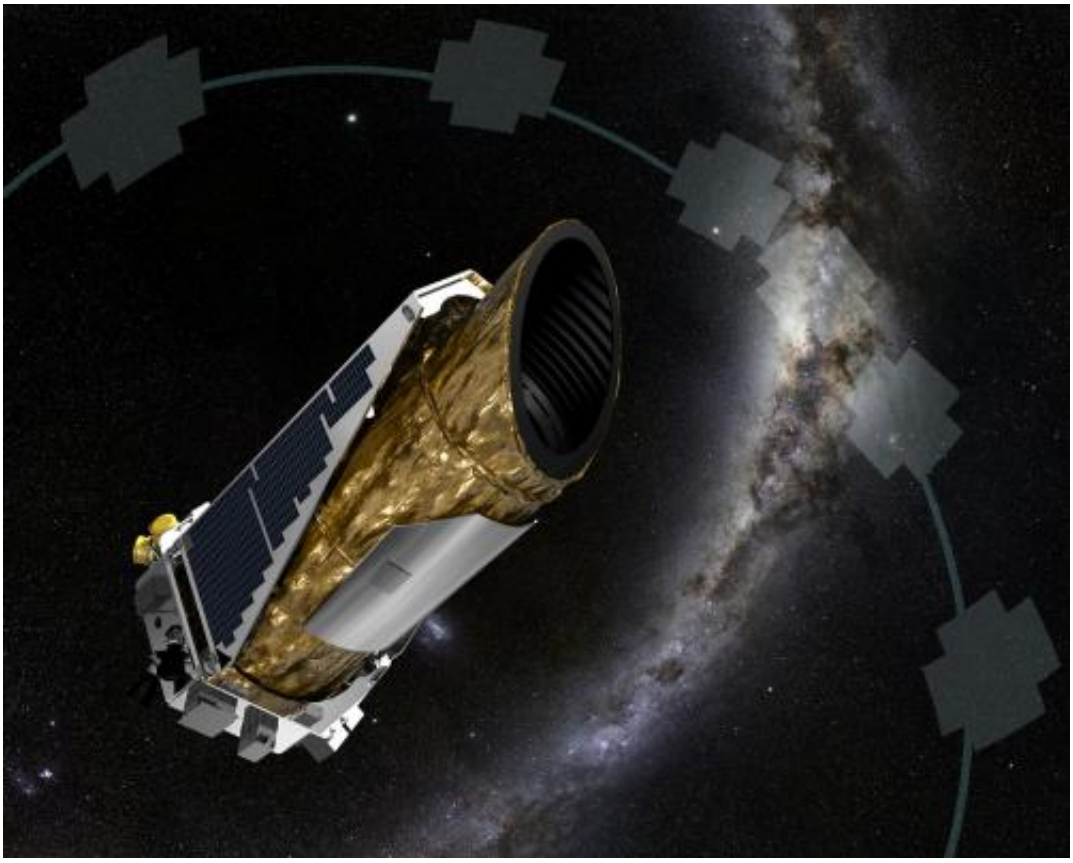

NASA's planet-hunting Kepler spacecraft operating in a new mission profile called K2. Credit: NASA Ames/JPL-Caltech/T Pyle

After a nail-biting few days, NASA's planet-hunting Kepler spacecraft has recovered from emergency mode, officials announced Monday.

Engineers toiled over the weekend to restore the spacecraft's functions and are still working to understand why the space telescope went into emergency mode in the first place, the first time it has done so in its seven years orbiting the sun.

"It was the quick response and determination of the engineers throughout the weekend that led to the recovery," Kepler and K2 mission manager Charlie Sobeck wrote in an update. "We are deeply appreciative of their efforts, and for the outpouring of support from the mission's fans and followers from around the world."

The Kepler team discovered that the spacecraft had fallen into emergency mode after a regularly scheduled check-in on Thursday. Emergency mode is fuel intensive, which means the spacecraft is spending precious reserves it needs to steer. In 2014, Sobeck told the Los Angeles Times that the spacecraft likely had about 2.5 years' worth of fuel left - though he added that this amount could probably be stretched.

For now, it's unclear what caused Kepler to enter this mode, Michele Johnson, a spokeswoman at NASA's Ames Research Center, wrote in an email.

"That's a question we won't be able to answer for some time," Johnson said. "The priority is getting the spacecraft back to doing its job, but making sure the steps taken are safe."

This is not the first episode in which the spacecraft has given astronomers a scare. Launched in 2009 to stare at a single patch of sky looking for transiting planets, Kepler picked out thousands of planetary candidates (1,041 of which have been confirmed), revealing a veritable menagerie of mini-Neptunes, hot Jupiters and super-Earths.

But Kepler eventually ran into technical problems: Two of its four reaction wheels failed (one in July 2012 and the other in May 2013), hobbling the spacecraft, which required at least three to point with enough precision to detect the planetary transits.

Still, the spacecraft's career was not over. Engineers at Ball Aerospace came up with a plan to use photons from the sun to help position the telescope, ultimately allowing it to go after a host of different targets, including young proto-stars, supernovas and even galaxy clusters. The K2 mission announced it had found its first planet with the new method in late 2014.

For K2, the spacecraft carries out roughly 80-day observing periods, or campaigns, before it's re-oriented onto a new target. The spacecraft was just about to begin Campaign 9, which would look toward the galaxy's center for planets that sit far from their stars - as Jupiter and Saturn do - and even hunt for rogue planets that have no star.

"The chance for the K2 mission to use gravity to help us explore exoplanets is one of the most fantastic astronomical experiments of the decade," Kepler and K2 project scientist Steve Howell at NASA Ames Research Center said in an announcement on April 7 - the same day Kepler was found to be in emergency mode. "I am happy to be a part of this K2 campaign and look forward to the many discoveries that will be made."

But Kepler's not back in action just yet. The team plans on checking the spacecraft through the week to make sure it's ready to return to science mode. But even as they do so, that window for Campaign 9 keeps shrinking: The chance to view the galactic center will end July 1, when it's no longer in the spacecraft's sights.

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