

Article of the Week (AoW) Directions

1. Mark your confusion – either highlighting or underlining.
2. Mark up the text. Annotate the article with comments, questions, inferences, etc. You can use a variety of sentences, phrases, and symbols to show your thinking.
3. Write a developed paragraph response to one of the prompts below.

Philae: The bouncing baby space probe that gave itself another chance

Source: Dave Gilbert/CNN/November 24, 2014

London (CNN) -- It flew for 10 years, crossed millions of miles of space, bounced over the surface of a comet and returned heaps of data ... and then quietly faded away.

The little spacecraft Philae that has captured the imagination of thousands with endearing tweets to the comet-chasing mother ship Rosetta stopped transmitting when its batteries drained.

"@ESA_Rosetta I'm feeling a bit tired did you get all my data? I might take a nap ..." The forlorn message was picked up by followers of @Philae2014 shortly before it fell silent.

The Rosetta orbiter mission will continue to track Comet 67P on its journey around the sun in the coming months but after the final transmission from Philae, the lander mission appeared to be over.

But is it?

Scientists from the European Space Agency (ESA), which is leading a consortium that includes NASA to find out more about the composition of comets and how they interact with the sun, say there's still a good chance that Philae will revive.

And the malfunction that caused the probe to bounce in the very weak gravity might actually turn out to be a blessing.

"It's good luck through bad luck," said lander system engineer Laurence O'Rourke.

"Yep, we're stuck against a wall. But when you look at the original location of where we were supposed to land -- it's a beautifully flat area -- we would never have seen the images and the structures of the comet wall unless we landed where we did. We'd have been in a dust field," he told CNN.

"We've had a number of happy accidents. It's bad luck that we bounced but the good luck is that all the instruments were on ... so what you have is a major scientific benefit -- results from two different locations when we were only expecting one."

Lander problems started when a thruster and harpoons designed to anchor the small probe to the comet failed. Philae bounced away from the original target touchdown area and appears to have settled under the face of a cliff. Project scientists are still not exactly sure where, even though the lander performed its experiments and sent back data.

O'Rourke said the team are still searching for it and that the location will be key to estimating when a new signal might come from the spacecraft.

He explained that the final resting place of Philae did not allow enough sunlight to fall on the solar panels so the probe ran out of power. It was able to complete its original mission, operating on the comet from the initial battery charge.

But before Philae closed down, engineers managed to rotate the probe so a larger solar panel would be exposed to sunlight and they believe this will be enough to automatically restart the spacecraft when the comet's orbit takes it closer to the sun.

Again, scientists think this shadowy spot on the comet might be another stroke of luck. The original landing zone would have exposed Philae to temperatures that would have burned out the electronics -- probably after about three months.

"The lander has the ability of keeping itself warm but doesn't have the capability to cool itself down," O'Rourke told CNN.

"The current environment benefits the lander because we're not worried about it overheating any more. We can keep it warm if we get enough power," he said.

O'Rourke believes that if the lander comes back online there's a high chance it will survive until the comet's closest approach to the sun in August next year.

So how does Philae come back from the dead?

O'Rourke explained the sequence:

- If enough sunlight falls on the solar panel, Philae will reboot
- It then needs more energy to warm the batteries
- Once warmed, the batteries will start recharging
- When it has enough power Philae will try to contact the orbiting Rosetta -- for two minutes every 30 minutes.
- If it fails to make contact, Philae will power down the transmitter and try again 30 minutes later

The power it needs is tiny -- roughly equivalent to the output of two or three domestic AA batteries -- but it will be enough to restart the lander mission.

When the Rosetta team find Philae they will then be able to estimate the point at which enough sunlight falls on the solar panel to expect a transmission from the probe, announcing that it's still alive. As long as it doesn't get too cold there's still hope.

In a statement, lander project manager Stephan Ulamec said he was confident that contact could be resumed -- probably in the spring of 2015.

In the meantime, scientists are sifting through the data from Philae's 10 instruments to see what they may have already discovered.

"When you look at what Philae's done -- it's been quite extraordinary," said O'Rourke. "A little satellite placed on a comet so far away -- you're always rooting for it. To give it that extra chance to have more power felt really good," he said.

Respond to one of the following prompts. Use the space below or a separate sheet of paper.

1. Do you support tax money going to space exploration projects? Why or why not?
2. If the probe cannot be restarted, will this mission be seen as a failure? Explain.
3. Select a word, phrase, sentence, or paragraph and respond to it.