The historic Philae comet probe hit its target, but then unexpectedly bounced twice, settling in the shadow of a cliff that could hinder its research, new images sent back Thursday showed.

Philae is designed to run a suite of scientific experiments for an initial 2 1/2 days on primary battery power, after which it is expected to receive power from solar panels that could keep it functioning for an additional three months.

But because of the awkward touchdown, the lander is now getting only 1 1/2 hours of sunlight a day instead of the planned seven hours—a scenario that could seriously curtail the probe’s ability to operate.

At a news briefing in Darmstadt, Germany, scientists working on the Rosetta mission said that systems aboard the Philae lander failed to secure it to the comet’s dusty surface.

The probe touched the surface once, then sailed to a height of one kilometer (3,300 feet) and stayed aloft for nearly two hours before the comet’s weak gravity pulled it back to the surface—about a kilometer from its initial touchdown spot. It then bounced again and stayed aloft for a further seven minutes before coming to rest on the surface.
The lander “hit less than 100 meters from the predicted point and did a huge jump,” said Stephan Ulamec, the European Space Agency scientist in charge of the Philae lander. “It is possibly now in the rim of a crater.”

The cliff wall appears to be about one meter (3 feet) away from the lander, blocking light for most of the day.

Stefano Mottola, another scientist involved in the mission, added: “Unfortunately, this is not the situation we were hoping for.” The comet, which is about 4 kilometers (2.5 miles) in diameter, has very low gravity: On its surface, the 100-kilogram (220-pound) lander weighs a mere gram—less than the weight of a penny on earth.

The scientists said they would now consider whether to send additional signals to the lander that could maneuver it into a better position.

Even so, they are continually receiving data from the craft, such as an initial analysis of the comet’s internal structure and the first pictures ever taken on the surface of a comet. The images show that the surface is dusty—not icy as some had predicted—and indicated that debris particles were swirling about its surface.
It is still not clear exactly where the three-legged lander is resting but the researchers expect to figure that out as they process more data sent back to Earth. The images sent back so far show that two of Philae’s legs are on the surface while a third isn’t touching.

Rosetta scientists said they are now reluctant to use a drilling system aboard the lander that was designed to dig up subsurface material and analyze it in a small “oven” carried aboard Philae. The fear is that the drilling process might cause the lander to move to an even less desirable position.

The mother craft, Rosetta, which is in orbit around the comet, lost radio contact with the lander about 30 minutes after the first touchdown. That was expected because by then Rosetta had moved below the horizon of the comet and beyond the reach of radio signals.

But this morning, to the relief of dozens of Rosetta scientists, the refrigerator-sized lander established contact with the mother ship and began to relay photographs of its unprecedented descent and new home.

Among the pictures was one showing the antenna of the lander amid a backdrop of stars.
Other photographs, taken from Rosetta, provided a view of Philae as it descended toward the comet’s surface. It couldn’t have made the descent any better, the scientists said, noting that the three legs were properly aimed downward.

“It’s prepared [like] a cat for landing,” one researcher said.

Rosetta, meanwhile, appears to be performing well and will continue to beam back data sent up from Philae while also doing its own study of the comet as it approaches the sun and becomes more active.

Though Philae’s positioning is not ideal, both craft in the days ahead are expected to unearth valuable information about the comet’s makeup and origins.

“It’s been a wild ride, a roller coaster,” said Ignacio Tanco, deputy operations manager for Rosetta.

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