

SPACE EXPLORATION

Israeli spacecraft crash-lands on Moon

Attempt to put first privately funded lander on the Moon fails.

BY ELIZABETH GIBNEY

The Israeli spacecraft Beresheet crash-landed on the Moon on 11 April after experiencing apparent engine trouble moments before it was scheduled to touch down. The mishap ended the mission's goal of becoming the first privately funded craft to make a controlled landing on the Moon.

"Well, we didn't make it. But we definitely tried," said Morris Kahn, the president of SpaceIL, the non-profit company that built Beresheet, speaking from mission control in Yehud, Israel. SpaceIL is still investigating what led to the crash, which dashed Israel's dreams of becoming the fourth country to put a spacecraft on the Moon — alongside China, Russia and the United States. But Opher Doron, general manager of the space division at Israel Aerospace Industries, which partnered with SpaceIL on the mission, noted that Israel is now the seventh country to orbit the Moon successfully.

"Navigating a complex trajectory to lunar orbit, and then attempting a soft landing on the



A last image captured by the lost Beresheet.

Moon with an autonomous robotic spacecraft, is a tremendous achievement regardless of the final outcome," says Bob Richards, founder and chief executive of Moon Express, a company in

Cape Canaveral, Florida, that is building its own lunar lander.

Beresheet — which means 'in the beginning' in Hebrew — was the size of a small car. It was set to undertake a two-day study of lunar rocks in a bid to understand the Moon's magnetic past. At US\$100 million, the craft was relatively cheap for a Moon lander, and its reported lack of back-up systems could have meant that it was vulnerable to even small failures.

Tel Aviv-based SpaceIL raised the cash largely through philanthropic donations. The aerospace and satellite firm Israel Aerospace Industries, in Lod, assembled the craft, and Israel's space agency contributed about \$2 million.

Beresheet launched on 21 February but suffered glitches from the start. Its computer system reset, and it had problems with its star-tracking navigation system, which struggled to deal with bright sunlight. But the team successfully manoeuvred Beresheet into orbit around the Moon in preparation for its landing.

From there, Beresheet fired rockets to reduce its speed and altitude, but about half-way through its descent a malfunction caused its main engine, which was slowing the craft, to shut down. Beresheet then careered towards the Moon's surface at speed. It lost contact with mission control when just 150 metres above the surface, still moving at 500 kilometres per hour.

But it seems the mission won't be SpaceIL's last. Kahn said on 13 April that he was planning a follow-up mission, currently known as Beresheet 2. "We're going to complete the mission," he said on Twitter. ■

SPACEIL VIA REUTERS

POLITICS

Indonesian election to set fate of science mega-agency

President Joko Widodo wants to create a single agency that controls most research.

BY DYNA ROCHMYANINGSIH

This week's Indonesian national election pits two old rivals against each other. The stakes are high for science: President Joko Widodo says that if he is re-elected, he will overhaul how the majority of the country's research is organized and funded. The main opposition candidate, Prabowo Subianto, has been silent on science so far.

Widodo first ran against Subianto, a nationalist and a former military general, in 2014. In this year's rematch on 17 April — which was getting started as *Nature* went to press — the politically more moderate Widodo looks set to win again: national polls suggest he could receive about

20% more of the votes than Subianto.

Widodo has introduced several policies unpopular with scientists. If he gains a second term, he is unlikely to win back their favour. He wants to create a National Research Agency (NRA) that would absorb most government research centres and control the 26-trillion-Indonesian-rupiah (US\$1.8-billion) annual research budget.

"We are going to improve research by coordinating all budget allocations," said Widodo's vice-presidential running mate, Muslim cleric Ma'ruf Amin, during a televised election debate on 17 March.

Some scientists are concerned that the national agency will take over almost all of

the decision-making power and funding for science. Currently, Indonesia's research budget is divided between 81 research centres managed by several ministries — including those for research, agriculture, health and forestry — along with several other bodies, such as the Indonesian Institute of Sciences (LIPI).

If the NRA decides not to support an area of research, scientists say, there will be few other sources of government funding for those projects. "The NRA will be an institution without checks and balances," says Satryo Brodjonegoro, president of the Indonesian Academy of Sciences (AIPI) in Jakarta, which provides science advice to the government and the public. Although it is not a research centre,



Indonesian President Joko Widodo (left on banner) faces Prabowo Subianto (right on banner) for election.

the AIPI is earmarked to join the NRA.

But other scientists support the proposal, saying it will bring together resources and reduce duplication between agencies.

Subianto has not spoken publicly about his views on the mega-agency, but his vice-presidential running mate, Sandiaga Uno, said during the debate that it was “unnecessary bureaucracy”. If elected, Uno says, the pair’s government will boost applied science through financial or other incentives to companies that invest in research.

Widodo and his cabinet have already shaken up Indonesia’s scientific community. University academics are now required to publish in international journals or risk losing some of their salary. Draft laws, if passed by the parliament,

will severely punish foreign scientists who do fieldwork without proper permits. And Indonesian scientists are annoyed with Widodo for cutting the funding his government promised the AIPI’s Indonesian Science Fund. This competitive grant-funding system was promised \$3 million a year when it was set up in 2016 to support long-term research projects, but has so far received less than half that amount.

Widodo first announced the NRA in October. He says the current system is inefficient because funding is spread across several ministries and institutions. Documents produced by members of the parliament in November reveal that Widodo’s Indonesian Democratic Party of Struggle (PDIP) plans to subsume the AIPI, LIPI and an engineering institute called the

Agency for the Assessment and Application of Technology into the new agency. His party has yet to confirm whether it intends to fold in all 81 government-managed research centres, too.

If the plan goes ahead and the NRA takes control of what research is supported and funded, there will be potential for the agency to misuse its power to give money to the projects the government likes, says Berry Juliandi, secretary-general of the Indonesian Young Academy of Sciences in Jakarta.

He thinks that Widodo and his party are trying to mimic the Chinese Academy of Sciences, which functions as both a scientific think tank and an academic governing body. “This centralization approach is not compatible with our democracy,” he says.

The NRA would also likely manage a one-trillion-rupiah endowment that Widodo set up last year to fund research separately from the national research budget, says Brodjonegoro.

But he says the endowment fund should be managed by the Indonesian Science Fund, which is modelled on the US National Science Foundation. Under the science fund, scientists would make grant decisions. “What Indonesia needs now is an independent funding body.”

The NRA will turn many scientists into bureaucrats, says a government scientist at LIPI who asked not to be named because she is not authorized to speak to the media. “All the tasks mentioned in PDIP’s plan are now being done by the ministry of research. If scientists take all those tasks, what would the ministry do?”

But Laksana Tri Handoko, who leads LIPI in Jakarta, supports the proposed agency; he says it will create a critical mass of researchers and resources that could help to improve the country’s science. “But of course, its establishment is not enough to boost Indonesian research without good internal research management in the agency,” he says. ■

CONSERVATION

Prison island could be nature reserve

Waters surrounding Isla María Madre host vibrant corals that have stayed relatively untouched for more than 100 years.

BY EMILIANO RODRÍGUEZ MEGA

A history of torture and repression ended in March when the Mexican government closed one of the last island prisons in the Americas. President Andrés Manuel López Obrador promised to turn the facility into a cultural and environmental education

centre. But researchers are pushing for more: they want the government to fully protect the site and surrounding islands, which have remained relatively untouched for more than a century.

The penal colony — located on Isla María Madre in the Pacific Ocean — was once a strict no-go zone. The island is a two-hour boat ride

from the nearest city, San Blas. And Mexico’s navy patrolled nearby waters to deter prison breaks. But now that the government has closed the facility, biologists worry that illegal fishing and wildlife trafficking in the area will increase.

Mexico instituted some protections for the Isla Marias archipelago, a 245-square-kilometre region that includes Isla María Madre, in 2000. But the government allowed some fishing in the area. Fully protecting the island and enforcing the rules for the archipelago would guard against practices such as overfishing, and enable scientists to study relatively intact forests and coral reefs, says Octavio Aburto, a marine biologist at the Scripps Institution of Oceanography in La Jolla, California.

If researchers’ push for extra protections succeeds, the former penal colony would join a surprisingly long line of prisons turned nature reserves. Many of these converted detention centres act as time capsules, demonstrating what an area’s ecosystem used to look like ▶