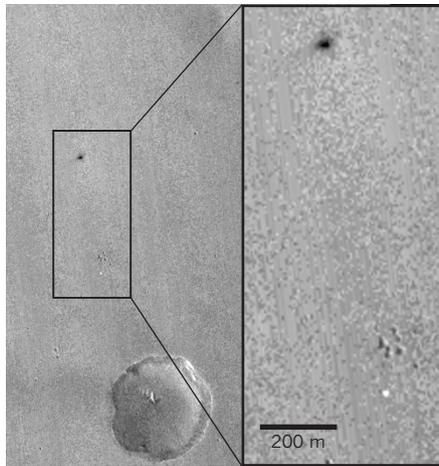


▶ between 2 and 4 kilometres before slamming into the ground at more than 300 kilometres per hour. That's according to estimates based on images (right) of the probe's probable crash site taken by NASA's Mars Reconnaissance Orbiter on 20 October.

The most likely culprit is a flaw in the craft's software or a problem in merging the data coming from different sensors, which may have led the craft to believe it was lower in altitude than it really was, says Andrea Accomazzo, ESA's head of solar and planetary missions. Accomazzo says that this is a hunch; he is reluctant to diagnose the fault before a full post-mortem has been carried out. But if he is right, that is both good and bad news.

European-designed computing, software and sensors are among the elements of the lander that are to be reused on the ExoMars 2020 landing system, which, unlike Schiaparelli, will involve a mixture of European and Russian technology. But software glitches should be easier to fix than a fundamental problem with the landing hardware, which ESA scientists say seems to have functioned well. "If we have a serious technological issue, then it's different, then we have to re-evaluate carefully. But I don't expect it to be the case," says Accomazzo.

The ExoMars team will try to replicate the mistake using a virtual landing system designed



Mars orbiter photos show the probable crash site.

to simulate the lander's hardware and software, says Vago, to make sure that scientists can deal with the issue before redesigning any aspects of ExoMars 2020. That mission has already been delayed by two years, owing to hold-ups on both the Russian and European sides. But Vago believes that design tweaks will not push the mission back. "At this point, no one wants to think about flipping to 2022. It was painful enough to go from 2018 to 2020," he says.

The 2020 mission has a budget shortfall of

around €300 million (US\$326 million), which ESA will request from European Union member states at a meeting of ministers in December. ESA director-general Johann-Dietrich Wörner insists that Schiaparelli's failure will have no impact. "We have the function which we need for the 2020 mission, so we don't have to convince them, we just have to show them," he told reporters at a press conference. But Vago is more pragmatic. "It would have been much nicer to be able to go to the ministers with a mission where both elements had performed flawlessly."

ESA is keen to stress that, overall, the ExoMars mission can be seen as a triumph: Schiaparelli sent back test data from most of its descent, and its sister craft — the Trace Gas Orbiter — successfully manoeuvred into Martian orbit. The orbiter is the more scientifically valuable of the two halves of the mission: from December 2017, it will study Mars's atmosphere, aiming to find evidence for possible biological or geological sources of methane gas. It will also be a communications relay for the 2020 rover.

"As it is, we have one part that works very well and one part that didn't work as we expected," says Vago. "The silver lining is that we think we have in hand the necessary information to fix the problem." ■

See go.nature.com/2ebtqfo for a longer version of this story.

NASA/JPL-CALTECH/MSS

POLICY

Scientific challenges loom for Canada's Trudeau

Prime minister has boosted budgets and unmuzzled researchers — but some forecast tricky times ahead.

BY NICOLA JONES

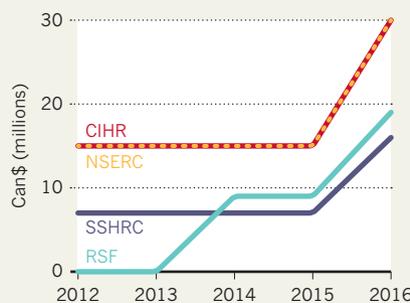
It didn't take long for Canada's Prime Minister Justin Trudeau to send scientists swooning. Within days of taking office on 4 November 2015, the middle-left Liberal relaxed restrictions on government scientists' ability to speak to the press and the public, and reinstated a long-form census prized by social scientists. A year on, Trudeau has boosted science budgets and restored some research jobs cut by his Conservative predecessor, Stephen Harper.

"The sun has peeked through some of the clouds," says Paul Dufour, a science-policy analyst at the University of Ottawa. "The dark prince has left."

Yet many in Canada's science community

BUDGET BOOST

Prime Minister Justin Trudeau's first budget included bigger annual increases for Canada's research councils.



CIHR, Canadian Institutes of Health Research; NSERC, Natural Sciences and Engineering Research Council of Canada; RSF, Research Support Fund; SSHRC, Social Sciences and Humanities Research Council.

say they are reserving judgement, waiting to see whether Trudeau can sustain his string of victories as he tackles some of country's thorniest science-policy issues. Among them are revisions of processes ranging from environmental regulations to Canada's system for doling out research grants.

Kathleen Walsh, executive director of the non-profit science-advocacy group Evidence for Democracy in Ottawa, worries that some of the Trudeau government's environmental policies may favour style over substance. Take the prime minister's decision to put a price on carbon — starting at Can\$10 (US\$7.5) per tonne in 2018 and rising to Can\$50 per tonne in 2022. Environmentalists and economists say that those prices are too low to achieve Canada's goal of reducing

SOURCE: GOVT OF CANADA

its greenhouse-gas emissions by 30% below the 2005 level by 2030. Many also see that emissions goal, set by Harper, as lacklustre.

And Trudeau has not broached harder subjects, such as fulfilling a campaign promise to phase out fossil-fuel subsidies. “The Trudeau government has squandered an opportunity for effective national action,” says Douglas Macdonald, an environmental-policy expert at the University of Toronto.

RETHINKING SCIENCE SPENDING

The prime minister’s first budget, released in March, brought good news for scientists: an increase of roughly Can\$95 million for the country’s research councils — more than twice the 2015 boost (see ‘Budget boost’). But there are still grumbles about how research councils’ funds are apportioned. “A lot of money is going to large institutions,” says Walsh. “Your everyday scientists in everyday labs are still struggling.”

Earlier this year, health scientists cried foul over reforms to the Canadian Institutes of Health Research (CIHR) system for awarding grants. Researchers complained that the measures, including a switch to online peer review, made reviews less effective and put early-career scientists at a disadvantage. More than 1,000 researchers signed a letter demanding changes; in September, the CIHR launched an international review of its grant processes.

A broader examination of the government’s science-funding system, called the Fundamental Science Review, began in June. Science minister Kirsty Duncan says that the government has received more than 1,200 public comments, and a final report on the review is due by early 2017 at the latest.

The Trudeau government is also re-examining Harper’s changes to fisheries



Prime Minister Justin Trudeau has yet to tackle some of the thorniest science-policy issues in Canada.

and environmental-assessment laws, with recommendations due by early 2017. In the meantime, controversial projects such as a natural-gas plant on the British Columbia coast are receiving government approval. “There is a rush by companies to get hearings over and the necessary papers in place before [environmental assessment] regulations are strengthened,” says David Schindler, an ecologist at the University of Alberta in Edmonton.

Trudeau’s main campaign promise to scientists was to reinstate evidence-based decision-making. To that end, jobs are being restored to some government research departments after a loss of roughly 1,800 positions during the Harper administration — 344 of those at the agency Environment Canada alone. Now,

the department of fisheries and oceans is hiring 135 scientists. And the Professional Institute of the Public Service of Canada, a union that represents government workers, wants the administration to hire 1,500 extra scientists next year.

Many researchers are waiting for Trudeau to deliver on his promise to install a chief science officer to keep science at the heart of governance. That position is still in the planning stage, and Duncan would not comment on when an appointment would be made.

“We’re kind of still in the honeymoon period,” says Dufour. “Everyone is willing to give the government some long string. But at some point they’re going to have to take some actual action.” ■

SOCIETY

@ScientistTrump will make science great again

Creator of Twitter parody account spotlights issues in science and academia.

BY SARA REARDON

As the US presidential election grinds into the final stretch, there is one version of Republican nominee Donald Trump that is laser-focused on research. The Twitter account @ScientistTrump showcases a fictional “Donald Trump, PhD”, who does the biggest, best science anywhere in the world. He hounds “weak” leaders of funding agencies

and the “failing” academic journals that don’t endorse him. “Only I can Make Science Great Again,” he tweets.

The man behind @ScientistTrump — ecologist Emilio Bruna at the University of Florida in Gainesville — is no stranger to social-media antics. Last year, as editor-in-chief of the ecology journal *Biotropica*, he instigated rap battles with the Twitter accounts of other science journals. Bruna started the Trump parody account

in July after joking with fellow editors that they should review papers as the presidential candidate would.

The feed went viral immediately and has amassed more than 6,400 followers. Bruna aims to amuse, but the account is also a tool for him to point out real problems in science and academia, including sexual harassment. @ScientistTrump frequently praises journal paywalls and expensive proprietary ▶