

NATO is boosting AI and climate research as scientific diplomacy remains on ice

As the military alliance created to counter the Soviet Union expands, it is prioritizing studies on cyberattacks, election interference and how climate change affects security.

The 32-country North Atlantic Treaty Organization (NATO) is admitting more members as it faces evolving geopolitical and military threats. The group's membership has more than doubled since its founding on 4 April 1949, and Finland and Sweden are the latest countries to join. Three more — Bosnia and Herzegovina, Georgia and Ukraine — want to become members. The organization's scientific work focuses mainly on defence and civil-security projects that, for instance, investigate how climate change is affecting war, how emerging technologies could enhance soldiers' performance and how to reduce discrimination and intolerance among military personnel. "The role of science and technology for NATO is likely to grow significantly over the next two decades," predicts Simona Soare, a defence-technologies researcher at Lancaster University, UK.

How does NATO use science?

"We're looking to make sure that we can provide scientific advice to the nations of NATO to enable them to maintain a technical and military advantage," says chemist Bryan Wells, the organization's chief scientist. Wells works at NATO's Brussels headquarters, where world leaders gathered last month to mark the organization's 75th anniversary.

Much of NATO's research and development (R&D) takes place through the Science and Technology Organization (STO), a network of more than 6,000 scientists at universities and national laboratories and in industry. They work together on defence research projects. NATO's member states and non-member countries together contribute around €350 million (US\$380 million) annually for the work of this network, says Wells.

The STO has its own research laboratory, the Centre for Maritime Research and Experimentation (CMRE) in La Spezia, Italy. The laboratory employs around 150 people and is led by Eric Pouliquen, a physicist who has worked on underwater remote sensing.

NATO also provides grants for a Science

for Peace and Security (SPS) research programme, headed by Claudio Palestini, a researcher in communications engineering.

The programme funds studies in areas such as counterterrorism and cyber defence. Last month, the SPS programme updated its priorities. These now include studies on the impact on defence and security from climate change and from artificial intelligence (AI); protecting underwater infrastructure; and what it calls "hybrid threats", which include interference in elections and disinformation. Each of its larger grants is worth between €250,000 and €400,000 and lasts for two to three years.

Wells says the STO publishes research — mostly from the CMRE — in peer-reviewed journals where possible. "We recognize if we can publish openly, it's very beneficial to do that," he says.

However, many of its research projects are classified. NATO does not publish a detailed breakdown of its R&D income and expenditure by country; nor does it release its funding trend data.

What sort of research is NATO doing?

Projects cover a spectrum of fields including using autonomous undersea surveillance to hunt for and identify mines; tracking and

identifying submarines; quantum radar; and synthetic biology.

For example, one programme led by CMRE researchers explores how autonomous underwater vehicles can identify submarines using quantum technologies and AI. Another project, 'Military Diversity in Multinational Defence Environments: From Ethnic Intolerance to Inclusion' studied the reasons for intolerance in NATO members' armed forces as part of an overall strategy to improve diversity and inclusion across the organization.

NATO is also examining how AI could affect troops' ability to conceal themselves and evade detection. Another initiative is investigating how biotechnology could boost soldiers' performance by enhancing the microbiome or through brain-computer interface technologies.

Why is NATO interested in climate research?

NATO is exploring how temperature changes could affect the security of its member and non-member countries as well as of military installations around the world. In a 2024 review paper in the Texas National Security Review, CMRE researchers — along with colleagues from the University of St Andrews, UK, the University of L'Aquila,



A NATO research vessel studies marine mammals in the Mediterranean Sea.

US NAVY PETTY OFFICER 2ND CLASS KRISTEN ALLEN VIA MIL IMAGE/ALAMY

Italy, and the Swiss Federal Institute of Technology in Zurich — found that submarines could become more difficult to detect using sonar in the North Atlantic Ocean as water temperature rises (see go.nature.com/4awx29k).

In another study, presented at last month's conference of the European Geosciences Union in Vienna, CMRE researchers working with scientists at the universities of Princeton in New Jersey and Central Florida in Orlando assessed how extreme weather might affect 91 NATO military bases and installations (see go.nature.com/4ara06t). The researchers found that multiple bases and installations are likely to become susceptible to climate change as emissions continue to rise.

What about a role for science in diplomacy?

In 1958, NATO established research fellowships and projects in what later became its SPS programme, to boost collaboration between nations including the United States and the Soviet Union. "Science provided a path for superpower adversaries to cooperate," says Paul Arthur Berkman, founder of the Science Diplomacy Center in Falmouth, Massachusetts.

The fellowships and collaborative projects continued to provide a point of contact between NATO and Russia until 2014, when Russia invaded Crimea. That year, Russia, Romania and the United States were jointly developing a system to connect telemedicine capabilities across all three countries to provide medical care in remote and emergency situations. However, the invasion prompted NATO to freeze cooperation with Russia.

In 2010, Berkman co-organized and chaired the first dialogue between NATO and Russia regarding environmental security in the Arctic. Now, he is concerned at the alliance's shift away from using science as a "safety valve" in its relations with Russia. He warns that cutting off this scientific dialogue undermines democracy and nations' ability to tackle global challenges such as climate change. "Open science is akin to freedom of speech. If we turn off open science, in a sense we're undermining democracy," says Berkman.

By **Natasha Gilbert**



DAVID KAWA/BLOOMBERG VIA GETTY

Canada's finance minister Chrystia Freeland (right) presented the federal budget on 16 April.

CANADIAN BUDGET BRINGS BOOST TO PHD AND POSTDOC PAY

Government announces biggest increase to postgraduate stipends in 20 years.

By **Brian Owens**

Researchers in Canada got most of what they were hoping for in the country's 2024 federal budget, with a big boost in postgraduate pay and more funding for research and infrastructure.

"We are investing over Can\$5 billion in Canadian brainpower," said finance minister Chrystia Freeland in her budget speech on 16 April. "More funding for research and scholarships will help Canada attract the next generation of game-changing thinkers."

Postgraduate students and postdoctoral researchers have been advocating for higher pay for the past two years through a campaign called Support Our Science. They requested an increase in the value, and number, of federal government scholarships, and got more than they asked for. Stipends for master's students will rise from Can\$17,500 (US\$12,700) to Can\$27,000 per year, PhDs stipends that ranged from Can\$20,000 to Can\$35,000 will be set to a uniform annual Can\$40,000 and most postdoctoral-fellowship salaries will increase from Can\$45,000 to Can\$70,000 per annum. The number of scholarships and fellowships provided will also rise over time, building to around 1,720 more per year after five years.

"We're very thrilled with this significant new investment, the largest investment in graduate students and postdocs in over 21 years," says Kaitlin Kharas, a PhD student at the University of Toronto, Canada, and executive director of Support Our Science. "It will directly support the next generation of researchers."

Although only a small proportion of students and postdoctoral fellows receive these federal scholarships, other funders tend to use them as a guide for their own stipends.

Many postgraduates said that low pay was forcing them to consider leaving Canada to pursue their scientific career, says Kharas, so this funding should help to retain talent in the country.

"This is going to move us from a searing brain drain to a brain gain, and position us to compete on the world stage," says Chad Gaffield, chief executive of the U15 Group of Canadian Research Universities, based in Ottawa, which supported the campaign.

'Determined to thrive'

The budget also includes marked boosts for basic research. There is an extra Can\$1.8 billion over five years in core funding for the three federal grant-awarding research councils, as well as Can\$400 million for upgrades to the