

# IceNet: faster, more accurate sea ice forecasting with a new AI-based tool

---

## What happened?

Researchers from The Alan Turing Institute and [British Antarctic Survey](#) (BAS) collaborated on an international, ASG-funded project to understand Arctic sea ice loss. [IceNet](#) is what emerged from this project: an open-source AI tool that uses deep learning algorithms to forecast sea ice conditions up to six months ahead based on satellite observations and climate data. Faster, more accurate sea ice predictions will enable more appropriate and timely responses to threats to wildlife and Indigenous peoples in an environment under intense pressure from climate change.

## What are the real-world impacts?

- For sea ice conditions two months ahead, IceNet achieves an accuracy of 92-97% (depending on the season), [outperforming state-of-the-art physics-based models](#).
- Researchers found that IceNet can run 2,000 times faster on a standard laptop than the physics-based models do on a supercomputer, and can quickly incorporate new real-time data to deal with rapidly changing sea ice conditions.
- The tool produces accurate forecasts for the season ahead: a timescale that is crucial to decision-making for those living and working in the Arctic.
- IceNet will integrate with a digital twin (virtual model) of the [Royal Research Ship \(RRS\) Sir David Attenborough](#), operated by BAS, to help [plot fuel-efficient routes](#) through sea ice, thus supporting BAS's [goal of becoming net zero by 2040](#).
- Collaborating with the [World Wide Fund for Nature](#) (WWF) and local governments, BAS is now exploring how IceNet can be applied in conservation planning and early warning systems for dangerous sea ice conditions across the Canadian Arctic.
- IceNet is a case study for the use of AI tools in environmental science in the Natural Environment Research Council's [first digital strategy](#), published in 2022.

## Why was the Turing's [ASG programme](#) uniquely placed to do this?

- The backing and collaboration of an AI-focused partner such as the Turing is rare in the environmental sciences and initially helped BAS attract machine learning expertise to the project.
- The project was conceived by BAS and funded by the Turing prior to ASG receiving funding, later becoming a key feature of the original ASG proposal and programme.
- Senior Research Fellow [Scott Hosking](#) leads a team spanning both the Turing and BAS, allowing for strong, open collaboration across the research institutes.
- BAS was able to tap into software engineering expertise and open source code development expertise within the [Research Engineering Group](#) at the Turing.
- BAS is working with an ASG-funded [Research Application Manager](#) on further stakeholder engagement.

**“WWF supports the development of IceNet and is very actively collaborating with BAS, the Turing and other partners to explore potential application of its sea ice forecasting capabilities for conservation planning in the Arctic, including for caribou sea ice crossings in northern Canada.”**

Rod Downie, Chief Polar Advisor, WWF



British  
Antarctic Survey

NATURAL ENVIRONMENT RESEARCH COUNCIL



Engineering and  
Physical Sciences  
Research Council

*This work was supported by Wave 1 of The UKRI Strategic Priorities Fund under the EPSRC Grant [EP/T001569/1](#) and EPSRC Grant [EP/W006022/1](#), particularly the AI for Science and Government theme within those grants & The Alan Turing Institute.*