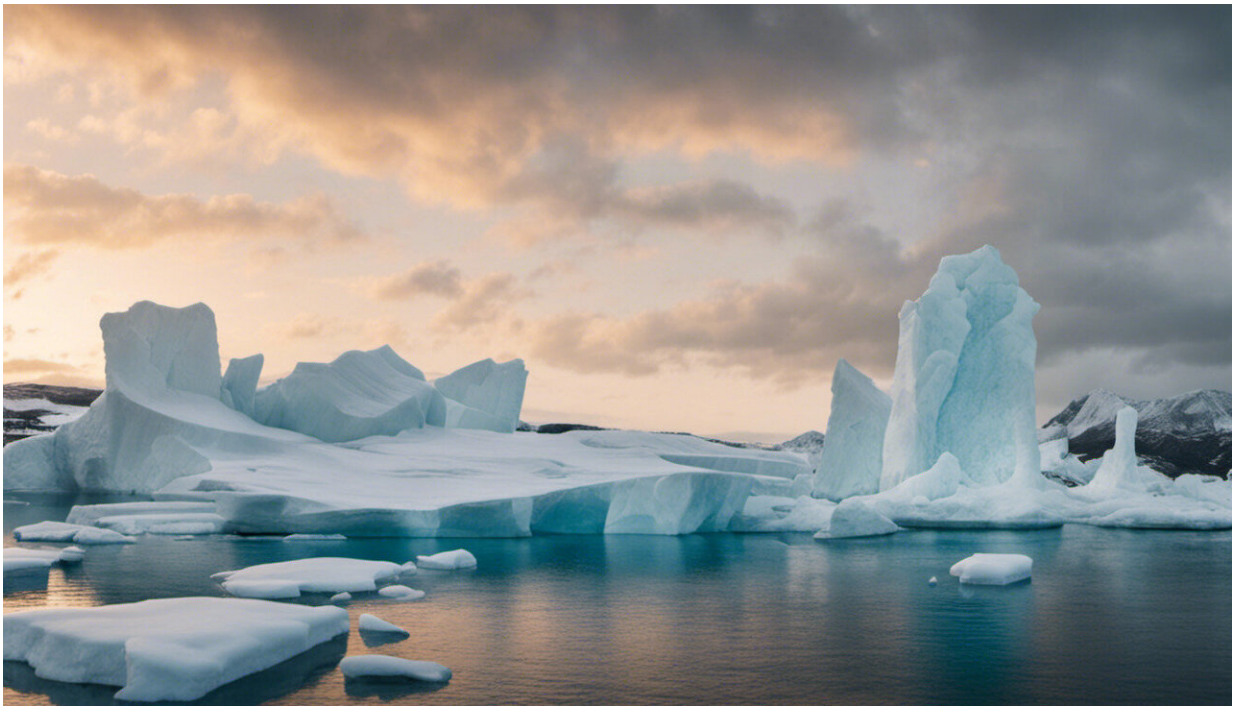
Arctic exploration provides window on future climate change

July 12 2013



Credit: AI-generated image (disclaimer)

Climate model projections show that the Arctic Ocean will be completely ice-free by the summer by 2060. However, the record lows in sea ice extent of 2007 and 2012 demonstrated that these projections were too optimistic and some scientists think that we might see and ice free Arctic within this or the next decade. This momentous

transformation will undoubtedly have important consequences for our climate, but opinions to the extent of the severity of this change vary.

In order to put in place timely and effective remedial action however, it is clear that we need to have the tools at hand to accurately monitor and assess exactly what is happening.

For this reason, the EU-funded DAMOCLES ('Developing Arctic Modelling and Observing Capabilities for Long-term Environmental Studies') project was established to improve Europe's Arctic modelling and observing capabilities. The ultimate objective is to identify and understand the changes that are currently happening in the sea-ice, atmosphere and ocean of the Arctic and subarctic region. Indeed, a key concern has been that while the rest of the world is monitored by meteorological and oceanic instruments, the Arctic has never been subject to a comparable level of monitoring.

In order to address this, the DAMOCLES brought together 48 research institutions - including 10 SMEs distributed among 11 European countries, Russia and Belarus - along with experts from the US, Russia, Canada and Japan. The project is part of an international effort, truly global in both its ambition and nature, to jointly tackle the Arctic research challenges.

The tasks were highly complex, involving ships, aircraft, icebreakers, satellite recordings and the use of equipment underneath the ice. The team attached unmanned buoys to drifting sea ice in order to measure the heat and salinity of the ocean. These buoys communicate with satellites and data streams in real time to scientists in Europe.

Furthermore, sound waves were used to measure ocean temperature. An underwater loud speaker was lowered below the surface, along with a receiver. Because travel velocity of sound depends on temperature (for a

given salinty), scientists are now able to monitor the water temperature at great distance with high accuracy and minimum expenditure. Torpedo-shaped robots were also used to measure temperature, salinity, pressure and speed as they travelled through the ocean at different depths.

Instruments were also anchored to the sea bed along the edge of the Arctic Ocean, where strong currents carry warm Atlantic waters from the North Atlantic into the central Arctic. This enables scientists to monitor the state of the ocean in a specific place over a long period of time. Instruments installed on drifting ice also provide a clearer picture of how fast Arctic ice is disappearing.

When data from early 2007 was entered into the DAMOCLES model, it correctly predicted the presence of large ice-free areas in the middle of the Arctic Ocean later on in the year. The project managed to improve Arctic monitoring, giving authorities a longer lead-time to prepare for the onset of extreme climate events.

More information: DAMOCLES www.damocles-eu.org/

Provided by CORDIS