Recent changes in Atlantic Ocean circulation patterns have caused dramatic shifts in marine populations

Press release: 23 April 2020

A new study has revealed significant changes in North Atlantic Ocean circulation patterns since the beginning of the industrial era compared to the preceding 10,000 years. The study, which examined deep sea fossils of marine organisms, suggested that these changes also shifted populations of fish, which could have profound implications for global fish stocks and other marine species if the trend continues.

Led by University College London (UCL), as part of the EU-funded **ATLAS** Project, researchers analysed seabed cores extracted south of Iceland. By counting the number and type of microscopic plankton fossils preserved in the cores, the team uncovered significant changes in plankton distributions. Until 1750, the fossil records were dominated by species that prefer cold waters. Since then, and even more prominent in the 20th century, more warm-water species have been found further north.

The findings add to a growing body of evidence which show a change in ocean circulation in the Atlantic Ocean, a region playing a crucial role in the global climate system and as habitat for many marine ecosystems.

As lead author, Dr Peter Spooner, UCL, explained, *"Counting the fossils of different species found in deep ocean sediments is one of the simplest methods we have of reconstructing the past oceans, and yet it is one of the most effective. The changes we have found are consistent with records from other parts of the North Atlantic: declines in biological productivity, a shift in the Gulf Stream, weakening of the Atlantic conveyor belt circulation and warmer water reaching the Arctic".*

Fresh water from melting ice could be the cause of changes to the ocean circulation patterns. While climate change may have been a driving factor, other events such as the end of the Little Ice Age in the mid-19th century could also have acted as a trigger.

"It is common sense that climate change will cause warm-water species to move northwards, but something more complicated seems to be going on here," said Dr Spooner. Changes in species distribution is a sign of complex changes to the structure of our oceans, affecting ocean temperature, currents, and nutrient availability.

Analysing the fossil record is significant because, by looking at records on a much longer timescale, it is clear that changes in ocean circulation began earlier than was previously thought.

Dr David Thornalley, UCL, explained *"We are too used to thinking of the North Atlantic as being dominated by natural cycles that last decades. But this is only because direct observations do not go back far enough. These new records allow us to put our observations into a much longer-term context and reveal the exceptional nature of what has happened in the 20th century."*

The shifts in plankton populations shown in the study coincide with shifts of larger fish stocks. Mackerel used to be found at lower latitudes but are now also regularly fished around Iceland and Greenland. With overwhelming evidence showing the growing impact of climate change, researchers fear such shifts could become more commonplace.

"*We know that ocean circulation in the area can affect the whole ecosystem, all the way up to top predators such as pilot whales. If the ocean has changed this much in the last hundred years - which we usually think of as being quite a stable period - it is absolutely essential we understand the implications before new human activities like deep-sea mining are allowed to begin,*" concluded Professor J Murray Roberts, **ATLAS** project coordinator at the University of Edinburgh (UK).

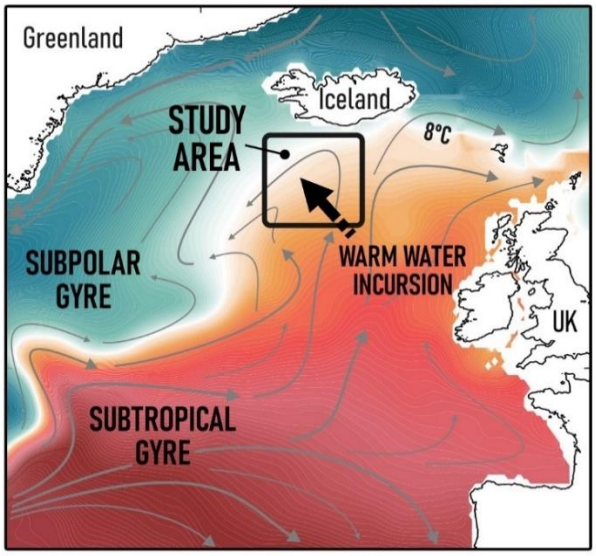

Figure showing the surface circulation of the North Atlantic, and the study region where increasing amounts of warm subtropical waters have been detected through the 20th century. © P. Spooner & D. Thornalley.

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Notes to Editors

ATLAS ("A Trans-Atlantic Assessment and deep-water ecosystem-based spatial management for Europe") is a research and innovation action funded under the European Union's Framework Programme for Research and Innovation, Horizon 2020, Grant No 678760. It is the largest integrated study of deep Atlantic ecosystems ever undertaken. The four-year project was launched in May 2016 and has a total budget of €9.4 million. Led by the University of Edinburgh (Scotland, UK) **ATLAS** brings together 25 partners (and one linked third party) from 10 European countries, the USA and Canada. For more information on the **ATLAS** project, please visit www.eu-atlas.org or follow the project on Twitter @eu_atlas| Facebook @EuATLAS | LinkedIn ATLAS - Deep Discoveries| YouTube: EU_ATLAS

For more information on the ATLAS project, please visit www.eu-atlas.org or contact Prof J Murray Roberts (Murray.Roberts@ed.ac.uk).

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*Issued on behalf of the **ATLAS** project by AquaTT.*