Parallel Roads of Lochaber
It's nothing but another ice age……You can't be serious!

I was shocked when a chance encounter with someone told me very authoritively that the SSSI (Parallel Roads …) was just a meaningless nonsense. This could not be further from the truth. The Parallel Roads have an important message for us today, our children, grandchildren and the generations that follow us. Many of you may have read about the "Cold Blob" in the North Atlantic, which has been in the news a lot recently. If you haven't heard of it don't worry, we will come back to it.

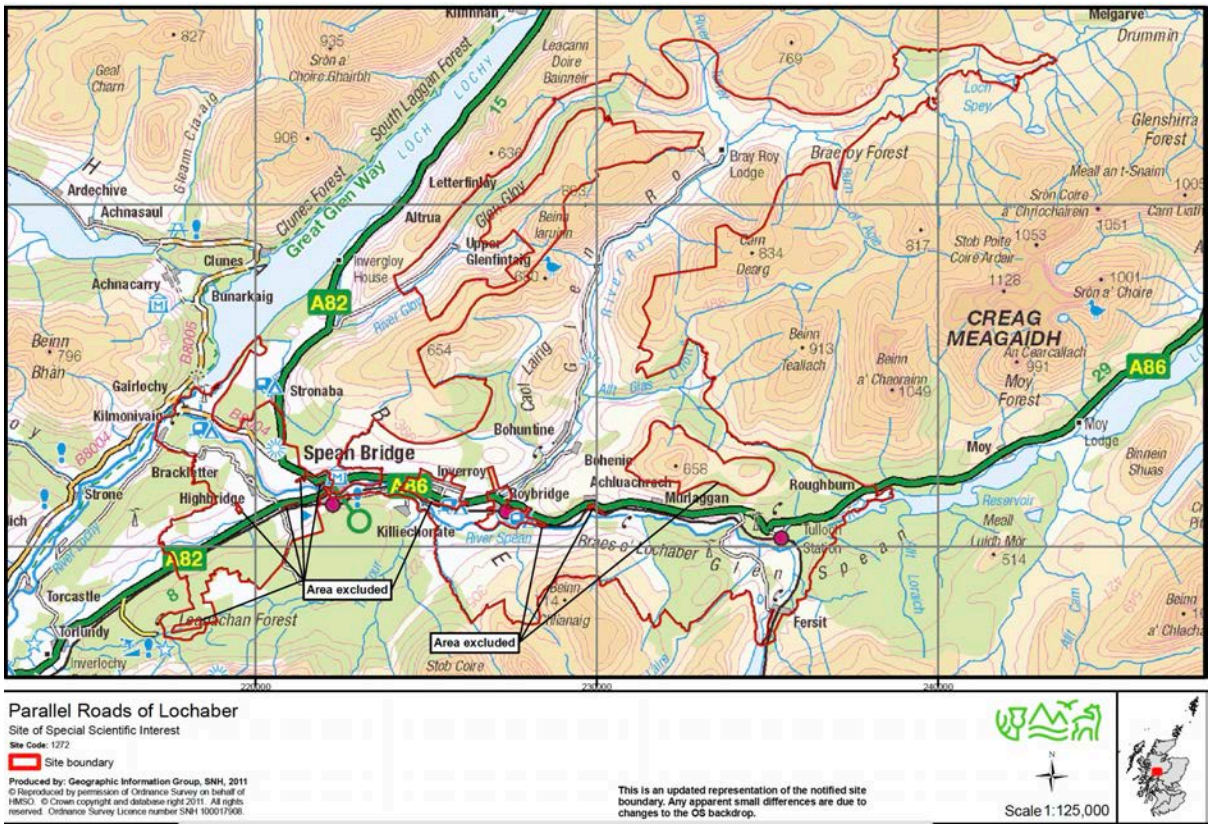
Unlike many SSSI's the Parallel Road is relatively unique in being a geological SSSI formed by glacial sediments. The SSSI is in the soft sediments between the surface and the bedrock. Remove the soft sediments then the SSSI is destroyed and cannot be restored.

The traditional view of the importance of the SSSI which can be found in the literature from organisations such as Nature Scot will point to the unique landforms present such as the Parallel Roads of Glen Roy, and its recent recognition within the world's top 200 geological sites. By itself this would justify its SSSI status and would be recognised as important by the local community if they understood knew more about it. The SSSI itself is large (see the figure below) at about 145 sq Km:

For many years research has focused on the Parallel Roads of Glen Roy, but it has become apparent following remapping by university teams working for Nature Scot that far more needs researched, with other key areas being identified such as that around Achnabobane, where multiple moraines are prominent.

While the uniqueness of the land forms and their preservation is an internationally important asset and a driving force for its preservation, there is another emerging story that is far more compelling from a purely Scottish and local view point which will be described below.

There were many ice ages between 500,000 years ago and today. The two major ice ages being the Anglican (478,000–424,000) and the Devensian (117,000 to 11,700 years ago) the



latter peaking around 22,000 years ago. During the course of these glaciations the ice reached a thickness of 1 km over the Highlands and travelled as far south as a line from the Seven Estuary to the Wash. These glaciations created much of the scenery of the Highlands.

The glaciation that caused the Parallel Roads of Lochaber is called the Younger Dryas glaciation and occurred between 12,900 and 11,700 years ago.

There is much that is unusual about this glaciation including:

1. In Scotland the glaciation was restricted to the western Highlands with a centre on Rannoch Moor.
2. It was very short lived around 1200 years
3. The onset of the glaciation was rapid, within a few generations and so was its departure.
4. Glacial advances were also seen in Scandinavia, areas of Europe such as the Alps, Northern Rocky Mts, Wisconsin and western parts of the New York State.
5. A sudden drop in temperatures of 10 ^{o}C occurred in parts of Scandinavia and 6 ^{o}C in Europe, while the southern hemisphere including Antarctica warmed.

In our area, it is the most recent glaciation and is responsible for many of the glacial features we see today. Ice



moving along valleys created a number of ice dammed lakes at different levels controlled by the spill points. The iconic land forms of the Parallel Roads of Glen Roy represents shorelines of an ice dammed lakes, caused by a glacier moving up Glen Spean. These ancient shorelines can also be seen in Glen Gloy and other areas around the Spean and Loch Lochy.

Many other land forms can be seen from small ponds, to linear ridges (moraines, marking points on the glacial retreat), elongated rocky mounds (giving direction of ice movement), U shaped valleys, scratches on bedrock (showing the direction of ice movement), etc.,. It is even possible that the Spean Gorge is the result of the collapse of a glacier damed a lake causing a sudden massive influx of flood water down the Spean valley. The flat bottom of many valleys may contain sediments deposited in the glacial lakes. These glacial lake sediments are made of alternating layers of sand and mud each pair being the summer thaw (sand) and winter freeze (clay). Counting the layers can give the period of time the lake lasted. Pollen within the lake can also tell both the age and climate at the time it was deposited.

Dating of the ice advance can be done by techniques such as quartz luminescence, cosmic ray exposure, tree rings etc..

Along the A82 between Spean Bridge and the Great Glen Cattle Ranch there are many low linear (generally east – west trending) features on both sides of the road. If you dug into them you would find they are made of sand and gravel. They are moraines left during the ice retreat or deposited by sub-glacial streams (eskers). They date the history of the ice advance and retreat.



Across the whole area a layer of glacial clay made of ground up rock was also deposited, showing where the glaciers were present.

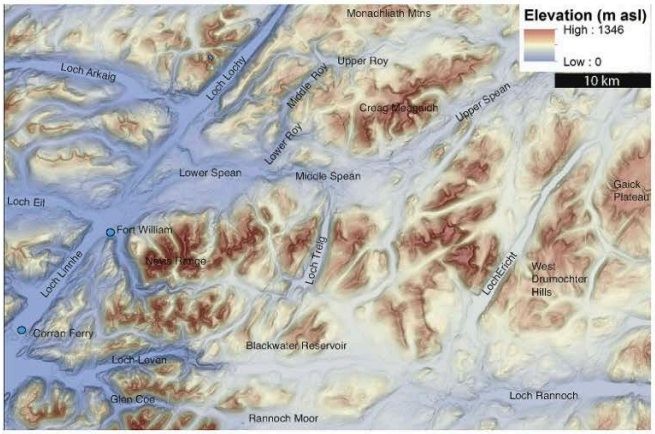


Below, is a series of cartoons illustrating the history of the glaciation in this area taken from a recent article[1].

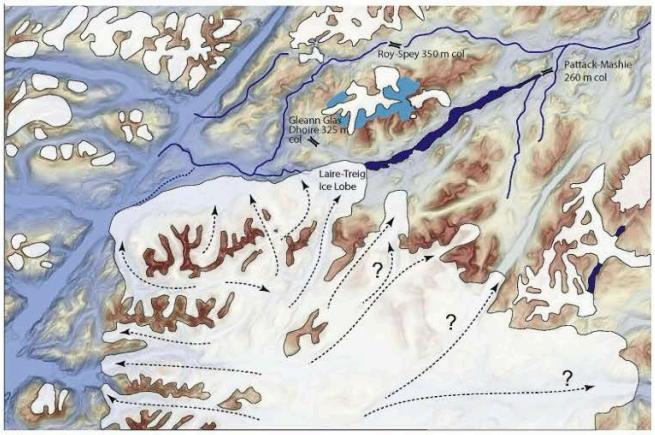
So why is it so important? The glaciation occurred in a generally warming climate following the Devensian glaciation, but all of a sudden temperatures plunged in the northern hemisphere and glaciers advanced within a few generations why?

The latitude of Fort William roughly coincides with southern Alaska and northern Alberta, but we have a much warmer climate courtesy of

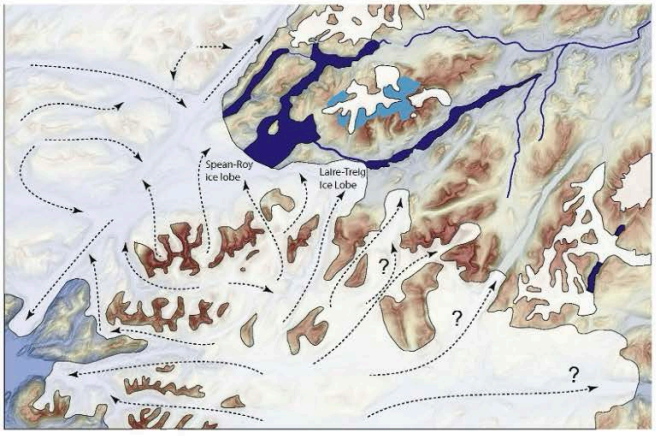
1) Relief map of the reconstruction area



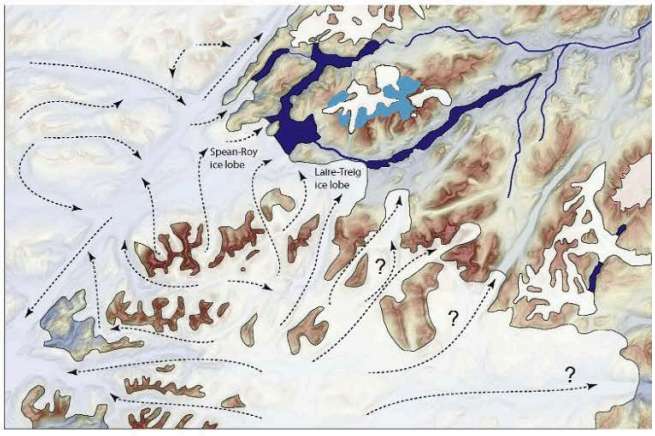
2) Rising 260 m lake Glen Spean - 12,135 - 11,948 cal yr BP



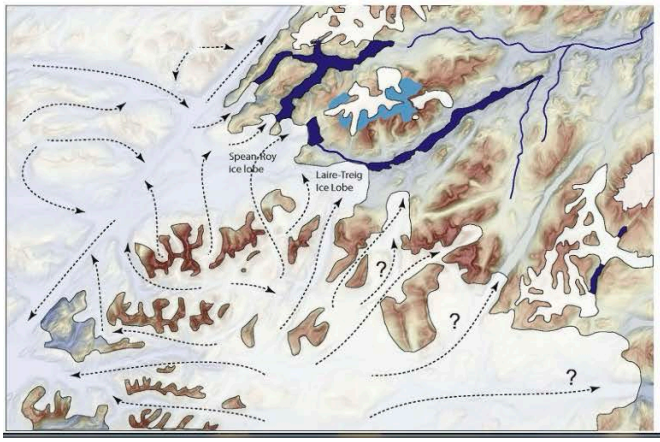
3) Early 325 m lake rising limb - 11,947 - 11,843 cal yr BP



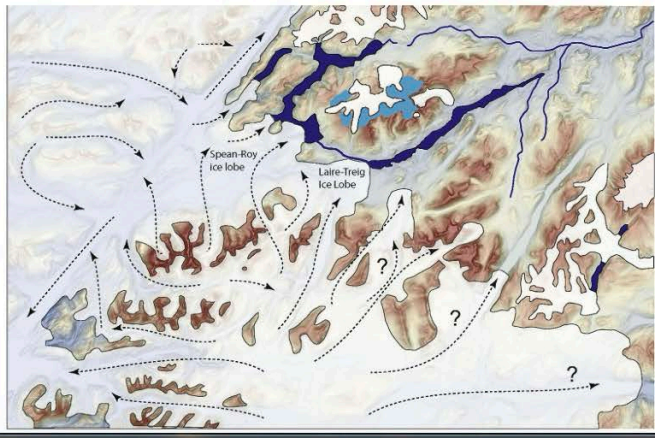
4) Late 325 m rising limb - 11,947 - 11,843 cal yr BP



5) Ice Maximum 350 m lake - 11,842 - 11,807 cal yr BP

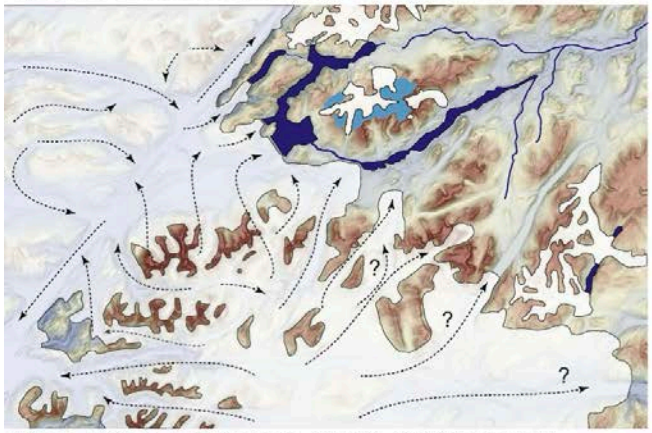


6) Jokulhaup to 325 m lake falling limb - 11,806 cal yr BP

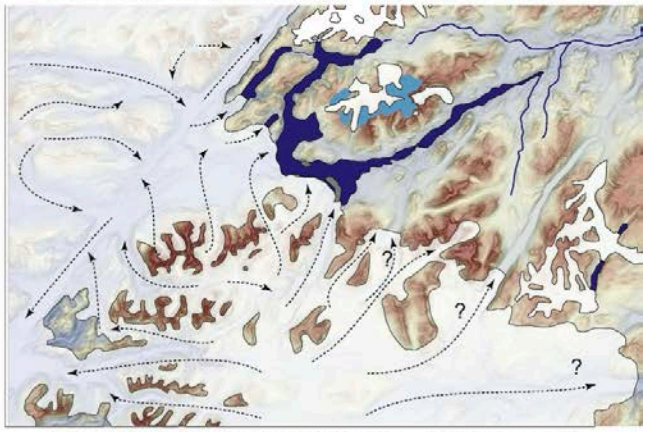


[1] "A revised chronology for the growth and demise of Loch Lomond Readvance ('Younger Dryas') ice lobes in the Lochaber area, Scotland By A.P. Palmer a, I.P. Matthews a, J.J. Lowe a, A. MacLeod b, R. Grant a
Quaternary Science Reviews, 15 November 2020, Article: 106548
Volume: Volume 248".

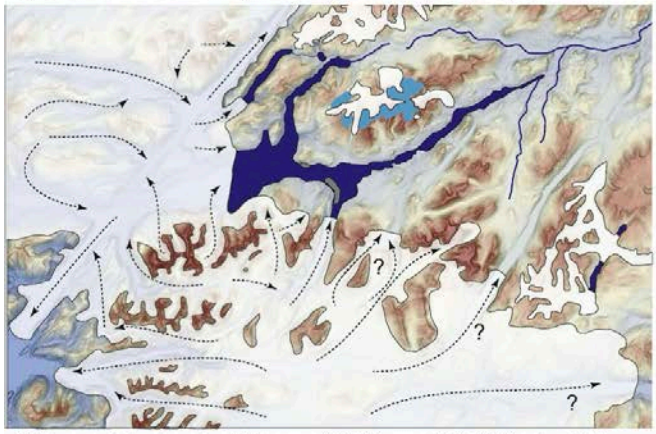
7) Transition to 325 m lake falling limb - 11,806 - 11,698 cal yr BP



8) Transition to 260 m lake falling limb - 11,698 cal yr BP



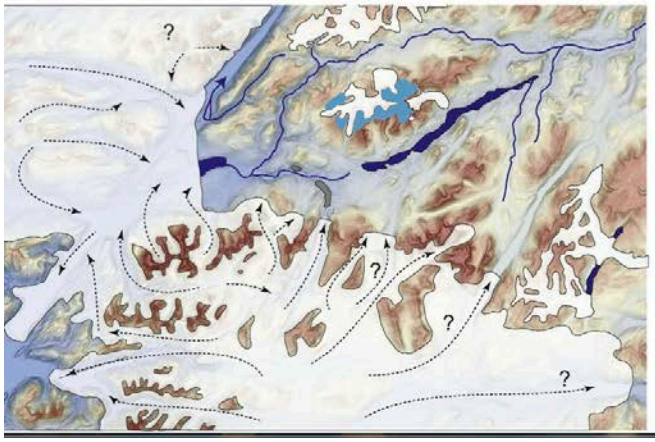
9) Late 260 m lake falling limb - 11,697 - 11,618 cal yr BP



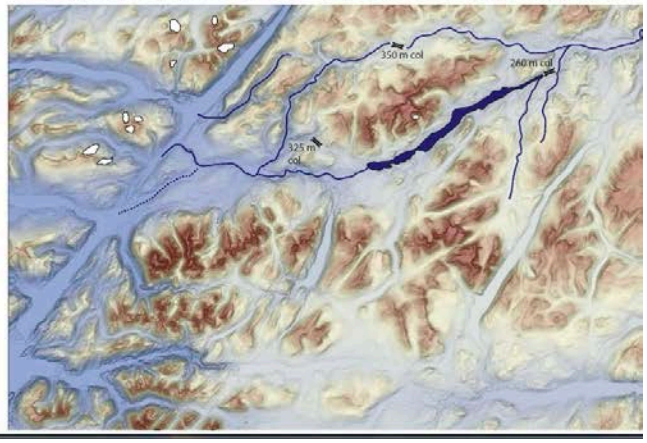
10) Drainage of 260 m lake falling limb - 11,618 cal yr BP



11) Lower lake levels of Sissons (1979) - post 11,618 cal yr BP



12) Ice free Rannoch Moor- ~11.5 ka cal BP Lowe et al. (2019)

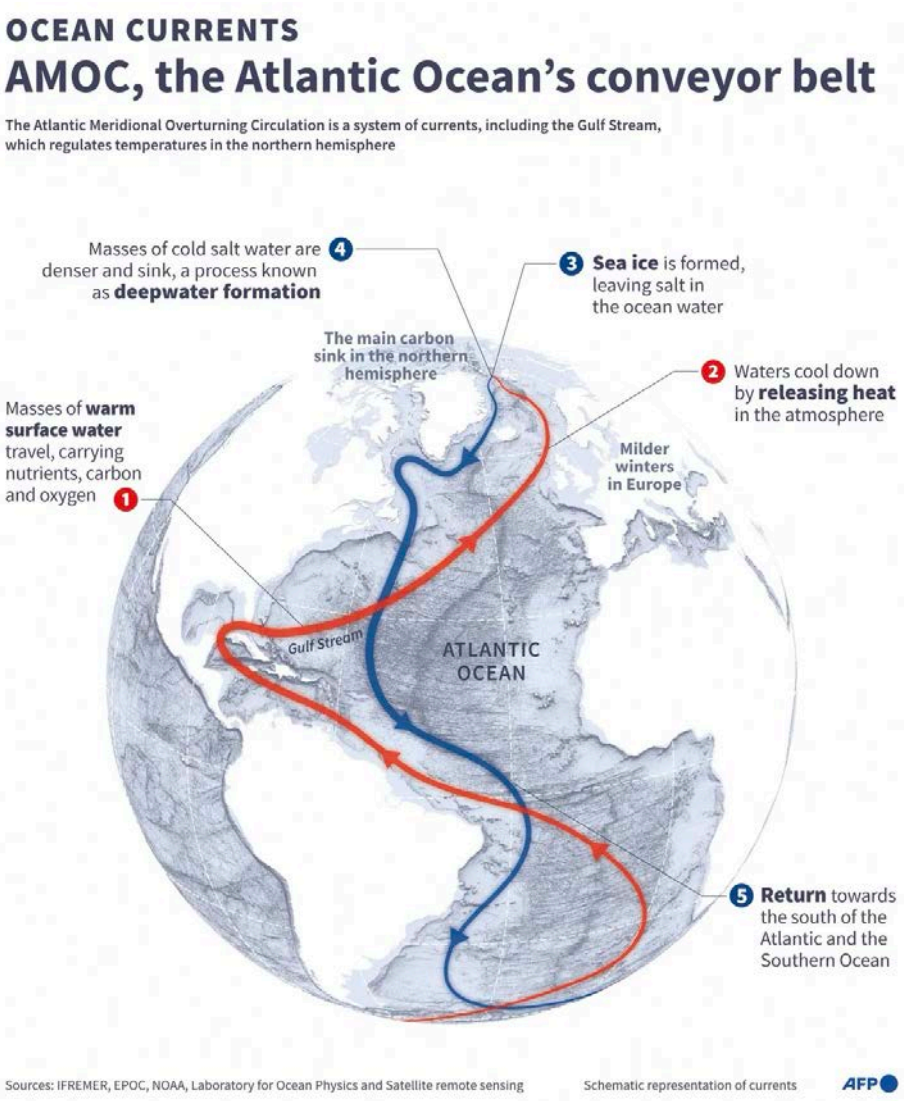


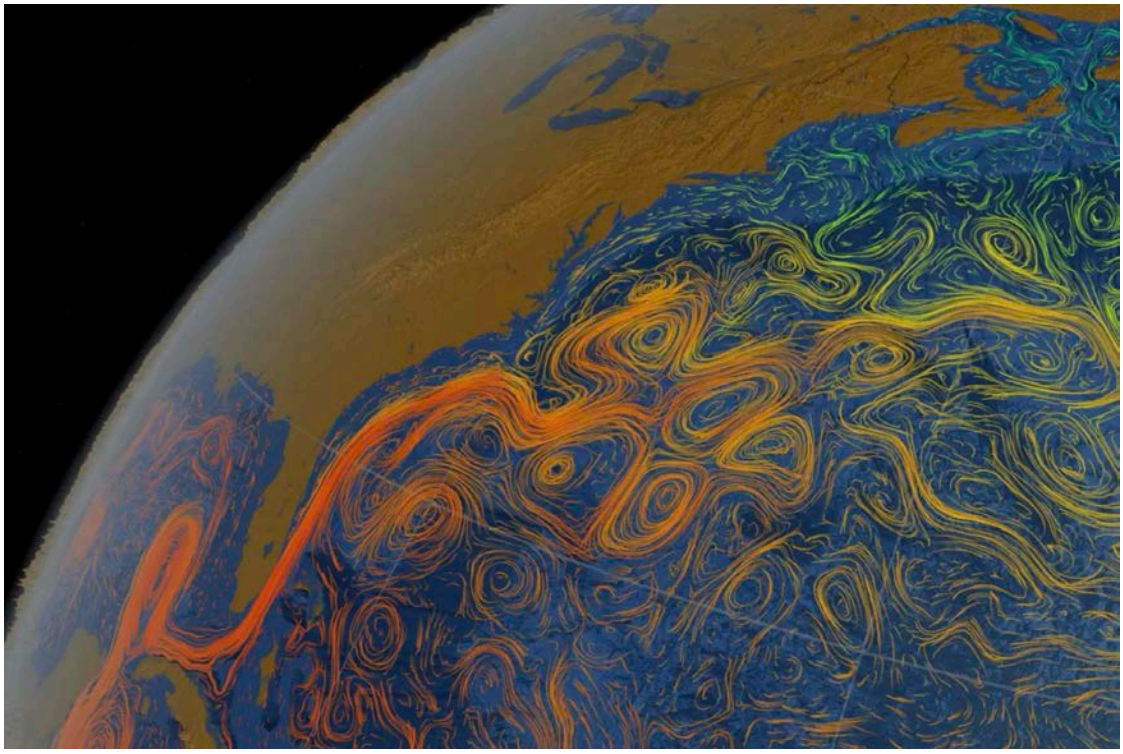
the Gulf Stream which brings warm equatorial water north to our shores mitigating the effect of being at a high latitude. The Gulf Stream is part of the Atlantic Meridional Overturning Circulation system that takes warm surface water north and via deep ocean currents cold water south as illustrated below.

In detail the currents are much more complex as illustrated by NASA image below.

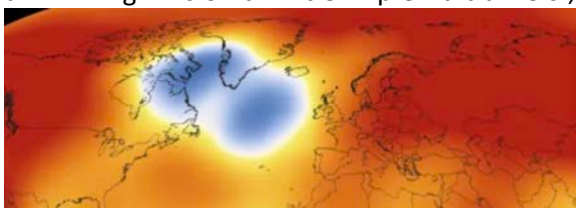
The currents are driven by density and temperature differences, salty water sinks due to its density and warm water floats. In detail the mechanism is not fully understood.

The most likely explanation for the rapid climate deterioration during the Younger Dryas is that the AMOC system shut down due to the volume of less dense glacial melt water entering the system from Greenland and North America. With the removal of the warm current, Scotland froze and developed glaciers very rapidly. With the restoration of the AMOC system, the glaciers melted and rapidly retreated.


OCEAN CURRENTS
AMOC, the Atlantic Ocean's conveyor belt
The Atlantic Meridional Overturning Circulation is a system of currents, including the Gulf Stream, which regulates temperatures in the northern hemisphere
Masses of cold salt water are denser and sink, a process known as deepwater formation
4
3 Sea ice is formed, leaving salt in the ocean water
The main carbon sink in the northern hemisphere
2 Waters cool down by releasing heat in the atmosphere
Milder winters in Europe
Masses of warm surface water travel, carrying nutrients, carbon and oxygen
1
Gulf Stream
ATLANTIC OCEAN
5 Return towards the south of the Atlantic and the Southern Ocean
Sources: IFREMER, EPOC, NOAA, Laboratory for Ocean Physics and Satellite remote sensing
Schematic representation of currents
AFP



So back to the "Cold Blob" in the North Atlantic…..
Recently, a cold blob has been identified in the North Atlantic that may be slowing the AMOC down. Global warming increasing the degree of melting of the Greenland Ice Cap occurring today is creating the blob of cold water that is reducing the flow of the AMOC, potentially driving cold temperatures,



more in line with our latitude, to predominate. If it were to collapse, then the events of the Younger Dyras may return as the climate of NW Scotland deteriorates rapidly.

The Institute of Engineers Scotland (https://engineers.scot/news/2026-04-29-the-amoc-tipping-point-why-scotlands-engineers-must-prepare-for-the-hemispheric-seesaw) has issued in 2026 a stark warning of what Scotland faces and the engineering consequences. To quote the paper "This is not merely a matter of slightly colder winters. Some models indicate winter temperature drops from 5 to 15 ^{o}C……"

You might ask if this is so well known why is it not a priority for the government? The answer is that it is well known, but like many political bodies they are waiting for unequivocal evidence of the collapse of the AMOC, by which time it is likely too late. The Scottish Government acknowledges the possibility of AMOC collapse (https://marine.gov.scot/sma/assessment/ocean-currents), but conclude that AMOC will only weaken to 2100. The assessment seems an outlier compared to recent results. The mitigation strategy is to pursue net-zero emissions by 2045.

What happened during the during the Younger Dyras is written in the sediments deposited in the SSSI. They can tell you about the rate of climate change, the rate of ice advance, what could happen. It is all there waiting to be read with modern scientific techniques, and future methods may enable further detailing, and consequently work on any area never stops. Destroying the SSSI makes no sense as we are destroying data that could be of immense use to us in the future.

The current "Cold blob" could be harbinger of change, although it is not certain. New research[2] [2]indicates that there is something like a 10% chance that the collapse of the AMOC has begun in the best case and 23% in the worst case growing to 80+% by 2100. What the Dryas warns us is that the collapse of the AMOC, were it to occur, could be nothing less than a disaster occurring over a few lifetimes. If it were to be underway now it could even affect our grandchildren. Knowing what might be coming can only help us deal with it.

Of course, we could take Michael Grove's BREXIT position, that you should not listen to experts. Given how well that has worked out for us maybe we need to think a bit more deeply?

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[2] ", Quantifying the probability of committed AMOC collapse" by Holden, Abrams, Bieger, Lenton, Mercure, Semieniuk, and Sharp. 2026 In press