Link between surface and deep ocean currents

- In the North Atlantic subtropical gyre, not all the water circulates round, with some branching up and flowing towards Britain and Europe it is this water that cools and forms the NADW in the GIN Seas, and is called the Gulf Stream
- The Gulf Stream current is driven by two things, the winds and also by the formation of this deep water as water is sinking in the GIN Seas, the water in the Gulf Stream is pulled Northwards to replace the lost water

Gulf Stream

- The Gulf Stream is a warm North-moving current
- It therefore warms the East Coast of the US and Northern Europe
- The Gulf Stream then extends into the North Atlantic and Norwegian currents, warming Northwest Europe
- This means our climate is far more warm and mild than would otherwise be expected, particularly in winter months
 - Britain is the same latitude as NYC and Washington DC in America, which in winter are marked by extreme snow and cold conditions, whereas temperatures in Britain remain fairly mild, because those areas of America don't enjoy the benefits of the Gulf Stream as we do

Current Debates

- Questions have now been raised about how climate change will impact on our climate, seeing as the Gulf Stream is so important in maintaining common temperatures
- Climate change is causing the world's oceans to the second s
 - This is affecting the density of the colors warmer water is less dense
 - It is also altering the salid to of the oceanse the melting of large areas of ice sheets across Antaltica and Green and Is injecting huge volumes of water with no same into the ocean
- Thi Das arsed the issue of whener he AMOC and the Gulf Stream is slowing down
 - The temperature in the GIN Seas is increasing due to climate change
 - This is decreasing the density of the water, so it is less likely to sink down
 - Simultaneously, an increase in freshwater from melting ice sheets in Greenland is decreasing the salinity of the water, further preventing the formation in NADW
 - Therefore the global conveyor belt of deep ocean water AMOC may be slowing in turn slowing down the Gulf Stream

Is the AMOC slowing?

- · A slowing of the Gulf Stream would have a drastic impact on the climate
- Computer models have shown that if there was no formation of NADW, slowing the Gulf Stream, temperatures in Britain and Europe would drop by about 4°C
- Winters would be far similar to those seen in NY, Canada, etc.
- This would devastate the UK as our infrastructure is not equipped to deal with this weather
- There is evidence of past slowdown of the Gulf Stream causing extreme winters in the UK freezing over the Thames
- However, modern day evidence seems to show nothing conclusive about whether the AMOC really is slowing in fact in 2010, Lozier *et al.* has shown there is spatial variability, with some parts of the Gulf Stream actually getting faster, with others slowing