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The incredible image that reveals how the Earth's oceans plunged the planet into a catastrophic big freeze

- Findings show how the conditions in the Arctic can act as a 'primary trigger' for climate change - relevant given the changes happening now

By DAMIEN GAYLE

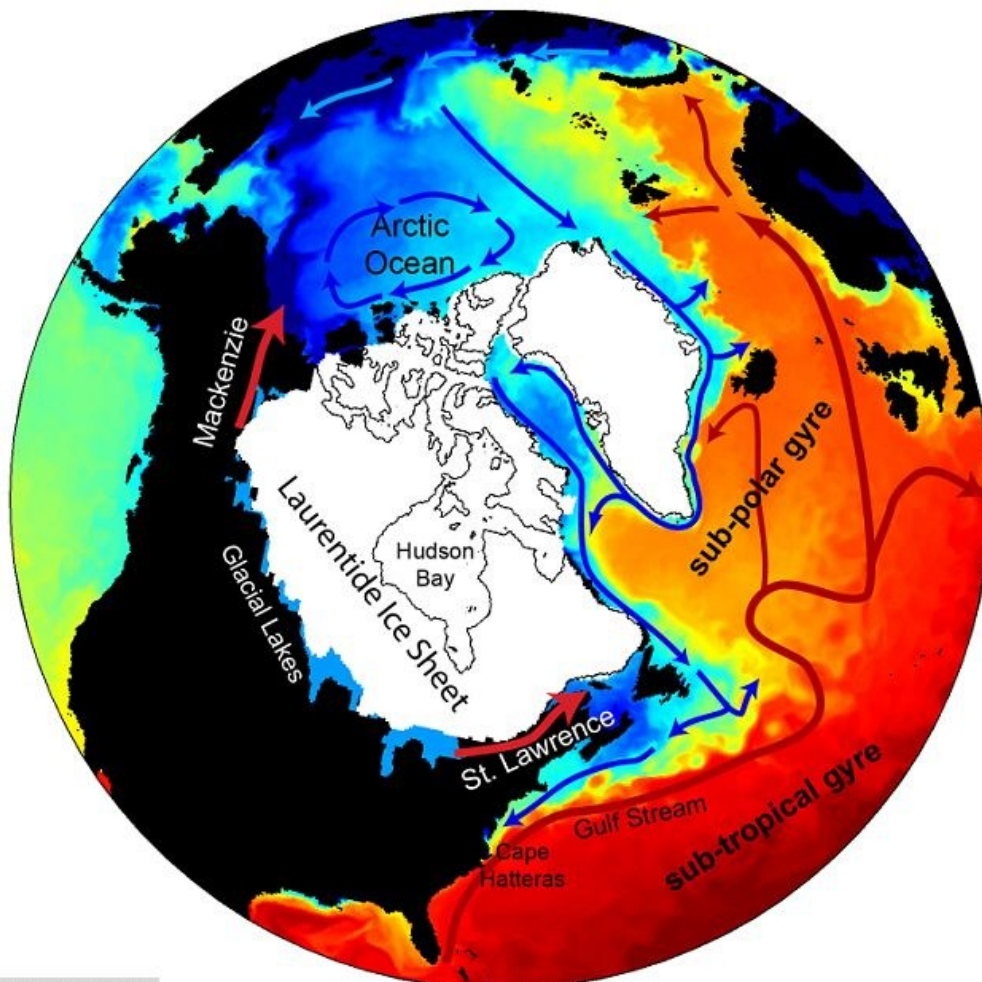
PUBLISHED: 15:12 GMT, 6 November 2012 | UPDATED: 15:48 GMT, 6 November 2012

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The planet's last major cold spell 13,000 years ago was caused by a catastrophic deluge of frigid fresh water from north-west Canada into the Arctic ocean, a new study suggests.

Detailed computer simulations show meltwater from the enormous Laurentide Ice Sheet halted the sinking of very dense, saltier, colder water in the North Atlantic.

That stopped the large scale ocean circulation - the so-called thermohaline circulation - that transports heat to Europe and North America, causing the continents to dramatically freeze.



© Alan Condron

Detailed: A new model of flood waters from the melting Laurentide Ice Sheet shows how water first flowed north-west into the Arctic, weakening deep ocean circulation and leading to the Earth's last major cold period

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The findings offer a new explanation for the cause of this last big chill, which scientists had thought was caused by freshwater flowing into the Atlantic through Canada's Gulf of St Lawrence.

It led to a cold spell lasting more than 1,000 years known as the Younger Dryas or 'Big Freeze', during which temperatures in parts of the northern hemisphere fell to about 10 degrees C colder than they are today.

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'This episode was the last time the Earth underwent a major cooling, so understanding exactly what caused it is very important for understanding how our modern-day climate might change in the future,' said Alan Condron, of the University of Massachusetts Amherst.

The cooling began after Lake Agassiz, at the southern edge of the Laurentide ice sheet covering much of the Canadian Arctic, broke through an ice dam and dumped thousands of cubic kilometers of cold water into the ocean.

Using a high resolution, global, ocean-ice circulation model 10 to 20 times more powerful than previous ones, the researchers compared how meltwater from the two different drainage outlets affected ocean circulation.

The original hypothesis, proposed 1989 by Wally Broecker of Columbia University, suggested that Lake Agassiz drained into the North Atlantic down the St Lawrence River.

But using the new model, Dr Condron, working with Peter Winsor of the University of Alaska, found that this proposed route would have weakened the oceans' thermohaline circulation by less than 15 per cent.

That level of weakening, they say, is unlikely to have accounted for the 1,000-year cold climate event that followed the flood.

Meltwater from the St Lawrence River actually ends up almost 1,900 miles south of the deep water formation regions, too far south to have any significant impact on the sinking of surface waters.

By contrast, Dr Condron and Dr Winsor's model shows that if the meltwater first drains into the Arctic Ocean, narrow coastal boundary currents efficiently deliver it to the deep water formation regions of the sub-polar north Atlantic, weakening the thermohaline circulation by more than 30 per cent.

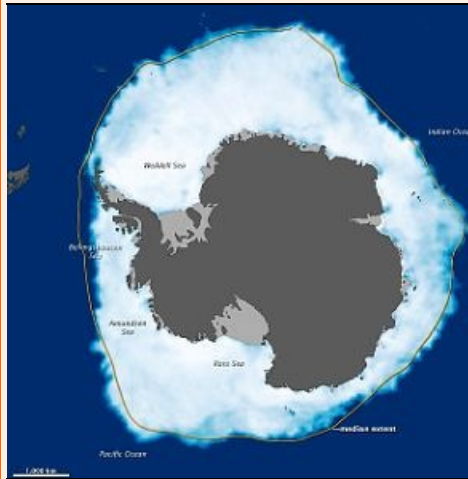
They conclude that this scenario, showing meltwater discharged first into the Arctic rather than down the St. Lawrence valley, is 'more likely to have triggered the Younger Dryas cooling.'

Dr Condron and Dr Winsor ran their simulations on one of the world's top supercomputers at the National Energy Research Science Computing Centre in Berkeley, California.

MORE ICE AT SOUTH POLE THAN EVER - BUT NORTH POLE HAS LEAST

Ice around the South Pole has expanded to cover a record area, scientists have revealed – after saying that the North Pole had lost an unprecedented amount of its ice.

Researchers say – rather confusingly – that both occurrences are down to the 'complex and surprising' effects of global warming.



The record Antarctic sea ice cover was revealed in satellite images from the US National Snow and Ice Data Center in Colorado. At the end of the southern winter in September, ice covered 7.51million square miles of sea – more than at any time since records began in 1979.

For the last 30 years the amount of Antarctic sea ice has been increasing by 1 per cent each decade.

While the rest of the world has been getting warmer over the last 50 years, large parts of the Eastern Antarctic have been getting cooler. Scientists say a cooler Antarctic fits in with the unpredictable nature of climate change.



Argentina's Patagonia ice-sheet: Much of Europe and North America would have looked like this after the

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Is that actually funny?



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That's one way to do it



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▶ **the death of her**



Reporting their findings in the journal Proceedings of the National Academy of Sciences, they wrote: 'With this higher resolution modelling, our ability to capture narrow ocean currents dramatically improves our understanding of where the fresh water may be going.'

Dr Condon added: 'The results we obtain are only possible by using a much higher computational power available with faster computers.'

'Older models weren't powerful enough to model the different pathways because they contained too few data points to capture smaller-scale, faster-moving coastal currents.'

'Our results are particularly relevant for how we model the melting of the Greenland and Antarctic Ice sheets now and in the future.'

'It is apparent from our results that climate scientists are artificially introducing fresh water into their models over large parts of the ocean that freshwater would never have reached.'

'In addition, our work points to the Arctic as a primary trigger for climate change. This is especially relevant considering the rapid changes that have been occurring in this region in the last 10 years.'

'Our work points to the Arctic as a primary trigger for climate change. This is especially relevant considering the rapid changes that have been occurring in this region in the last 10 years'

Alan Condon, University of Massachusetts Amherst

mother at 79 after 'long illness'

Mother and former manager Teri passed away in New York



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Hadh't read any of the Stephenie Meyer books

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Accidental result of giving up cigarettes



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Said he wasn't always so confident with women



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The 24-year-old singer looked very excited



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Reached royalty now!



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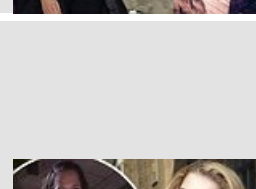


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▶ **battle with panic attacks and depression**



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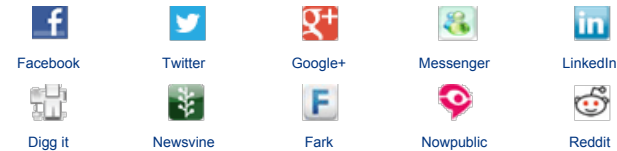


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Twas bryllyg, and ye slythy toves Did gyre and gymble in ye wabe. Explains all the nonsense. View all

- Evel Lucion , Bracknell, 06/11/2012 17:13

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Yes the truth is coming out now. It has been known since the 80's that the planet has a 100 thousand year climate cycle. Lake Vostok ice cores prove this and show that the cycle is 10 thousand years warming followed by 90 thousand years ice age with the planet covered by up to 30% ice. We are at the end of a warm period and due to enter an ice age which would have naturally happened. The problem is that the natural start is triggered by a natural greenhouse effect and we have massively added to that with all of the CO2 we have been pumping into the atmosphere. Scientists said in the 80's that after 20 years we may hit a sudden climate 'flip' and that the gulf stream might turn off in 2010 plunging Europe into an ice age. Looks like they may have got it right. The change is recorded as being very rapid, only a matter of a few years.

- Jetty , London, United Kingdom, 06/11/2012 17:02

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I thought this was about Firefox .

- Jamal , London, 06/11/2012 17:01

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We must have more research, give us huge grants, loads of money so that we can swan about telling the world how important our research is. We have been told that we will not be able to have grass lawns as it will be to dry due to global warming, with massive droughts, Now we are awash with water and the biggest Antarctic ice sheet. What are they going to dream up next for their research and scare mongering.

- Rob , Reading, 06/11/2012 16:57

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My 99 year old skinny little auntie keeps the heat in her house turned up past 90 degrees all year. It is all her fault. Soon she will pass on and global climate warming will fade into history's dust bin and we can all break out the coats and mittens again. At least that makes more sense than the article's conclusions.

- **Willie** , Pennsylvania, 06/11/2012 16:56

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As quick as one Global Warming scare theory is debunked, they come up with another. It's starting to get surreal; so now, global warming is leading to global freezing.

- **a192_a** , London, 06/11/2012 16:55

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Oh! Quick! Build some more windmills!

- **Henry Wood** , Newcastle upon Tyne, United Kingdom, 06/11/2012 16:45

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Yet another "theory of epicycles" to reconcile the revealed dogma of human-caused global warming with the cold wind of reality.

- **Michael Rivero** , Honolulu, United States, 06/11/2012 16:44

Click to rate Rating 10
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They're at it again, they will do anything, I mean anything to convince people that Global Warming is happening, the truth is they don't really know, all they are worried about is securing funding and keeping the global warming climate change gravy train going and their snouts in the trough. Not the Guy's name, Condron, the clue is there, says it all really

- **SimonnotanEUcitizen** , Alton Hampshire, 06/11/2012 16:41

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Theory and speculation. - Brett, Brigadoon, United Kingdom, 06/11/2012 16:31 Like most science... Everything has to start with a theory!

- **waa waa waa** , Milton Keynes, 06/11/2012 16:40

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...and a depression.



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Has hinted that she and Simon Cowell were more than just co-stars

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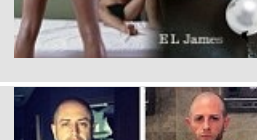
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Friedman reveals the effects of his 60 day meal plan as he shows off ripped torso on Twitter



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Star-studded bash



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Many show no sign of aging in ten years



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Mr and Mrs matching



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Putting on a bit of muscle



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Comedy star says she's accepted she will always be on the large side



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After discovering she carried the 'cancer gene'



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Newly single



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The sisters have injected their style in to more than 100 pieces for the store



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Sisterly shoot



Even Ella is feeling the pressure! X Factor star Miss Henderson looks

▶ exhausted as she leaves rehearsals with other contestants





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Since their split the pair remain friends



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Watch the scary trailer here



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Keeping it light



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At least she is warm!



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Doesn't she learn?



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slim figure in ruby red sequined dress
All eyes were on her on the red carpet



Strictly sexy!
Kimberley Walsh heats up awards dinner in peekaboo lace dress as it's announced she has signed solo record deal
Release date: February



It's all about the kids!
Heidi Klum and boyfriend Martin Kristen take her children shopping and treat them to an ice cream too
A regular unit



Well, it is the city of romance!
Akon looks smitten as he enjoys a gondola ride with his new girlfriend in Venice
Perhaps he is finally ready to settle down



Not ready for maternity wear just yet!
Pregnant Coleen Rooney indulges her passion for fashion in a retro photoshoot
She has shown off her glamorous side again



It's all about the bob!
Alesha Dixon sports fun and flirty curls as she attends awards dinner
Ditched the sleek and straight look for a shorter, curlier 'do



Who are you to judge?
Twilight co-star Kristen Stewart over affair scandal in new interview
Rising star is quick to defend her friends



That's a bit dotty!
Dianna Agron goes for ethereal spotted frock AND matching polka dot bag on shopping trip
Teamed it with some dark shades



That's not a good look!
Christina Aguilera sports odd plaited hairstyle as she joins The Voice panel for TV appearance
Distracting or what?



What fine fillies!
Kris Smith cosies up to the ladies at Melbourne Cup... including the model rumoured to have caused Dannii Minogue split



Tres chic!
French actress Marion Cotillard is divine in Dior as she displays her slender figure in edgy black and white gown
Just beautiful





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GADGET REVIEWS

VIBE BlackDeath headphones



With their aggressive styling, thunderous bass and unflinchingly in-your-face packaging, there is nothing subtle about VIBE's BlackDeath headphones.

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App of the week: DriveOFF



When driving, it's easy to get distracted by your phone suddenly going off. But, thankfully, DriveOFF works by ridding your car of any technological interruptions.

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RHA SA950i headphones



Quality sound usually comes at a price. But while RHA's SA950is won't win any beauty awards, their audio output blows away similarly-priced opposition.

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Philips Sunrise Simulation wake-up light



As winter looms, the thought of getting-up early becomes ever-more unappealing. Thankfully, Philips have developed an affordable, easy-to-use solution.

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RHA MA450i earphones



Forged from aircraft-grade aluminum and coated with a scratch-resistant material, the tiny MA450is pack in loads of tech at a price that won't break the bank.

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The New Furby



With eyes packed with liquid crystal diodes, and dozens of transistors, the new Furby is built more like a cyborg than a children's toy. But it's still fun, if frequently tiresome.

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Philips Fidelio M1 headphones



Sometimes simplicity is best – a motto Philips likely adhered to when designing these M1 headphones. Strong build quality makes them a sound investment.

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Union 34 Stripe Rucksack Pannier bag



A clever rucksack that attaches to your bike's seatpost, leaving the rider completely free to negotiate the roads without the bother of a heavy bag on your back.

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