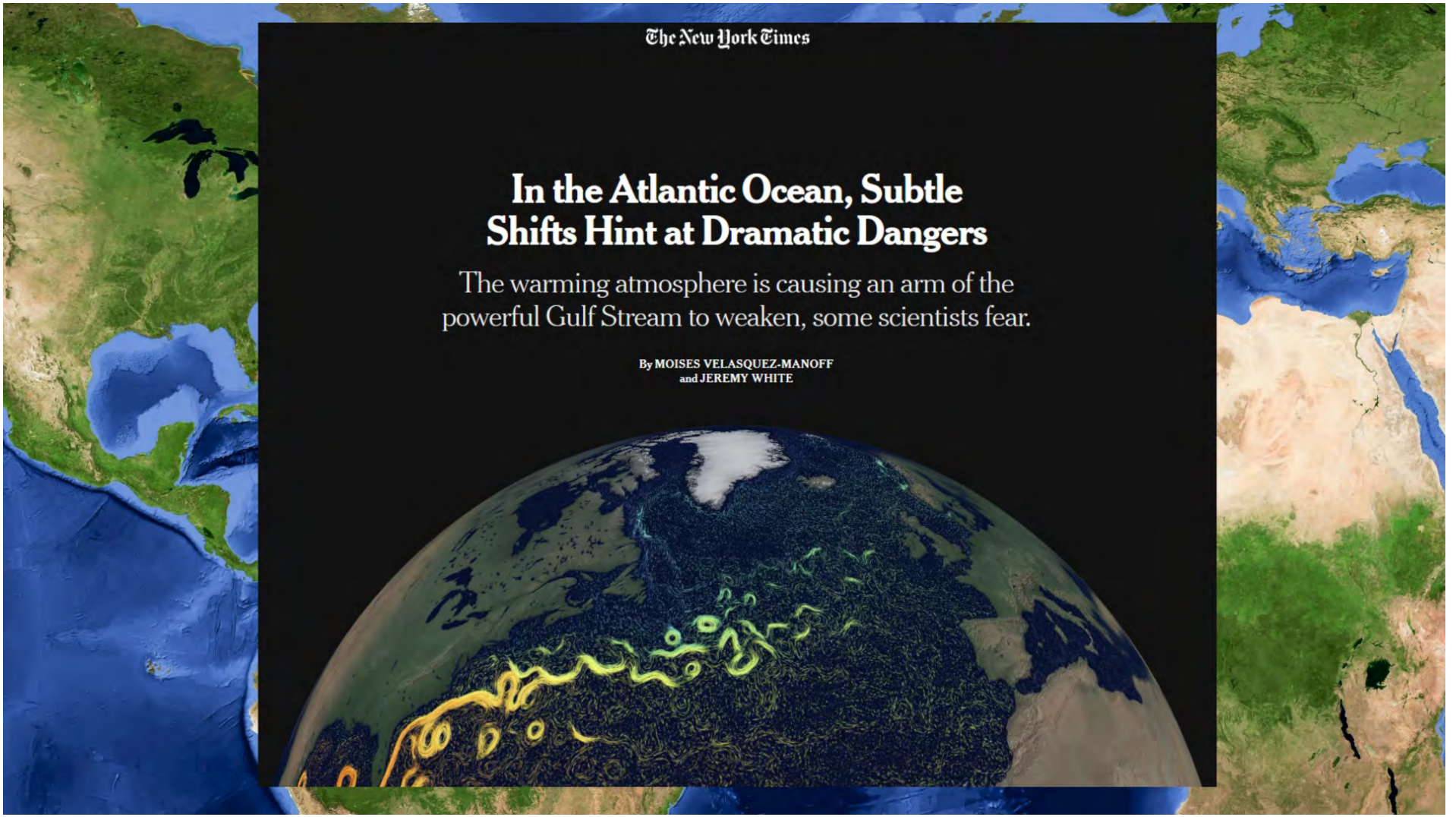
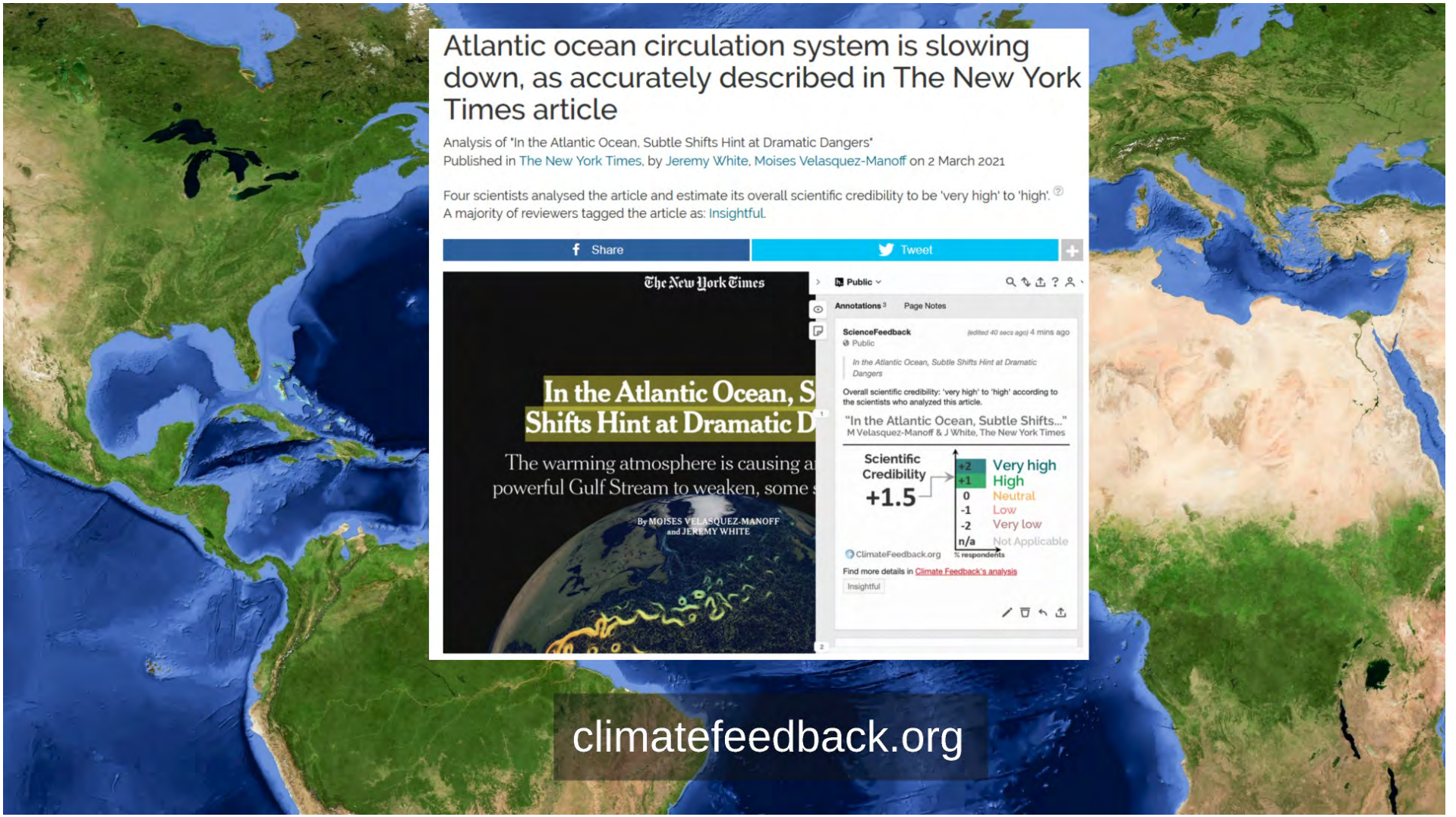
Recent insights on AMOC

Prof. Stefan Rahmstorf
Potsdam Institute for Climate Impact Research


The New York Times
In the Atlantic Ocean, Subtle Shifts Hint at Dramatic Dangers
The warming atmosphere is causing an arm of the powerful Gulf Stream to weaken, some scientists fear.
By MOISES VELASQUEZ-MANOFF and JEREMY WHITE


Atlantic ocean circulation system is slowing down, as accurately described in The New York Times article
Analysis of "In the Atlantic Ocean, Subtle Shifts Hint at Dramatic Dangers"
Published in The New York Times, by Jeremy White, Moises Velasquez-Manoff on 2 March 2021
Four scientists analysed the article and estimate its overall scientific credibility to be 'very high' to 'high'.
A majority of reviewers tagged the article as: Insightful.
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The New York Times
In the Atlantic Ocean, S
Shifts Hint at Dramatic D
The warming atmosphere is causing a
powerful Gulf Stream to weaken, some
By MOISES VELASQUEZ-MANOFF and JEREMY WHITE
Public
Annotations 3
Page Notes
ScienceFeedback
(edited 40 secs ago) 4 mins ago
Public
In the Atlantic Ocean, Subtle Shifts Hint at Dramatic Dangers
Overall scientific credibility: 'very high' to 'high' according to the scientists who analyzed this article.
"In the Atlantic Ocean, Subtle Shifts..."
M Velasquez-Manoff & J White, The New York Times
Scientific Credibility
+1.5
+2 Very high
+1 High
0 Neutral
-1 Low
-2 Very low
n/a Not Applicable
% respondents
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Insightful
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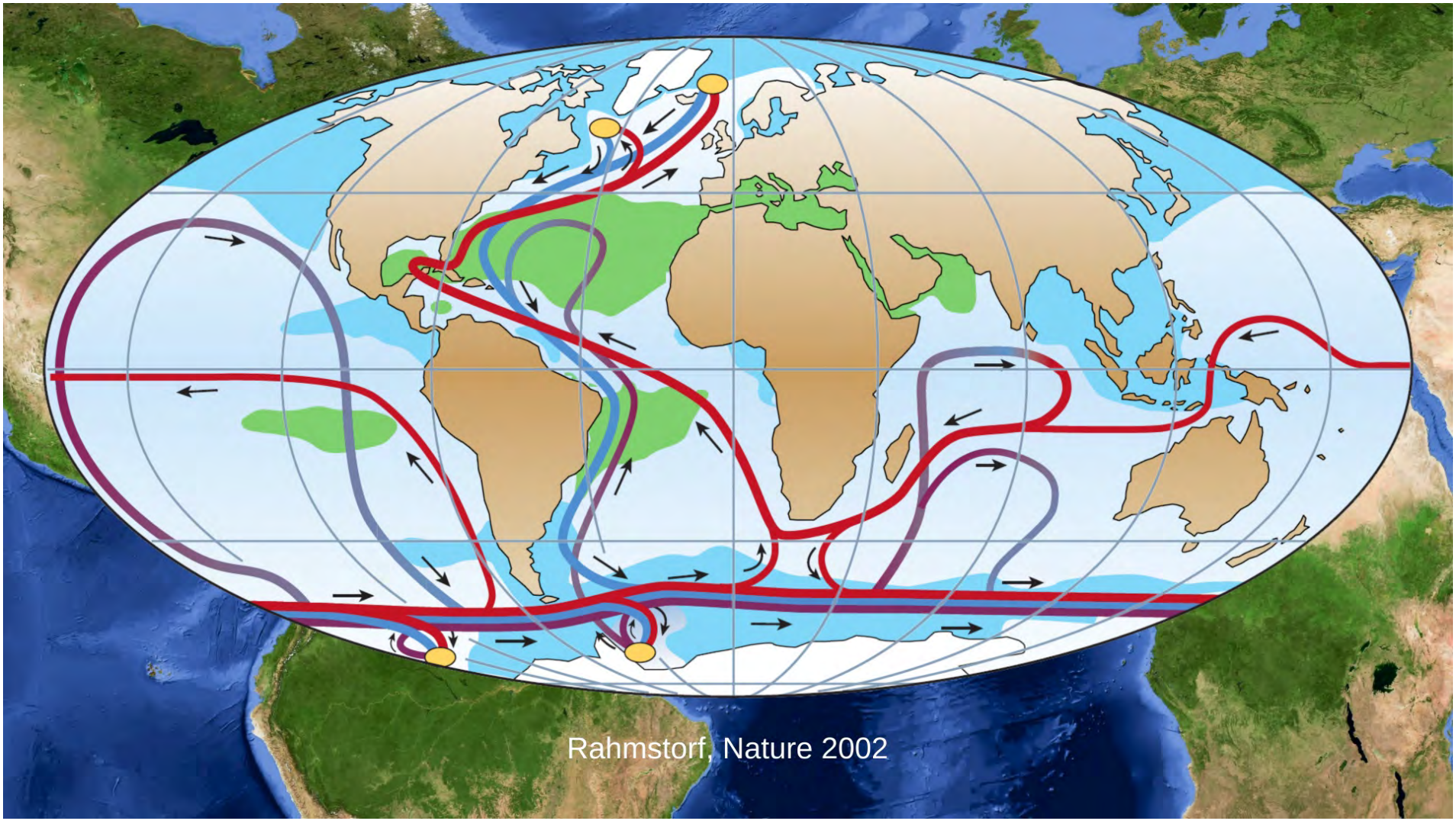
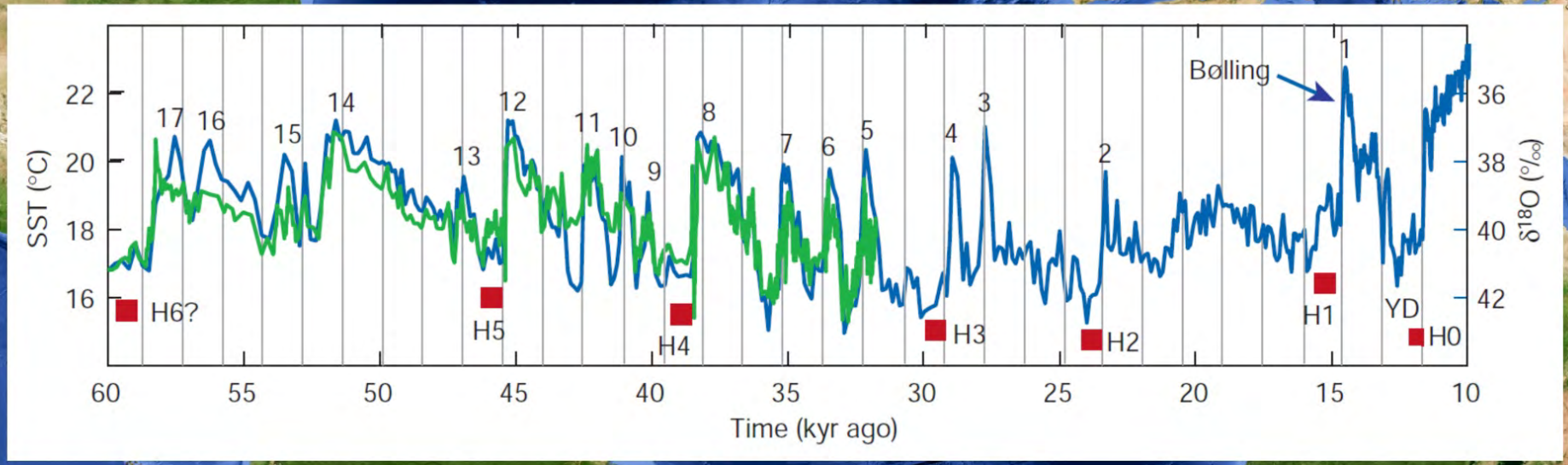
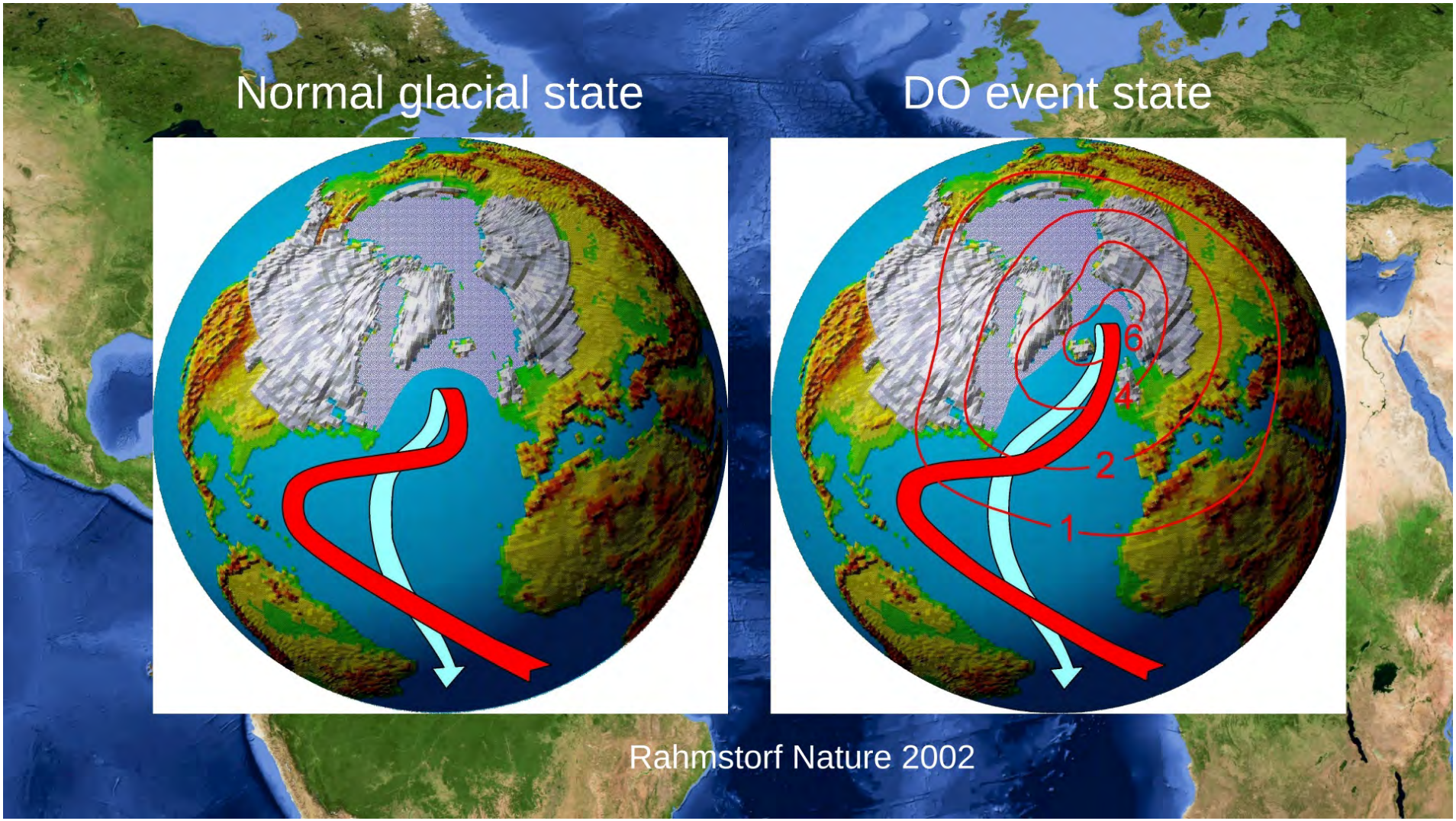
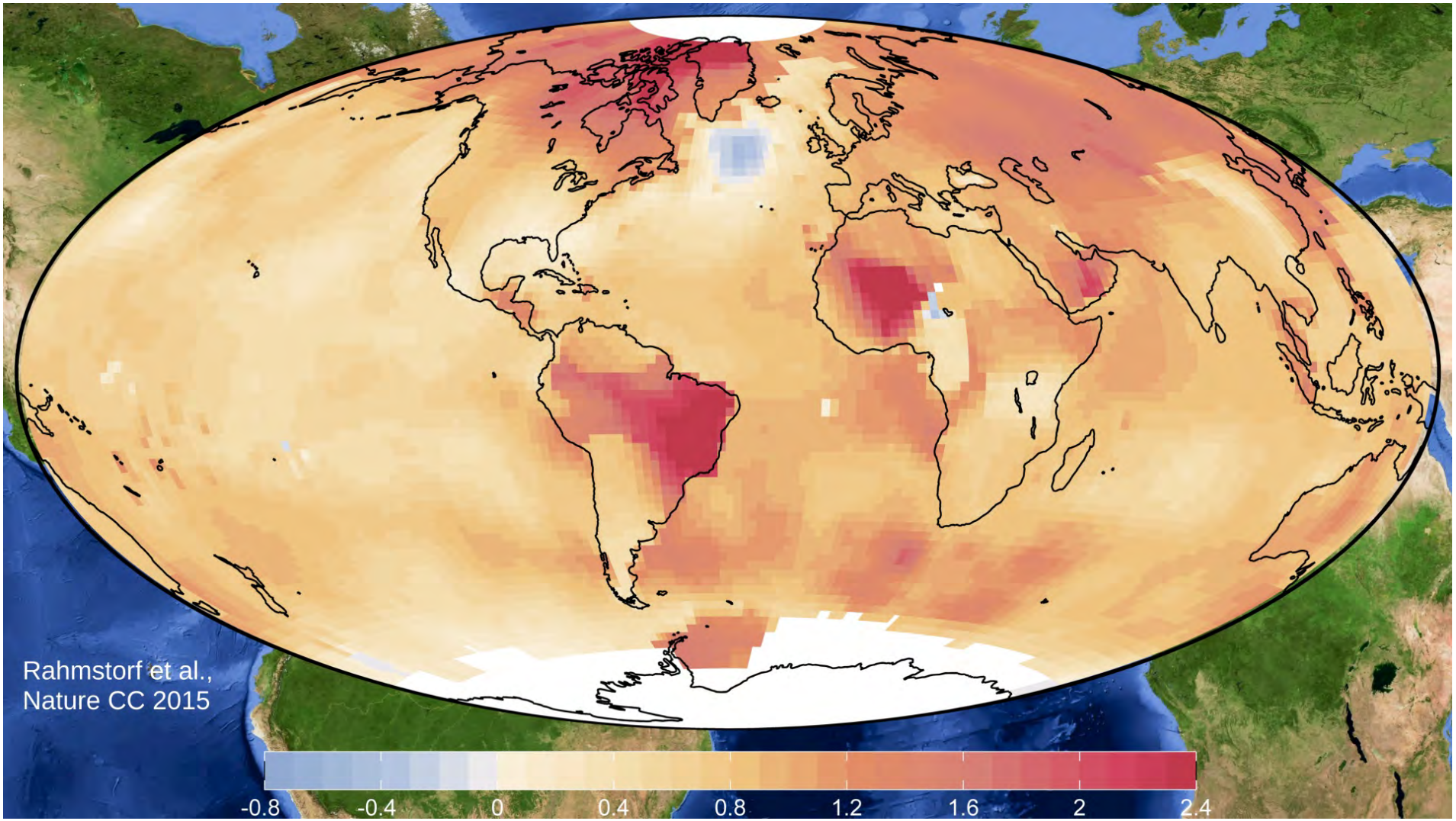

Rahmstorf, Nature 2002

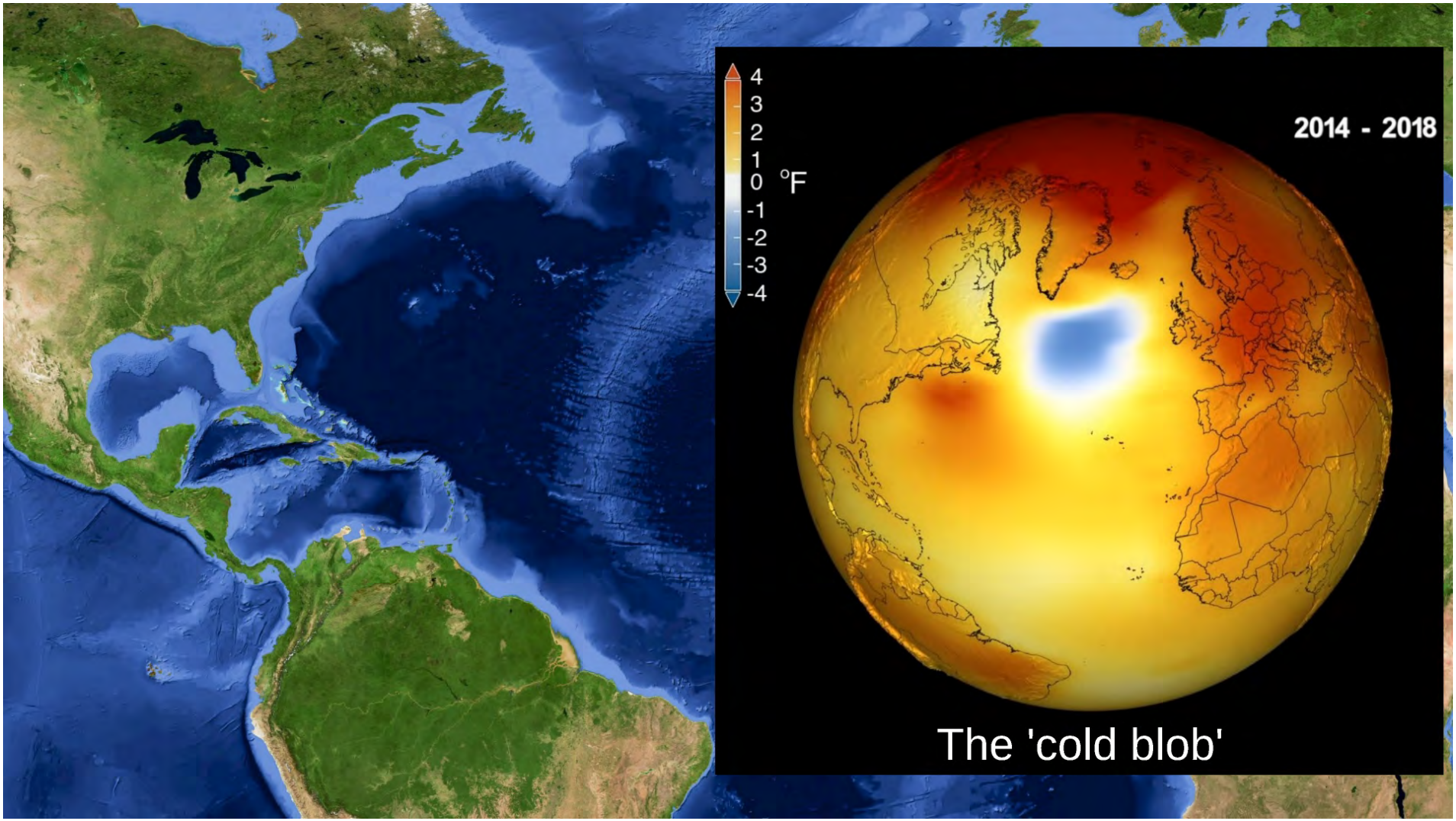
Abrupt glacial climate events



Rahmstorf Nature 2002


Normal glacial state
DO event state
6
4
2
1
Rahmstorf Nature 2002


Rahmstorf et al.,
Nature CC 2015
-0.8
-0.4
0
0.4
0.8
1.2
1.6
2
2.4


4
3
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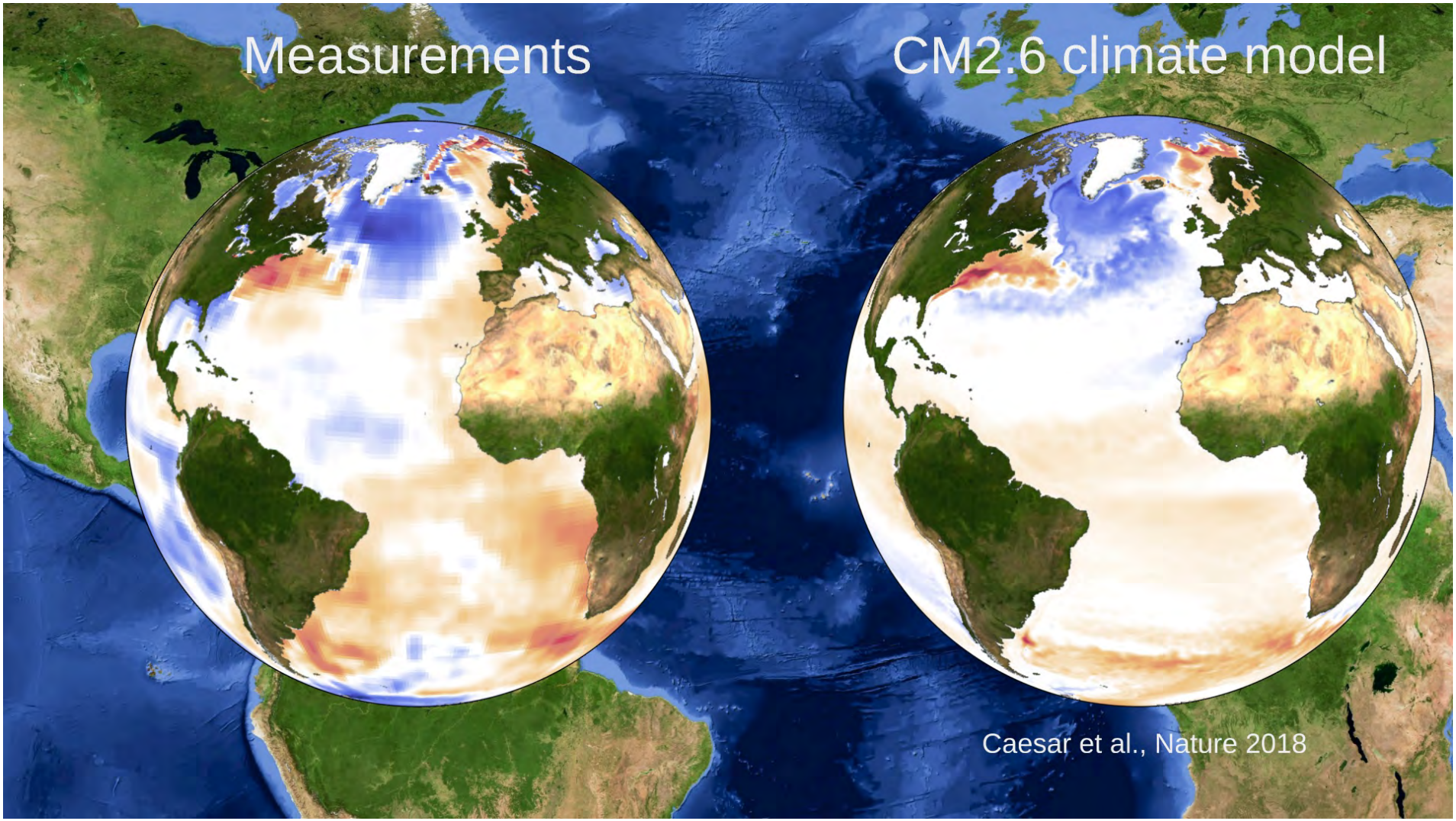
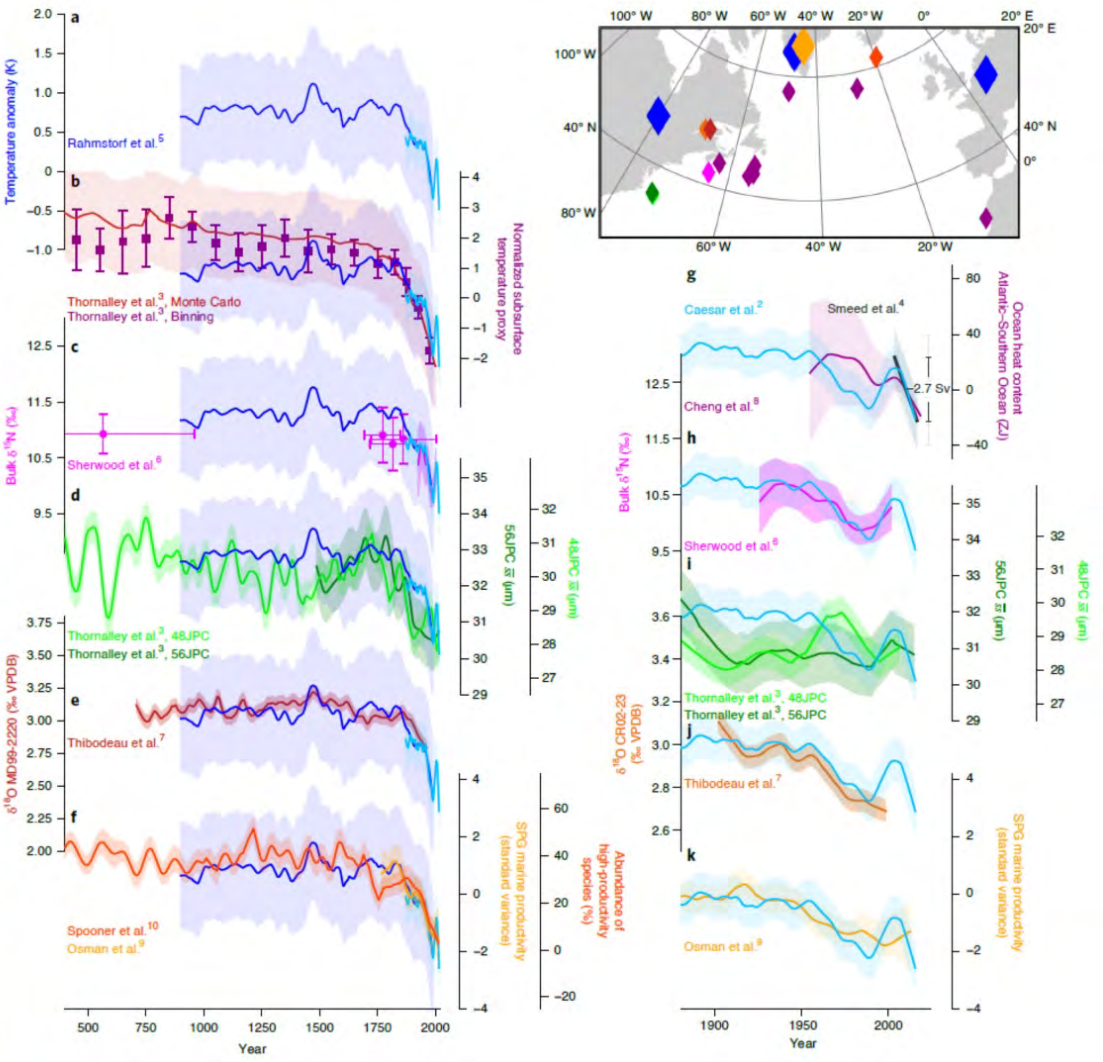
1
0
-1
-2
-3
-4
°F
2014 - 2018
The 'cold blob'

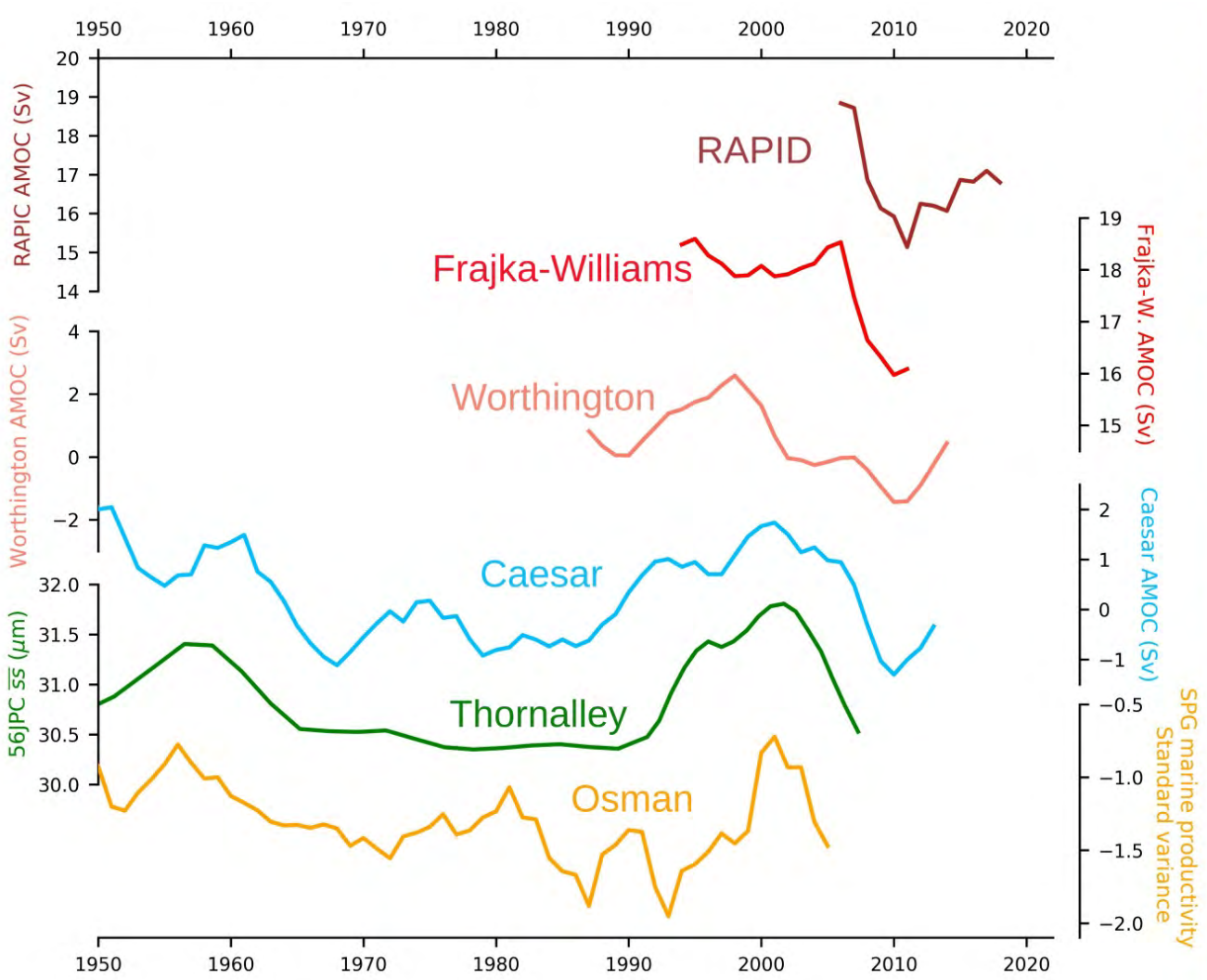

Measurements
CM2.6 climate model
Caesar et al., Nature 2018

nature geoscience

Current Atlantic Meridional Overturning Circulation weakest in last millennium

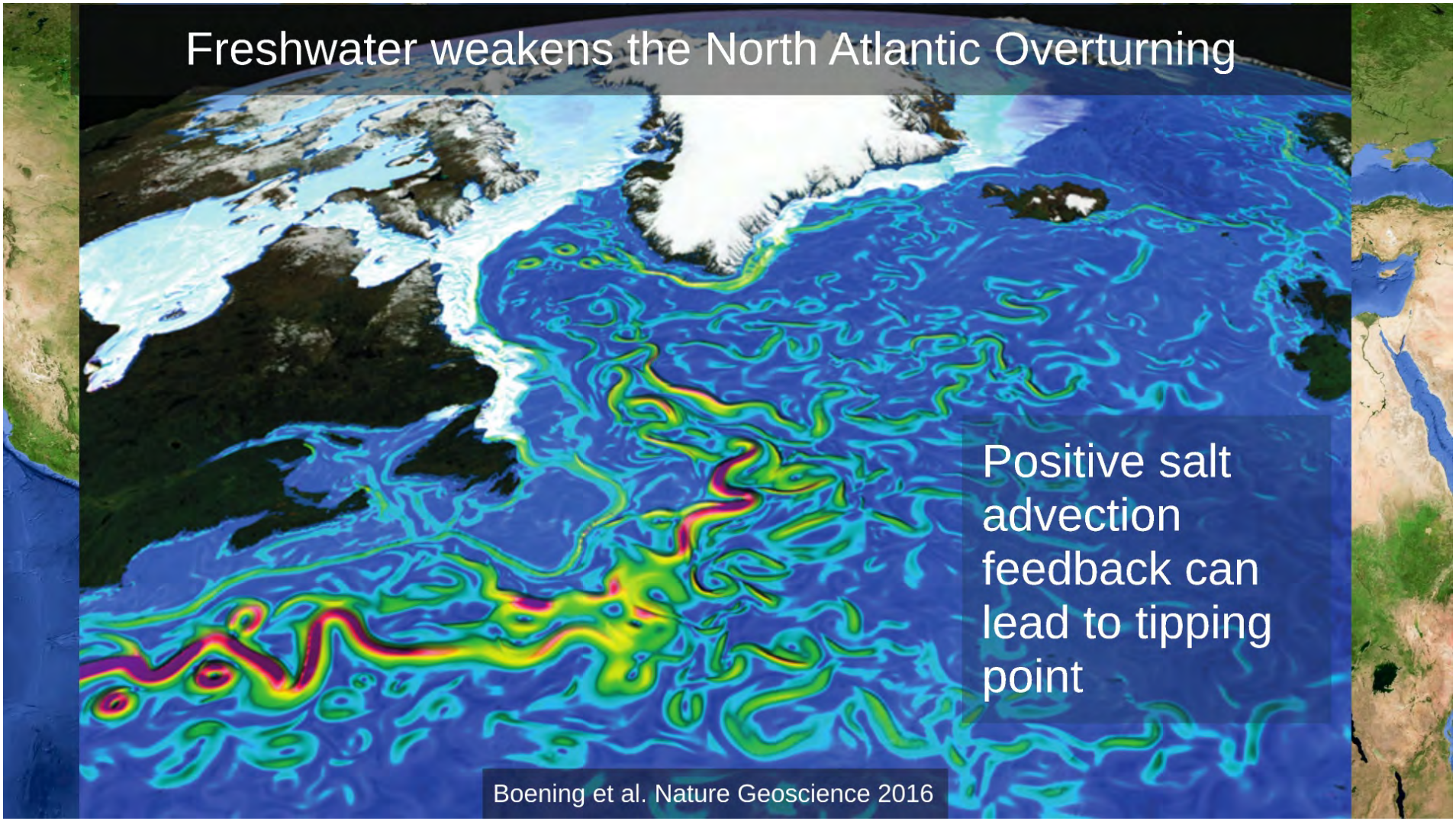
L. Caesar[1,2] ✉, G. D. McCarthy[1], D. J. R. Thornalley[3], N. Cahill[4] and S. Rahmstorf[2,5]




1950
1960
1970
1980
1990
2000
2010
2020
RAPIC AMOC (Sv)
RAPID
Frajka-Williams
Frajka-W. AMOC (Sv)
Worthington AMOC (Sv)
Worthington
Caesar
Caesar AMOC (Sv)
56IPC $\overline{ss}$ (μm)
Thornalley
Osman
SPG marine productivity
Standard variance

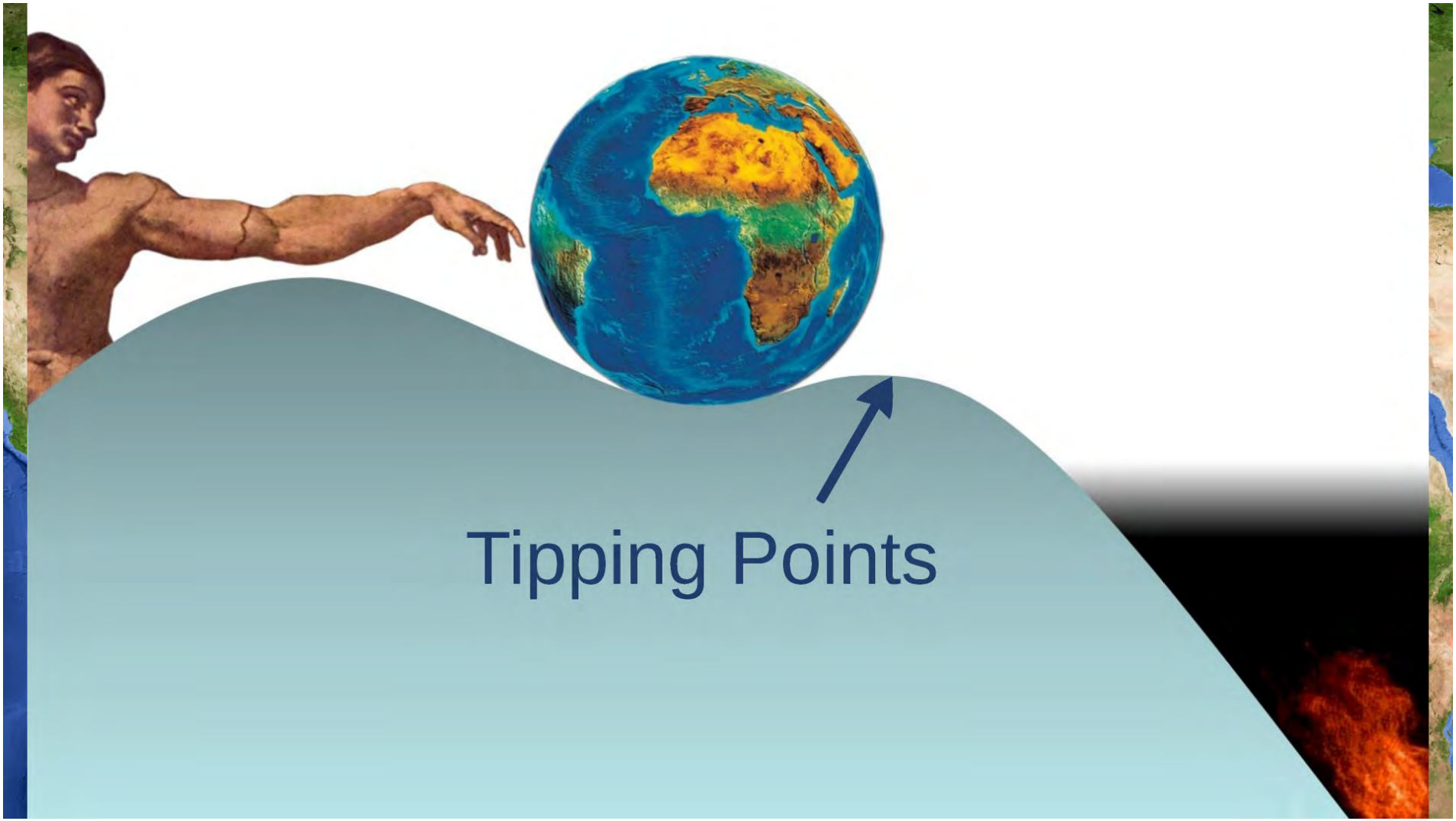

Do AMOC reconstructions agree since ~1950?
Here, subpolar gyre temperature (Caesar) and productivity (Osman) lag AMOC by 6 years, sortable silt (Thornally) leads by 6 years.
Caesar et al. 2022

Freshwater weakens the North Atlantic Overturning

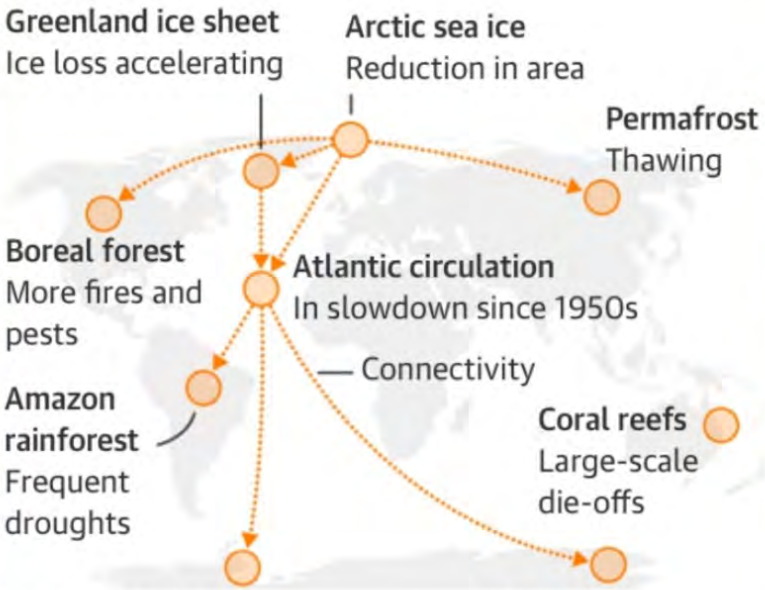


Positive salt advection feedback can lead to tipping point

Boening et al. Nature Geoscience 2016


Tipping Points

Scientists' warning: a cascade of climate tipping points is possible



Guardian graphic. Source: Lenton et al, Nature, 2019

Climate tipping points – too risky to bet against

Timothy M. Lenton, Johan Rockström, Owen Gaffney, Stefan Rahmstorf, Katherine Richardson, Will Steffen & Hans Joachim Schellnhuber

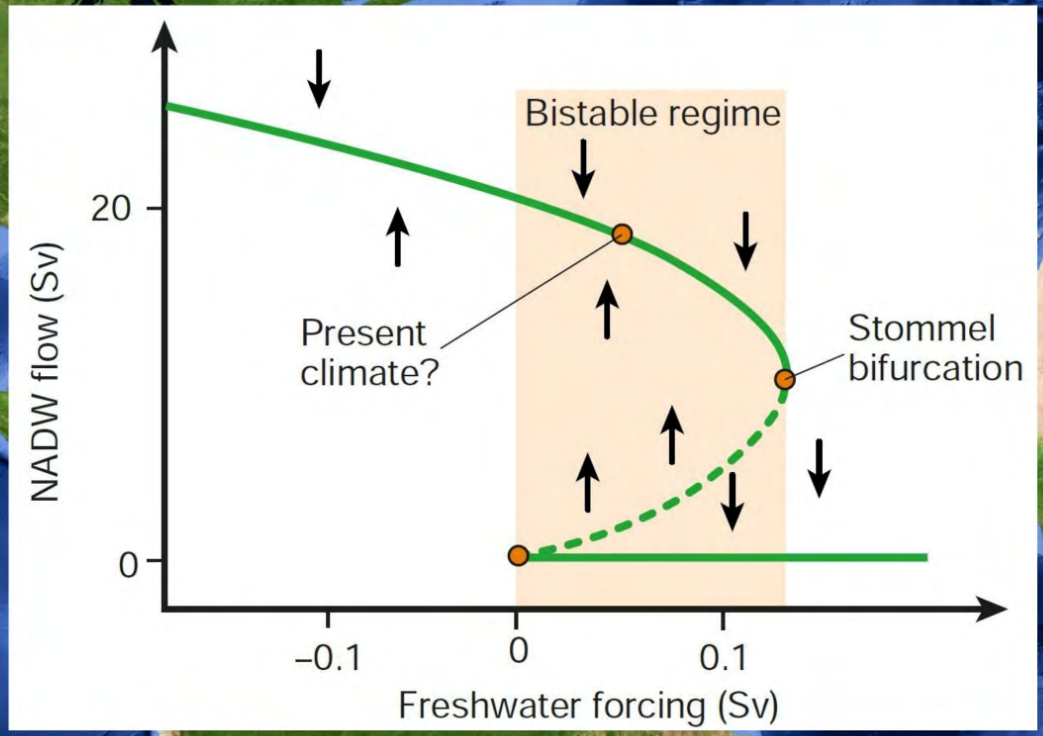
The growing threat of abrupt and irreversible climate changes must compel political and economic action on emissi

assuming that climate tipping points are of very low probability (even if they would be catastrophic), have sugge that 3 °C warming is optimal fit perspective. looking more recommendate-economy recent IPCC ng must be emergency

"The clearest emergency would be if we were approaching a global cascade of tipping points."

Lenton et al. Nature 2019

Atlantic ocean bifurcation



Rahmstorf Nature 2002

Are we close to a tipping point?

nature climate change

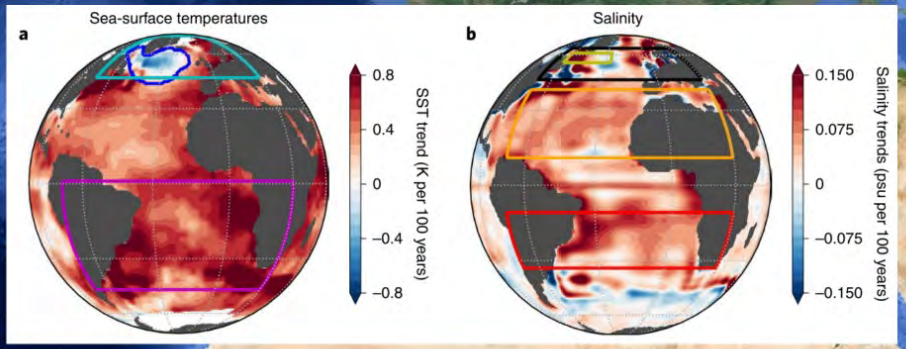
ARTICLES

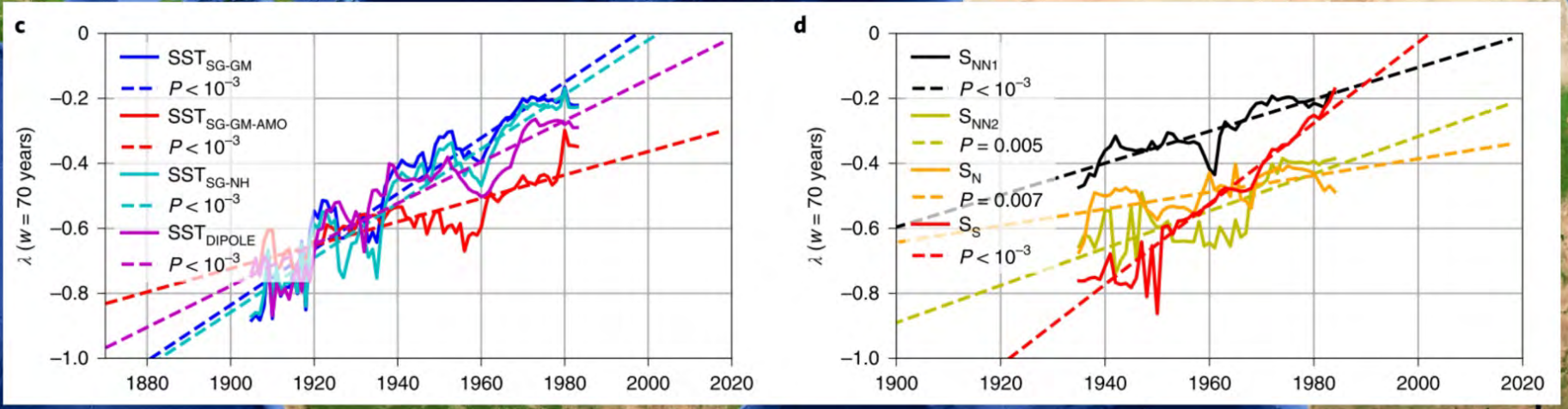
https://doi.org/10.1038/s41558-021-01097-4

Check for updates

Observation-based early-warning signals for a collapse of the Atlantic Meridional Overturning Circulation

Niklas Boers [1,2,3] ✉





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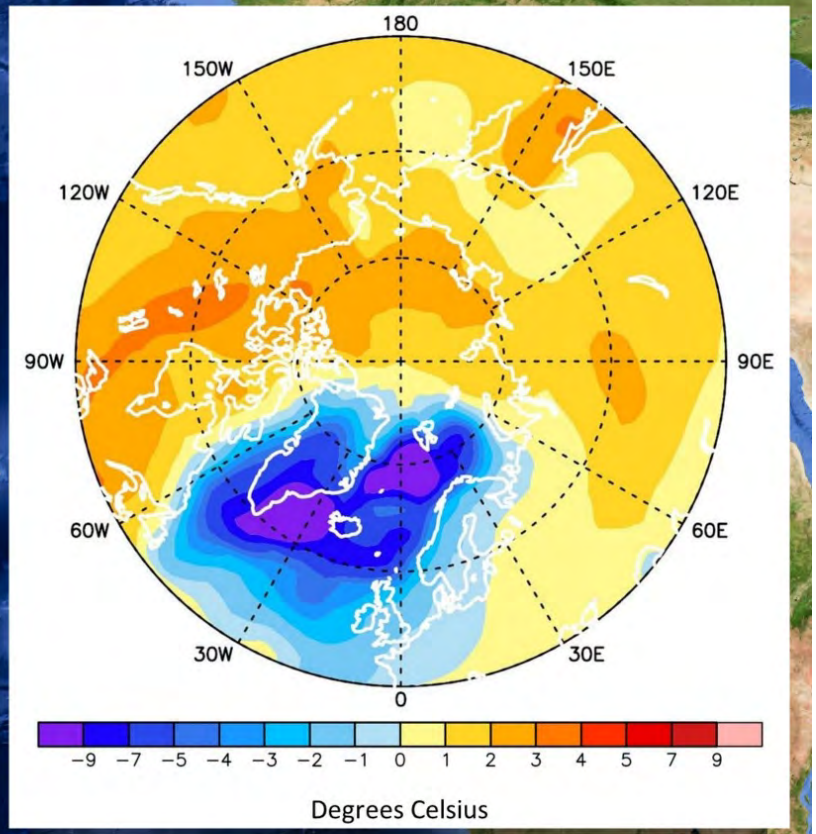
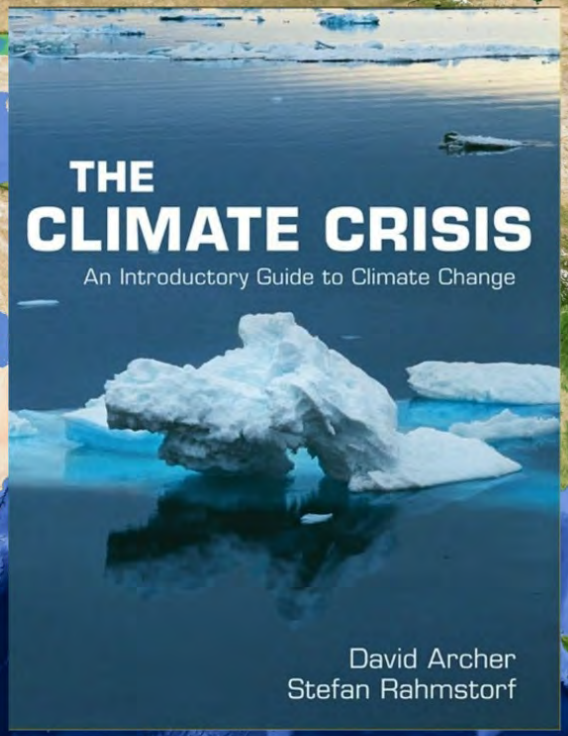
Overlooked possibility of a collapsed Atlantic Meridional Overturning Circulation in warming climate

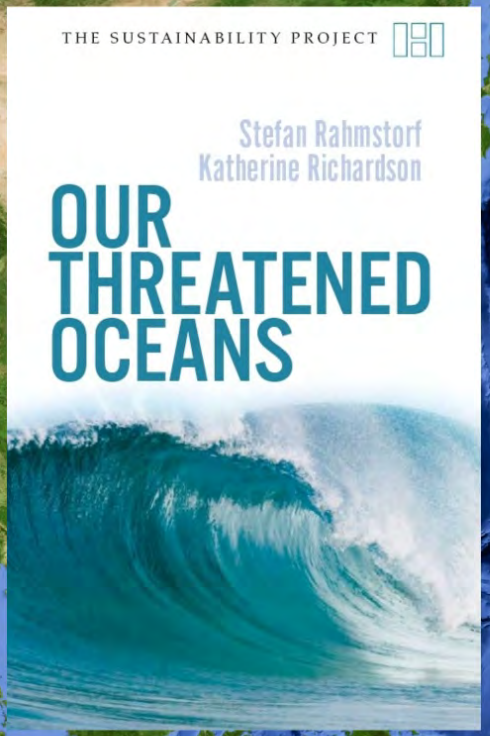
Wei Liu,[1]*† Shang-Ping Xie,[1] Zhengyu Liu,[2] Jiang Zhu[2]



Liu et al., Science Advances 2017

Thank you for your attention!





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