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# **The Hard Work of Hope:**

## ***Sustaining Cooperation on Water Security & Climate Stability in the Post-Truth Trumpocene***

*A Presentation by*

*R.W. Sandford*

*EPCOR Chair, Water and Climate Security*

*United Nations University*

*Institute for Water, Environment & Health*



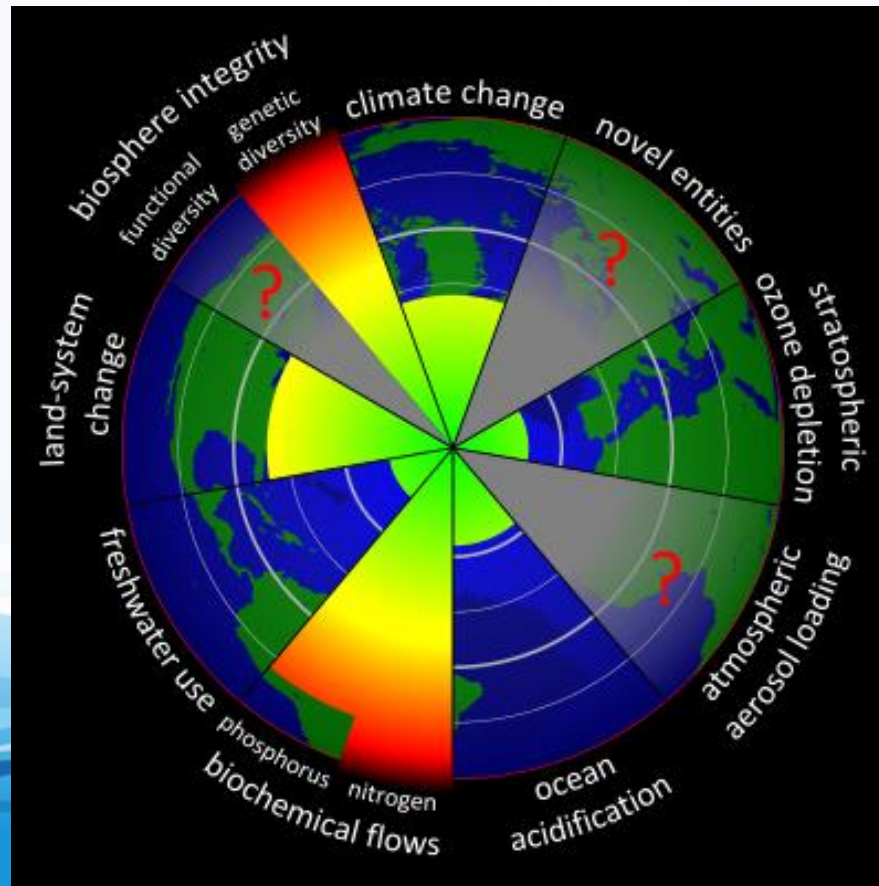


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## *Follow the Water: Earth system boundaries*





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## *Follow the Water: Earth system function*







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## *Follow the Water: The Atmospheric Ocean*





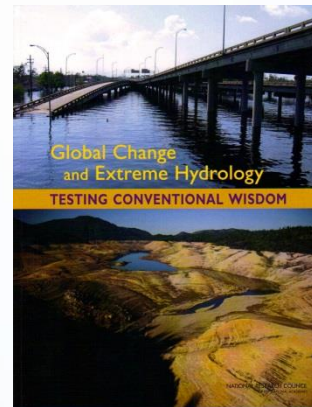
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## *Follow the Water:*

[www.nap.edu](http://www.nap.edu)



***"Continuing to use the assumption of stationarity in designing water management systems is, in fact, no longer practical or even defensible."***

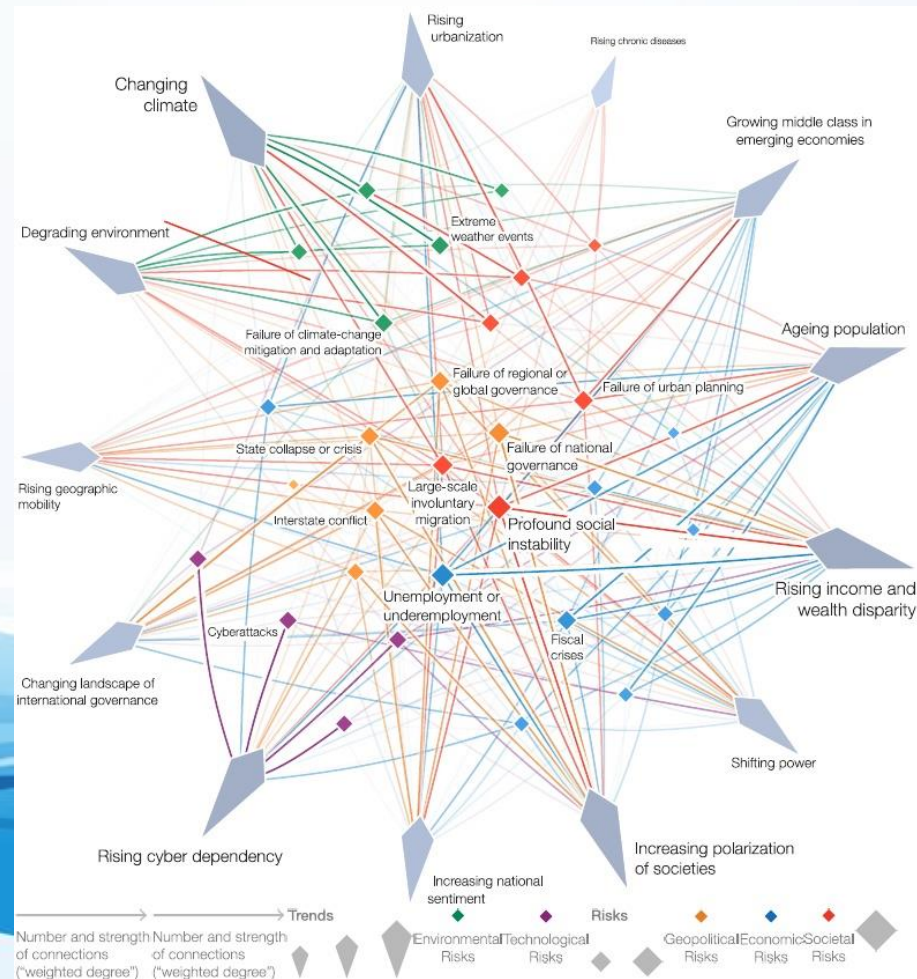


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# Follow the Water: The World Economic Forum







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## *Follow the Water: A new geological era?*

The 'Anthropocene' [or human-centered] geological epoch may be characterized by the collapse of natural systems' built-in resilience strategies, meaning human beings will take on even greater **responsibility** for environmental disruption and/or wellbeing...





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## ***Follow the Water: Extinction is forever.***







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## *Follow the Water:*

### Worldwide Distribution of Population Growth





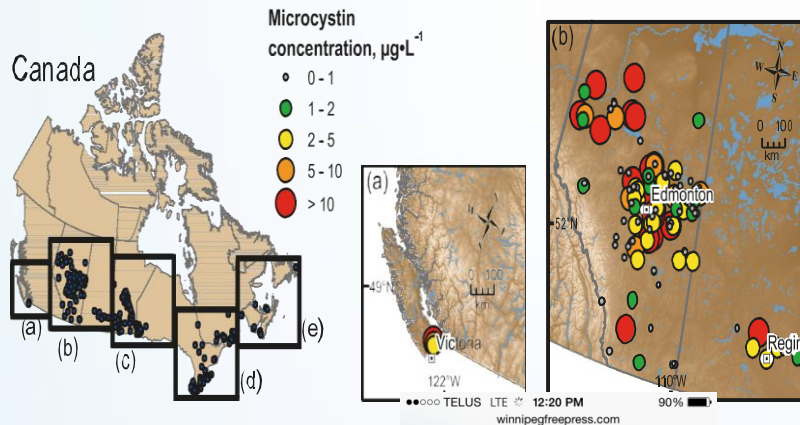
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# Water & Climate Security:

## Eutrophication of Canadian Lakes & Waters



Winnipeg Free Press

Local

### Watchdog urges consumers not to buy fish from Manitoba's largest lakes

Threat of the highest scale

By: Bartley Kives

Posted: 11/9/2015 3:00 AM | Last Modified: 11/9/2015 10:02 AM |

Updates | Comments: 37







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## ***Follow the Water: Externalities:***

***a cost or benefit that affects a party that did not  
choose to incur that cost or benefit.***



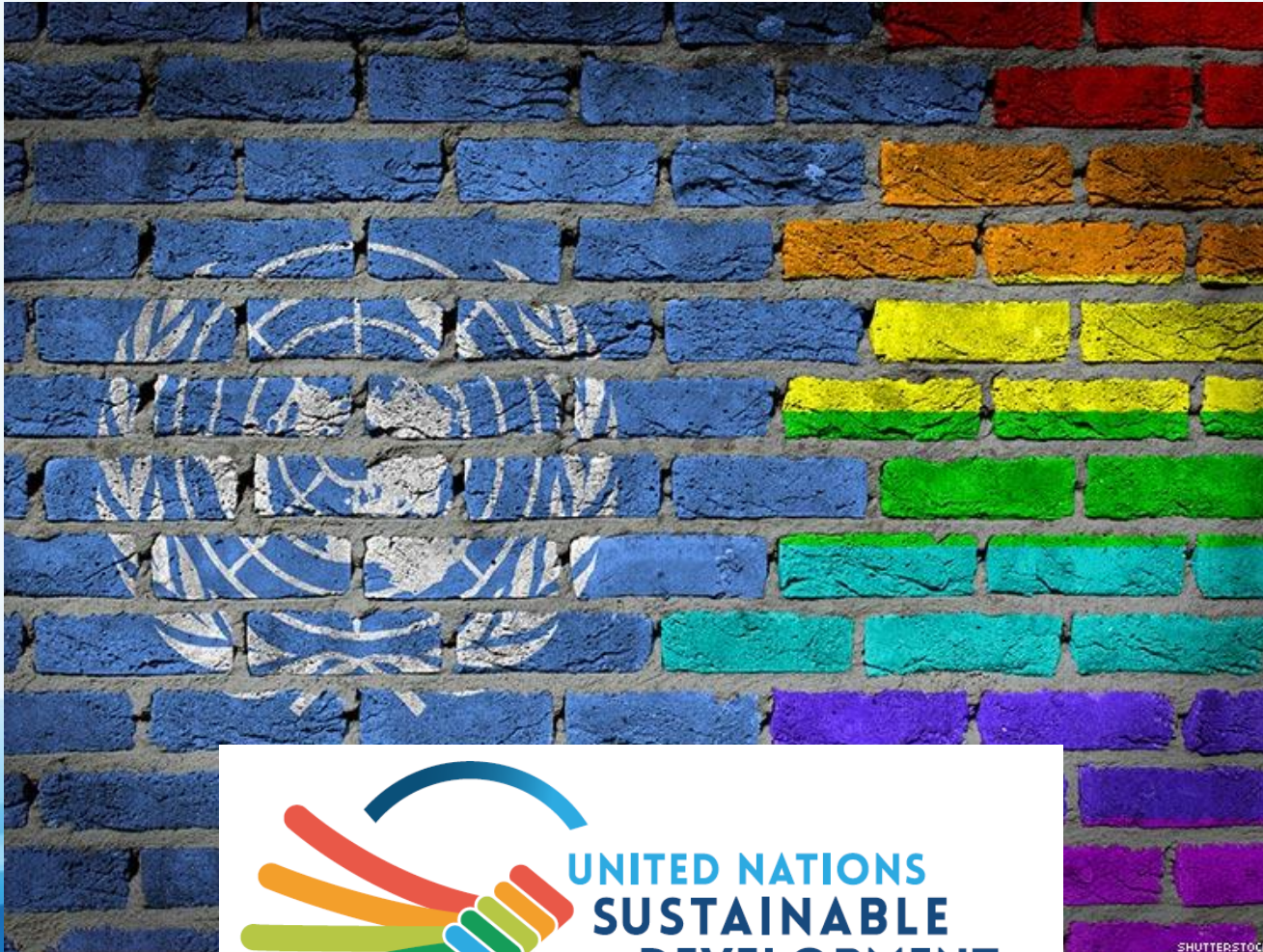




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SUMMIT 2015  
25 - 27 SEPTEMBER

SHUTTERSTOCK



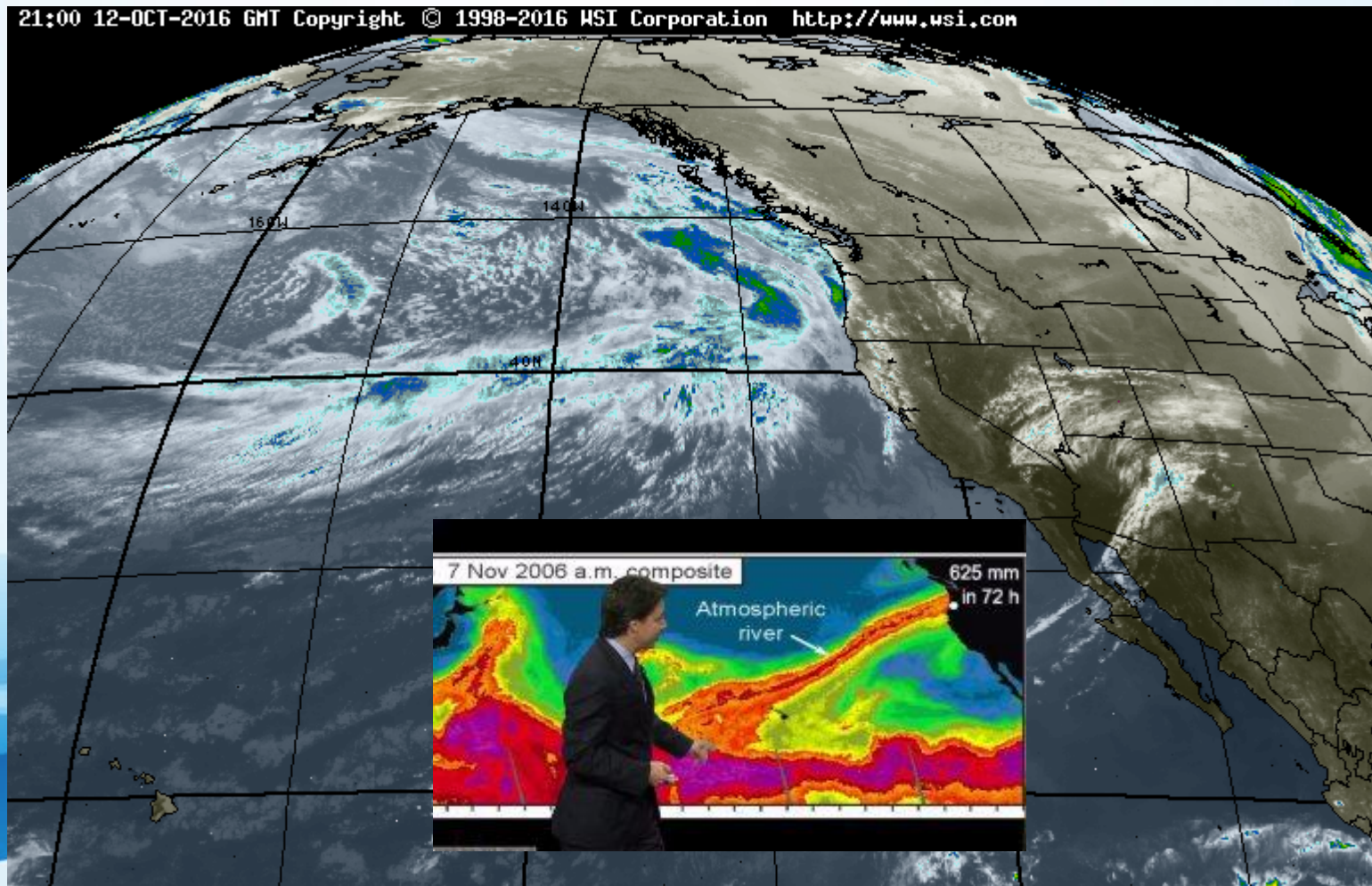


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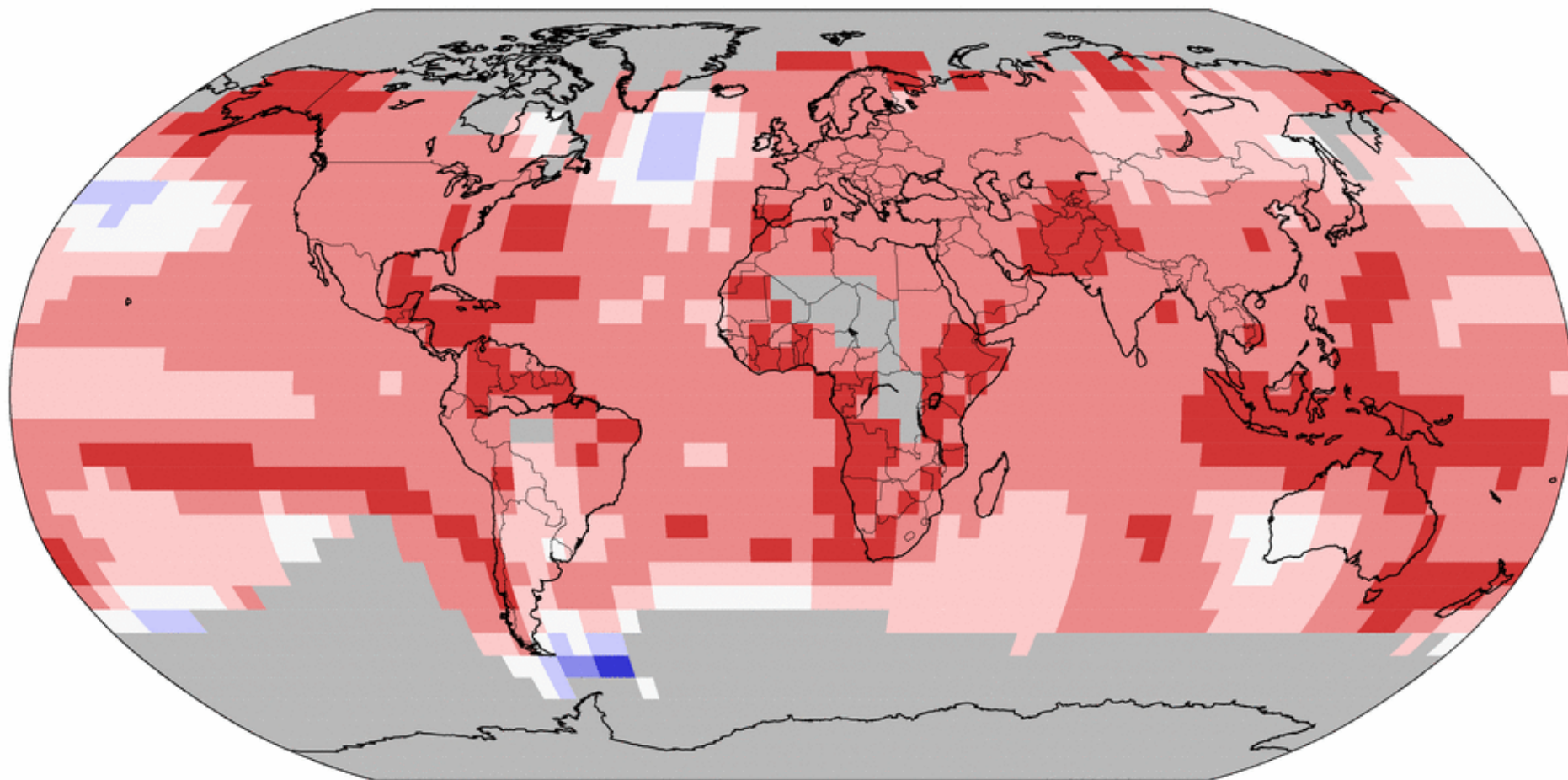
# Atmospheric Rivers



# Land & Ocean Temperature Percentiles Jan–Dec 2016

NOAA's National Centers for Environmental Information

Data Source: GHCN–M version 3.3.0 & ERSST version 4.0.0



**Record  
Coldest**



**Much  
Cooler than  
Average**



**Cooler than  
Average**



**Near  
Average**



**Warmer than  
Average**



**Much  
Warmer than  
Average**



**Record  
Warmest**







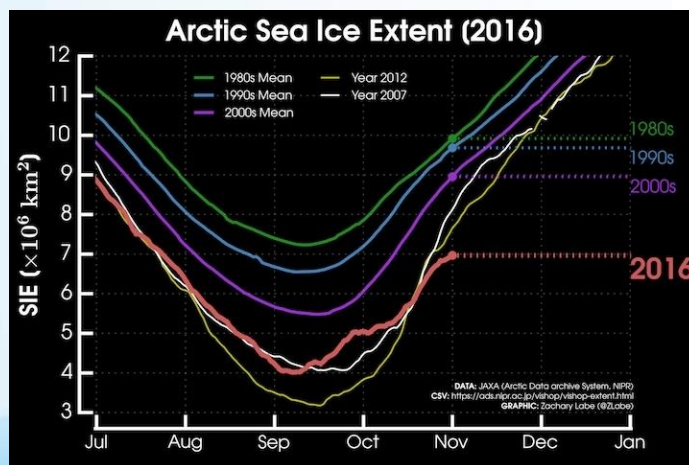
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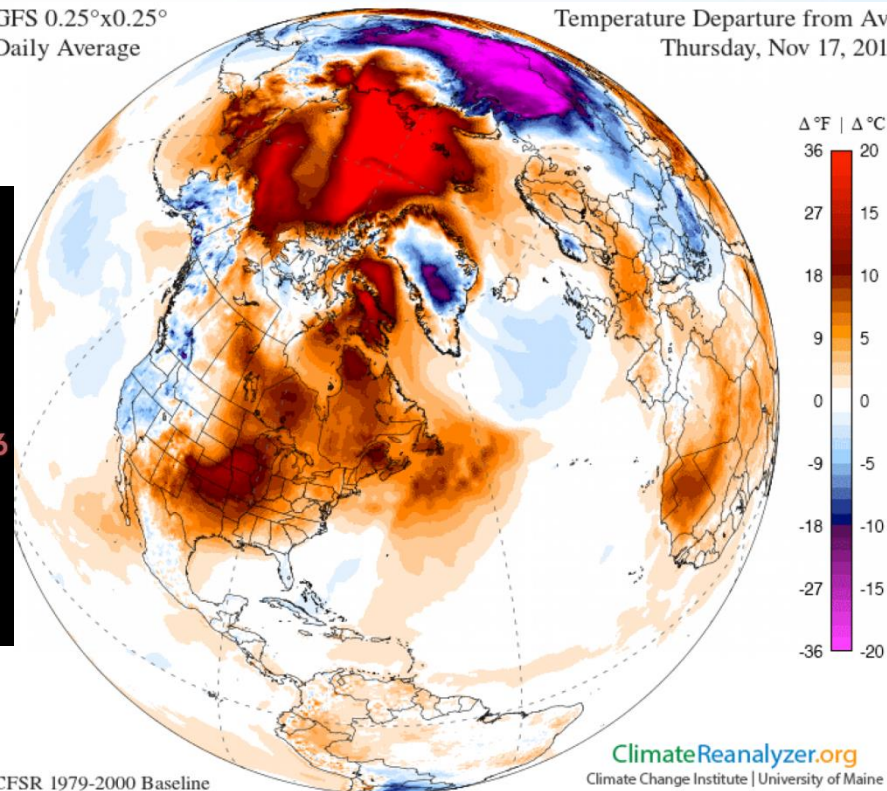
# Follow the Water:

## Arctic sea ice extent in 2016.



GFS 0.25°x0.25°  
Daily Average

Temperature Departure from Avg  
Thursday, Nov 17, 2016



CFSR 1979-2000 Baseline

World  
+ 0.55 °C

Northern Hemisphere  
+ 0.94 °C

Arctic  
+ 6.42 °C

Tropics  
+ 0.31 °C

Southern Hemisphere  
+ 0.15 °C

Antarctic  
+ 0.92 °C

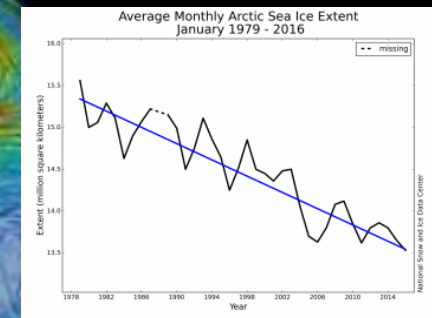
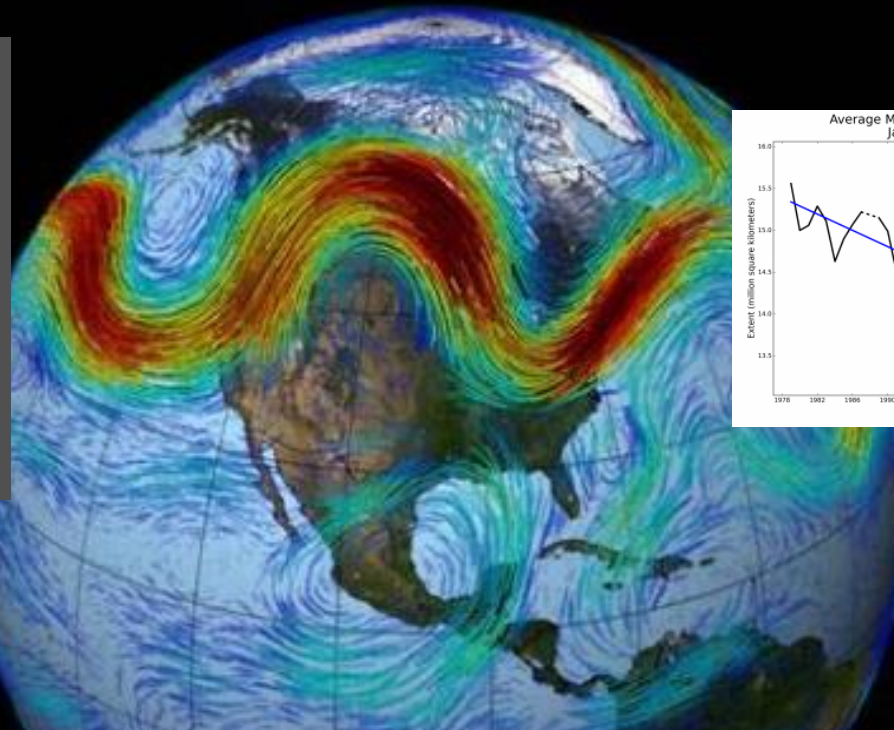
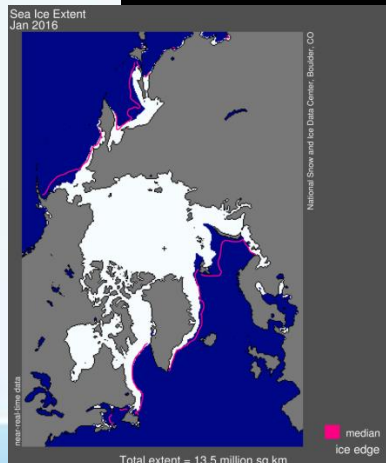


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# *What we know scientifically: The loss of Arctic sea ice appears to be causing the jet stream to meander.*







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# *Follow the Water:* *Carbon bubbles rise in an Alaskan lake.*



Chip Phillips  
Photography



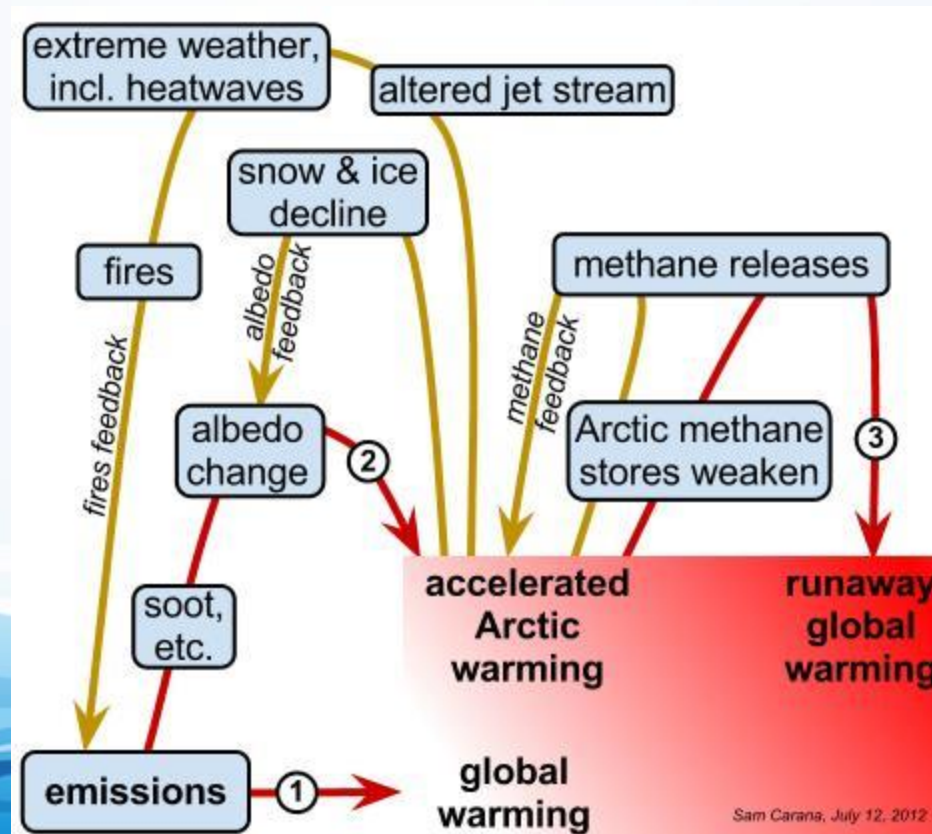


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## *Follow the Water:* *Arctic climate warming feedbacks*





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