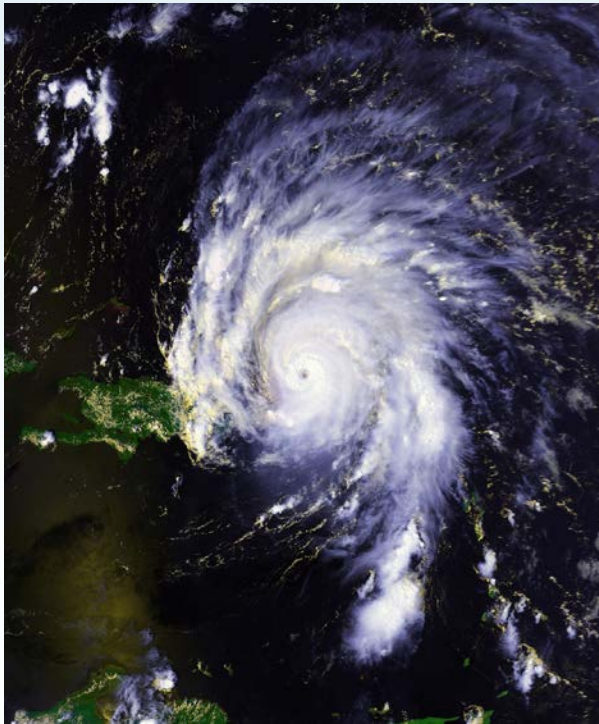


# GLOBAL HEATING AND CLIMATE CATASTROPHE completing the picture



**Bill McGuire**

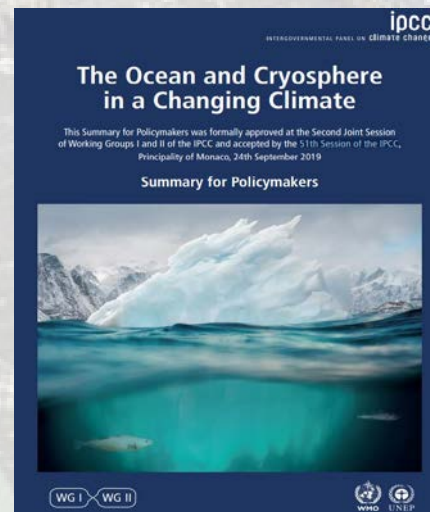
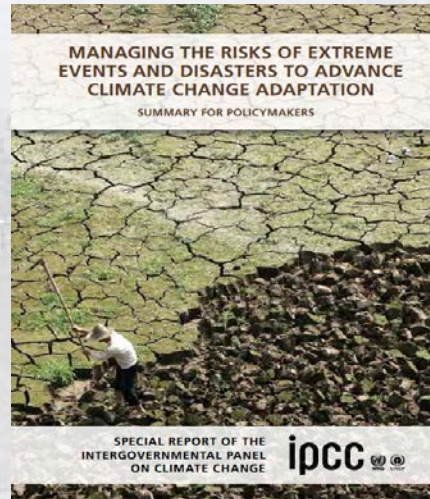
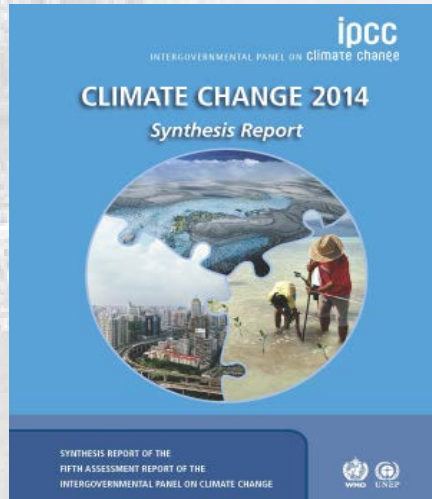
*Professor Emeritus of Geophysical & Climate Hazards UCL*

## UGLY SCIENTISTS.....

“Sometimes you see beautiful people with no brains. Sometimes you have ugly people who are intelligent.....like scientists”

José Mourinho. Chelsea FC Manager  
BBC Online. February 20<sup>th</sup> 2005

# CLIMATE BIBLE OR INCOMPLETE PICTURE?



- ☹ Complete picture of the potential consequences of global heating and climate breakdown is not in the accessible public domain
- ☹ IPCC reports and announcements are inevitably conservative and consensus based
- ☹ Widely regarded as the climate bible that drives news stories in the media
- ☹ Many (if not most) climate scientists have a problem with telling it like it is – at least in public



# SOME MISSING PIECES



Sea-level rise



Solid Earth response



Gulf Stream (AMOC) shutdown



Extreme heat



# TREADING A FINE LINE



# SEA LEVEL RISE: HOW FAST?

- ☹ IPCC SROCC (2019) Worst case *likely* range 51 – 92cm for 2081-2100. Up to 110cm by 2100
- ☹ More rapid breakup of West Antarctic Ice Sheet. Worst case → 292cm by 2100
- ☹ Ice melt doubling times lower end of 10 - 40y range → multi-metre rise by 2100
- ☹ Rate of Antarctic ice loss tripled 2012 – 17
- ☹ Tripling time of 5 years → SL rising by ~ 5cm a year by mid-2040s



## Sea-level rise increase

1901-90	1.4mm/y
2006-2015	3.6mm/y
2019	5mm/y

Hansen et al. 2016 Atmos. Chem. Phys., **16**, 3761-3812

Le Bars, D. et al. 2017 Env. Res. Lett., **12**, no.4.

The IMBIE Team 2018 Nature **558**, 219-222



# DID THE EARTH MOVE FOR YOU?



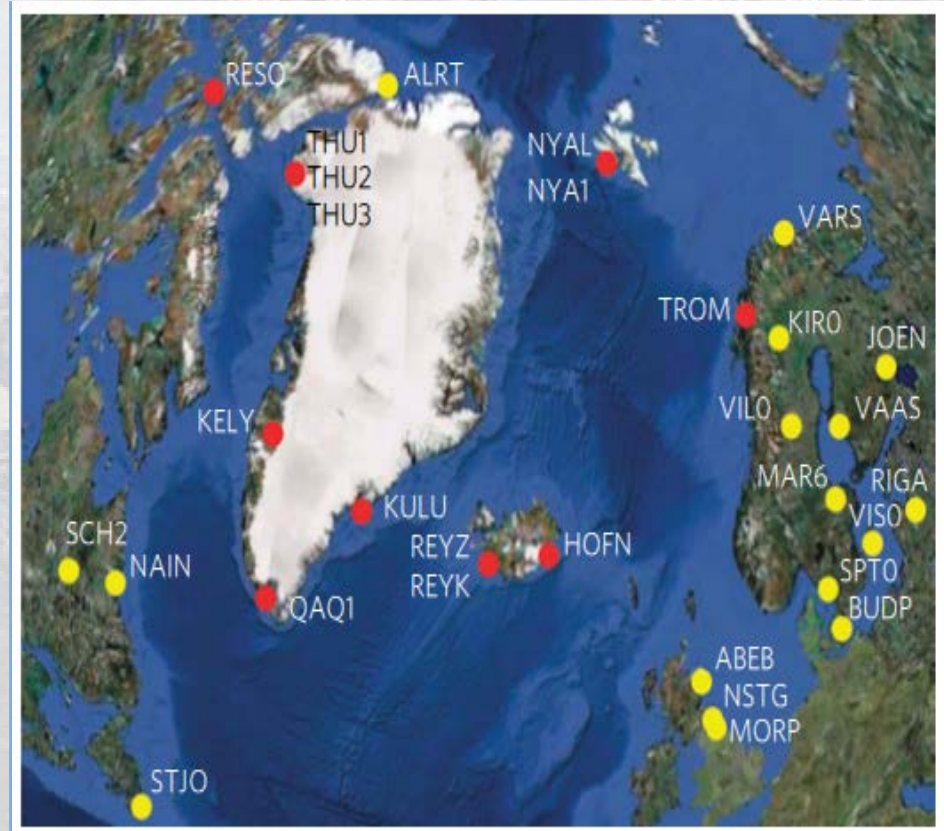
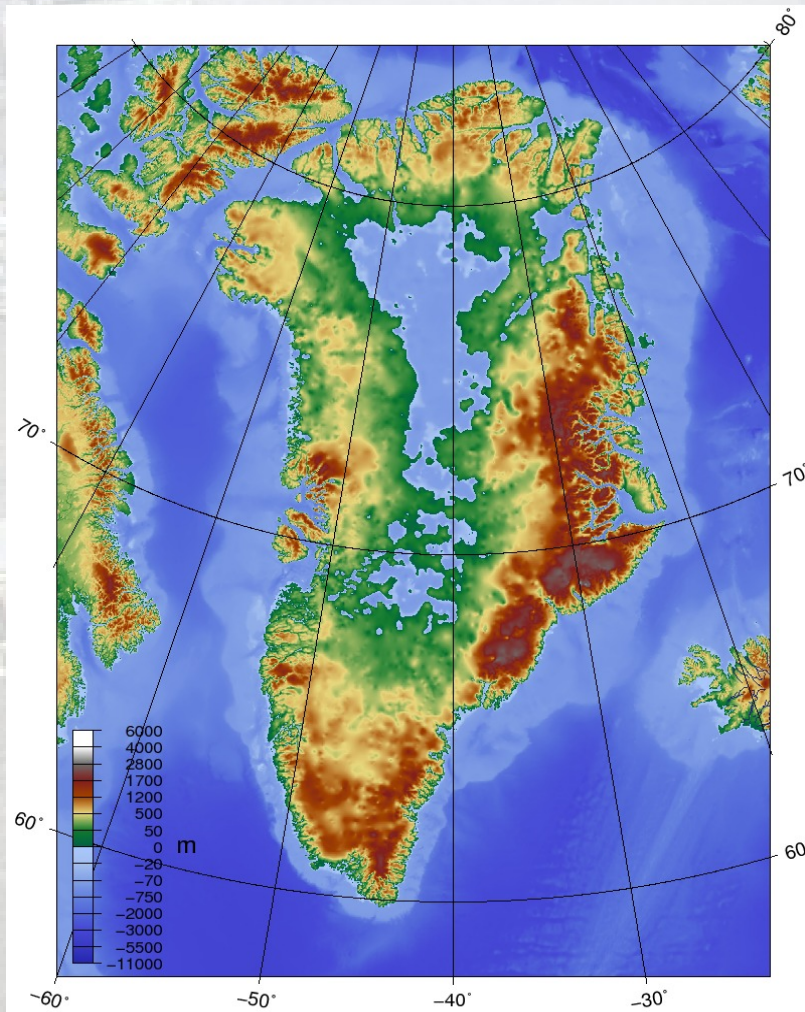
- ☹ IPCC SREX 2012  
*'....modulations of seismicity and volcanic activity on.....century to millennium time scales'*
- ☹ *'....low confidence in the nature of recent and projected future seismic responses to climate change'*
- ☹ Seismic response already recognised in southern Alaska
- ☹ 100m ice loss on glaciated volcanoes may promote more explosive eruptions
- ☹ Seismic response to Greenland ice unloading → timescales as short as 10 – 100y

Sauber, J. M & Molnia, B. F. 2004 Global Planet. Change. **42**, 279-93

Hampel, A. et al. 2010 Phil. Trans. R. Soc. A., **368**, 2501-18

Tuffen, H. 2010 Phil. Trans. T. Soc. **368**, 2535-2558

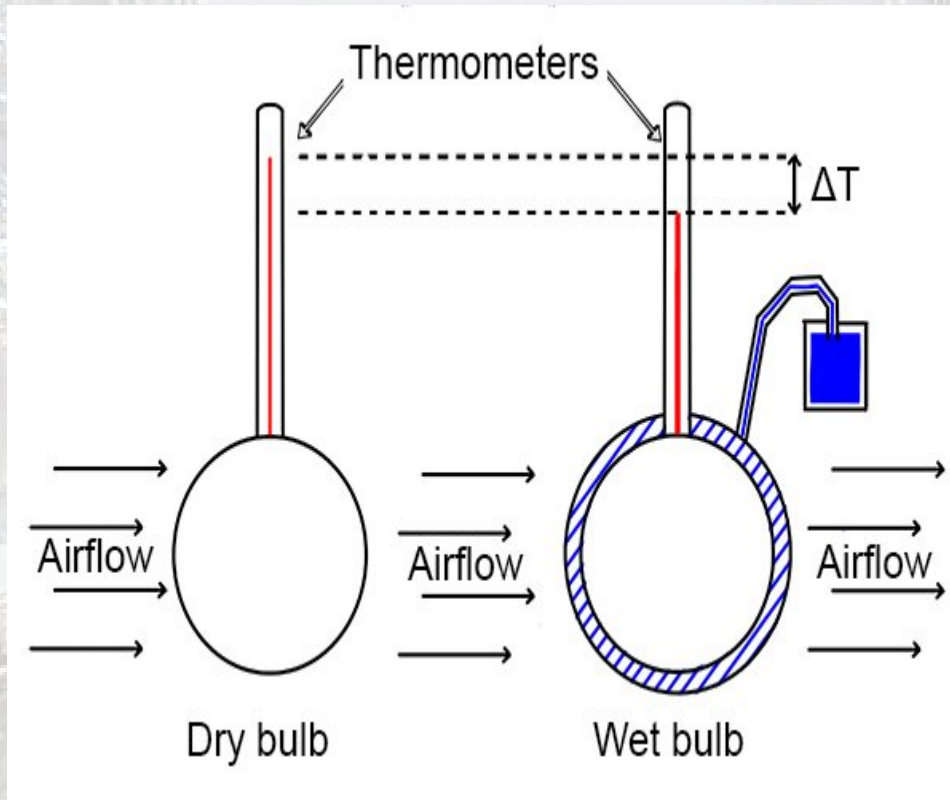
# BACK TO THE FUTURE?



The great Storegga landslide



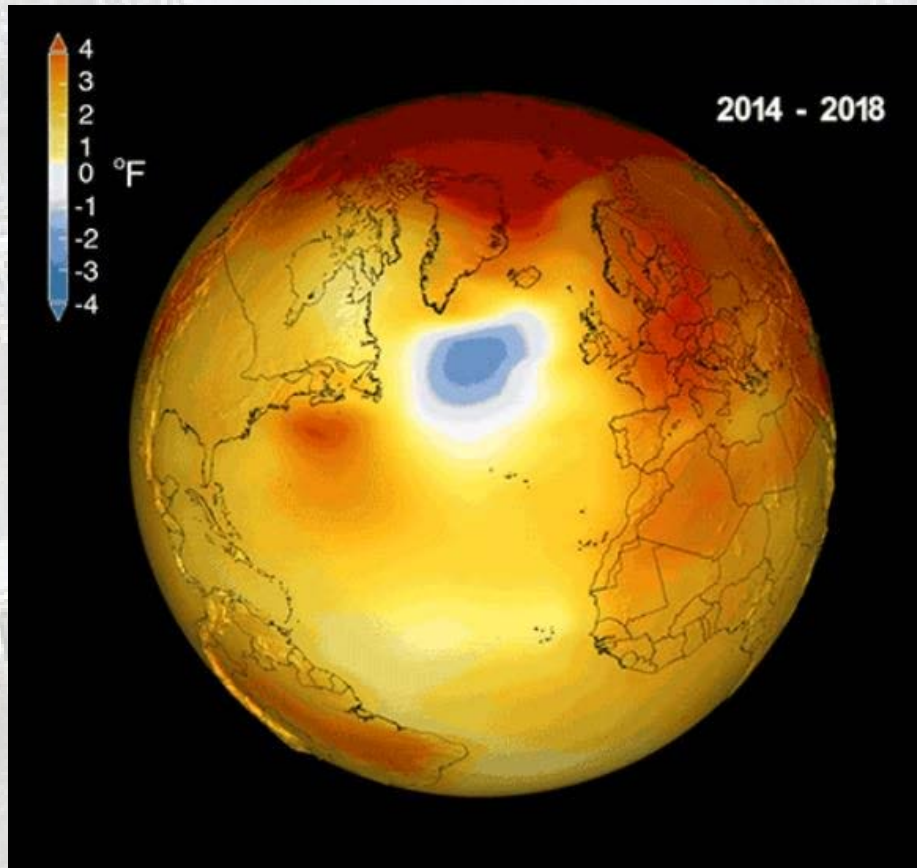
# THE HEAT THAT KILLS IN HOURS



Human physiology cannot handle wet-bulb temperatures of 35°C

- ☹ IPCC AR5 '*....it is very likely that heat waves will occur with a higher frequency and duration.*'
- ☹ Sustained wet-bulb temperature of 35°C and above is unsurvivable
- ☹ Fit, healthy, human in the shade has six hours to live
- ☹ Conditions almost met in Iran in July 2015
- ☹ Forecast to affect Ganges and Indus valleys, Persian Gulf and China
- ☹ BAU scenario – 400 m people in irrigated North China Plain

# THE BIG CHILL?

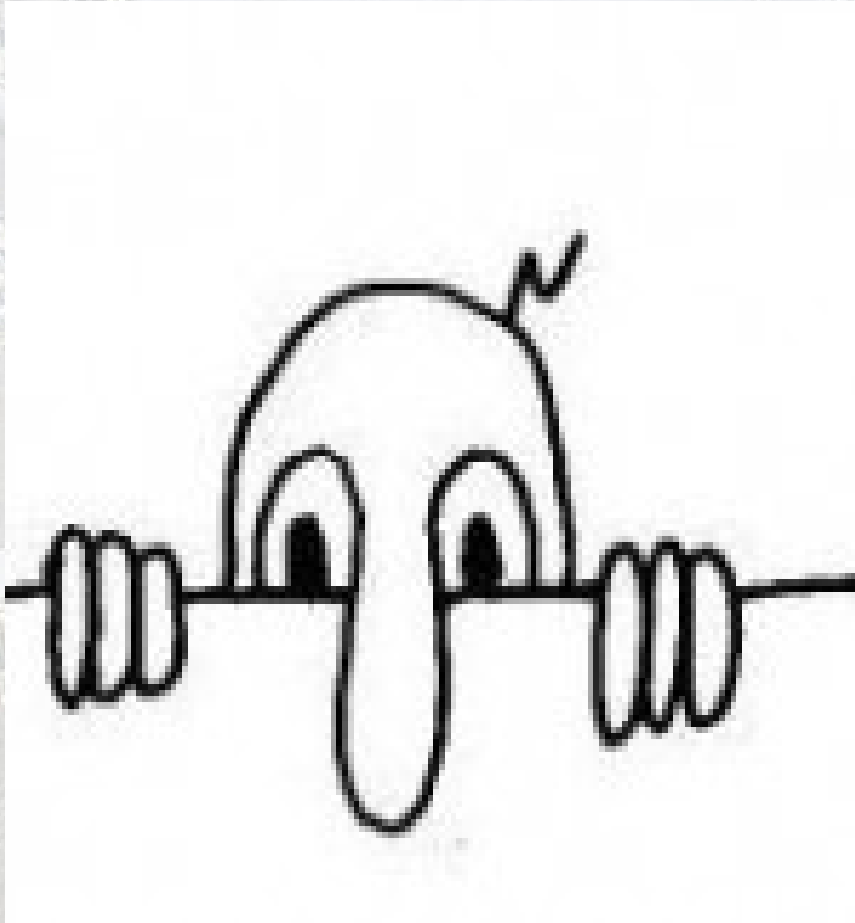


Thornalley, D. J. R. et al. 2018 Nature **556**, 227-230  
 Caesar, L. et al. 2018 Nature **556**, 191-196

- ☹ SROCC (2019) on the Atlantic Meridional Overturning Circulation
- ☹ '....AMOC has weakened relative to 1850-1900....insufficient data to quantify magnitude of weakening...or to properly attribute it to anthropogenic forcing....'
- '....AMOC is projected to weaken in the 21<sup>st</sup> century....although collapse is very unlikely.'
- ☹ Has declined by 15% since mid C19
- ☹ Weakest for at least 1500, probably 11,500y
- ☹ Shutdown could occur as quickly as 1-2 years resulting in widespread consequences



# STICKING YOUR NECK OUT



- ☹ Later observations of climate system (e.g. ice extent, SL rise) typically worse than earlier predictions
- ☹ Clear underestimation of key climate indicators
- ☹ Perceived need for consensus (univocality)
  - Scientists worry about how they will be perceived when they know the world is watching
- ☹ Consensus should not be a goal – it will emerge
- ☹ But substantive differences in opinion must be acknowledged and explained

**DISCERNING EXPERTS: the practices of scientific assessment for environmental policy**  
Dale Jamieson et al. 2019.

# THE BOTTOM LINE



Hansen, J. et al. 2013. P. Trans. R. Soc. A. **371**, 20120294.