

# KNOWLEDGE GAPS IN REGIONAL CLIMATE CHANGE INFORMATION



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Research



# Storyline approach to the construction of regional climate change information

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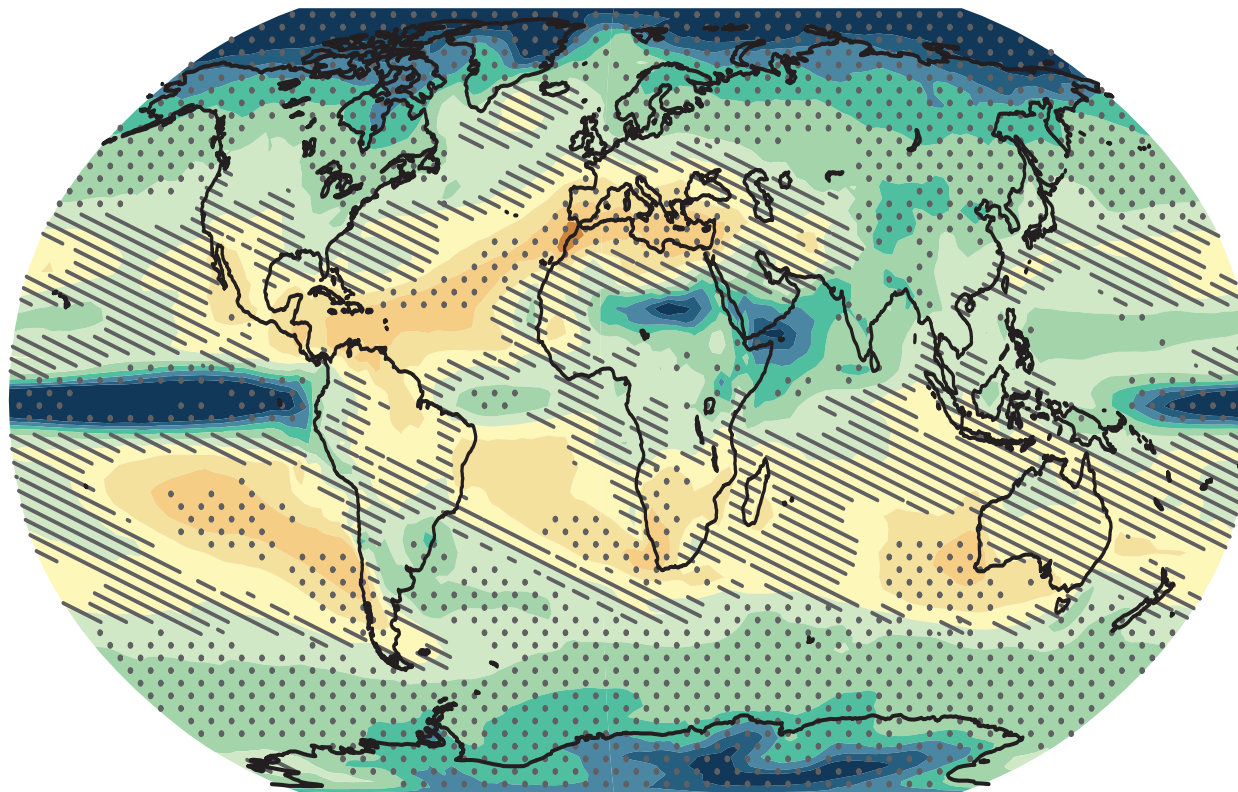
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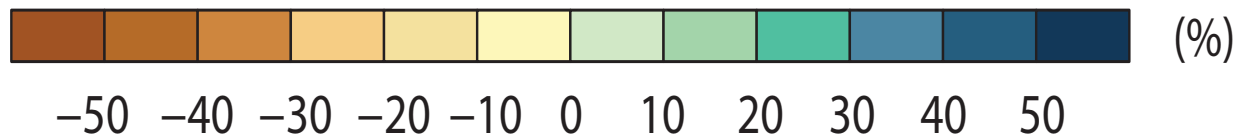
# The IPCC AR5 narrative on the water cycle

Changes in the global water cycle in response to the warming over the 21st century will not be uniform. The contrast in precipitation between wet and dry regions and between wet and dry seasons will increase, although there may be regional exceptions (see Figure SPM.8).

**Reliability is achieved at the price of informativeness**



Predicted changes  
in precipitation in  
response to  
climate change



IPCC AR5  
WGI (2013)

- The climate science community’s consensus view on the North Atlantic **storm track response to climate change** (IPCC WGI AR5 Technical Summary):

- The AR5 SPM is completely silent on circulation changes!

*“Substantial uncertainty and thus low confidence remains in projecting changes in NH storm tracks, especially for the North Atlantic basin.”*

*“...it is unlikely that the response of the North Atlantic storm track is a simple poleward shift”*

- Note that in IPCC WGI, the word “unlikely” is generally used to *dismiss* possibilities

Term*	Likelihood of the outcome
<i>Virtually certain</i>	99–100% probability
<i>Very likely</i>	90–100% probability
<i>Likely</i>	66–100% probability
<i>About as likely as not</i>	33–66% probability
<i>Unlikely</i>	0–33% probability
<i>Very unlikely</i>	0–10% probability
<i>Exceptionally unlikely</i>	0–1% probability

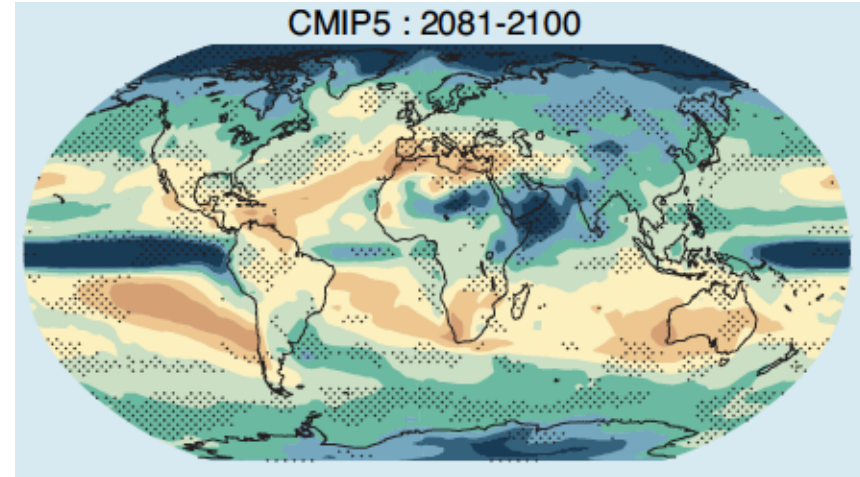
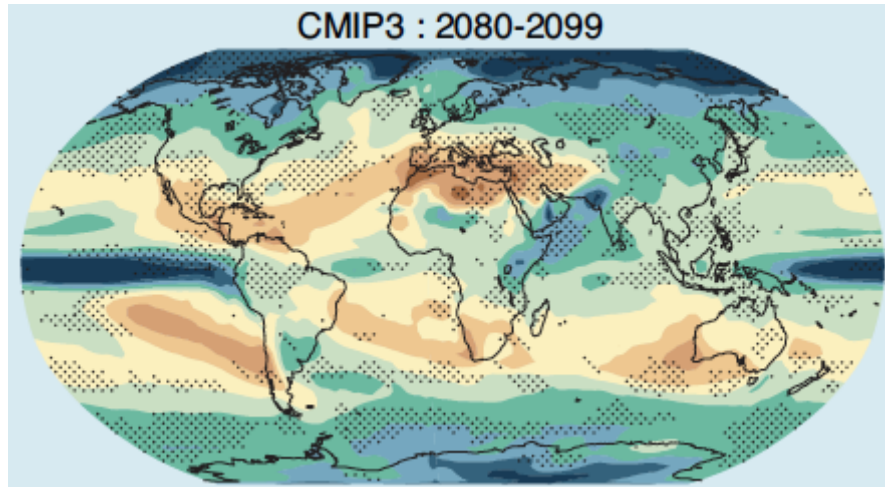
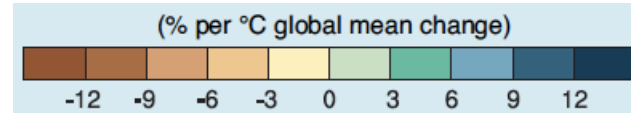
The IPCC calibrated uncertainty language does not seem to correspond to common usage!

- Climate science emphasizes **avoidance of Type 1 errors**
- But why is it considered ‘rigorous’ to be conservative?  
(Lloyd & Oreskes 2018 Earth’s Future)
  - May be appropriate for statements like ‘climate change is unequivocal’, but not so clear for regional impacts (i.e. risk)
- Example of drug testing: avoiding Type 2 error is hardly radical!
- **There is no such thing as value-free climate science**

		Reality	
		True	False
Measured or Perceived	True	Correct 😊	<b>Type 1 error</b> False Positive
	False	<b>Type 2 error</b> False Negative	Correct 😊

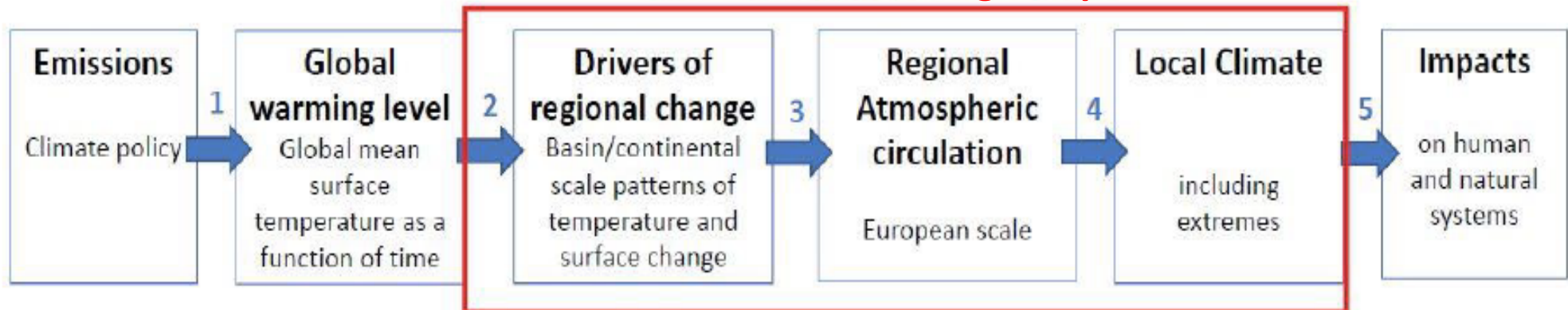
- The situation has not changed with subsequent generations of models; *why does so much of our resource go into this?*

Precipitation scaled by global T (% per °C)



IPCC AR5 WGI (2013)

**The Knowledge Gap**



Courtesy of Rowan Sutton (University of Reading & NCAS)

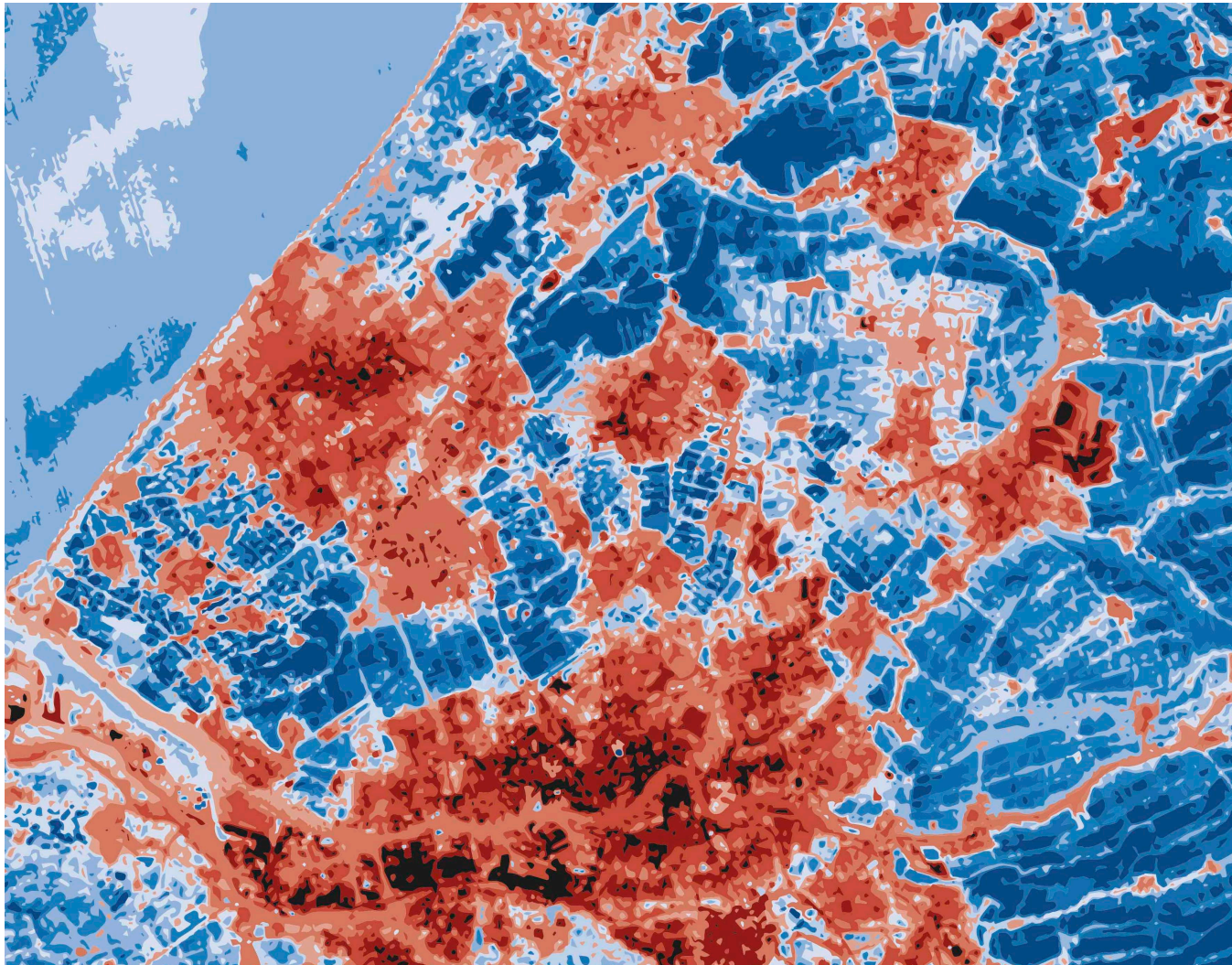
- From the *Good Practice Guidance Paper on Detection and Attribution Related to Anthropogenic Climate Change* (IPCC 2010)

To avoid *selection bias* in studies, it is vital that the data are not preselected based on observed responses, but instead chosen to represent regions / phenomena / timelines in which responses are expected, based on process-understanding.

Confounding factors (or influences) should be explicitly identified and evaluated where possible.

- Recommendations work against any consideration of **the local** (Shepherd & Sobel, CSSAAME, in press)
  - “Detaches knowledge from meaning” (Jasanoff 2010)
  - Represents a form of “hermeneutical injustice” (Fricker 2007)
- Interestingly, IPCC WGII defines climate change as *any* observed change, without requiring attribution to anthropogenic forcing!

- **Example:** Nighttime summertime temperature differences across Southern Holland, based on three nights of data
  - To treat the urban heat island effect as a confounding factor seems perverse

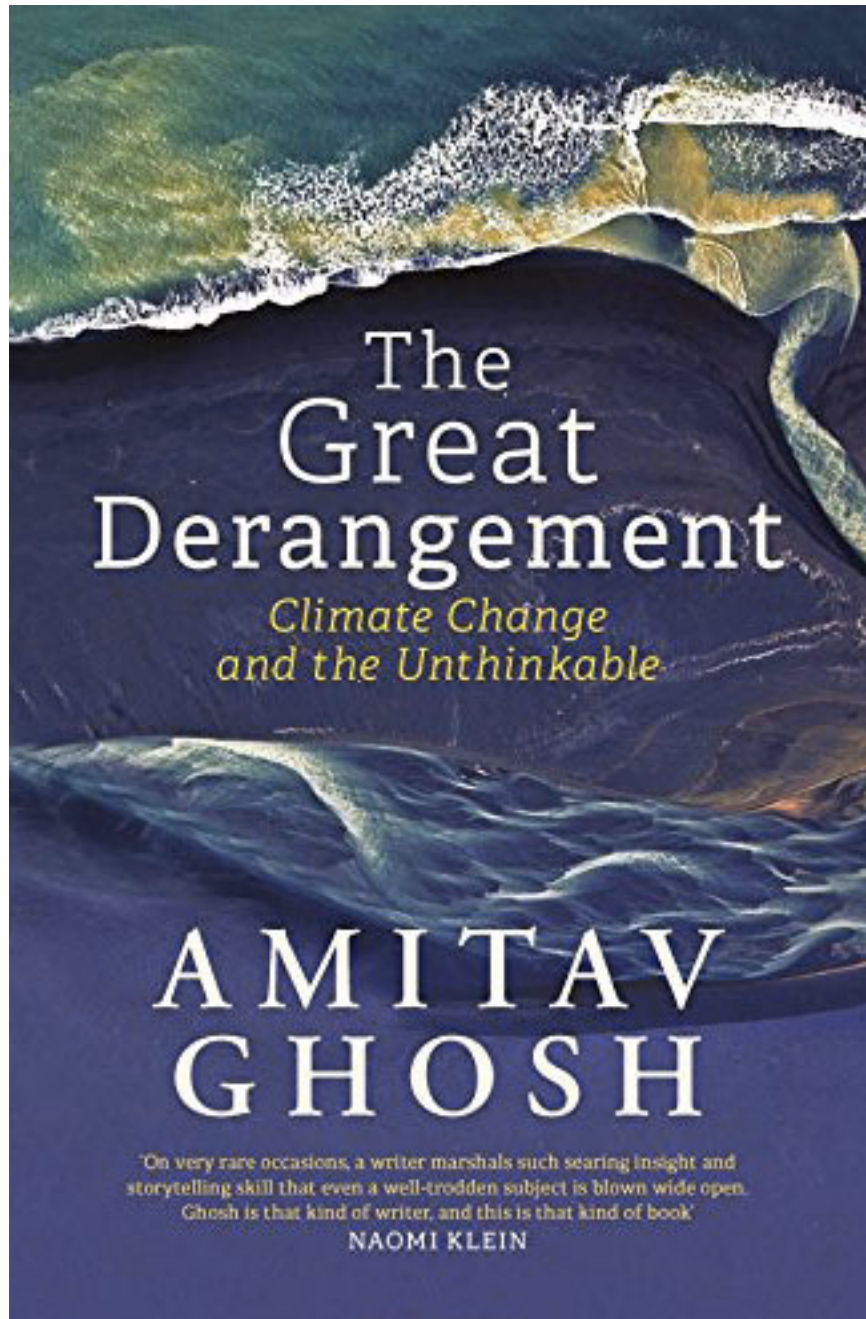


Local studies are not highly regarded by research scientists (or journals)

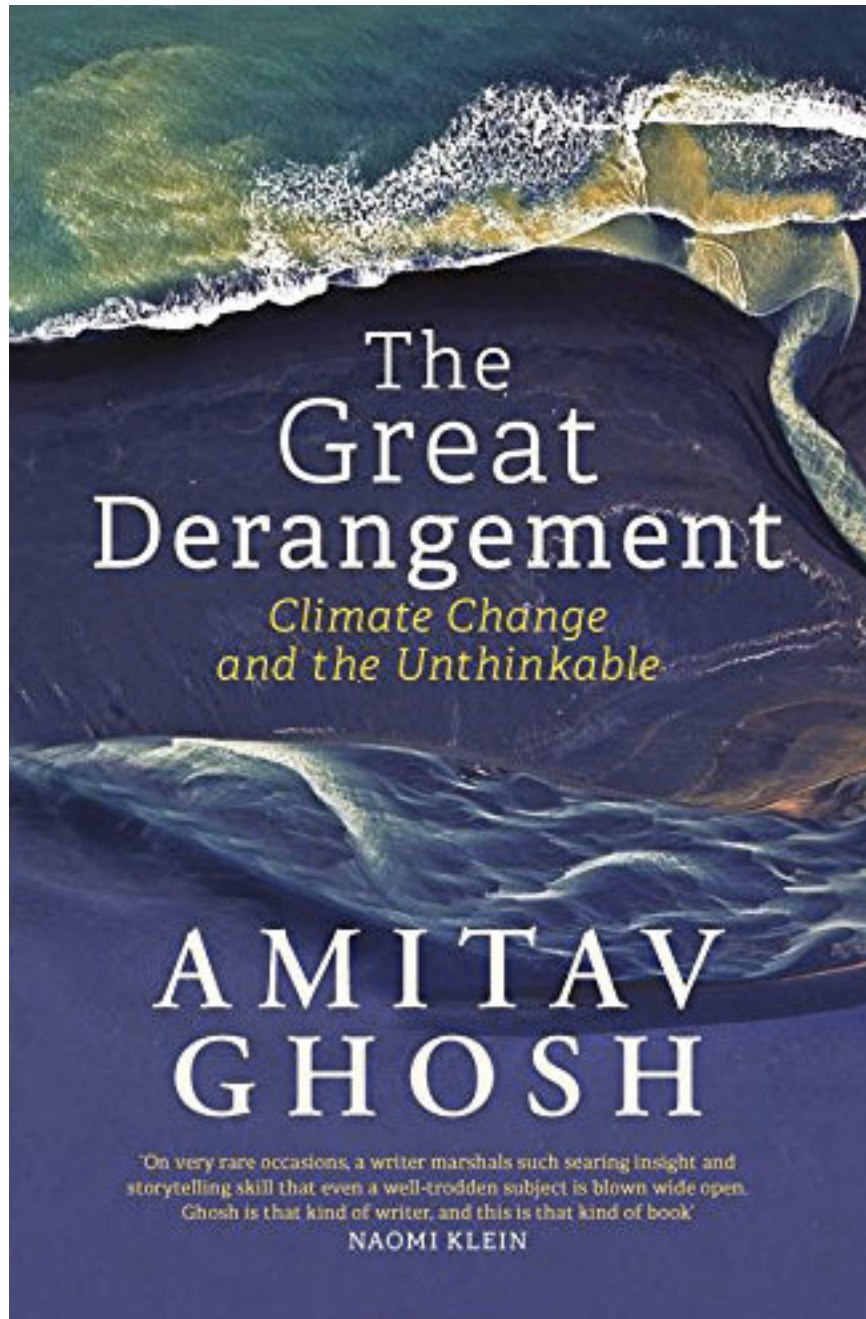
van der Hoeven & Wandl (2017)



- **“A paradigm can...insulate the [scientific] community from those socially important problems that ...cannot be stated in terms of the conceptual and instrumental tools the paradigm supplies”** (Thomas Kuhn, *The Structure of Scientific Revolutions*, first published 1962)
- The societally relevant question is not “What will happen?” but “What is the impact of particular actions under an uncertain regional climate change?” (Shepherd 2019 Proc. R. Soc. A)
- **The implications for climate science are radical**
  - “the traditional domination of ‘hard facts’ over ‘soft values’ [is] inverted... traditional scientific inputs... become ‘soft’ in the context of the ‘hard’ value commitments that will determine the success of policies for mitigating the effects of [climate change]” (Funtowicz & Ravetz 1993 Futures)



- “...the [Paris] Agreement’s rhetoric serves to clarify much that it leaves unsaid: namely, that its intention, and the essence of what it has achieved, is to create yet another neo-liberal frontier where corporations, entrepreneurs, and public officials will be able to join forces in enriching each other.”



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- And, one might add, climate scientists...