

# Malleable uncertainty

Andrea Saltelli, “Conference on Decision-Making Under Uncertainty in Climate and Macroeconomics”, Milano, May 24–25, Bocconi University





## Coming Out Soon: The politics of modelling



### Praise for the volume

*"A long awaited examination of the role —and obligation —of modeling."*

**Nassim Nicholas Taleb**, Distinguished Professor of Risk Engineering, NYU Tandon School of Engineering. Author, of the 5 -volume series *Incerto*.

\*\*\*

*"A breath of fresh air and a much needed cautionary view of the ever-widening dependence on mathematical modeling."*

**Orrin H. Pilkey**, Professor at Duke University's Nicholas School of the Environment, co-author with Linda Pilkey-Jarvis of *Useless Arithmetic: Why Environmental Scientists Can't Predict the Future*, Columbia University Press 2009.

\*\*\*

*"The methods by which power insinuates itself into models, and facilitates their portability and amendments, are diverse and sometimes insidious: that is one reason why the range of*

### Mastodon Toots by

@AndreaSaltelli



AndreaSaltelli

2023/4/29 7:55

"Using the methods developed in the #PNS tradition one discovers how never as with the present pandemics have numbers, and the attendant activities of measuring and modelling, taken centre-stage. Yet these numbers, often delivered by academics and media alike with extraordinary precision

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Uncertainty is the locus of power conflicts; it can be inflated or deflated according to interests e.g. in regulatory capture



Futures


Volume 135, January 2022, 102860



# Science, the endless frontier of regulatory capture

[Andrea Saltelli](#)<sup>a</sup>  , [Dorothy J. Dankel](#)<sup>b c</sup>, [Monica Di Fiore](#)<sup>d</sup>, [Nina Holland](#)<sup>e</sup>, [Martin Pigeon](#)<sup>e</sup>

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Readings I liked

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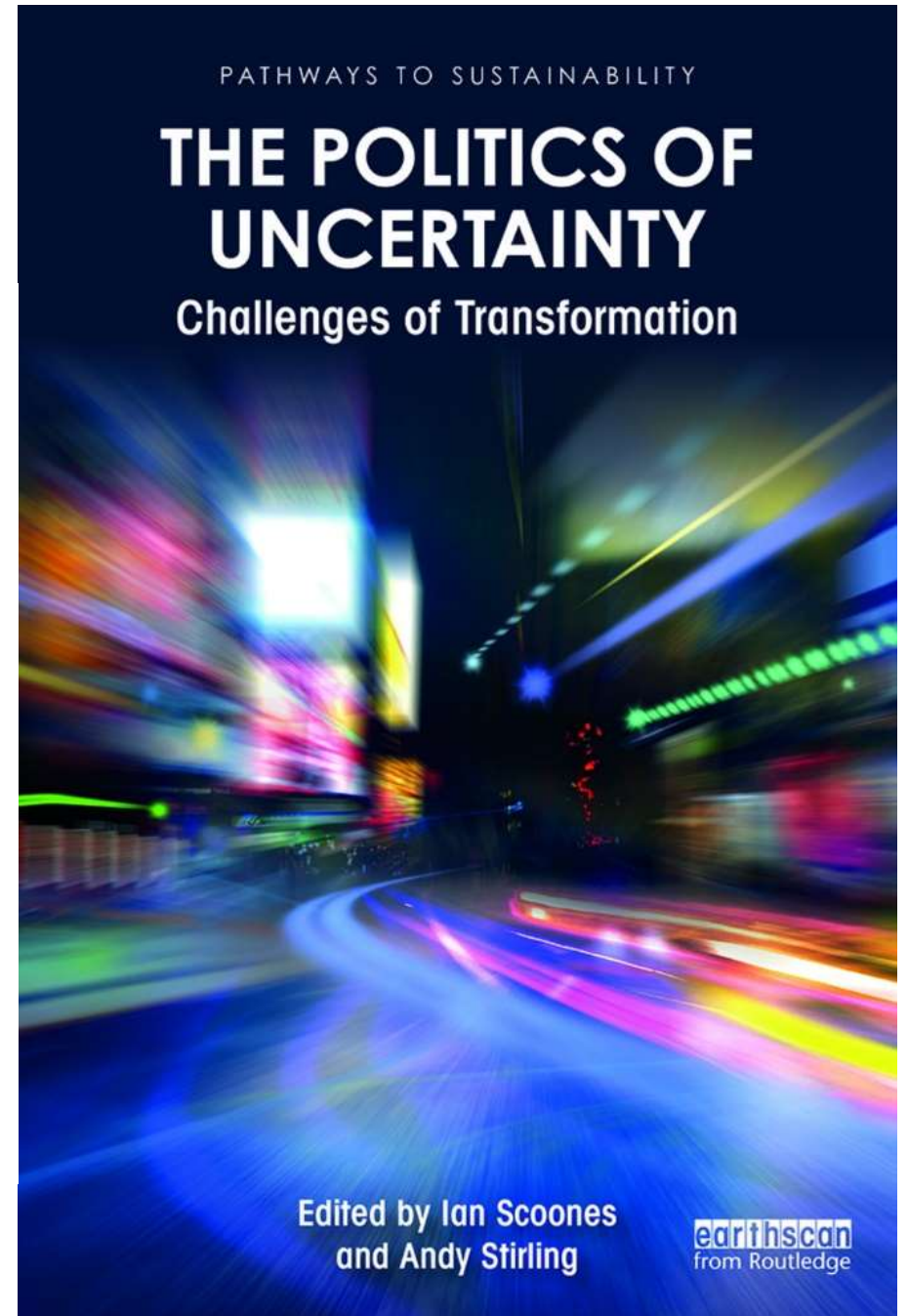
Suggested chapter



## THE UNRAVELLING OF TECHNOCRATIC ORTHODOXY?

Contemporary knowledge politics  
in technology regulation

*Patrick van Zwanenberg*



# Readings I liked

Suggested chapter

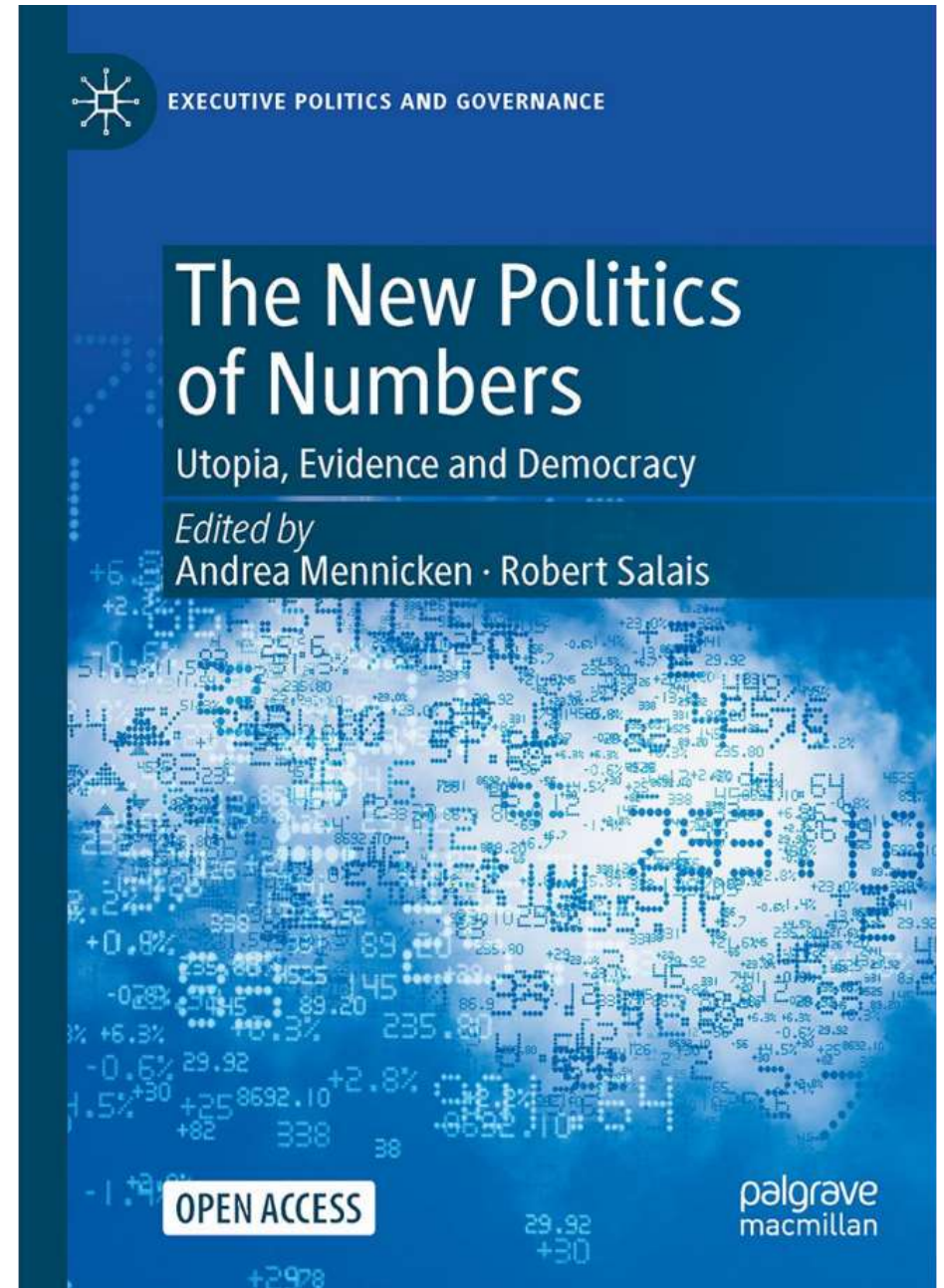


CHAPTER 12

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“La donnée n’est pas un donné”: Statistics,  
Quantification and Democratic Choice

*Robert Salais*





# Impact assessment culture in the European Union. Time for something new?



[Andrea Saltelli](#)<sup>a b</sup>  , [Marta Kuc-Czarnecka](#)<sup>c</sup> , [Samuele Lo Piano](#)<sup>d</sup> ,  
[Máté János Lőrincz](#)<sup>d</sup> , [Magdalena Olczyk](#)<sup>c</sup> , [Arnald Puy](#)<sup>e</sup> , [Erik Reinert](#)<sup>f g</sup> ,  
[Stefán Thor Smith](#)<sup>d</sup> , [Jeroen P. van der Sluijs](#)<sup>b h</sup> 

Own works:  
uncertainty in impact  
assessment

Use more ‘lenses’  
Non-Ricardian Economics  
Post normal science  
System ecology (a-la-Rosen)  
(Feminist economics)



# The technique is never neutral. How methodological choices condition the generation of narratives for sustainability

[Andrea Saltelli](#)<sup>a b</sup>  , [Lorenzo Benini](#)<sup>c</sup>, [Silvio Funtowicz](#)<sup>a</sup>, [Mario Giampietro](#)<sup>d e</sup>,  
[Matthias Kaiser](#)<sup>a</sup>, [Erik Reinert](#)<sup>a f</sup>, [Jeroen P. van der Sluijs](#)<sup>a g h</sup>

How about uncertainty in climate science and policy ?



# An ambivalence?



*Janus Bifrons, Vatican Museum, Wikipedia Commons*

There is too much uncertainty and this prevents energetic action; more research is needed

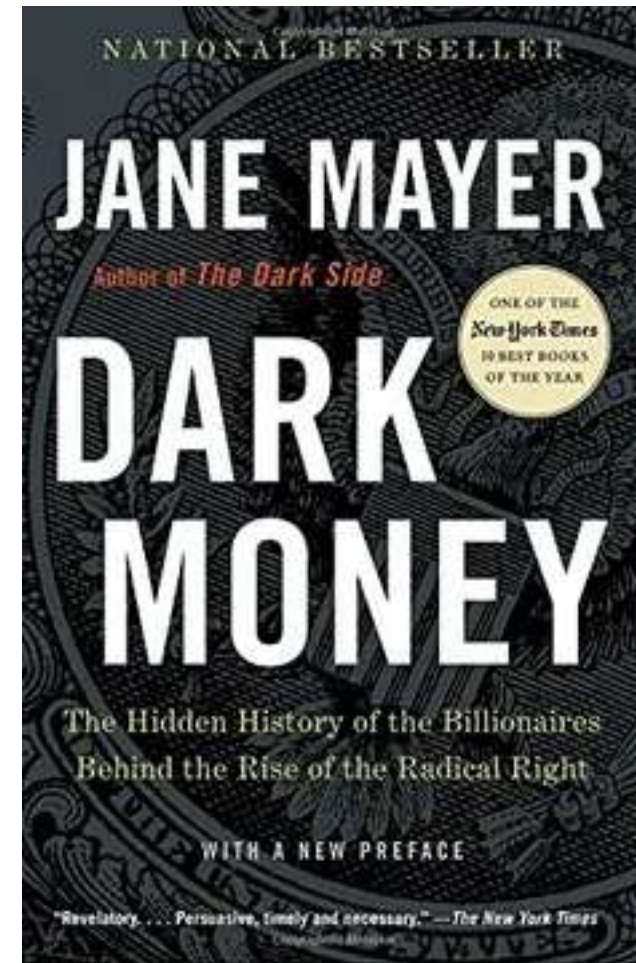
Science dispose of the tools to manage this uncertain to predicting the fate of the planet, humans and their economy





Too much uncertainty (and this prevents energetic action) so that more research is needed

Perhaps we could change our consumption pattern



– irrespective of what deniers tell us to do

WHO: 7 million people die every year of atmospheric pollution (outdoor and indoor)



→ 7,000,000 reasons to reduce the consumption of fossil fuels without awaiting the climatic Armageddon

I am sceptical of an impending climatic catastrophe that can only be averted with a rapid exit from fossil fuel consumption ...

... and this rapid exit is very much a fabricated narrative

Can the economy be made circular, or rapidly decarbonized?

… against historical evidence of past transformations



Special Feature: Editorial | [Open Access](#) | [Published: 23 March 2023](#)

# The more things change, the more they stay the same: promises of bioeconomy and the economy of promises

[Dennis Eversberg](#) , [Philip Koch](#), [Rosa Lehmann](#), [Andrea Saltelli](#), [Sabaheta Ramcilovic-Suominen](#) & [Zora Kovacic](#)

[Sustainability Science](#) **18**, 557–568 (2023) | [Cite this article](#)



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# Mega initiatives such as Destination Earth and its Digital Twins to ‘tame the uncertainty’ in climate science

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Review Article | [Published: 02 May 2023](#)

## Big Data in Earth system science and progress towards a digital twin

[Xin Li](#) , [Min Feng](#) , [Youhua Ran](#), [Yang Su](#), [Feng Liu](#), [Chunlin Huang](#), [Huanfeng Shen](#), [Qing Xiao](#), [Jianbin Su](#), [Shiwei Yuan](#) & [Huadong Guo](#)

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[Peter Bauer](#) , [Bjorn Stevens](#) & [Wilco Hazeleger](#)

[Nature Climate Change](#) **11**, 80–83 (2021) | [Cite this article](#)

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Science dispose of the tools to manage this uncertain to predicting the fate of the planet, humans and their economy

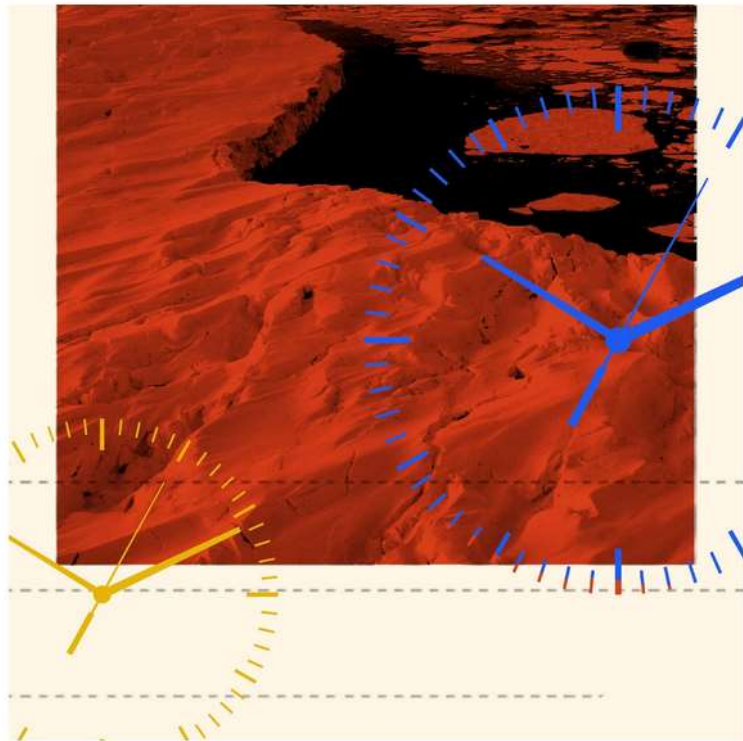
A proliferation of fantastic model-generated numbers



OPINION  
PETER COY

# 'The Most Important Number You've Never Heard Of'

Sept. 17, 2021



“social cost of carbon:

=\$56 a ton on average at a 3 percent discount rate

=\$171 a ton on average at a 2 percent discount rate”

**The New York Times**


# Social cost of carbon estimates have increased over time

**Richard S. J. Tol**

Received: 3 August 2022

Accepted: 23 April 2023

Published online: 15 May 2023


 Check for updates

Mathematical models predicting the damage in dollars from hurricanes and draughts up to the year 2300

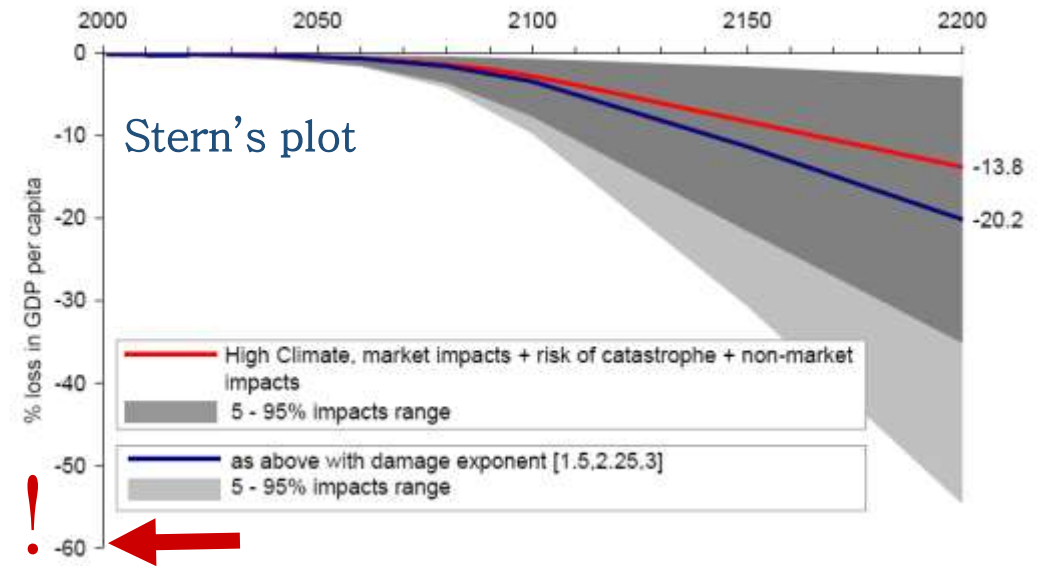
## The Social Cost of Carbon: Advances in Long-Term Probabilistic Projections of Population, GDP, Emissions, and Discount Rates

Kevin Rennert, Brian C. Prest, William A. Pizer, Richard G. Newell, David Anthoff, Cora Kingdon, Lisa Rennels, Roger Cooke, Adrian E. Raftery, Hana Ševčíková, and Frank Errickson

Working Paper 21-28  
October 2021



The Stern–Nordhaus controversy;  
 a reverse engineering the model:  
 → uncertainty is too large to take  
 decisions → both Stern and  
 Nordhaus are wrong



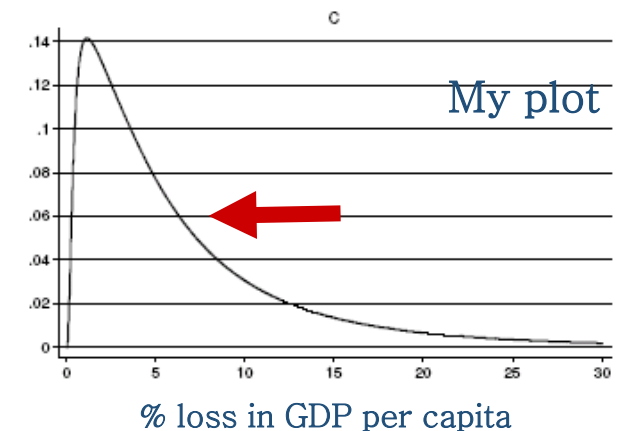
Global Environmental Change 20 (2010) 298–302



Contents lists available at ScienceDirect

Global Environmental Change

journal homepage: [www.elsevier.com/locate/gloenvcha](http://www.elsevier.com/locate/gloenvcha)



Sensitivity analysis didn't help. A practitioner's critique of the Stern review

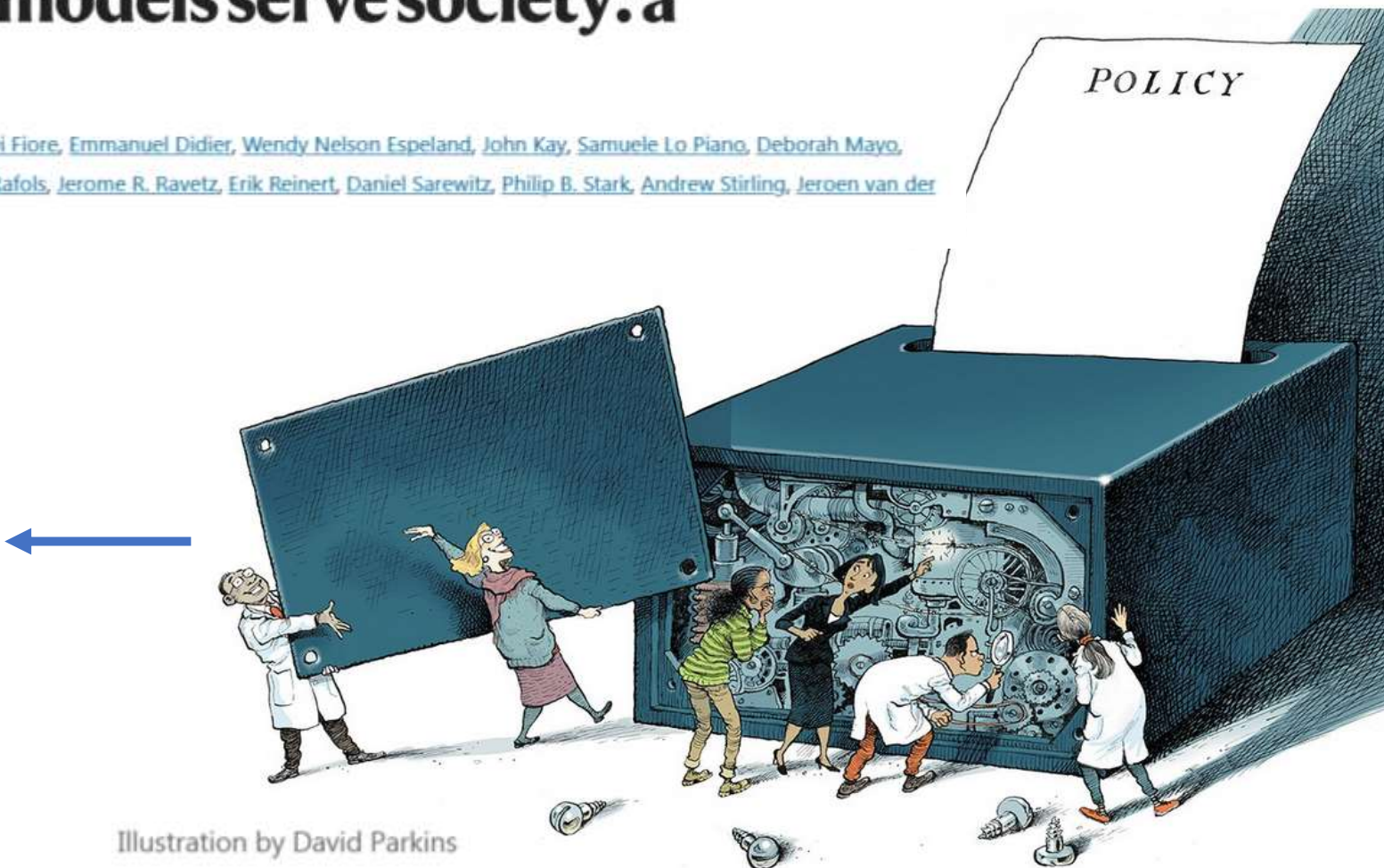
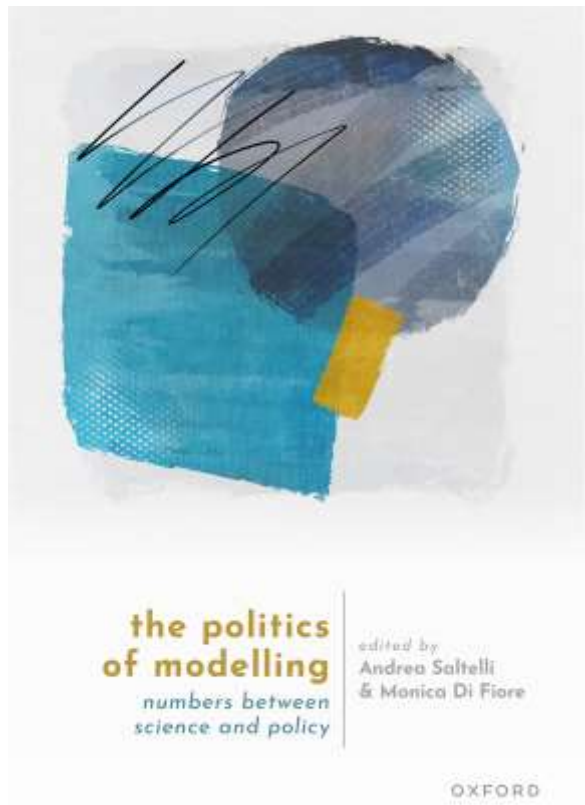
Andrea Saltelli \*, Beatrice D'Hombres

Joint Research Centre, Institute for the Protection and Security of the Citizen, Ispra, Italy

COMMENT · 24 JUNE 2020

## Five ways to ensure that models serve society: a manifesto

[Andrea Saltelli](#) ✉, [Gabriele Bammer](#), [Isabelle Bruno](#), [Erica Charters](#), [Monica Di Fiore](#), [Emmanuel Didier](#), [Wendy Nelson Espeland](#), [John Kay](#), [Samuele Lo Piano](#), [Deborah Mayo](#), [Roger Pielke Jr](#), [Tommaso Portaluri](#), [Theodore M. Porter](#), [Arnald Puy](#), [Ismael Rafols](#), [Jerome R. Ravetz](#), [Erik Reinert](#), [Daniel Sarewitz](#), [Philip B. Stark](#), [Andrew Stirling](#), [Jeroen van der Sluijs](#) & [Paolo Vineis](#)

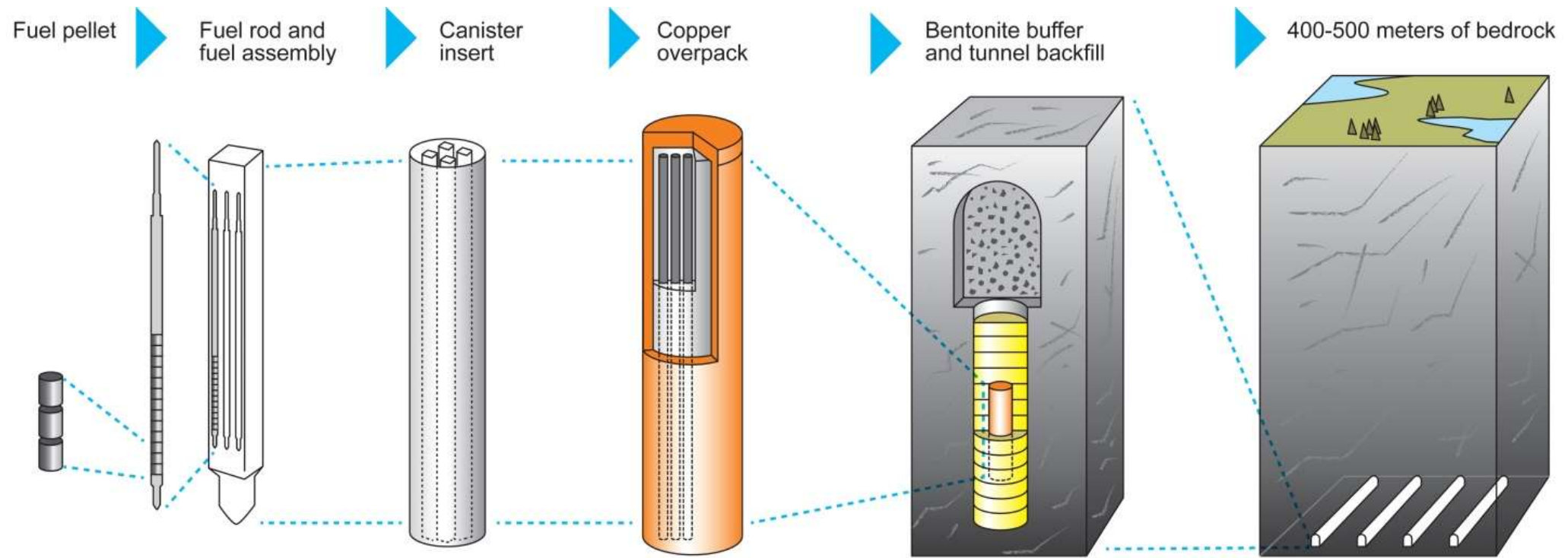


## Models with higher effective dimensions tend to produce more uncertain estimates

[ARNALD PUY](#) , [PIERFRANCESCO BENEVENTANO](#), [SIMON A. LEVIN](#) , [SAMUELE LO PIANO](#) , [TOMMASO PORTALURI](#), AND [ANDREA SALTELLI](#)  [Authors Info &](#)

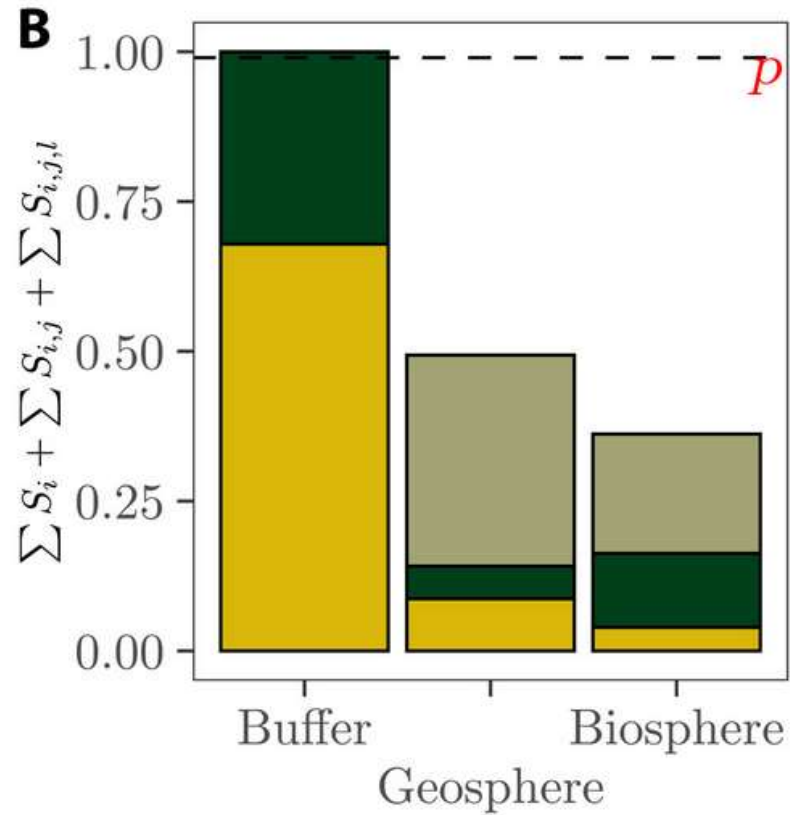
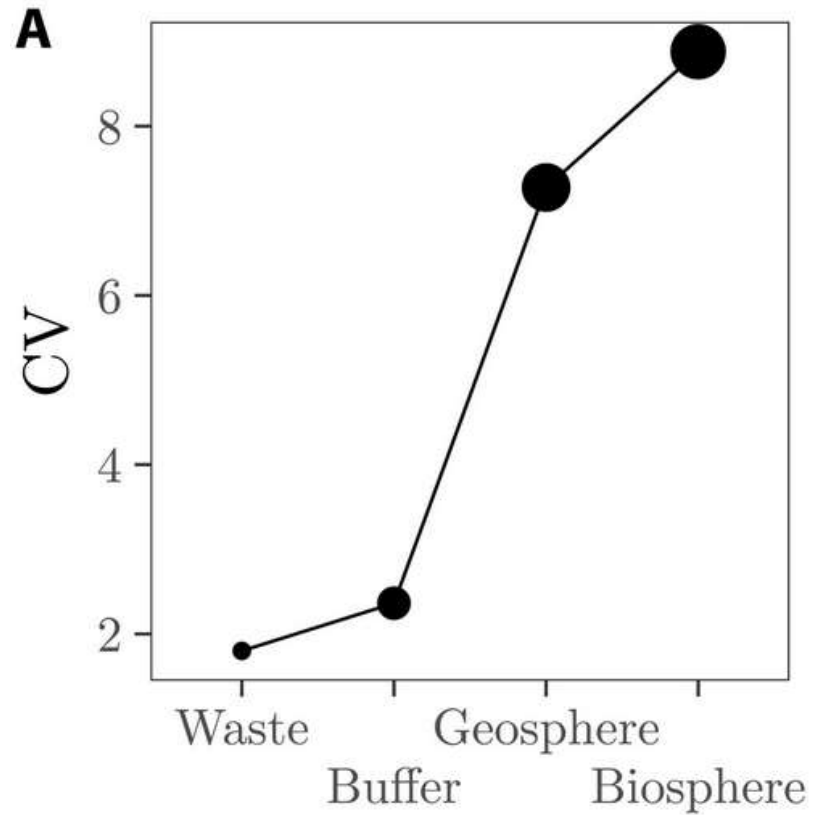
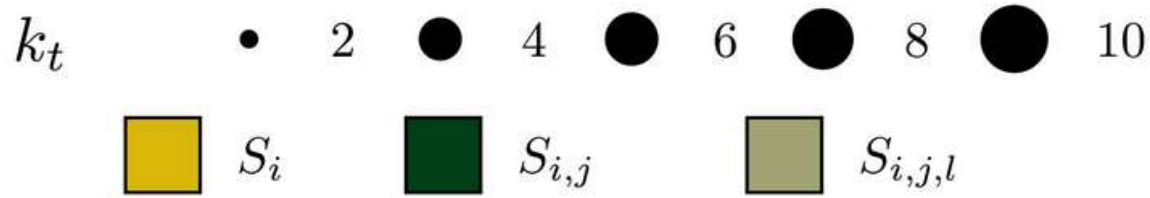
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Ongoing work

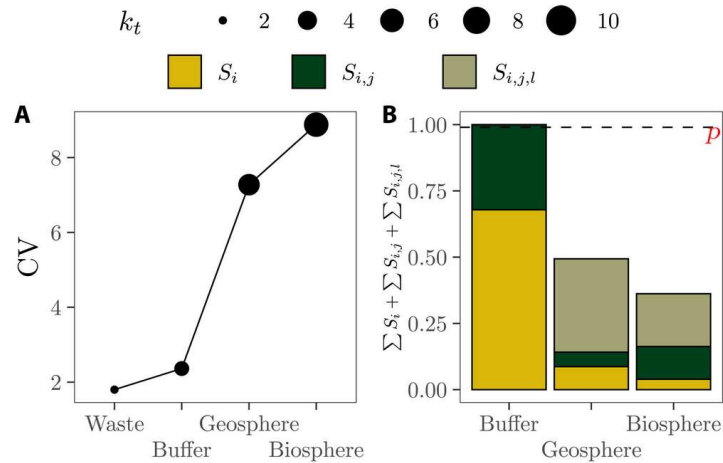


A typical nuclear waste disposal concept: the waste is separated from humans by a series of barriers.

Source: World Nuclear Organization, <https://world-nuclear.org/information-library/nuclear-fuel-cycle/nuclear-waste/storage-and-disposal-of-radioactive-waste.aspx>



Propagating uncertainty across the barriers increases variability (CV=mean/std), effective dimension ( $k_t$ ), and the importance of interactions ( $S_{ij}$ ,  $S_{ijk}$ )



The regulation should not set limits on doses to humans in the biosphere, as done e.g. in the US, since these are impossible to predict with any certainty

A more realistic and defensible safety standard could be set as a maximum level of radioactivity leaving the buffer

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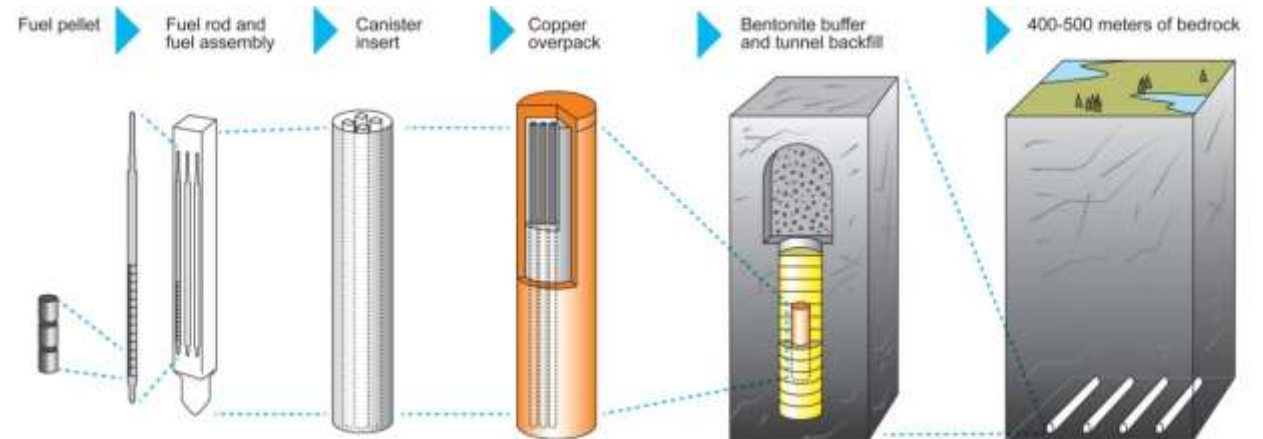
HOME > SCIENCE ADVANCES > VOL. 8, NO. 42 > MODELS WITH HIGHER EFFECTIVE DIMENSIONS TEND TO PRODUCE MORE UNCERTAIN ESTIMATES

RESEARCH ARTICLE MATHEMATICS

Models with higher effective dimensions tend to produce more uncertain estimates

ANALI PIU' · PIERFRANCESCO RIVELANTE AND SIMONA A. LEVI · MARILEA LO PRATO · TOMMASO PORTALUSSI AND ANDREA SACELLI

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# The End



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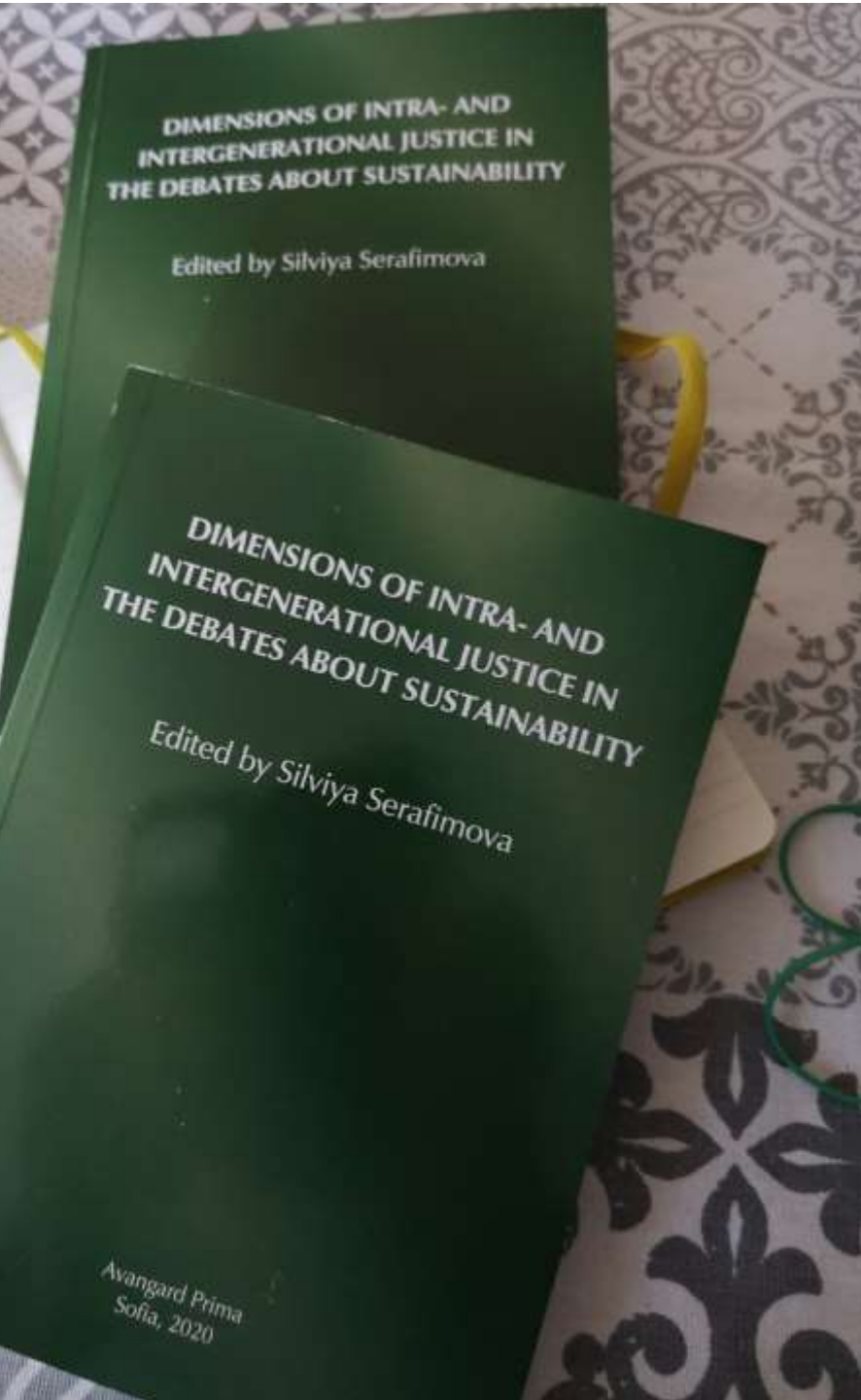
## Outline

Uncertainty can be gamed strategically by different players

How about uncertainty in climate science and policy? An ambivalent attitude:

- There is too much uncertainty (and this prevents energetic action)
  - So we need more research, e.g. Destination Earth and its Digital Twins
- Still science dispose of the tools to manage this uncertain to predicting the fate of the planet, humans and their economy
  - As a result we see a proliferation of fantastic model-generated numbers

Premises associated to these narratives are from exaggerated to false. Models, specifically, need some form of societal scrutiny.



Chapter 3, A  
Climate of  
dialogue, with  
Paul-Marie  
Boulanger

# Climate Etc.

[← Road to Climate Neutrality](#)

[Assessment of climate change risk to the  
insurance sector →](#)

## A climate of dialogue

[https://judithcurry.com/2021/  
02/12/a-climate-of-dialogue/](https://judithcurry.com/2021/02/12/a-climate-of-dialogue/)



Taken up by Judith  
Curry on her blog

Climate science

## Climate scientists first laughed at a 'bizarre' campaign against the BoM - then came the harassment



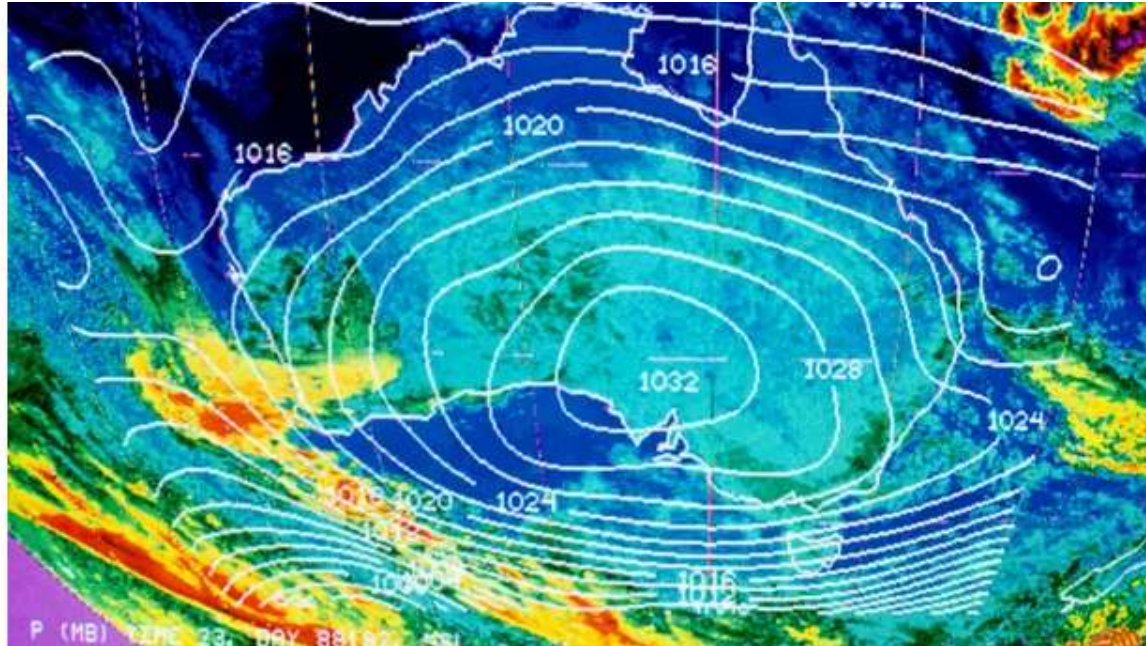
**Graham Readfearn**

@readfearn

Sat 6 May 2023 21.00 BST



137



**The  
Guardian**

May 6<sup>th</sup>, 2023:  
scientists  
harassed and  
becoming sick  
because of  
sceptics

“My biggest concern was for the health of the climate scientists. They did that work admirably and stuck with it but for a significant number it affected their health and wellbeing and their professional standing. They were concerned it was going to damage their careers.”

Instead of fostering ecological sensitivity, a status of climatic exception boxes ecological problem into a single planetary container, where an **odourless and colourless gas** slowly increases the temperature of the planet

This vision risks obscuring the messier aspects of our impact on the planet

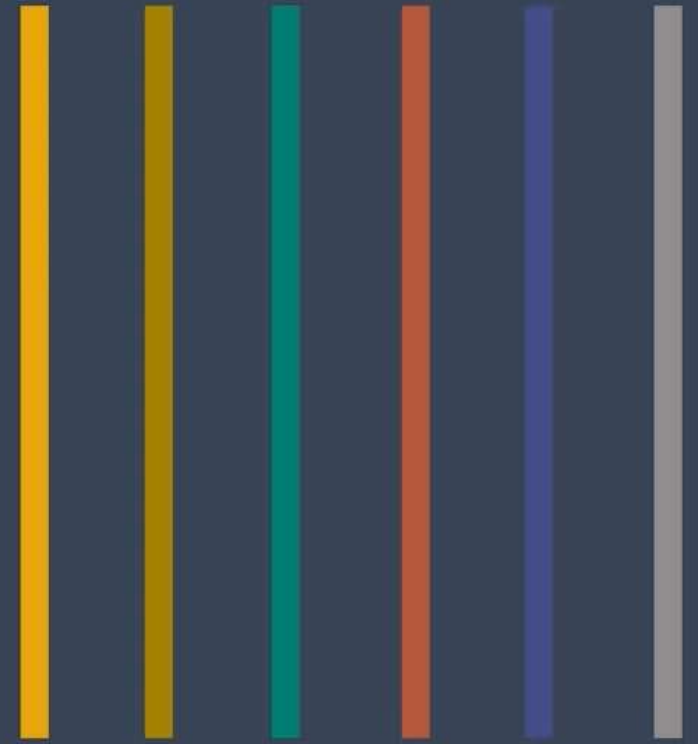


Since we need to fight all forms of fossil fuel we cannot fight the dirtiest, from tar sands to shale gas fracking



# Orders of worth

ON JUSTIFICATION  
ECONOMIES OF WORTH  
Luc Boltanski & Laurent Thévenot



Translated by Catherine Porter