Royal Netherlands Meteorological Institute
Ministry of Transport, Public Works and Water Management

VU UNIVERSITY AMSTERDAM

PBL Netherlands Environmental Assessment Agency

Bridging the gap between stakeholders and climate modellers

Demand-driven adaptation assessment for uncertain changes in weather extremes

4 October 2012 | Arthur Petersen

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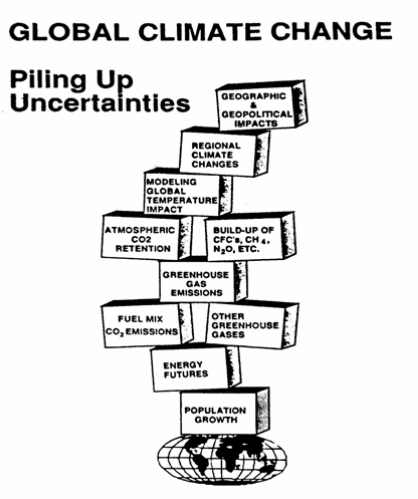

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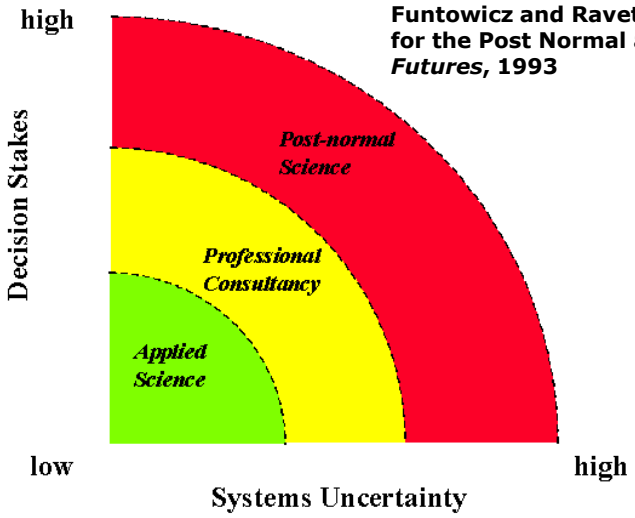

Funtowicz and Ravetz, Science for the Post Normal age, *Futures*, 1993

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Bridging the gap between science and policy

- Uncertainties with respect to climate change and extreme weather events; knowledge about future is based on models
- Need for adaptive governance and for methodology to assess policy options with different, even conflicting, outcomes
- Need for indicators of outcomes for evaluating policy options relevant for stakeholders and reliable for scientists

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Bridging the Gap
Building from two sides

- Social Sciences side (led by IVM)
  - Interviews – repertory grid
  - Workshops – including more than the usual suspects
  - Find indicators / methods useful for 'societal actors'
  - **Useful** ways to represent uncertainty

Building coordination: PBL

- Natural Sciences side (led by KNMI)
  - Statistical analyses of uncertainties in extremes
  - Search robust parameters
  - How useful is downscaling?
  - **Faithful** ways to represent uncertainty

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Three stages

- Stage I: Identifying stakeholder perspectives and future scenarios (13 months)
- Stage II: Comparison and deliberation (6 months)
- Stage III: Improvement of scenarios / exploring options for adaptation governance

Component	Variance explained	Interpretation
Perspective 1	16%	Very disastrous, rescue needed
Perspective 2	15%	New versus old weather extremes
Perspective 3	12%	Prepare for (material) damage
Perspective 4	12%	People involved
Perspective 5	12%	Beyond imagination
Perspective 6	6%	Natural resources management

"Very disastrous, rescue needed!" (12 interviewees)

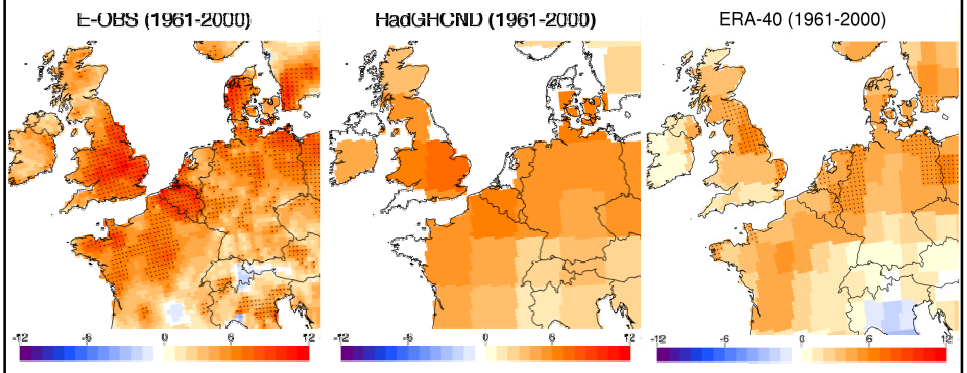
i.e. Very disastrous ---------- least disastrous
Rescue needed fast ---------- help can wait
Violent/ you can do little about ---------- peaceful and calm

"New versus old weather extremes"
(13 interviewees)

i.e. High temperatures ---------- low temperatures
No impact on transportation---------- Impacts on transportation
Happens in recent years---------- happens since long

Estimate uncertainty in observations

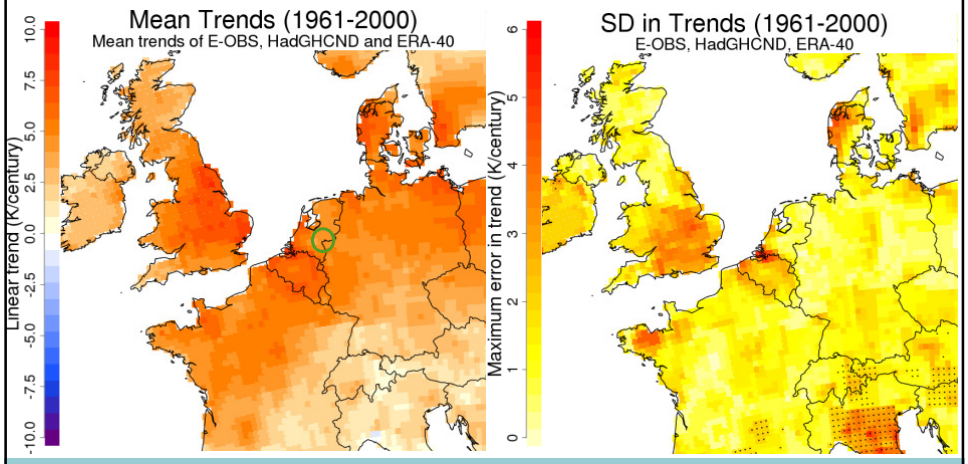
Trends in temperature of hottest day of the year



Comparing different datasets

Estimate uncertainty in observations

Trends in temperature of hottest day of the year

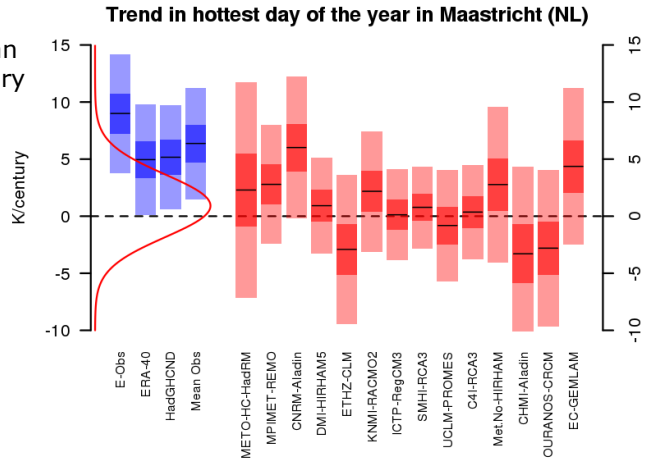


Hindcasts from 14 Regional Climate Models

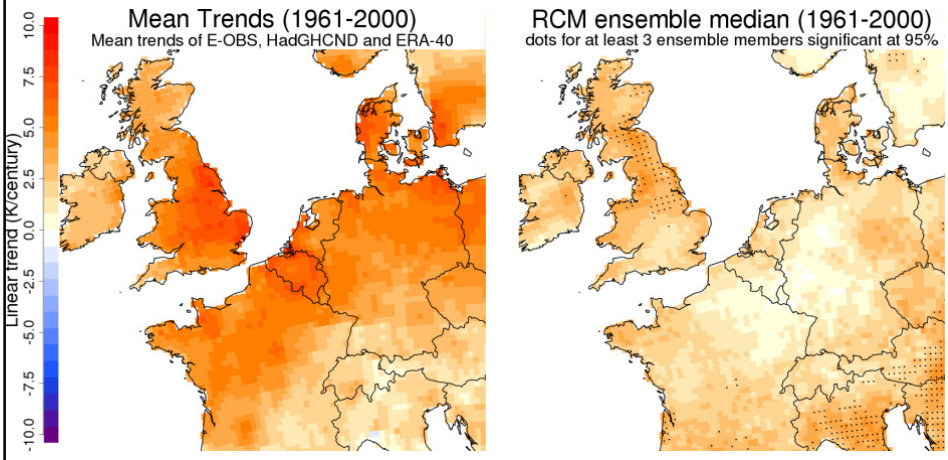
14 different European RCMs taking boundary conditions from 'observations'

Large inter-model spread
(σ ~ 3 K/century)

RCM Ensemble strongly under-estimates observed trend



RCM ensemble strongly underestimates trend



How do extremes change in the future?

KNMI'06 scenarios for 2050

- Coldest winter day in the year: 1°C to 2.9°C warmer
- Hottest summer day in the year: 1°C to 3.8°C warmer

- Long periods of precipitation in winter: 4% to 12% increase
- Extreme storms in summer: 5% to 27% increase

- No insight for changes in wind extremes

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Stakeholder workshop 8 March 2012

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Project outputs (phases I and II)

- Four scientific articles
  (three submitted to *Regional Environmental Change*; *Ecology and Society* and *Environmental Research Letters*; one in preparation for *Nature Climate Change*)
- Six international conference presentations
- Stakeholder workshop March 2012
- Three MSc theses

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Main results (phases I and II)

- Perspectives on extremes vary more **within** sectors than among sectors
- Raising concern about extreme events is difficult, since concern is mainly triggered by life-threatening **personal experience**
- Regional Climate Models (RCMs) are **unable** to reproduce trends in temperature extremes
- Stakeholders should **be very careful** in using projections from RCMs for local adaptation measures
- Use **narratives** based on physical reasoning, with simulated examples
- Stakeholders need **integrated knowledge** for the medium-term future