

Robustness and legitimacy

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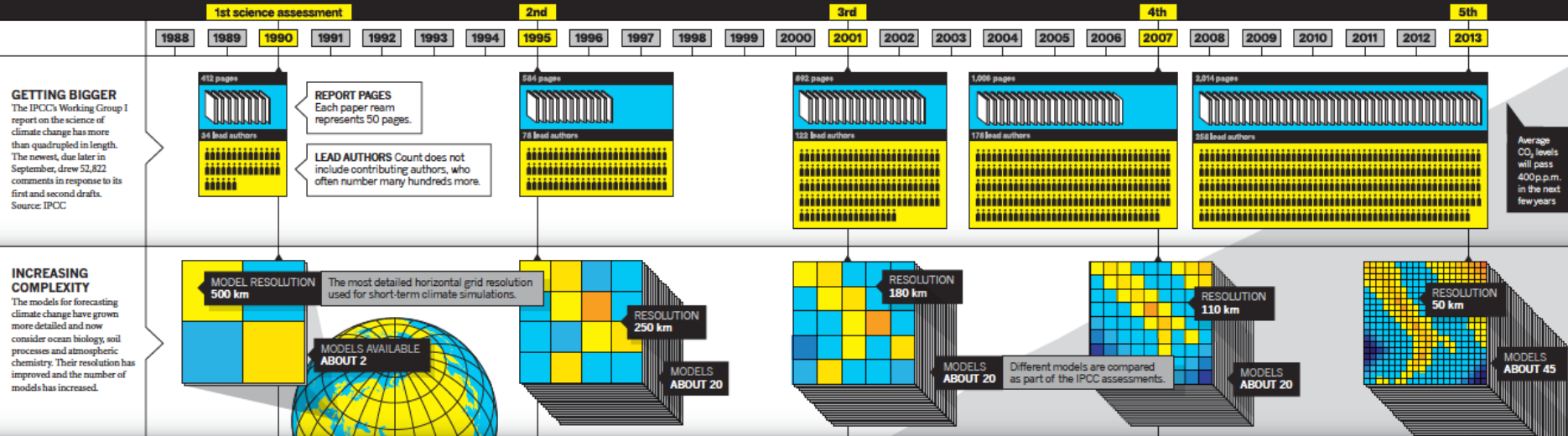
Workshop «Robustness and legitimacy of models for climate policy assessment», 26 May 2020



After decades of modeling

25 years of the IPCC

THE INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE (IPCC) was founded 25 years ago to provide authoritative assessments on the emerging problem of climate change. Since its first report in 1990, the IPCC has issued increasingly complex follow-ups about every six years. The climate models that feed into the assessments have grown bigger and better, but researchers have not succeeded in reducing some key uncertainties about climate change. Where the reports have grown most firm is in declaring that humans are causing the world to warm.



Source: Jones (2013) Nature

A large ensemble of global solar PV scenarios

(slides on unpublished work were excluded)



Your inputs on robustness and legitimacy

Open-ended survey (Feb-May 2020):

- **50 responses in total**
- 36 researchers, 6 policy, 4 business, and 4 other stakeholders
- 37 responses from outside Navigate
- 24 integrated assessment modelers, 14 other modelers
- 16 countries

Findings on models and methodologies

* *frequent themes*



Choice and setup of models	General features	Thematic features	Uncertainty and sensitivity
<p>Purpose</p> <ul style="list-style-type: none"> • <i>Fit for purpose</i>; one model cannot be robust for all questions <p>Simple vs. complex</p> <ul style="list-style-type: none"> • Comprehensive with greatest degree of complexity; serving to complicate rather than simplify • VS. • Simple, but not simplistic • Understood and run easily 	<p>Decision options</p> <ul style="list-style-type: none"> • Wide variety of technological and behavioural options • Different types of climate policies <p>Transformation</p> <ul style="list-style-type: none"> • Transformative change and option for a sustainable economy • Non-linearities, tipping points, synergies, dynamic feedbacks, black swans <p>Granularity</p> <ul style="list-style-type: none"> • Sufficient spatial, temporal and sectoral granularity 	<p>Thematic improvements</p> <ul style="list-style-type: none"> • Structural changes in the human system • Demand side in much more detail • Distributional aspects • Political economy • Some aspects of energy, agriculture, and land systems • Biodiversity issues <p>Climate</p> <ul style="list-style-type: none"> • Permafrost thaw, nitrogen cycle and its impacts on vegetation, phosphorus cycle and implications of carbon store • Effects of climate extremes • Afforestation and its effectiveness, e.g. droughts, fire • Ocean in the climatic component 	<p>Uncertainty</p> <ul style="list-style-type: none"> • <i>Extended sensitivity and uncertainty analysis</i> • Does not eliminate the uncertainties in the future • Meaningful, diverse scenarios without anchoring • Trends, insights and not numbers or predictions • Identify mitigation policies despite uncertainty <p>Other</p> <ul style="list-style-type: none"> • Stochastic representations, conditional projections • Stability under small fluctuations in model parameters • Not overly sensitive under different types of uncertainties

Findings on data and reporting

* frequent themes



Data and validation	Openness and reproducibility	Reporting the modeling	Reporting the results
<p>Data</p> <ul style="list-style-type: none"> • <u>Good quality data</u> • <u>Up to date</u> with the latest statistics and sectoral analyses • Good base year calibration • Realistic assumptions <p>Validation</p> <ul style="list-style-type: none"> • <u>Ex-post validation, matching the observed trends and impacts</u> • Comparison with other models and studies • Multi-model comparisons; diagnostic work • Verified structural equations, plausible reactions to changes in input data 	<p>Open</p> <ul style="list-style-type: none"> • <u>Open data, code, documentation, model outputs, methodology</u> • FAIR: findable, accessible, interoperable, and reusable • Documentation at two levels: expert user and high-level user <p>Reproducible</p> <ul style="list-style-type: none"> • <u>Ability to reproduce</u> the outcomes, independently from the researcher 	<p>Scope and limitations</p> <ul style="list-style-type: none"> • What the <u>models can and cannot do</u> and why • Communicate routine omissions <p>Methodology</p> <ul style="list-style-type: none"> • <u>Transparent</u> methodology and assumptions • Functioning of the model and why it gives the results it does • Normative assumptions and inherent judgments • Explicitly address controversies associated with prior assumptions • Model comparisons as tools to highlight the complementarities 	<p>Short messages vs. insights</p> <ul style="list-style-type: none"> • Short messages, main drivers and their effects • Simple and yet capable to show the complexity behind the scenes <p>VS.</p> <ul style="list-style-type: none"> • Insights on causal relations, trade-offs, opportunities without adding own value judgement on a certain solution • Communicate <u>limitations</u> and sensitivity • Detailed <u>matching of results with assumptions</u> <p>Uncertainty vs. not too much</p> <ul style="list-style-type: none"> • Report <u>uncertainty</u> not to give a false sense of certainty • Uncertainty is not fragility; no predictions • Serve to expand rather than narrow the range of policies and approaches discussed <p>VS.</p> <ul style="list-style-type: none"> • <u>Not too sensitive to uncertain</u> parametric and structural assumptions, and initial conditions

Findings on communication and process

* *frequent themes*



Communication	Legitimacy	Process
<p>Focus on the users</p> <ul style="list-style-type: none"> • <i>Driven by user demands</i> in order to be relevant, e.g. effects on business, other sectors of the economy, other sectoral policies • Adapt communication strategy to the audience; empirical testing • Not only OECD and not only experts • Help interpretation; interactive platforms <p>Communication style</p> <ul style="list-style-type: none"> • Don't overstate scope and certainty • The concept of uncertainty should be better transmitted • Meaningful reasoning, not alarmistic • Results need to be contextualized to avoid misinterpretation <p>General</p> <ul style="list-style-type: none"> • More outreach and communication 	<p>Academic rigour</p> <ul style="list-style-type: none"> • <i>Peer reviewed</i>, including models, data, scenarios • Tested by a broad community • Developed and run according to the standards agreed by the community • Assessed by independent scientific committee • Verified by academic scholars and not by non-experts (including users) • Track record of successful applications to climate policy analysis • Open model and a broad and active community joining in to send corrections and updates <p>Some caution</p> <ul style="list-style-type: none"> • Over-legitimacy: Decision makers are often referring to these models acritically • Closed community • Various models as only one source of evidence • Policy recommendations should be made by stakeholders who will balance their objectives with model results 	<p>One-way communication</p> <ul style="list-style-type: none"> • Direct and objective messages • Science first, independent of politics • Issued by impartial institution and supported by an authority of actors <p>VS.</p> <p>Two-way engagement</p> <ul style="list-style-type: none"> • Driven by user demands; connected to policy debates • Ask stakeholders for the most relevant topics and discuss model results, e.g. in workshops • Broad participation, including governments, industries, academics, and the public • Include experts from all parts of the World • Policy makers having access to the modelling teams to interrogate them <p>Types of stakeholder inputs</p> <ul style="list-style-type: none"> • Agree on assumptions rather than results • Co-design of qualitative narratives • User-relevant model outputs

Please get in touch with
questions and comments!



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