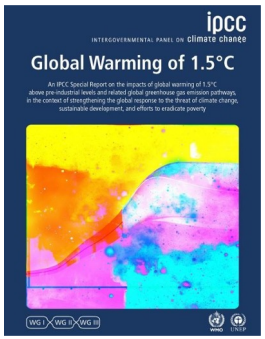
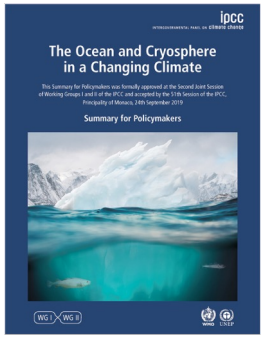
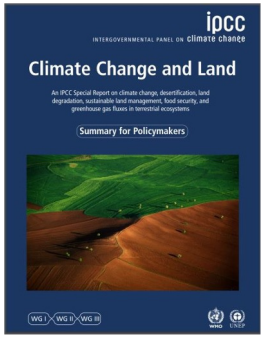
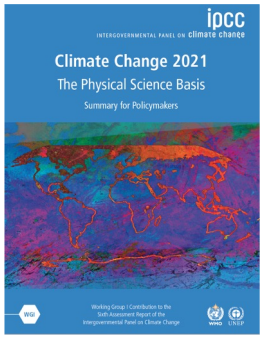
From the IPCC AR6 to the IPCC AR7 and beyond : the physical science basis of climate change empowering transformations

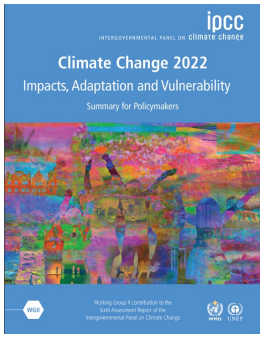
Considering values, power relationships, inequalities, diverse perspectives and ethics embedded in the assessment framing, processes and outcomes

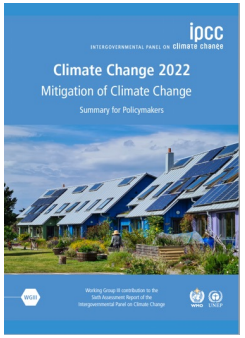






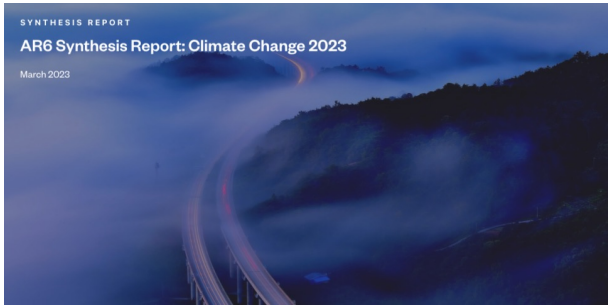






IPCC AR6 Expert meetings and workshops

Communication (2016)
Mitigation, sustainability, climate stabilisation scenarios (2017)
Regional expert meeting (2018)
Short-lived climate forcers expert meeting (2018)
Cities IPCC (2018)
IPBES-IPCC workshop (2021)
IPCC-UNESCO-ICOMOS (2022)
Use of scenarios in AR6 and subsequent assessments (2023)



Seriousness
Urgency
Action

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AR7 timeline to be defined in 2023

Alignement with the Paris Agreement Global Stocktake (2028) or longer cycle (2030?) not yet decided

Special Report on Cities and Climate Change (horizon 2026) (*methodological frameworks - scenarios and climate information at urban scales)*

Perspectives from AR6 WG Co-Chairs on lessons learnt

↑ literature, review comments, intensity of AR6, integration across disciplines, FAIR principles
↑ burden on the scientific communities, authors, Technical Support Units, IPCC Bureau members

➡️ supporting processes and tools
avoiding overlaps (number and ambition of planned reports)
greater use of expert meetings and workshops on emerging topics
other products with shorter timelines
means other than full Assessment Reports to inform the second Global Stocktake
how to best coordinate and liase with **other organisations** (WMO, UNEP, IPBES…) for the preparation of products and outreach

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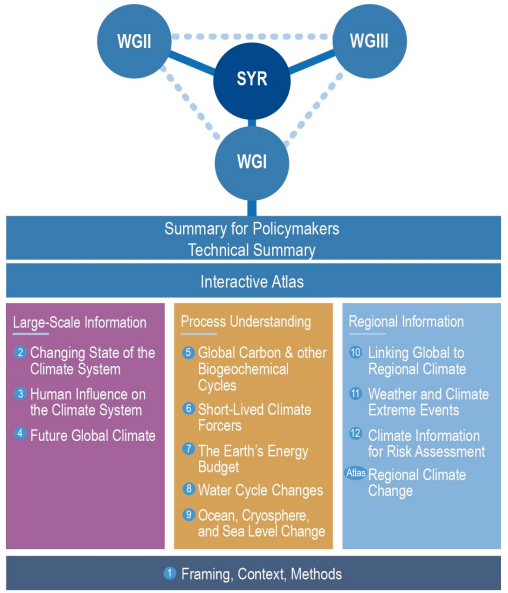

AR6 (2021)

Scientific advances - thanks to WCRP for coordinated efforts

Closure of observed changes in the Earth's energy and sea level budget
New scenarios, CMIP6
Narrowing the uncertainty range for climate sensitivity, constrained projections
Event attribution, distillation of regional climate information, physical storylines

Integrated approach in the AR6

Cross-WG Special Reports
New WGI outline to facilitate a « holistic » approach
FAIR, interactive atlas

climatic impact-drivers

incl. low likelihood, high impact eventualities

emulators

Enhanced handshakes with WGII and WGIII : regional information, risk framework, scenarios & levels of global warming, cumulative CO_2
Cross WG boxes (eg. attribution, solar radiation modification)
Climate information relevant for risk assessment and to inform regional adaptation
Geophysical perspective on limiting global warming (net zero CO_2, non-CO_2, air quality)

Engaging new generations of scientists within the WGI assessment

Authors reflect the research community structure in the world's regions
Median year for PhD degree of WGI authors : 2002
Five networks of early career scientists self-coordinating collective reviews of the WGI report (120 individuals)

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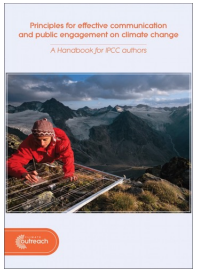

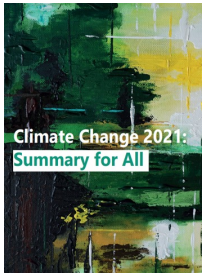

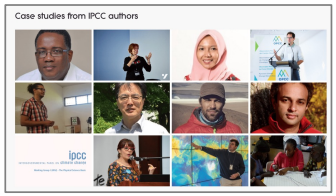

AR6 (2021)

Enhancing climate literacy

Stakeholders (incl. education, training, practitioners)
Engagement with stakeholders (TS, FAQs, regional and sectoral fact sheets)
Outreach products (Summary for all, Summary for actuaries, Summary for Urban policy makers)
IPCC Interactive Atlas, NASA sea level atlas
Collaboration with the Office for Climate Education (Summaries for teachers)
Climate Outreach (Handbook, Case studies from IPCC authors)

Ethical issues

Plausibility and equity challenges associated with scenarios (choice of scenarios, how communicated)
Use of different emission metrics to aggrege the climate effects of GHG with different atmospheric lifetimes
Choices of regionally relevant highlights in Summaries for policy makers (eg. types of droughts)
Deep uncertainty and high end storylines (eg sea level rise)
How to frame solar radiation modification (ethics, governance, power relationships, conflicts of interests)
How to identify knowledge gaps as an outcome of assessments
Ethics of authorship within IPCC
IPCC practices, greenhouse gas emission reductions, net zero strategy (role model, space for engaged scientists to contribute to IPCC)

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Views from AR6 WGI authors

AR6 structure well suited, but increased coordination needs

Artificial barriers from the WG structure (eg. carbon sinks, air quality, water…)

Work supported by the formatting, availability, access, software and infrastructure supporting the use of CMIP6 data

Challenges from late availability of CMIP6 results and limits to parameters available across models and MIPs, slow access (Global South)

Equity challenges (ability to quickly analyse and publis results) – regional biases

Important that IPCC and CMIP7 timelines are aligned with ideally early availability of data for a prioritized, focused set of experiments (ScenarioMIP and DECK) (eg for the first order draft), better tailoring CMIP7 to AR7

Allowing time for the analysis of CMIP results and their critique (model evaluation) as important as having the data

Responsive MIPs (eg HAPPI, Covid-MIP…)

Consistency (eg scenarios comparable to CMIP6 SSP-RCP), time extension beyond 2100,

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Views from AR6 WGI authors

- Importance of broad regionally coordinated activities by WCRP
- Regular webinars, workshops, thematic working groups and discussion networks
- Exchange on good practice in distillation of regional climate information
- Topical review groups, regular assessments buildong on regional and process knowledge gaps, generating synthesis material on key topics (pre-assessment support)
- Focus on ecosystems
- Stronger engagement with the disaster risk community
- Start training young scientists for the AR7 - identify topics young scientists find exciting

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Knowledge needs

- Deep uncertainty e.g. ice sheets / tipping points, Antarctic sea-ice, aspects related to land carbon
- Key uncertain processes (in particular clouds, dynamics) relevant for the global climate response and for regional hazards
- Interface between climate change, ecosystems and biodiversity

  Feedbacks from ecosystem degradation (incl. tree hydraulics, mortality, competition dynamics, disturbances)
  Relevant climatic impact-drivers (climate velocities etc)
  Best practices / climate information
  Biodiversity and carbon rich hotspots

- Advancing climate science relevant for climate action :

  Earth system response to net zero / net negative emissions, overshoot (incl. validity of emulators)
  Internal variability
  Climate information relevant for sectors (eg. health, tourism, supply chains, incl. tree crops…)
  Hard limits to adaptation and mitigation (eg. water, biomass resources, nature-based solutions) (maladaptation, malmitigation)
  Loss and damage (impacts, attribution, emergence, early warning, vulnerability hotspots)
  Consideration of ethics, power relationships, climate justice (related to knowledge development, incl. solar radiation modification)

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Building on AR6 WGI, coordinated initiatives to advance regionally relevant knowledge

Empirical approaches (constraining projections, model evaluation, bias corrections etc) / improved theoretical understanding / model fitness for purpose

Regional information consistent with constrained CMIP6 projections / constraining other variables

Supporting impact studies (grounded in CMIP6 and fitness for purpose), considering multiple climatic impact-drivers (not only few variables)

Biogeophysical plausibility of scenarios (eg. water, biomass)

Targeted modelling for overshoot and sustaining net negative CO_2 emissions in a warmer world

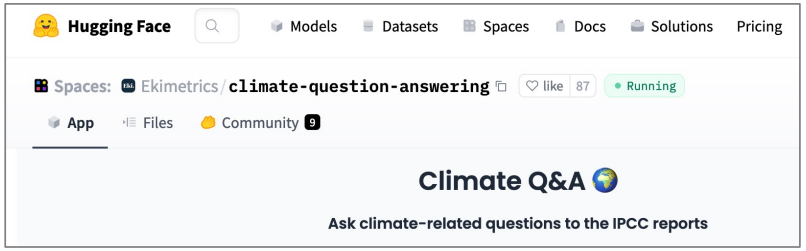
Post- 2100 modelling efforts (incl. for carbon cycle and ice sheets)

Use of artificial intelligence / IPCC

Systematic literature review methodologies

Framing the related AR7 assesssment

Designing reports to provide robust findings when used with IA tools



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Preparing AR7

Updating the good practice IPCC guidance

- on assessing and combining multi-model projections
- on attribution incl. methodologies for the attribution of single, composite, compound events
- on methodologies associated with the use and assessment of scenarios (incl. their plausibility considering biogeophysical limits)

How to enhance the relevance of the physical climate information for the business sectors

- Engagement with practitioners
- Information relevant for climate stress tests of supply chains (incl. agroclimate zones, tree crops)
- Information targeted to the integrity and accuracy of corporate responsibility reporting

Evidence to support the Loss and Damage mechanisms (in the spirit of the IPCC Task Force on emissions inventories)

Assessment of the effects of implemented adaptation and mitigation responses into the profiles of climate impact-drivers