The interactions of Science and Policy in the Climate Regime. IPCC, a key actor

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Climate Science
I

Climate models
Coupling and Integrations
Numerical Laboratory
Methodology

A climate model has several functions and roles :

- The computer allows studying the behavior of a (numerical) atmosphere simplified under some conditions
- Enunciating diverse hypotheses and testing them
- Looking for causes of different mecanisms and testing them
- Permits manipulating virtual climates
- Permits exploring the past and the futur (role of paleo-climatologists, i.e. Jean Jouzel)
- Has both caracteristics of theories and experiences
- So powerful that there is a danger to be locked in the universe of the model

Evolution in the 1990's

- Coupling : atmosphere, oceans, ices, soils.. In the 2000's, models of the Earth System.
- Modular approaches of coupling
- Integrations : carbon cycle, chemical pollutions, several mechanisms…
- Pluridisciplinarity : widening the collaborations
- Network of an increasing number of research groups

D'un point de vue anthropologique:

- Univers ambigu des modèles et des simulations
- Un petit groupe de gens l'ont construit, explorent ses rétroactions, sont familiers etc
- Laboratoire numérique
- Un monde virtuel, idéalisation des modèles
- Un modèle peut être opaque à ses utilisateurs

- D'où retour au local, besoin de modélisations régionales…

Méthode concrètement anti-réductionniste : trois aspects épistémologiques novateurs

- Terreau désunifié et hétérogène sur lequel se construisent les modèles. D'où méthodologie intégratrice qui est aussi une complexification des acteurs
- L'ordinateur (et le web) jouent un rôle central dans la méthodologie, dans l'interdisciplinarité
- Déplacement de l'attention vers les processus modélisations

Study of expertise

- Genealogy and History of the IPCC
- International frame of the climate governance
- Scientific and political co-construction process of climate change

After the IPCC ....

Studying how worked the IPCC, conducted us to focuse on different other subjects:

- Process of expertise (global and local)
- Different participants of the climate arenas, relations in the COP
- Co-construction between science and politics during these last 20 years
- Tensions North-South in the IPCC and in the COP,
- Also a return on the debate on the Limits to Growth (1971) and their models…

Beginnings of IPCC

- Conception between 1987 et 1988, creation in 88
  Role of US, through the WMO and UNEP for an *intergovernmental* mechanism of scientific assessment
- Multiplicity of actors: american agencies, WMO, UNEP, several countries, divergent interests interest and opinions
- Mostafa Tolba (director of UNEP) suggested the organisation in 3 Working Groups : I, Science, II, Impacts, III, Political Answers.
- The choice of people and countries had been pre-negociated and answered to technical and political necessities.

- IPCC : Strict procedures of referees, transparency of the process,
- To obtain a consensus , even on dissensus
- It is obvious that a scientific assessment has to reach the political level

Expertise - Policy

- Alerte scientifique 1988-90 et 1er Rapport IPCC (1990)

  -1992 Suppl. Reports
  -six IS92 scenarios
  -1994IPCC Special Report “Radiative Forcing on Climate Change”
- 2ème Rapport IPCC (1995)

  -Sp Rep Regional Impacts of CC:an Assessment of Vulnerability (97)
  -Aviation and Global Atmosphere (99)
  -Technology Transfer (1999)
  - Rapport SRES (2000)
  -Land Use and Forestry (2000)
- 3ème Rapport IPCC(2001)

  Special Reports (2005): Ozone Layer and Global Climate System
  Carbon Dioxide Carbon and Storage
- 4ème Rapport IPCC 2007

- 1992 Conf de Rio. Adoption de l ’UNFCC

  -1994 mise en œuvre de l ’UNFCC, 192 pays membres; création du “SBSTA”

  Mandat de Berlin et préparation de Kyoto
- COP3 de Kyoto (1997)
- Ratification du protocole -Accords de Marrakech (2001)

  COP7 invite l ’IPCC à faire un rapport sur le stockage
- COP8 et 14èRencontre du protocole de Montréal : 1 rapport sur l ’ozone
- COP 10 Buenos Aires: Adaptation

Expertise and Governance

- At the beginnings no consensus at all, on who would give a guarantee on expertise, on its critique
- Political tensions for 1990, coming from Southern countries
- Role of the United Nations
- Creation of the INC, then of SBSTA, in 1995: buffers between negotiators and the IPCC. Opening the spectrum between science and politics
- IPCC tried to reinforce its scientific image
- Importance of each Report (1990, 1995, 2001, 2007)

The reconfiguration of the climate regime (1)

- The IPCC launched the preparation of six new technical Reports, to anticipate the demands of decision-makers : national evaluation of greenhouse gas emissions, energy-related and industrial issues, agriculture and forestry, and emissions scenarios...; later on CCS
- Enlarging the scope of scientific expertise

The reconfiguration of the climate regime (2)

- IPCC contributed to reshaping research on CC: role of soil and forests, regional predictions, vulnerability to a rise of water level,...
- Report “Land-Use, Land-Use Change and Forestry” (2000) by IPCC, requested by SBSTA: important repercussions
- Fairer distribution of responsibilities within the report-writing teams for the TAR (leading authors from North and South)

IPCC / SBSTA

- Both are called expertise bodies with close missions
- But SBSTA is a political body, which must give technical advices to the governments, and liaises between IPCC and governments
- SBSTA: liaises between the IPCC and various governments, deals with the political expression of divisions that appear at the CoP's
- It assumes the political clivages and the controversies
- It opens as space of deliberations on scientific expertise
- Sharing the roles, the tandem embodies the joint scientific/political production process

The IPCC, classical expertise ?

- IPCC appears to adhere to the traditional relationship between science and politics (linear model)
- Two conceptions of the work and position of expertise
- IPCC conducted to practicing a reflexive expertise: i.e. the controversy about clouds (Lindsay)
- Attention to the critics coming from southern countries
- In Latourian terms: IPCC is a purification plant of science
- Veritable spearhead of the climate change regime: the trade-offs between science and politics took place under its auspices
- Lasting alliance with the NGO's

Representation of Southern countries: insufficient ?

The global numerical modeling :

- forgets the past
- naturalizes the present
- globalizes the future

Frame is non neutral : the physics-based approach privileges the global instead of the local.

CO_2 can be globalised, but not humans.

The reference year 1990 is unacceptable

Is the numerical climate modeling a “northern-science”?

Critics from southern figures of the whole methodology

Universal validity of scientific declarations or moral trust ? (1)

- Example : Standard methodologies for preparing national inventories of anthropogenic emissions
- Heated debates in the SBSTA which illustrated the challenges in any effort to harness science to public policy, on:

- Question of contingencies (vs universal validity)
- Questions of trust and credibility
- Moral issues

- Deconstruction of scientific evidence

Universal validity of scientific declarations or moral trust ? (2)

- Three different means to validate scientific findings and advance the debate :
- political standards of democratic participation.
- The consensus rule for reinforcing the credibility of scientific enterprise
- Participation of all NGOs
- Credibility of science is linked with institutions and with political norms

Turning of Adaptation

- Rise of this theme since 2002 (Delhi)
- Adaptation versus Mitigations
- "COP 10 of Buenos Aires(2004) called the CoP of Adaptation Meanings of this shift ?
- Changes in the hierarchies of the IPCC
- Today, Adaptation is one of the 4 pillars of the Road Map to a possible agreement with :
  - Mitigations,
  - Transfers of Technologies,
  - Financial Transfers

The Question of Carbon Cycle

- Crucial since the early 2000s, in models and scenarios
- New role of vegetation: soils, forests, ecosystems
- Biological control of the climate
- Striking correlation between:

i) the relative decline of physics in modeling practices

ii) the critiques of "physics-oriented" approaches to the framework of climate change

No direct causality !! But …same zeitgeist .

The role of sciences in the CoPs

- The climate sciences written in the IPCC Reports like a 'black box' for the negotiators, but a huge authority
- All the discussions and negotiations started with: scientists tell us..., sciences proof without ambiguity...
- The question of extreme events (droughts, floods, thunderstorms..), and
- The key numbers: 2° C, the dangerous threshold

Is it given by IPCC, by Europe …? Its importance

- Objectives of stabilisation 450 ppm ? 350? 550?

The role of sciences (2)

- Changing scales in climate research:
  — important words: proximity, convergence
  — increasing will of a closer approach between research and social demands
- Time scales and space scales:
  — demands about regional impacts (downscaling), questions of adaptation
  — Imminence of some risks ? The horizon of 2020-2030 more and more important
- Reducing gap between climatic projections and meteo. Predictions; defining “essential climate variables” (WMO)

The IPCC methodology on scenarios up to 2007

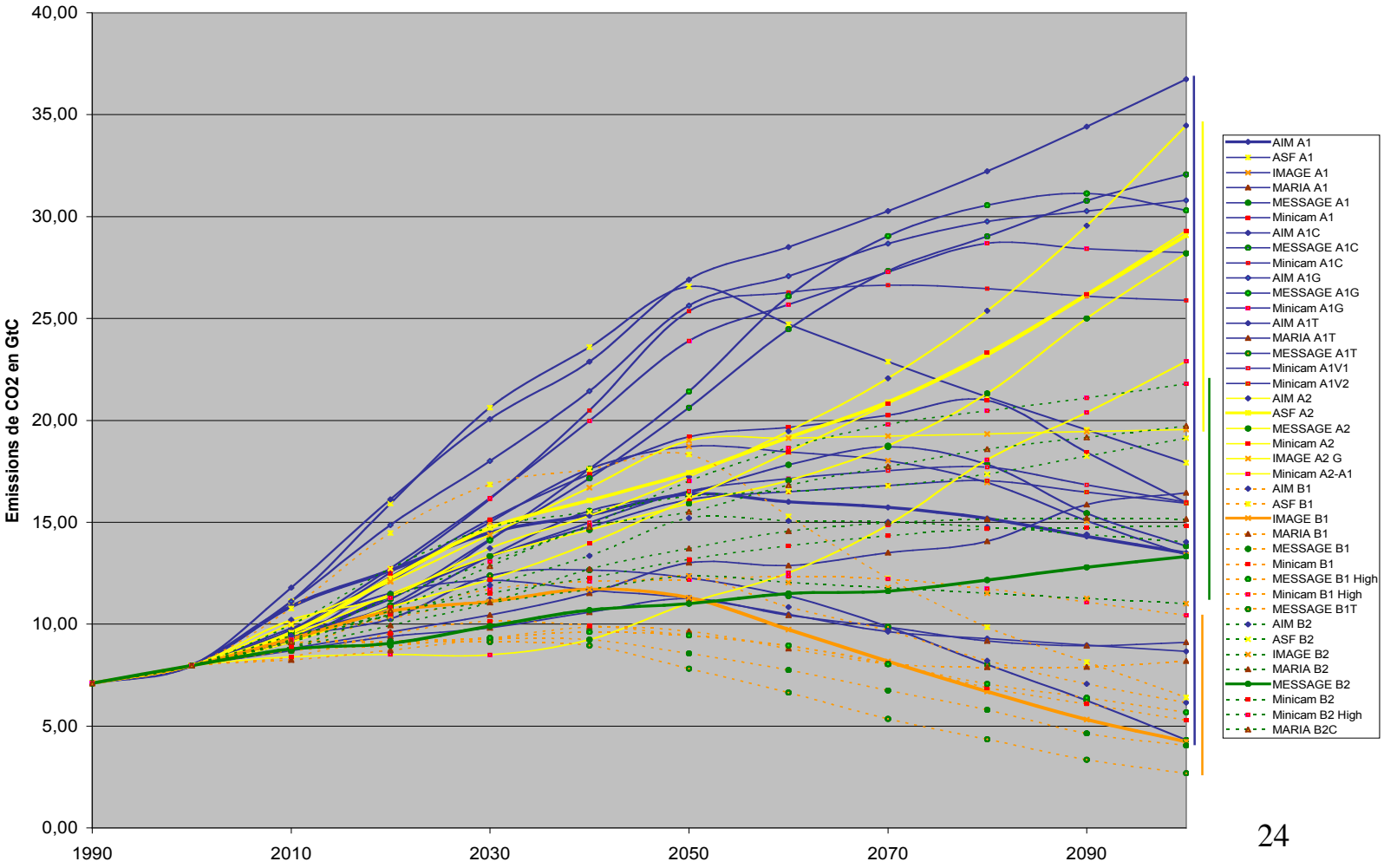
Three Working Groups :

- 1) Science of climate system and of biosphere
- 2) Impacts of CC on biosphere and on ecological or socio-economical systems (adaptation, vulnerabilities)
- 3) Mitigation, economic tools

A methodology in 3 stages: i) images of futures & economic scenarios , ii), transforming them, by using carbon cycles models, into CO2 atmospheric concentration scenarios, iii) Using these concentration scenarios to “force” their way into climate models

But methodology partly misleading: too sequential and “linear”

Uncertainties of projections



6 scenarios and their results

Table SPM-3. Projected globally averaged surface warming and sea level rise at the end of the 21st century. {10.5, 10.6, Table 10.7}

Case	Temperature Change (°C at 2090-2099 relative to 1980-1999) [a]		Sea Level Rise (m at 2090-2099 relative to 1980-1999)
	Best estimate	*Likely* range	Model-based range excluding future rapid dynamical changes in ice flow
Constant Year 2000 concentrations [b]	0.6	0.3 – 0.9	NA
B1 scenario	1.8	1.1 – 2.9	0.18 – 0.38
A1T scenario	2.4	1.4 – 3.8	0.20 – 0.45
B2 scenario	2.4	1.4 – 3.8	0.20 – 0.43
A1B scenario	2.8	1.7 – 4.4	0.21 – 0.48
A2 scenario	3.4	2.0 – 5.4	0.23 – 0.51
A1FI scenario	4.0	2.4 – 6.4	0.26 – 0.59

Table notes:

[a] These estimates are assessed from a hierarchy of models that encompass a simple climate model, several Earth Models of Intermediate Complexity (EMICs), and a large number of Atmosphere-Ocean Global Circulaion Models (AOGCMs).

[b] Year 2000 constant composition is derived from AOGCMs only.

Towards New scenarios :

- Meeting of 130 experts 19-20-21 septembre 2007 à Noordwijkerhout (Pays-Bas)

- 3 scientific communities :
  - — Integrated Assessment Modeling (IAM),
  - – Impacts, Adaptation and Vulnerability (IAV),
  - – Climate Modeling (CM), considered as « intermediate users »,
- « final users » : the politicians
  - – climate negotiators NGOs, UNFCC
  - – FAO, WB, WHO, UNEP, UNDP, IEA, OECD

New scenarios : objectives

- A stronger social demand
  - Distributing temporal scales :
  - Distributing spatial scales :
  - Taking in account the other gas, the carbon cycle, the vegetation and the feedbacks between these factors
  - Expressing the uncertainties in terms of risks.
- Some needs of the different communities
  - Finding a scenario-basis to which different communities could agree
  - Giving autonomy and time to climatologists, who suffered from having depended heavily on the economists

Toward New Scenarios for the 5th AR

- Climatologists and economists would work in parallel:
- the former on AOGCM and ESM-type climate models
- the latter on projections of socioeconomic activity that give rise to scenarios of CO2 and other gas emissions
- Simulations of climate models would run on a small number of concentration trajectories :

  the representative concentration pathways RCP interpreted as climate system forcing scenarios

Various temporal horizons: 2035, 2100 2200

A parallel approach

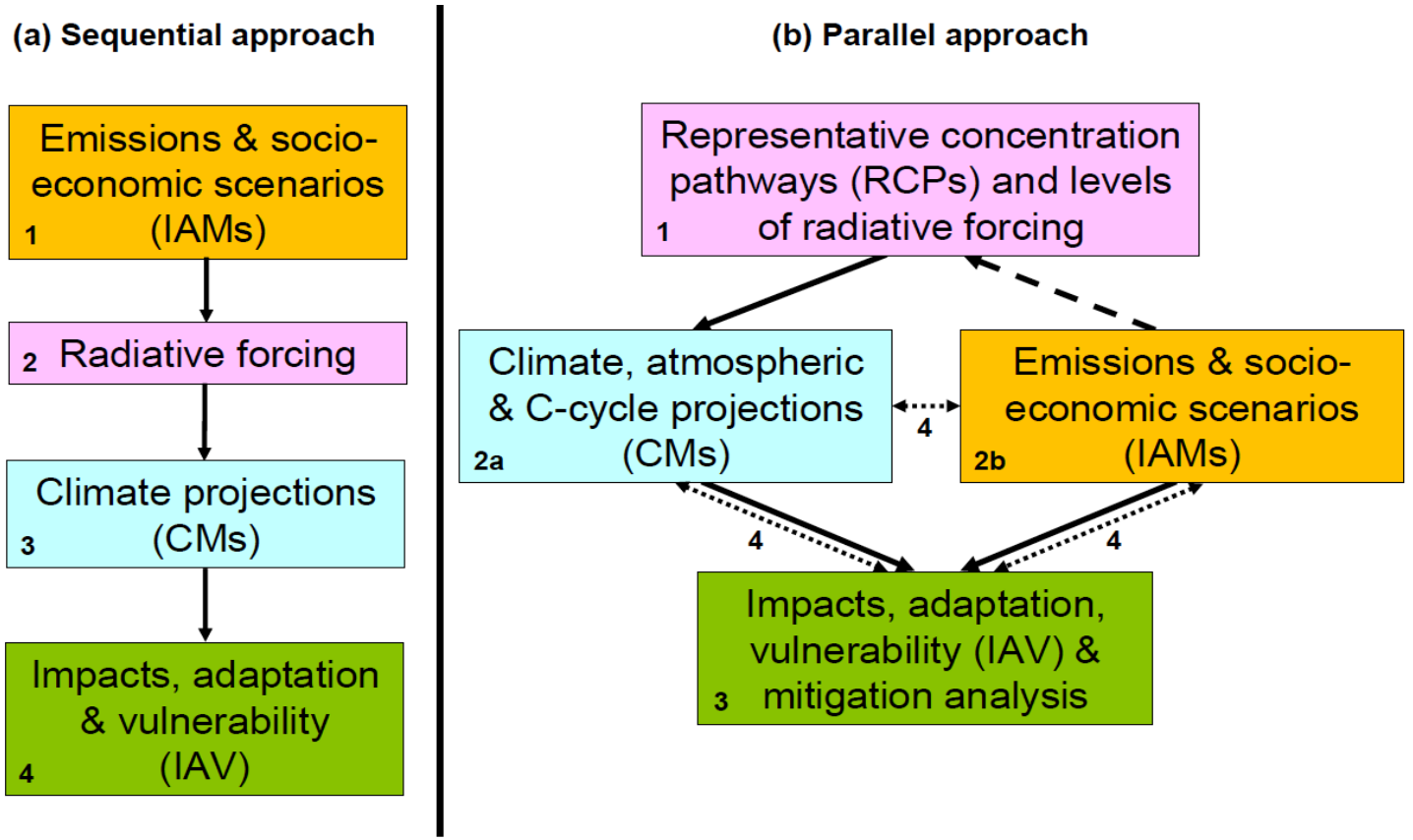


Figure I.1. Approaches to the development of global scenarios: (a) previous *sequential* approach; (b) proposed *parallel* approach. Numbers indicate analytical steps (2a and 2b proceed concurrently). Arrows indicate transfers of information (solid), selection of RCPs (dashed), and integration of information and feedbacks (dotted).

Acquired facts of the IPCC process

- High scientific credibility (Nobel Prize 2007):

  methodology of integration, associating several disciplines and knowledge ; (climate gate)

  Creating epistemic communities
- Contributing to national capacity-building: ex of guidelines for national inventories of anthropogenic emissions
- “Policy-relevant research, not prescriptive research”
- Helping developing countries to be concerned
- It is not a linear expertise !

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