ESF Forward Look RESCUE
« Responses to Environmental and Societal Challenges for our unstable Earth »
Sept 10, 2009

New, emerging and neglected Scientific Questions in the RESCUE remit

Perspectives from the « natural sciences »

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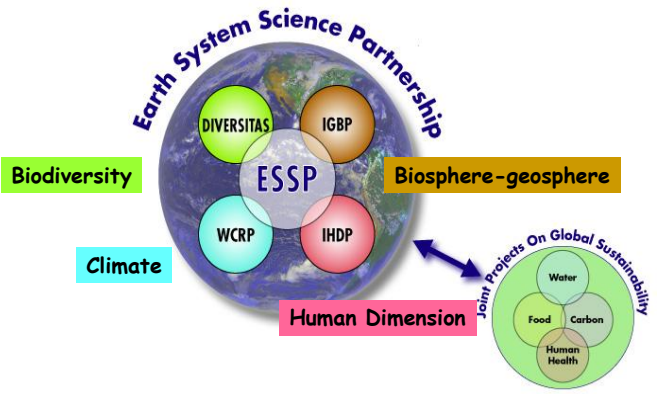
Paris Consortium « Climate-Environment-Society »

Science framework

Global Environmental Change « Earth System Science Partnership »
http://www.essp.org/

Amsterdam (2001) : Towards an integrated study of the Earth System



Climate Change impact on health

IPCC (2007)

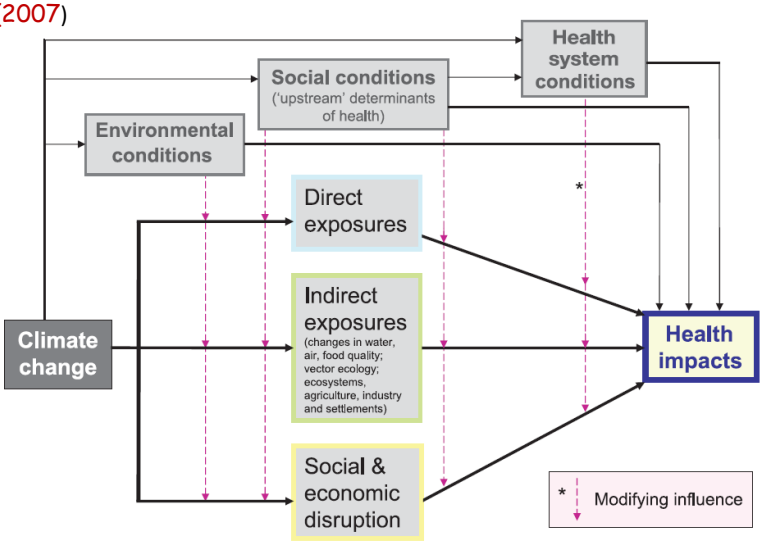


Figure 8.1. *Schematic diagram of pathways by which climate change affects health, and concurrent direct-acting and modifying (conditioning) influences of environmental, social and health-system factors.*

RESCUE

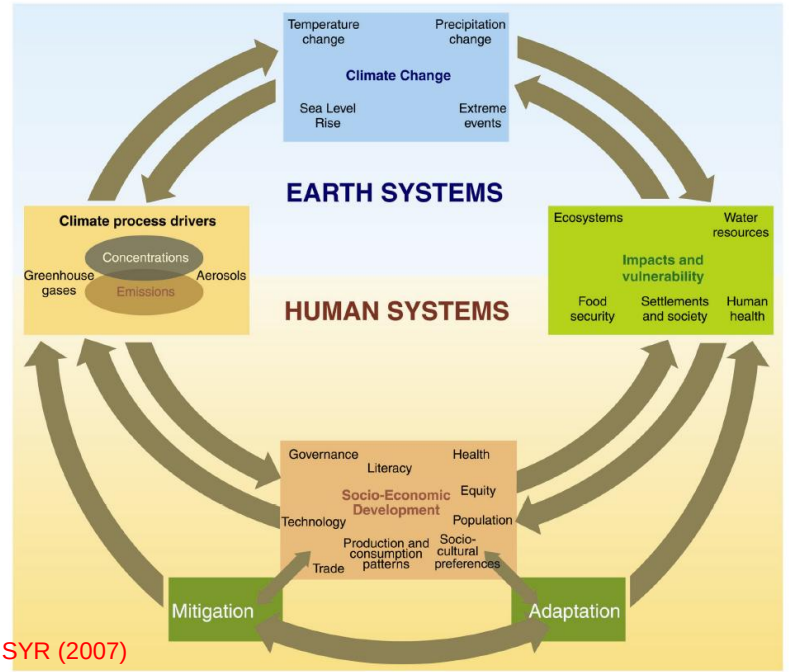
Some key words

- Global Environmental Change
- Interdisciplinarity / Integrated
- Stakeholders

Example of Climate Change issue

A perspective from climate science

Schematic framework of anthropogenic climate change drivers, impacts and responses



IPCC, SYR (2007)

RESCUE

Some key words

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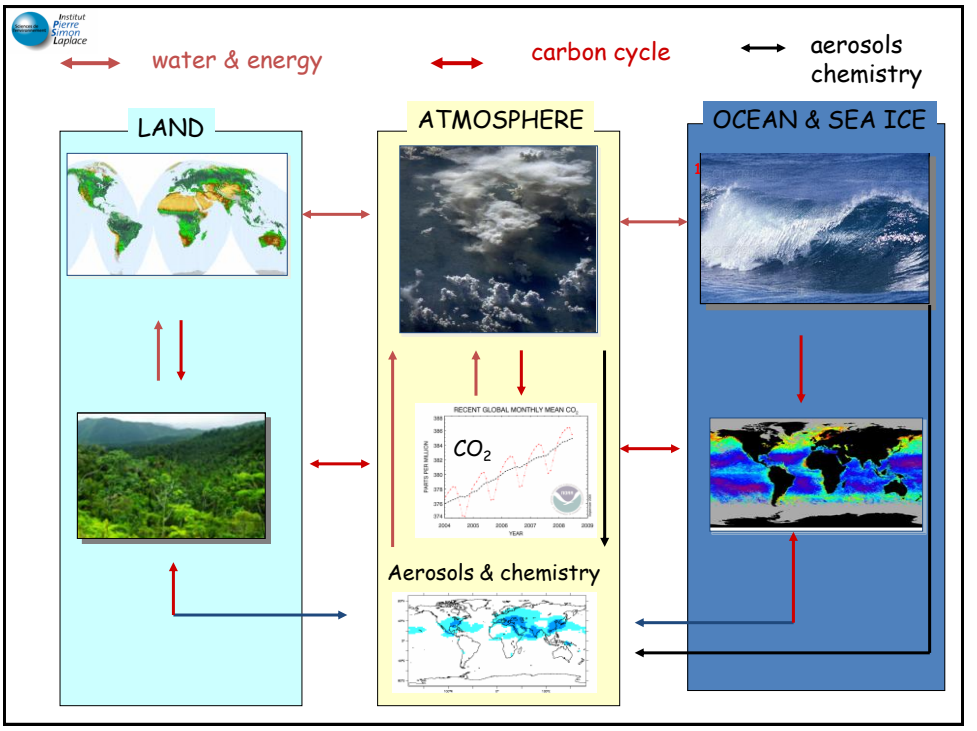
Example of Climate Change issue

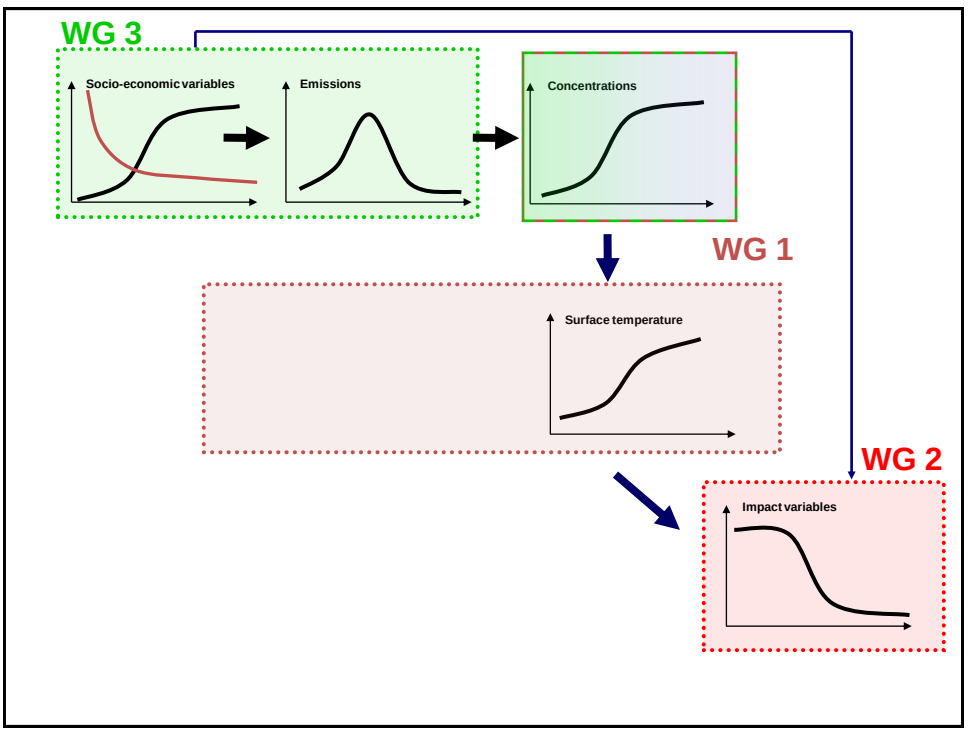
A perspective from climate science

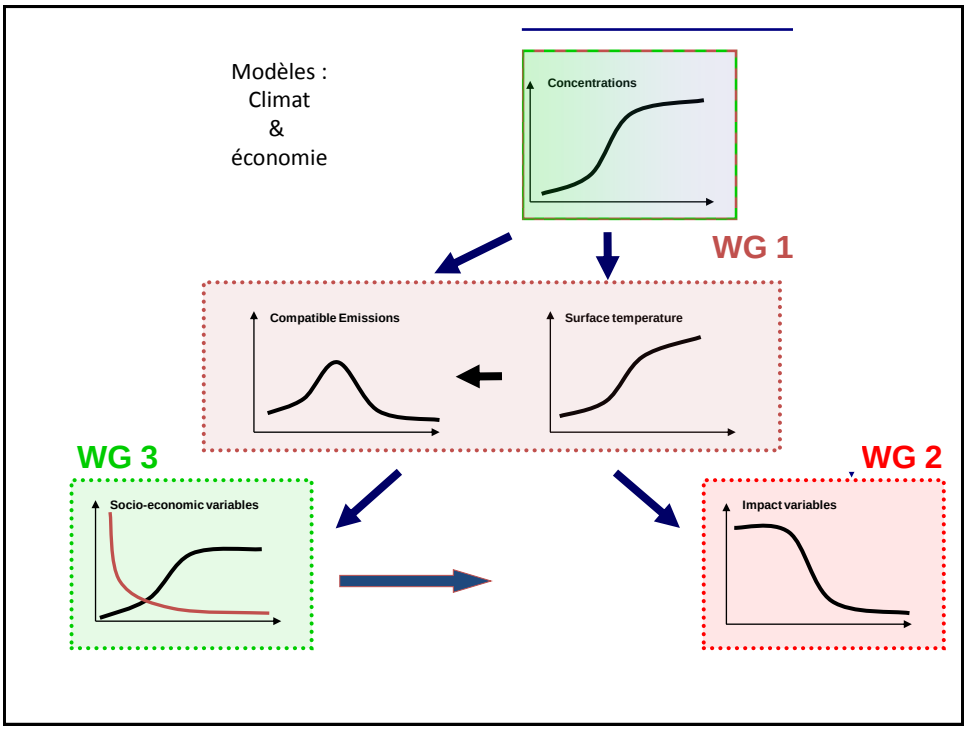
Challenges

1) Improve our understanding and projections of future climate changes

2) Improve our knowledge of climate change impacts on society:
Regional
sectors (water, ecosystems, health …)
interface with users


Institut Pierre Simon Laplace
water & energy
carbon cycle
aerosols chemistry
LAND
ATMOSPHERE
OCEAN & SEA ICE
RECENT GLOBAL MONTHLY MEAN CO2
CO2
Aerosols & chemistry


WG 3
Socio-economic variables
Emissions
Concentrations
WG 1
Surface temperature
WG 2
Impact variables



CLIMAT ENVIRONNEMENT SOCIÉTÉ
Groupement d'Intérêt Scientifique

Paris Consortium

Foster interdisciplinary studies of climate change

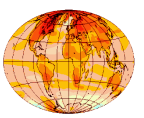
starting 2007

http://www.gisclimat.fr

Ecology

BIOEMCO
ESE

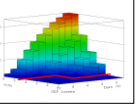
Climate Sciences



IPSL
LMD
LOCEAN
LSCE
LATMOS
LISA
LPMA

Economic and Social Sciences

CIRED
PREG
C3ED



Hydrology

SISYPHE

Health Sciences

PIFO

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Groupement d'Intérêt Scientifique

Four Interdisciplinary Research Areas

(1) Global climate, energy policies and economic development

(2) Climate extremes analyses and vulnerable regions

(3) Climate change, ecosystems, water resources and land use

(4) Climate change impacts on health

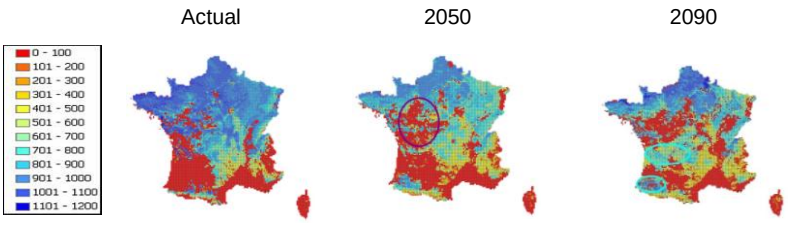
~ 15 projects
One project « RAMONS » on the development of interdisciplinarity

(3) Climate change, ecosystems, water resources and land use

Example of project:
Human Impacts on Biodiversity, Ocean Environment and Climate in the Anthropocene: Linking environmental and biodiversity research.

Labs involved: ESE, BIOEMCO, LMD, LOCEAN, LSCE

Objectives:
- Better consider biodiversity into climate models
- Ease interface ecologists and climate scientists
- Develop a service interface for ecologists



Quercus Petraea - volume of wood produced (m3/ha)

Projections of climate change impacts - CASTANEA with CO2, ANR Project QDiv

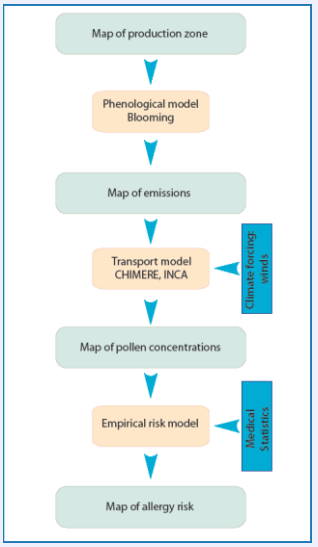
(4) Climate change impacts on health

Example of project:
Pollen, Allergy and Climate
Labs involved: LOCEAN, LSCE, CIRED, LMD

Objectives:
• Develop a platform for the impacts of climate change on pollen and allergy

• Coupling models for phenology, pollen transport and allergy risk to provide maps of allergy risks

• Develop an alert system



Modeling chain used for the project

What do we learn ?

on Interdisciplinarity:
- From pluri, multi, inter, trans-disciplinarity : growing integration
- Needs to be motivated by the shared scientific question
- Needs co-construction
- Takes time : is a long-term objective / Requires maturing time

- on the process : motivated by
  Science or Society
  Clarify : how use time / how evaluate results

Positive	Negative
- Dedicated funds helps - Time/place to discuss - young people : seems more natural	- Takes time - Evaluation/Publication - science : unknown processes/scales

Requires disciplinary developments !
examples
experimentation on ecosystems
Processes for health

Some lessons from a recent foresight exercice

- Balanced group of disciplines : strong stimulus
  - eg coupling economy-climate and ecosystems
  - eg social sciences & health
- Discussions in small groups
- Some suggestions:
  - In long-term observing networks : add social/health data (+ access)
  - Use a historical perspective
  - Adaptation : define examples of key contrasted areas
- « RAMONS » : moved from multi to interdisciplinarity

Worldwide

UK
Tyndall Centre for Climate Change Research (2000) http://www.tyndall.ac.uk/

GERMANY
Potsdam Institute for Climate Impact Studies (1992) http://www.pik-potsdam.de/

CANADA :
Institute des Sciences de l'Environnement, Montéral, Québec, http://www.ise.uqam.ca/

New initiatives are emerging
with a strong involvment of the « natural sciences »

UK
Walker Institute for Climate System Research, University of Reading (2006)
http://www.walker-institute.ac.uk/
Grantham Institute for Climate change (Imperial College) - Collaboration LSE
http://www3.imperial.ac.uk/climatechange

GERMANY
Deutsches Klima Konsortium (2007)

CANADA
Pacific Institute for Climate Solutions, British Columbia (2008) http://www.pics.uvic.ca/

...

Interface with end-users

1) **IPCC : interface with policy**

2) **« Climate services »**

World Climate Conference 3, Geneva, Aug 30-Sept 4, 2009
http://www.wmo.int/wcc3/

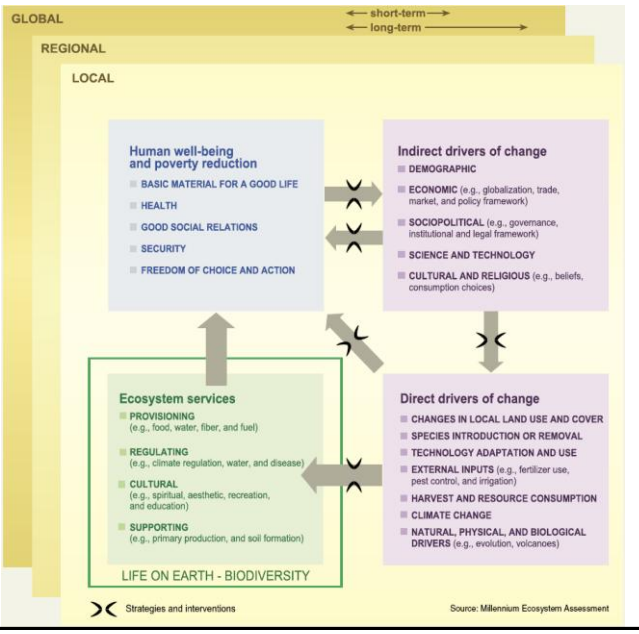
- Need for «climate information » to society
- **Need for research** : climate & interdisciplinarity
- Need capacity building for developing countries

Emerging :
GERMANY: Climate Service Center, starting 2009

3) Develop the link between research-education-innovation

e.g. European Institute for Innovation and Technology :
Climate change (mitigation & adaptation)

Similar issues are emerging for ecology/biodiversity



Conclusions

- Integrated / link with users : under progress

- Difficulty :

time to develop an integrated approach vs need to find solutions

- Coordinated international strategy can help (RESCUE ?)

- **Strong limitations** :
  - Limited human resources
  - Need disciplinary developments in parallel : science limitations
  - Need data acquisition and access
  - Need education : concepts, langage, methodologies

(1) Global climate, energy policies and economic development

Example of project:

Assembling biophysical and economic models to assess long run integrated scenarios
Labs involved: LSCE, LMD, CIRED

Objectives:
- A new modeling platform built for IPCC report (AR5)
- Embedded Land-Use choices in a world macro-energy model
- Scenarios with full consistency between socio-economic pathways and biophysical constraints