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From Climate Researchers to Climate Advisors

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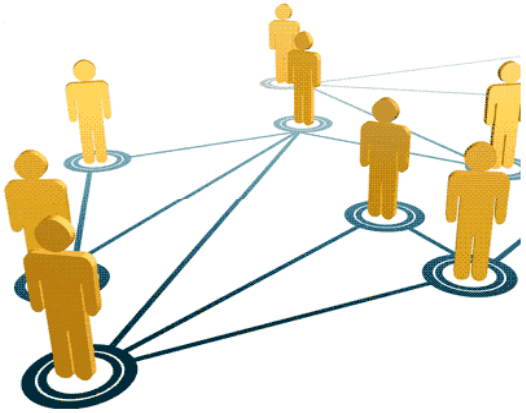

The fundamental question that society is asking has considerably changed

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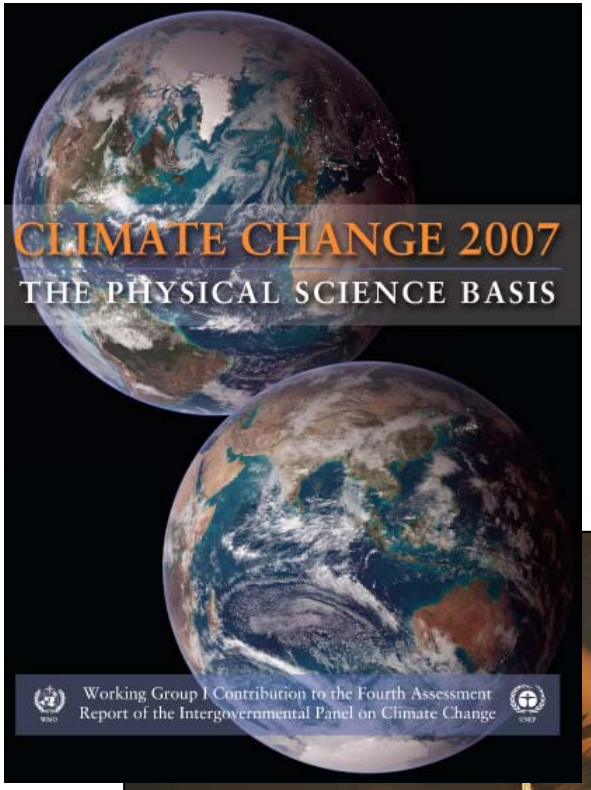
Old Question:

Is anthropogenic climate change occurring?

- **Classic, low-resolution, global climate modeling (past 40 years)**
- **After broad acceptance of IPCC-AR4 findings ...**

… the question is now:



www.ipcc.ch

What is the impact of this climate change on our coupled human and natural systems? And what are the solutions to address the problem?

- Magnitude and speed? Direct and indirect impacts?
- Adaptation and mitigation – Options and limits?
- Regional / local focus on “usable” science
- Sustainable Systems:
  - Energy, Food, Water, Health,
  - Cities, Ecosystems
- Societal Impacts:
  - Climate Services (GIS, Extremes…)

Addressing these much more complex questions requires:

- **Improvements to existing climate tools**
- **Integrating new approaches, priorities, capabilities**
- **Cooperation with new collaborators and partners**

Mission

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To produce and deliver useful, authoritative, and timely science-based knowledge, using Earth system observations, model projections, data synthesis, interdisciplinary analyses and dialogue with economic actors to help

(1) mitigate the causes of environmental changes (**mitigation**)

(2) manage climate-related risks, opportunities and impacts (**adaptation**).

To be a reliable source of climate information, presented in a compelling and effective way to reach large and influential audiences, and to build capacity to anticipate, plan for, and adapt to climate change

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Important Attributes of a Climate Service

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- Provide balanced, credible, cutting edge scientific and technical information
- Engage a diversity of users in meaningful ways to ensure their needs are being met
- Provide and contribute to science-based products and services to minimize climate-related risks
- Strengthen observations, standards, and data stewardship
- Improve regional and local projections of climate change
- Inform policy options

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Many Sectors that will benefit from and contribute to Climate Services

- Energy
- Agriculture
- Forestry and land management
- Water management
- Coastal management
- Fisheries
- Transport
- Tourism
- Trade and Commerce
- Human health
- Financial services and insurances
- Construction and urban development
- Civil protection and environmental security

The socio-economic and environmental benefits of a revolution in weather, climate and Earth system analysis and prediction

Melvyn Shapiro, Jagadish Shukla, Brian Hoskins, John Church, Kevin Trenberth, Michel Beland, Guy Brasseur, Mike Wallace, Gordon McBean, Jim Caughey, David Rogers, Gilbert Brunet, Leonard Barrie, Ann Hendersen-Sellers, David Burridge, Tetsuo Nakazawa, Martin Miller, Phillippe Bougeault, Rick Anthes, Zoltan Toth and Tim Palmer

Scientists from the World Weather Research Programme (WWRP), World Climate Research Programme (WCRP), International Geosphere-Biosphere Programme (IGBP) and the natural-hazards and socio-economic communities[1] have identified an urgent necessity for establishing a weather, climate and Earth-system prediction project. This will increase the capacity of disaster-risk reduction managers and environmental policy makers to make sound decisions, in order to minimize and adapt to the societal, economic and environmental vulnerabilities arising from high-impact weather and climate.

Title required

Clockwise from top left: Brush fire in Macedonia during the south-eastern European summer heat wave of 2007; the town of Upton upon Severn in Worcestershire, England, surrounded by water during the devastating flooding of July 2007; an Ethiopian goat herder leads his live stock through the dust in the desert where severe drought in East Africa has forced overgrazing, which destabilizes the soil; refugees from Hurricane Katrina wait for evacuation

Rationale

The socio-economic, environmental and health impacts of recent extreme weather and climate events, such as the destructive flooding rains over India, China, England, and the United States and the simultaneous south-eastern Europe severe heat wave and drought during the summer of 2007; the devastation of New Orleans by Hurricane Katrina in 2005; the deadly European heat wave of August 2003, and the persistent multi-decadal African drought that ravaged the semi-arid regions of the Sahel, demonstrate the vulnerability of modern humanity, economies, and the environment to high-impact weather and climate. Effective mitigation of, and adaptation to, such events requires accurate prediction of the likelihood of changing weather and climate at global, regional and local scales, combined with enhancing the capacity of disaster-risk reduction managers and environmental policy makers to utilize this information to make sound decisions that minimize the societal vulnerability, economic and environmental losses and that maximize economic opportunities arising from high-impact weather, climate variability and climate change.

We stand at the threshold of providing and responding to major advances in observations, analysis and prediction of high-impact weather and climate events, and the complex interaction between the physical-biological-chemical Earth system[2] and global societies. This opportunity arises from the notable progress in our ability to monitor and predict short-term weather hazards and climate variability and change, and the utilization of this information by disaster-risk-reduction managers and environmental policy makers. For example, short-term regional forecasts (hours to three-day periods), prepared on spatial scales of a few kilometres, are currently capable of predicting the occurrence of flooding rainstorms, air-quality emergencies, coastal storm surges, severe wind events, hurricane track and land fall, with reasonable skill. Global weather

Partnerships with stakeholders will have to be developed.

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Climate Services will Require an Unprecedented Level of Coordination

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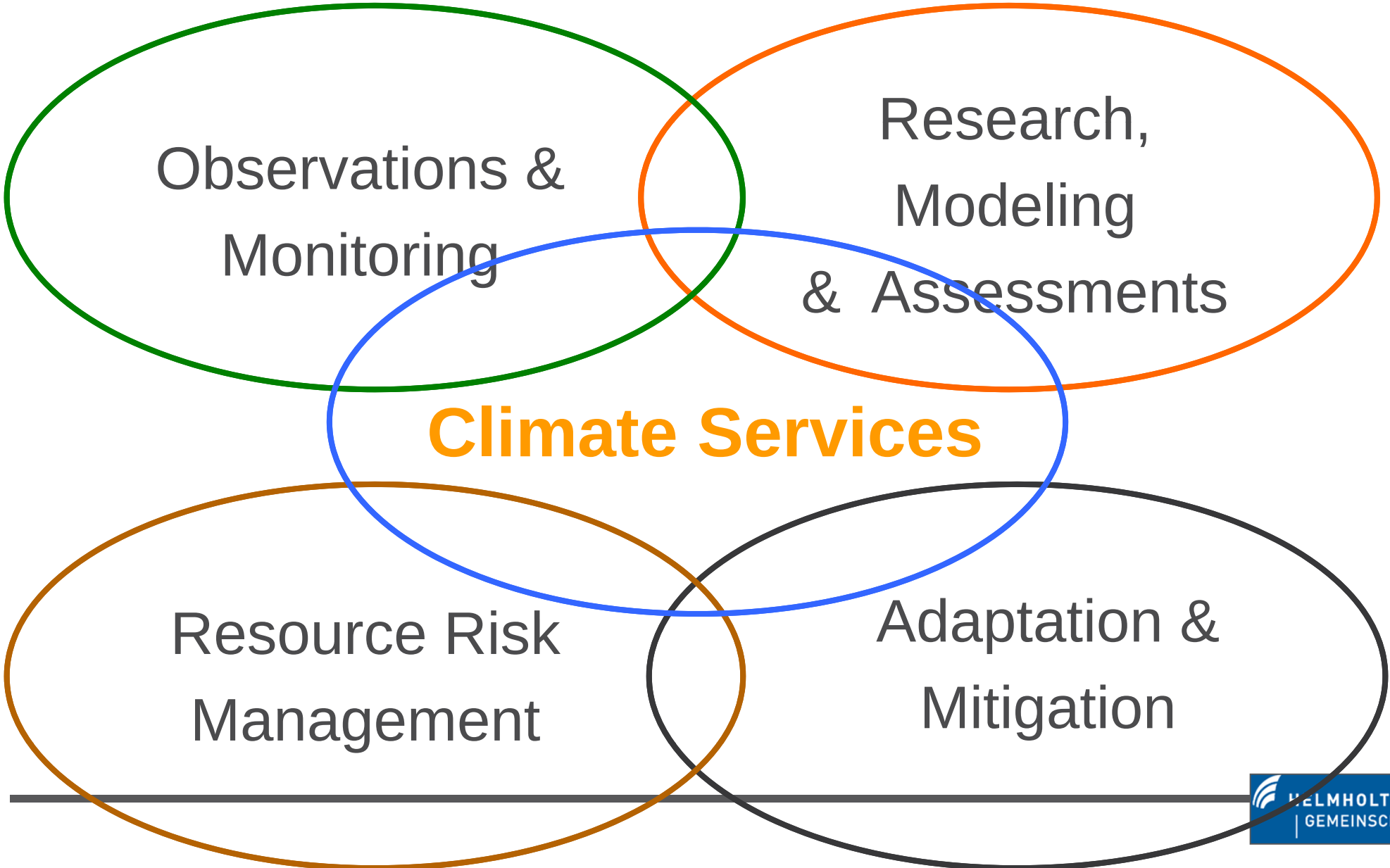

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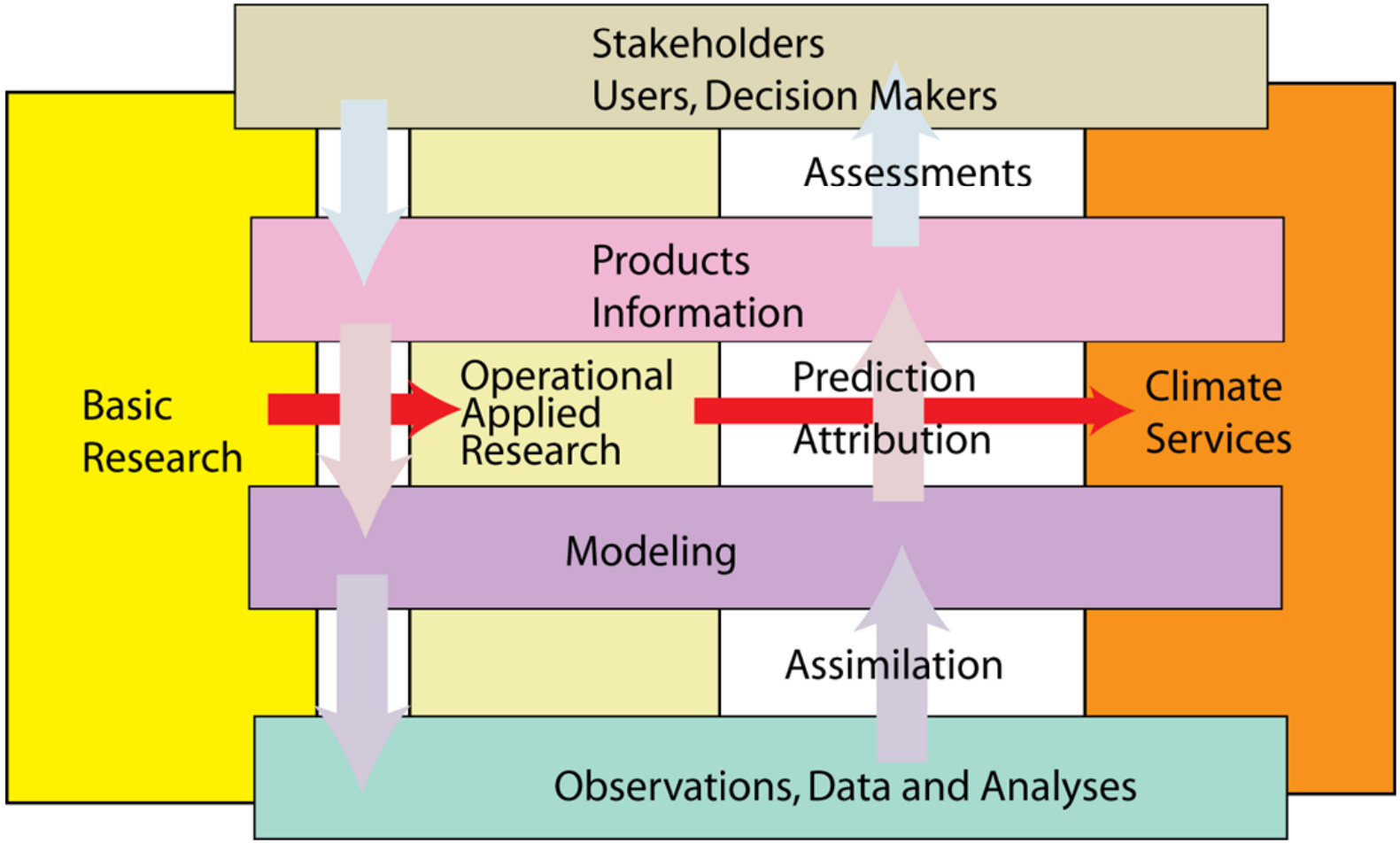
From Fundamental Research to Climate Services



From K. Trenberth

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CSC was created as part of the Hightech-Strategy for protection against climate change of the German Federal Government.

CSC is funded by the Federal Ministry of Education and Research (BMBF). It is operated by the Helmholtz Centre Geesthacht. It is located in Hamburg.

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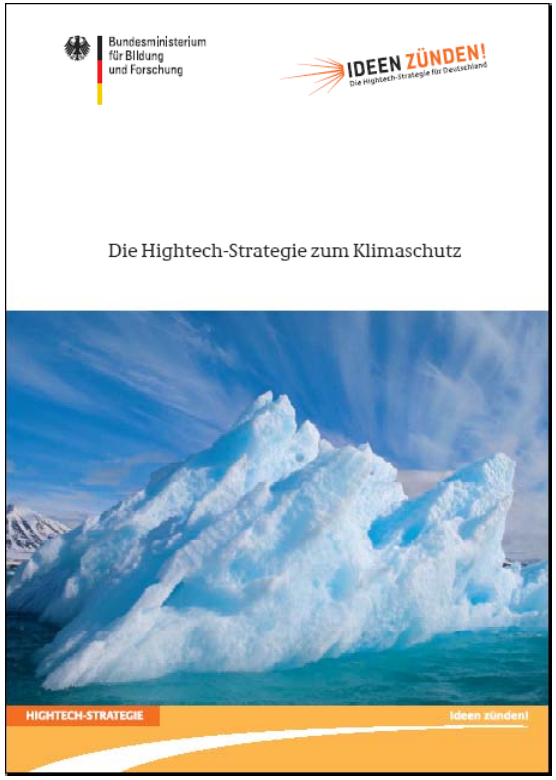
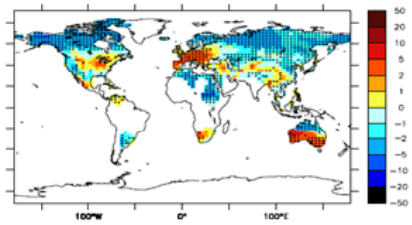


Climate Services : Building an Information System

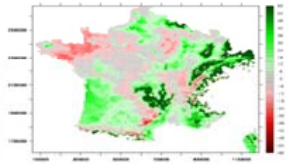
Interactions with users/stakeholders

Decision support tools
Dedicated analyses
Support Innovation : eg EIT



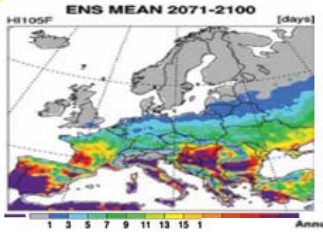
Energy supply
Threshold diurnal amplitude

Impact studies
Socio-economy, Ecosystems, Health
Develop Interdisciplinarity



Maize yield change

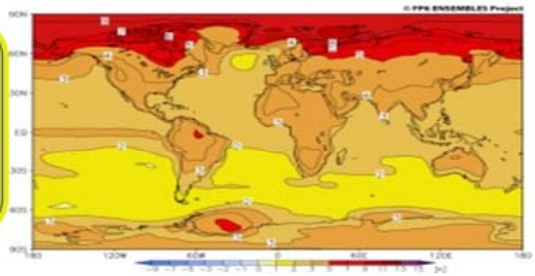
Climate Indicators
Heat waves, drought/floods



Heat index
(ENSEMBLES FP6)

Climate projections
Global models
downscaling

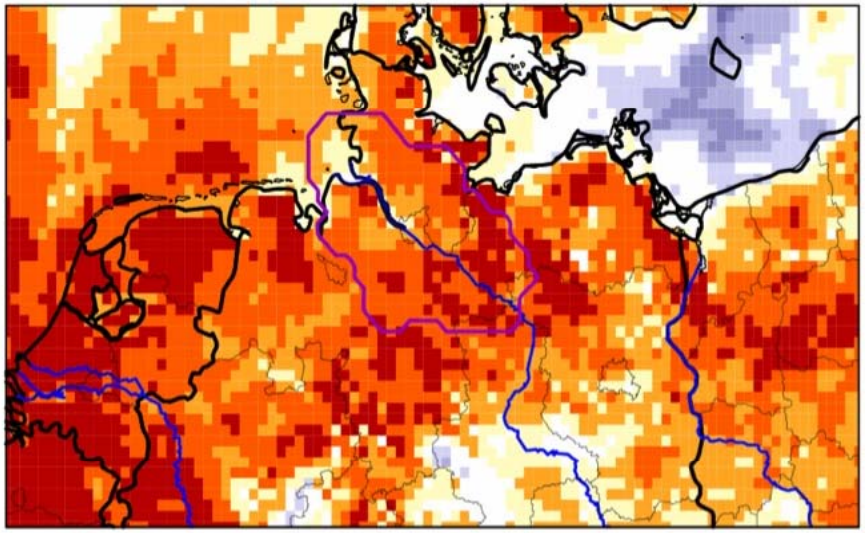
Climate Observations



From: Sylvie Joussaume

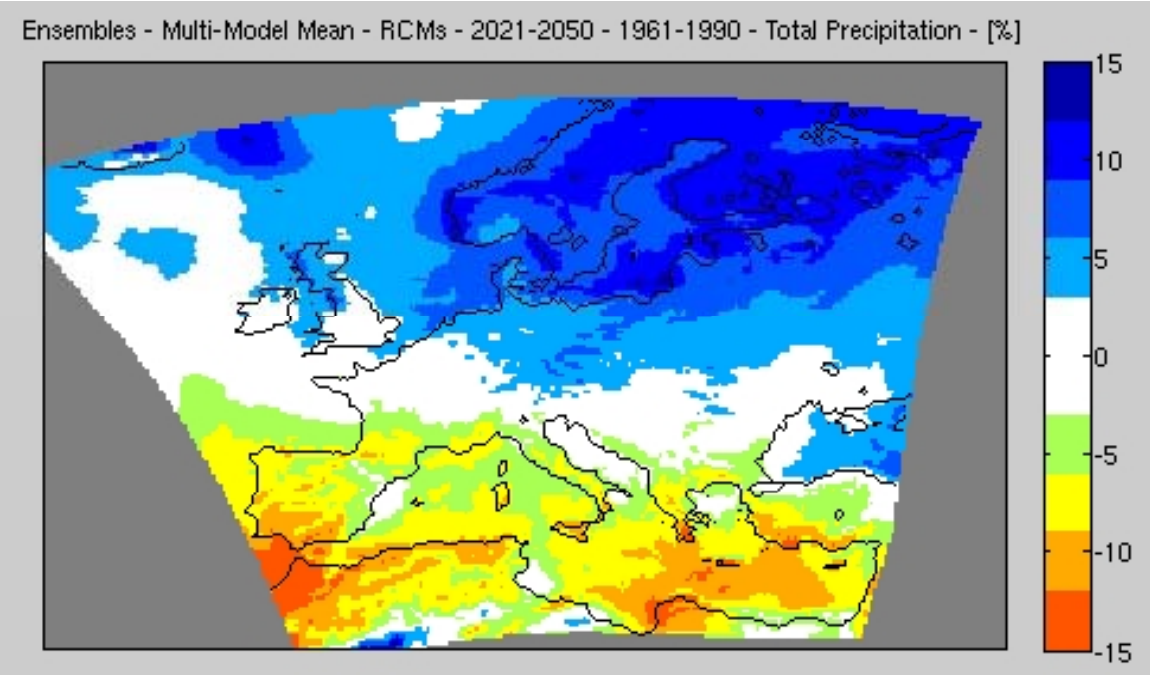
Climate System

Global and regional climate projections and data analysis



Topics:

- Regional climate changes:
  Understanding feedbacks
  and reactions
- Regional climate change information for climate change impact assessment, vulnerability and mitigation studies
- Bandwidth / Development corridors:
  Handling the spread of climate change information in climate change impact assessments



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Expected Changes in Precipitation in Europe

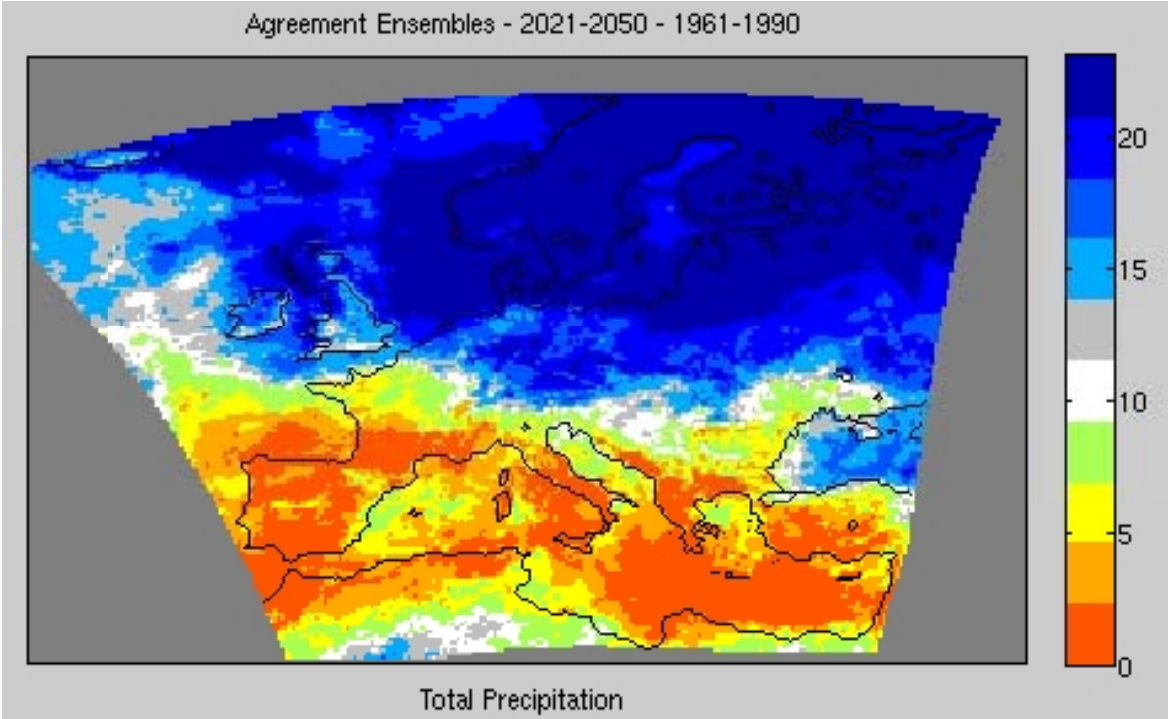
Convergence of the 23 models

Change in Precipitation

Multi-Model-Mean

(2021-2050)-(1961-1990)

ENSEMBLES



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Climate System

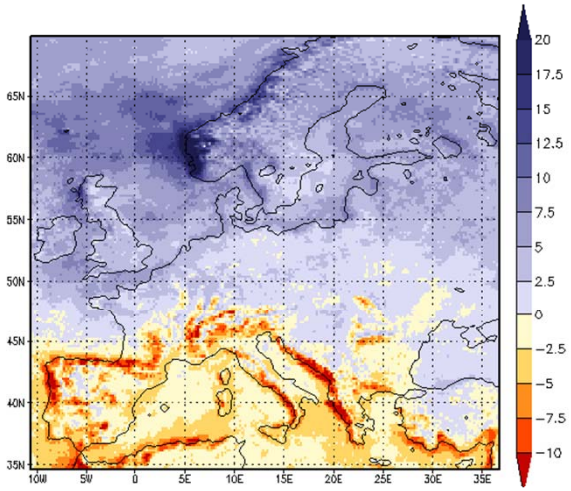
Examples for Maps and Dataproducts

Different Precipitation and Temperature Indices

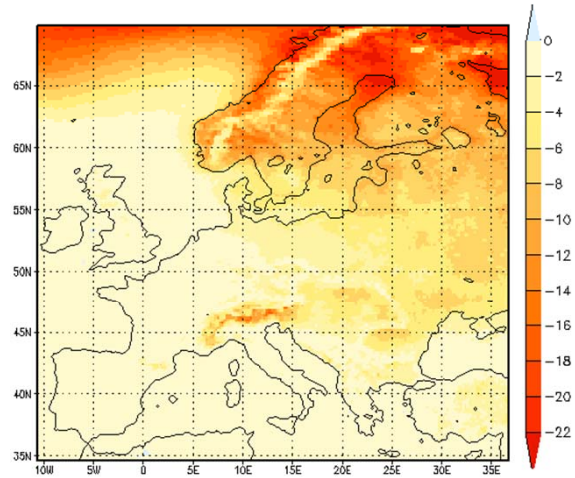
(2071-2100) vs. (1961-1990)
Scenario A1B

Model: CCLM

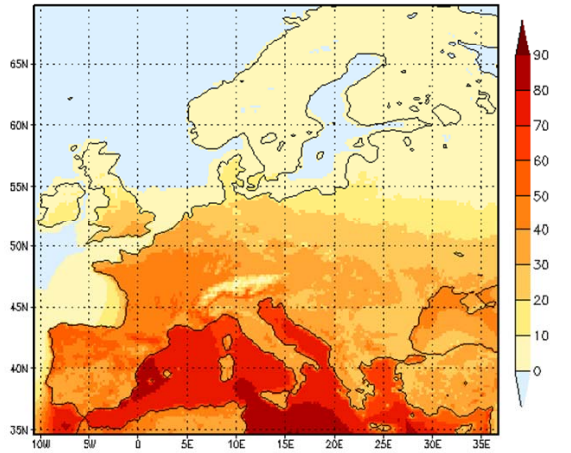
Tage mit Niederschlägen > 10 [mm/h]



Schneetage



Sommertage



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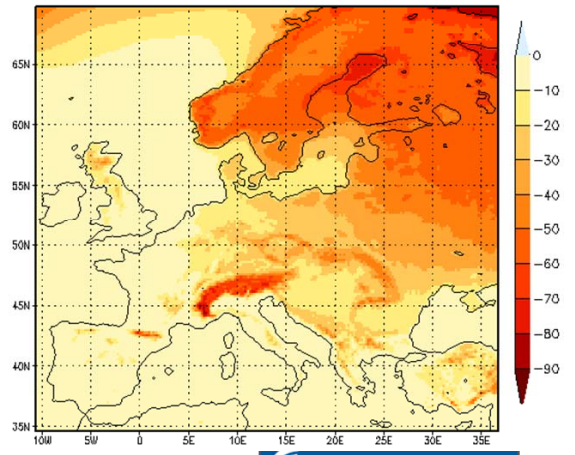

Impacts, Vulnerability, Adaptation

- Integrated Assessment of the impacts of climate change and other environmental perturbations on natural resources and human health

- Management of the consequences, integrating aspects of climate change mitigation – tailored to individual needs

Principal topics:

- Biodiversity (preserving diversity of species)
- Agriculture and forestry
- Water management
- Health

Economics and Policy

- Evaluate economic, social and political consequences of climate change
- Assess potential mitigation and adaptation strategies
- Evaluate the costs of business and policy responses

Sectoral Focus:

- Energy sector (in particular renewable energies and emission trading)
- Financial services (in particular insurance)
- Construction, transport and infrastructure
- Civil protection
- Tourism and recreational industries
- International climate policies and foreign trade

Communication, Information and Education

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Communication of the complex topic of climate change to a broader public.

Target groups:

Policy- and decision-makers
- European authorities
- National Government
- Provinces
- Municipalities
- Private sector (different sectors)

Economists

Teachers

Students

Public

Integrating Research Model and Data into end-use Knowledge Systems

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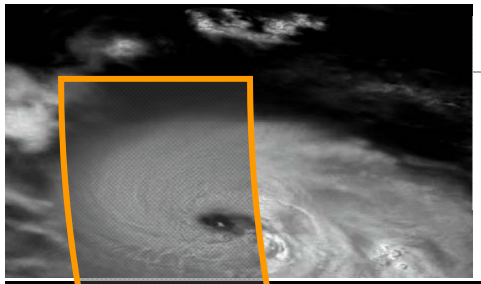
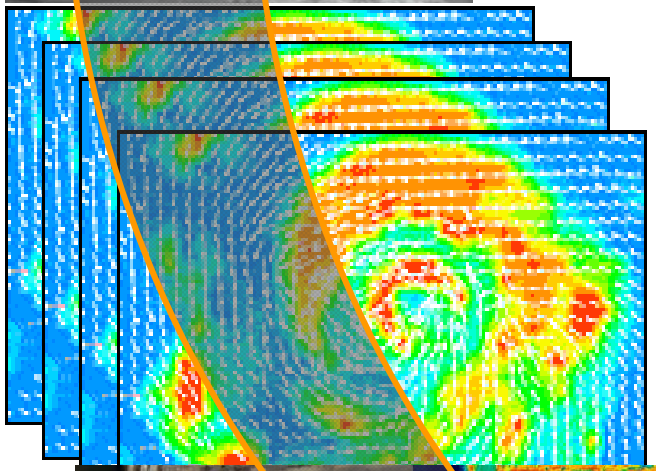
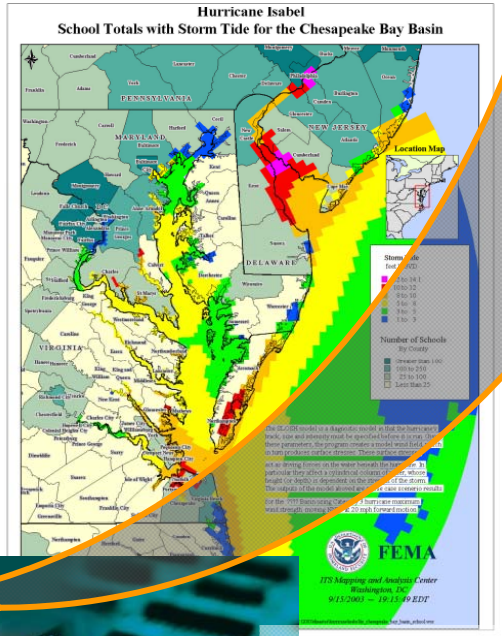


Weather/Climate Data Assimilation Models



Ensemble Predictions

Regional Environments



Decision Tools

Reliable Information Delivery

Operational Implementation

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Thank you.