

Climate Change Research supported by the EU Framework Programmes

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**International Conference on Climate Change Impacts on Tourism,
Lisbon, Portugal, 7-8 September 2007**

EU research: the story so far

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- **1952:** ECSC treaty; first projects started March 1955
 - **1957:** EURATOM treaty; Joint Research Centre set up
 - 1983:** ESPRIT programme
 - 1984:** **First** Framework Programme (1984-1987)
 - 1987:** 'European Single Act' – science becomes a Community responsibility;
Second Framework Programme (1987-1991)
 - 1990:** **Third** Framework Programme (1990-1994)
 - 1993:** Treaty on European Union;
role of RTD in the enlarged EU
 - 1994:** **Fourth** Framework Programme (1994-1998)
 - 1998:** **Fifth** Framework Programme (1998-2002)
 - 2000:** European Research Area
 - 2002:** **Sixth** Framework Programme (2002-2006)
 - 2005:** Proposal for the **Seventh** Framework Programme (2007-2013)

The Historical Perspective of the Climate Research in the Framework Programmes

- FP3 & 4:** Research on ecosystem functioning, climate and environment protection technologies
- FP5:** Integration of the environmental dimension in research; more attention to climate change, water, coastal integration and urban dynamics
- FP6:** Sustainability to be integrated in all areas of research, especially Energy, Transport and Agriculture
- FP7:** Sustainable management of the environment and its resources, functioning of climate and the earth system, development of new technologies, tools and services

FP5 Climate Change Research

Over 25 research projects funded (budget: ~50 M€) in areas such as climate dynamics, climate change impacts, abrupt changes and mitigation/adaptation

- PRUDENCE (special issue on *Climate Change* journal, site event)
- STARDEX (glossy brochure, side event, policy fishes)
- MICE (special issue on *Climate Research* journal, stakeholder folder)
- GreenICE (EC publication, site event)
- DINAS-COAST (site event, CD-Rom to users)
- ...

Contribution to IGBP, WCRP, IHDP and IPCC 4AR

PRUDENCE Project

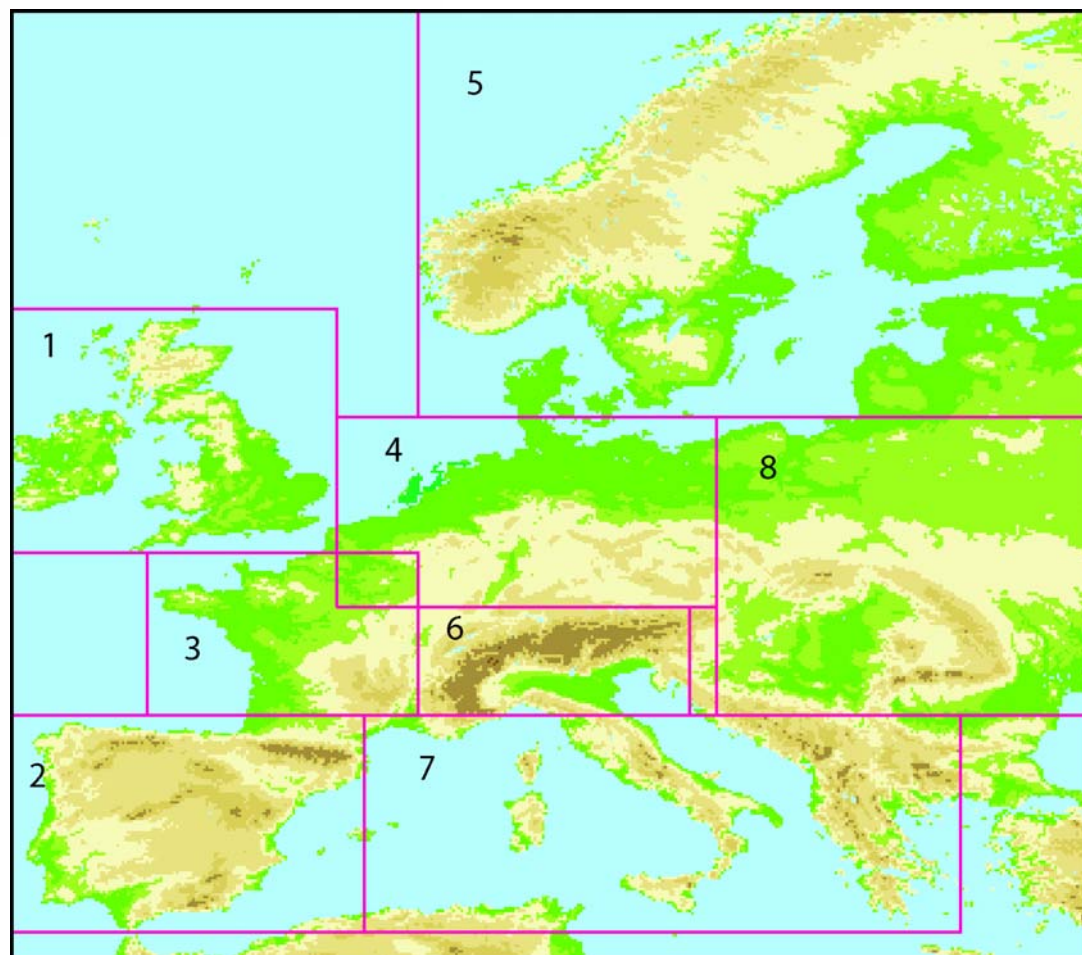
Prediction of Regional scenarios and Uncertainties for
Defining European Climate change risks and Effects

22 European institutes led by the Danish Meteorological Institute

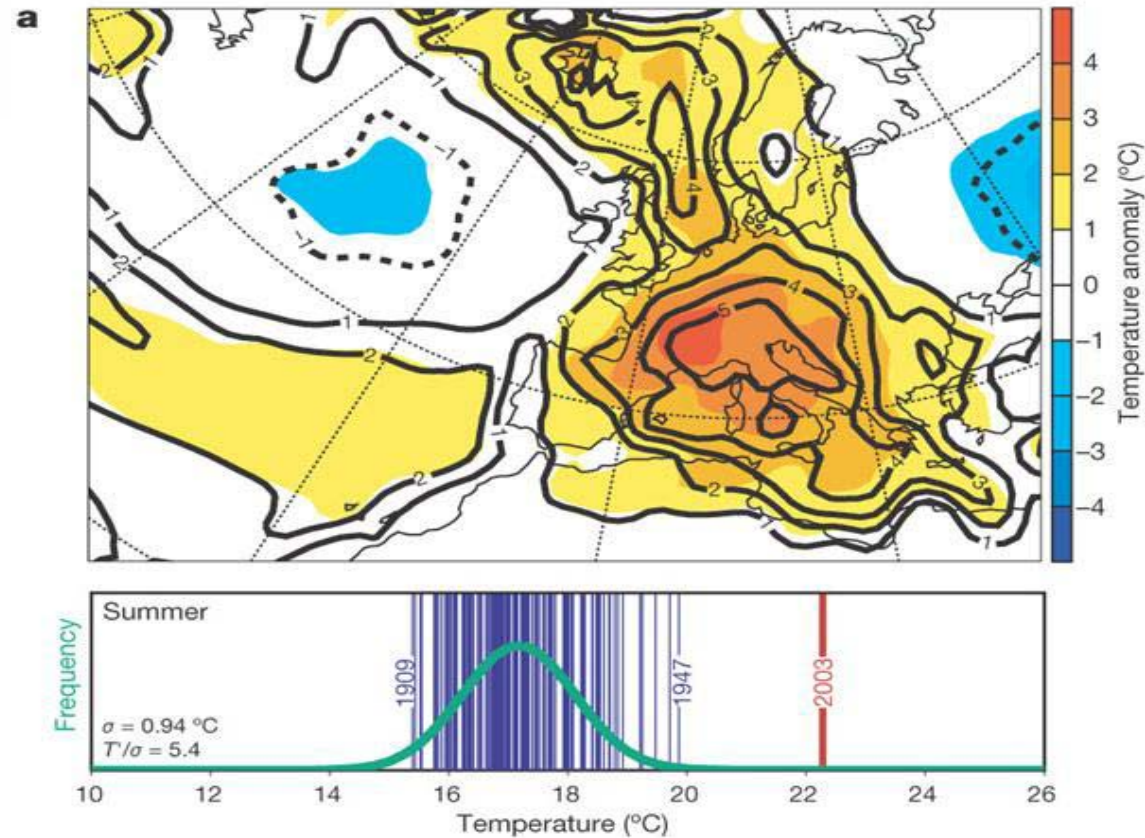
Home page: <http://www.dmi.dk/f+u/klima/prudence>

Objective: PRUDENCE provides high-resolution climate change projections for 2071-2100 for Europe using regional climate modelling. The variability and level of confidence in these scenarios are characterised as a function of uncertainties in model formulation, natural/internal climate variability, and alternative scenarios of future atmospheric composition.

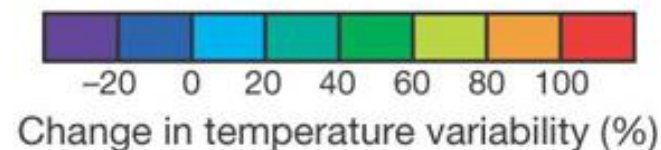
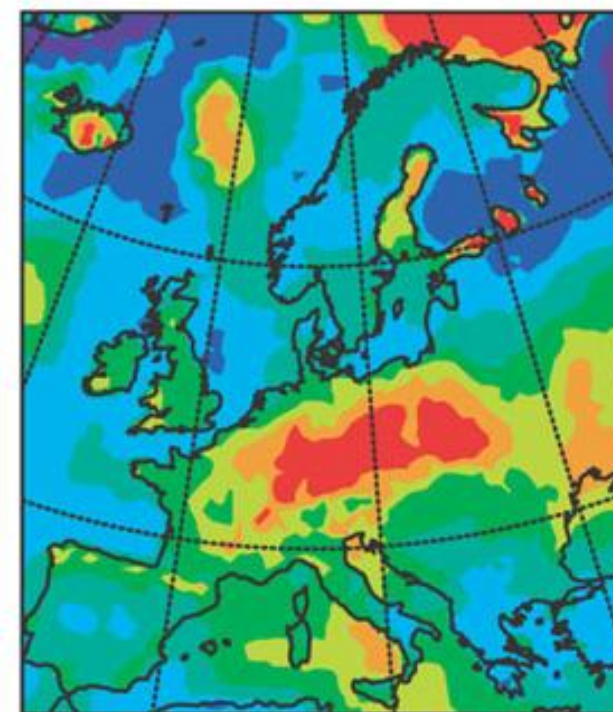
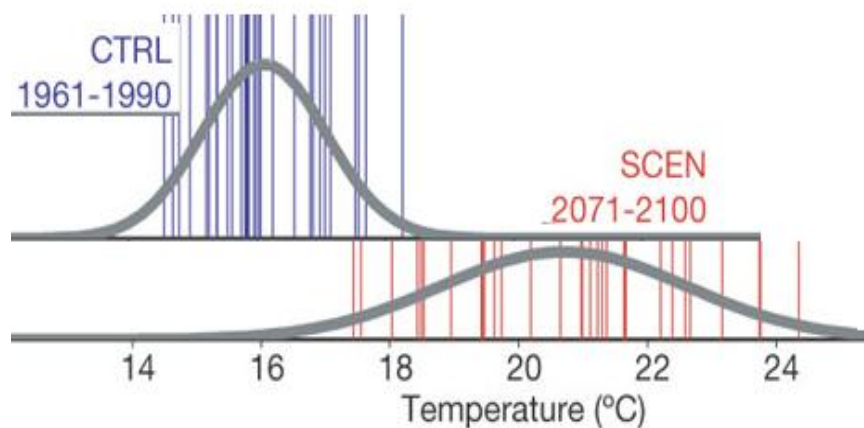
PRUDENCE



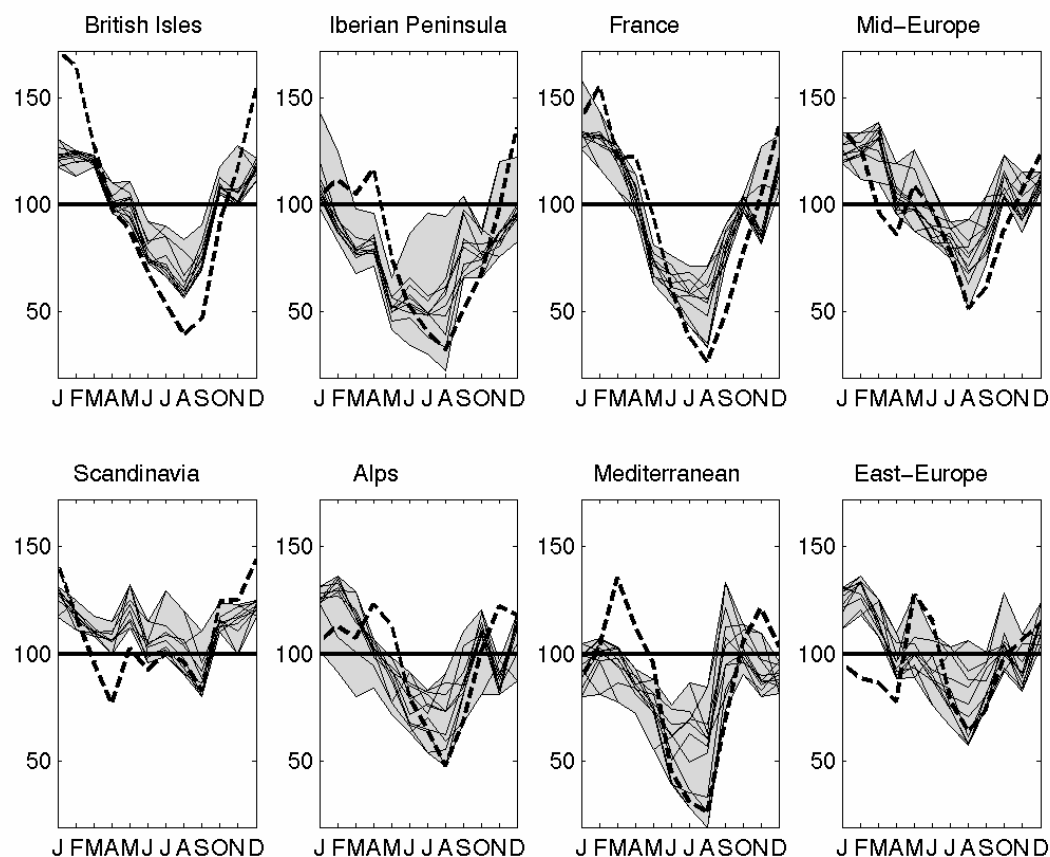
PRUDENCE: the 2003 heatwave in Europe from observational data



PRUDENCE: Changes in temperature during 2071-2100



PRUDENCE: signal in precipitation 2071-2100 minus 1961-1990, A2



STARDEX Project

Statistical and Regional Dynamical downscaling of Extremes for European regions

14 European institutes led by the University of East Anglia, UK

Home page: <http://www.cru.uea.ac.uk/projects/stardex/>

Objective: STARDEX provides improved downscaling methodologies for the construction of scenarios of changes in the frequency and intensity of extreme events. The objective is met by taking a case-study approach and using standard data sets and consistent methods, including a publicly and freely available software tool for calculating a standard set of extreme statistics.

MICE Project

Modelling the impact of climate extremes

8 European institutes led by the University of East Anglia, UK

Home page: <http://www.cru.uea.ac.uk/projects/mice/>

Objective: MICE uses information taken directly from climate models to explore future changes in extreme events across Europe in response to global warming. The impacts sectors investigated range from those where the relationships between climate and impact are well understood (agriculture, energy use) and those where the potential implications of climate change are multi-faceted (forestry, tourism).

MICE Project Results (General)

In the warmer climate of 2070-2099 under the A2 IPCC scenario:

- Temperature: Heat waves will become hotter and last longer over much of Europe, while the cold season will be much shorter
- Rainfall: Southern Europe and the Mediterranean are expected to become drier with prolonged droughts commonplace in summer and reduced rainfall in winter. Northern Europe to become wetter in winter but periods of drought are likely to become more frequent in summer
- Water: Floods, droughts and episodes of water pollution are likely to become more severe and more common
- There will be adverse effects on a number of activity sectors including agriculture, hydroelectricity production, property insurance, health and tourism

MICE Project Results (Tourism)

Winter Sports in the Alps

- Snow depth is expected to decrease by about 20-30 % by 2020 under the A2 scenario.
- The most sensitive altitude range is below 1500m.
- For every 1°C rise in temperature there will be about 14 fewer skiing days.

Mediterranean Summer Tourism

- Warmer Northern European summers encourage an increase in domestic holidays.
- In a warmer future, there is an increased likelihood of people from the Mediterranean holidaying in the north.
- More frequent and more intense heat waves and drought are likely to discourage Mediterranean summer holidays.
- There is likely to be a shift in the Mediterranean holiday season to spring and autumn.

Snow depth, March 1

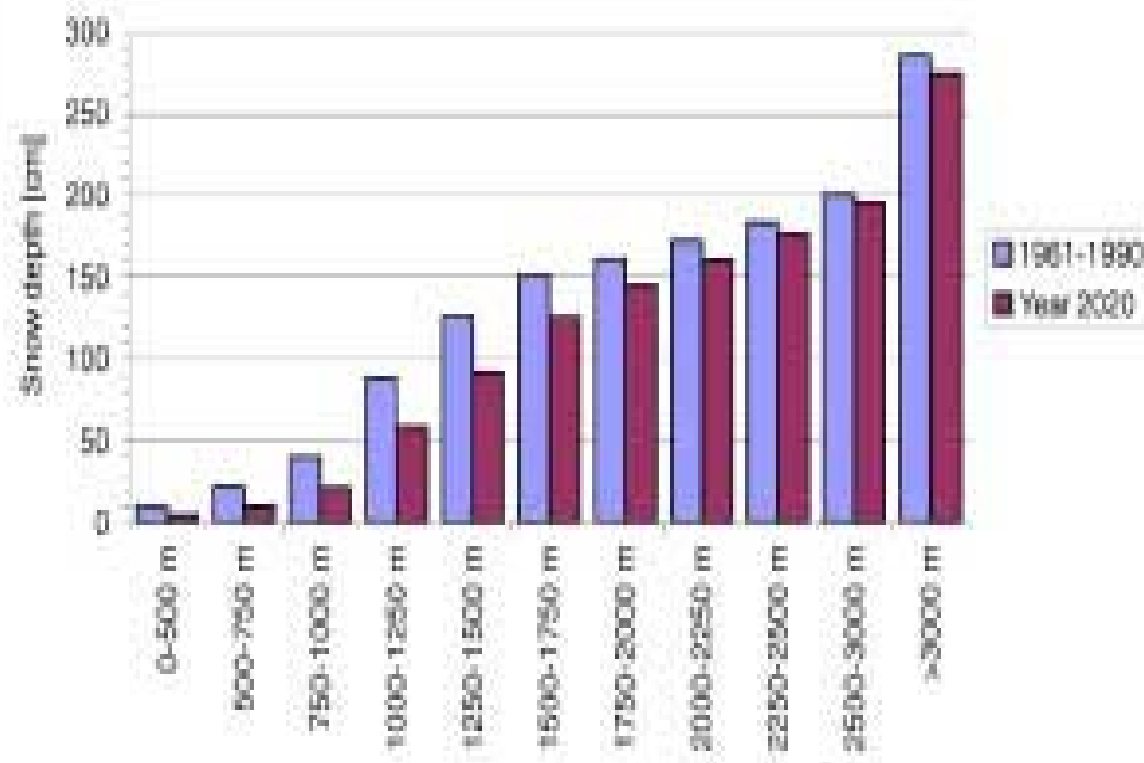


Figure 13. Snow depth at March 1st for the baseline period (1961-1990) and the future period 2010-2039 (the 2020s) at different altitudes in the Alpine region under the A2 scenario.

FP6 Work Programme on Area I

*Impact and mechanisms of greenhouse gas emissions
and atmospheric pollutants on climate, ozone depletion
and carbon sinks*

Research priorities

- I.1 Carbon and nitrogen cycles: sources and sinks
- I.2 Atmospheric pollutants and their regional impacts
- I.3 Climate dynamics and variability
- I.4 Prediction of climate change and its impacts
- I.5 Stratospheric ozone and climate interactions
- I.6 Adaptation and mitigation strategies

FP6 (2002-2006) Research

8 research projects funded (budget: ~50 M€) in areas such as climate dynamics and variability, and prediction of climate change and its impacts

- ENSEMBLES IP (probabilistic climate change predictions)
- AMMA IP (W. African monsoon multidisciplinary analysis)
- CLARIS SSA (A Europe-South America network for climate change)
- DYNAMITE STREP (Dynamics of the coupled climate system)
- ENHANCE SSA (Climate change and variability Conference)
- CLAVIER STREP (Climate change impacts in CE Europe)
- CECILIA STREP (Climate change impacts in CE Europe)
- CIRCE IP (Climate change impacts and adaptation in the Mediterranean)

Contribution to IGBP, WCRP, IHDP and IPCC 4 and 5AR

ENSEMBLES Integrated Project

ENSEMBLE-based Predictions of Climate Changes and their Impacts

- Objective: Predictions of both natural climate variability and human impact on climate to address uncertainties in forecast, initial conditions, representation of key processes within models and climatic forcing factors
- Coordinator: D. Griggs, Met. Office, Hadley Center, UK
- Partners: 69, mainly from Europe, but also USA, Australia
- Duration: 5 years
- EC Support: 15 M€
- Starting date: 1st of September 2004

ENSEMBLES

Research Theme 6: Asses Impacts

Local	Catchments/ national	Europe	Extremes
Temperate crops	Crops	Crops	Crops
Mediterranean crops	Runoff Stream discharge	Water availability	Forest fires +damage +heat stress
Soil/water	Wind energy		Flooding+ flood damage
			Heat stress
			Arrival pattern extremes
			Ecosystem damage

ENSEMBLES Research

Theme 7: Impact sector targets

ENSEMBLES is studying the effects of climate change on various sectors such as human health, energy production and demand, agriculture, forest damage, insurance and tourism.

- The tourism aim will be the production of scenarios that will incorporate the impacts in the tourism and leisure behavior (as 'shocks' in the model).
- Moreover ENSEMBLES will target tourism stakeholders especially in the Mediterranean with an end-user workshop taking place in Greece.

ENSEMBLES tourism impacts

- Shifts in space and season of leisure behavior as well as changes in tourism supply and demand due to climate change will be examined. Changes will be disaggregated for the various countries.
- These changes will be fed into scenario generating models to test the sensitivity of these models to climate change. The way this will be done is by expressing impacts as productivity and supply shock and inserting this to the economic model of scenario generator.

Policy relevant site events in UNFCCC

- A. “Regional climate modelling and impacts”, UNFCCC COP10 in Buenos Aires, 13 December 2004 based on the results of the PRUDENCE project.
- B. “Vulnerability of coastal zones to climate change”, UNFCCC COP10 in Buenos Aires, 10 December 2004 based on the results of the DINAS-COAST project.
- C. “Ice and ocean changes off Greenland”, during the UNFCCC SBSTA 22 in Bonn, 24 May 2005 based on the GreenICE project.
- D. “Climate change predictions, impacts and adaptation”, UNFCCC COP-11 in Montreal, 28 November 2005 based on STARDEX, ADAM, etc.
- E. “African Monsoons and climate change”, UNFCCC COP-12 in Nairobi, 14 November 2006 based on the AMMA project.
- F. Side event is planned on “probabilistic climate change predictions”, UNFCCC COP-13 in Bali, December 2007 based on the ENSEMBLES project.

FP7 Work Programme on Activity I Climate Change, pollution and risks

Pressures on Environment and Climate

- Area 1: *The Earth System and Climate: Functioning and abrupt changes*
- Area 2: *Emissions and Pressures: Natural and anthropogenic*
- Area 3: *The Global Carbon cycle – Green House Gas budget*
- Area 4: *Future Climate*
- Area 5: *Climate Change: Natural and Socio-economic Impacts*
- Area 6: *Response strategies: Adaptation, Mitigation and Policies*

Sub-activity 6.1.1. Pressures on environment and climate

ENV.2007.1.1.1.1. Stability of the Thermohaline Circulation

ENV.2007.1.1.2.1. Mega-cities and regional hot-spots, air quality and climate

ENV.2007.1.1.3.1. Ocean acidification and its consequences

ENV.2007.1.1.5.1. Climate change impacts and adaptation strategies in water policies

ENV.2007.1.1.5.2. Climate change impacts on vulnerable mountain regions

ENV.2007.1.1.5.3. Past and future climate change impacts in the Parana-Plata river basin of South America

ENV.2007.1.1.6.1. Full costs of climate change

ENV.2007.1.1.6.2. Effectiveness of adaptation and mitigation measures related to changes of the hydrological cycle and its extremes

ENV.2007.1.1.6.3. Impact and feed-backs of climate policies on land use and ecosystems in Europe

Indicative list of future topics of FP7 in climate change research

- **Sea-level change: Trends in contributions from continental ice, processes and links to climate change**
- **Climate-chemistry interactions in the Stratosphere related to Ozone depletion**
- **Assessment of terrestrial carbon sinks and their future evolution including impacts of climate variability and extreme events on carbon storage, exchange and soil functioning**
- **Process-oriented evaluation of the Earth System Models**
- **New components in Earth System modelling for better prediction**
- **Quantification of greenhouse gas emissions from deforestation in developing countries, socio-economic drivers and impacts, and policy options for emissions reduction**
- **Climate change impacts on Arctic ocean ecosystems**
- **Impacts and related adaptation strategies to the melting of the Himalayan glaciers and Asian monsoon to water resources in Northern India**
- **Implications and risks associated with new methods in addressing climate change**
- **...**

Chart 2: Major international tourism flows, 2000
(million arrivals)

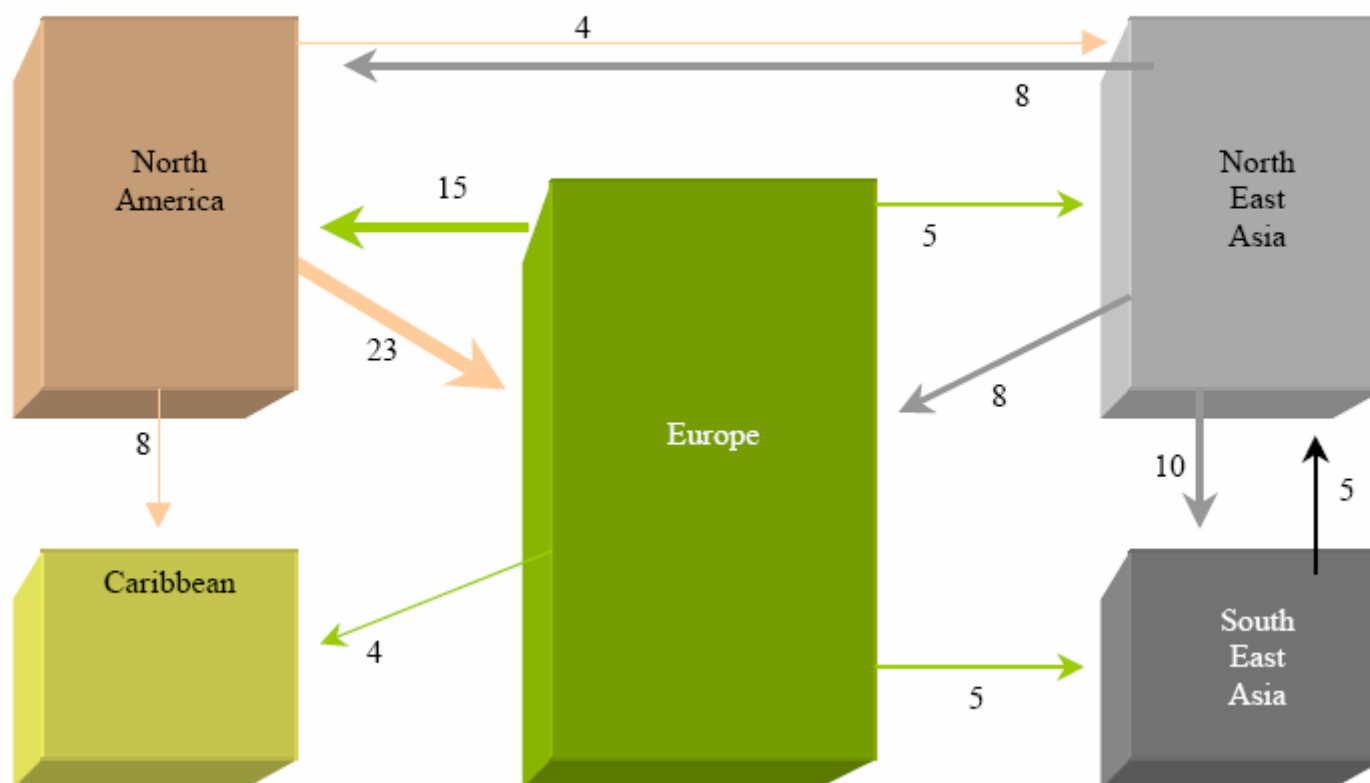
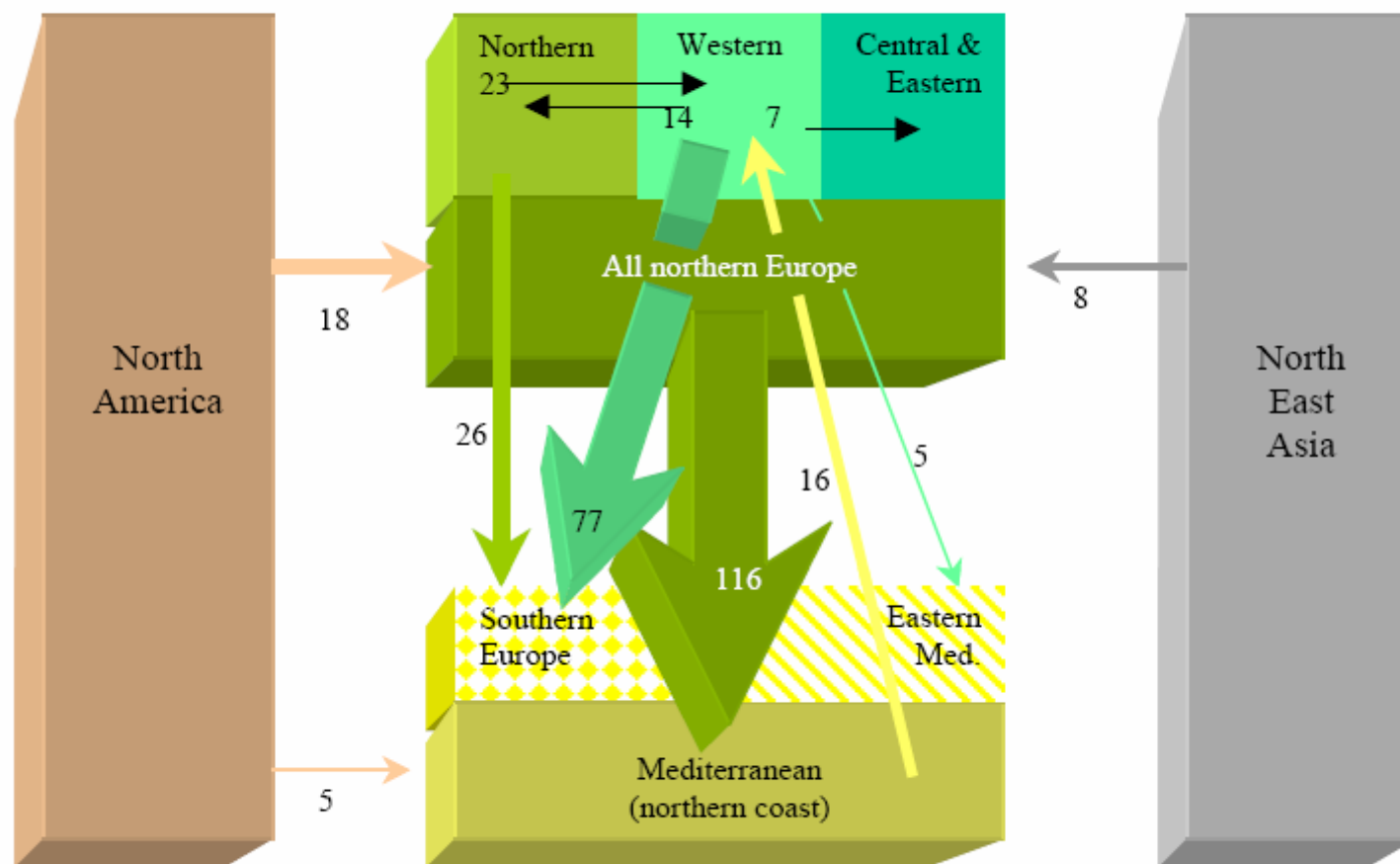


Chart 3: Major tourism flows within and into Europe, 2000
(million arrivals)



Source: Travel Research International from World Tourism Organization data

Information

- EU research:
<http://europa.eu.int/comm/research>
- Seventh Framework Programme:
http://europa.eu.int/comm/research/future/index_en.cfm
- Information on research programmes and projects:
<http://www.cordis.lu/>
- RTD *info* magazine:
<http://europa.eu.int/comm/research/rtdinfo/>
- Information requests:
research@cec.eu.int



Towards FP7