Climate Services

in support of society needs

Daniela Jacob

Helmholtz-Zentrum Geesthacht
Zentrum für Material- und Küstenforschung

Climate Service Center Germany 2.0
Eine Einrichtung des Helmholtz-Zentrums Geesthacht

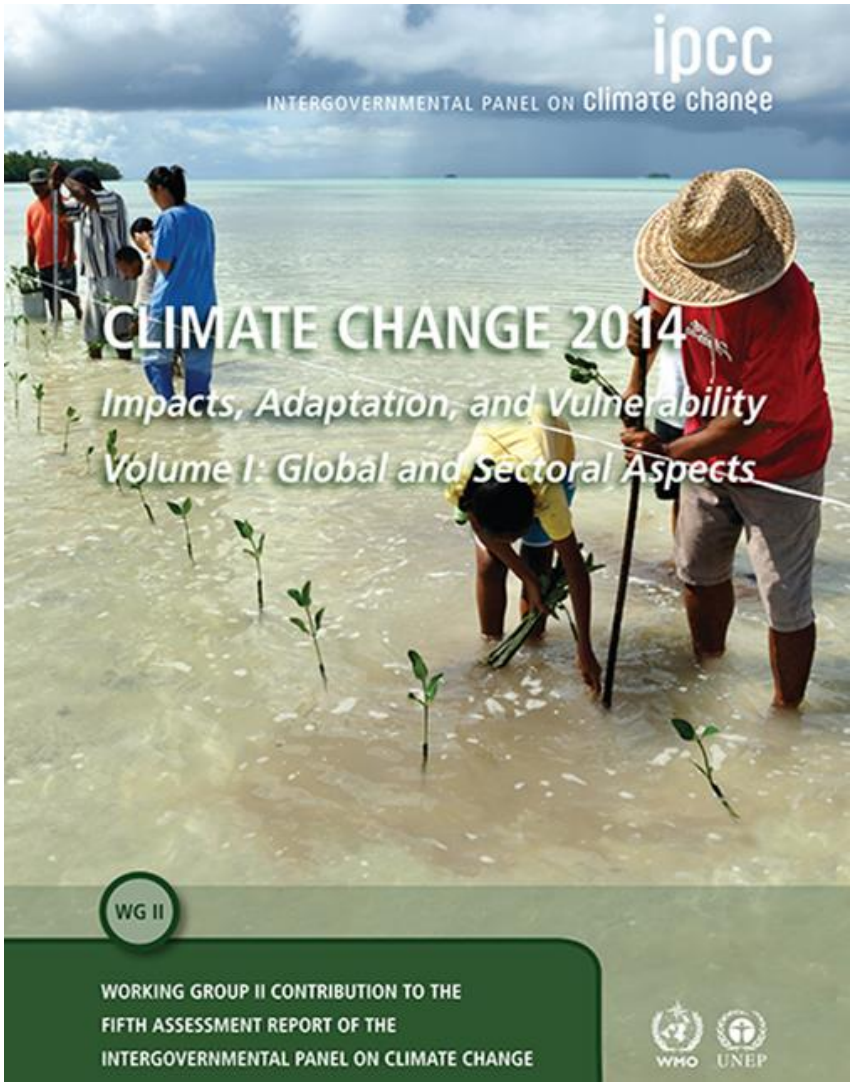
Outline

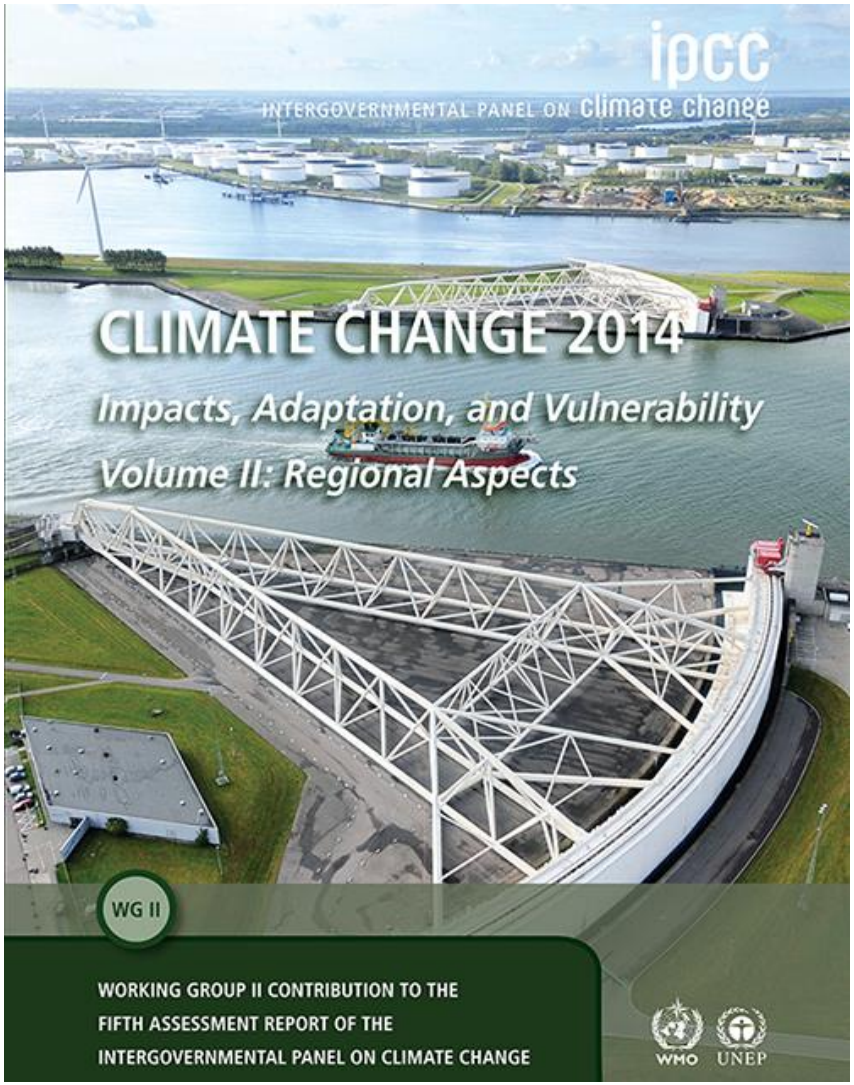
Why do we need Climate Service?

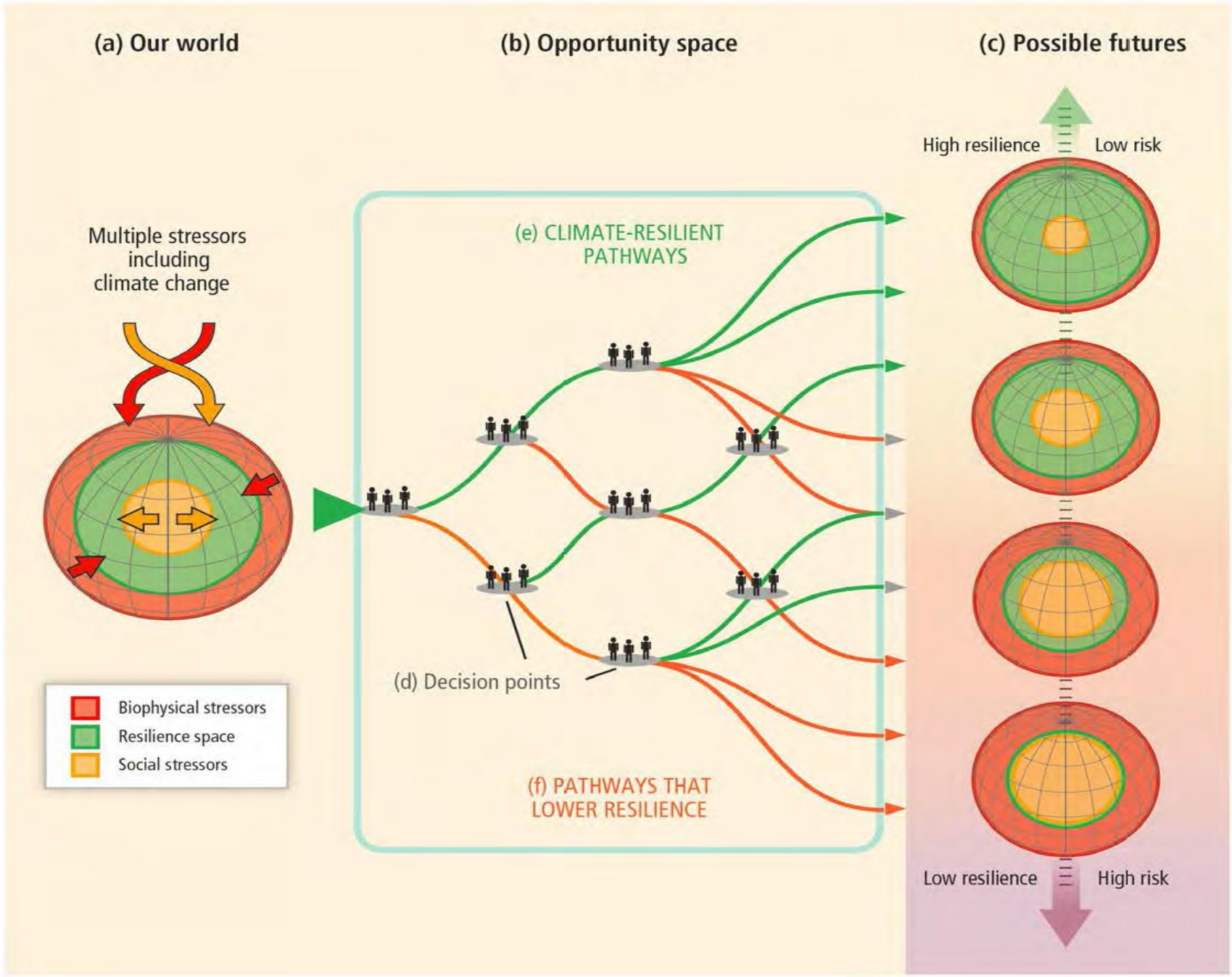
What are Climate Services?

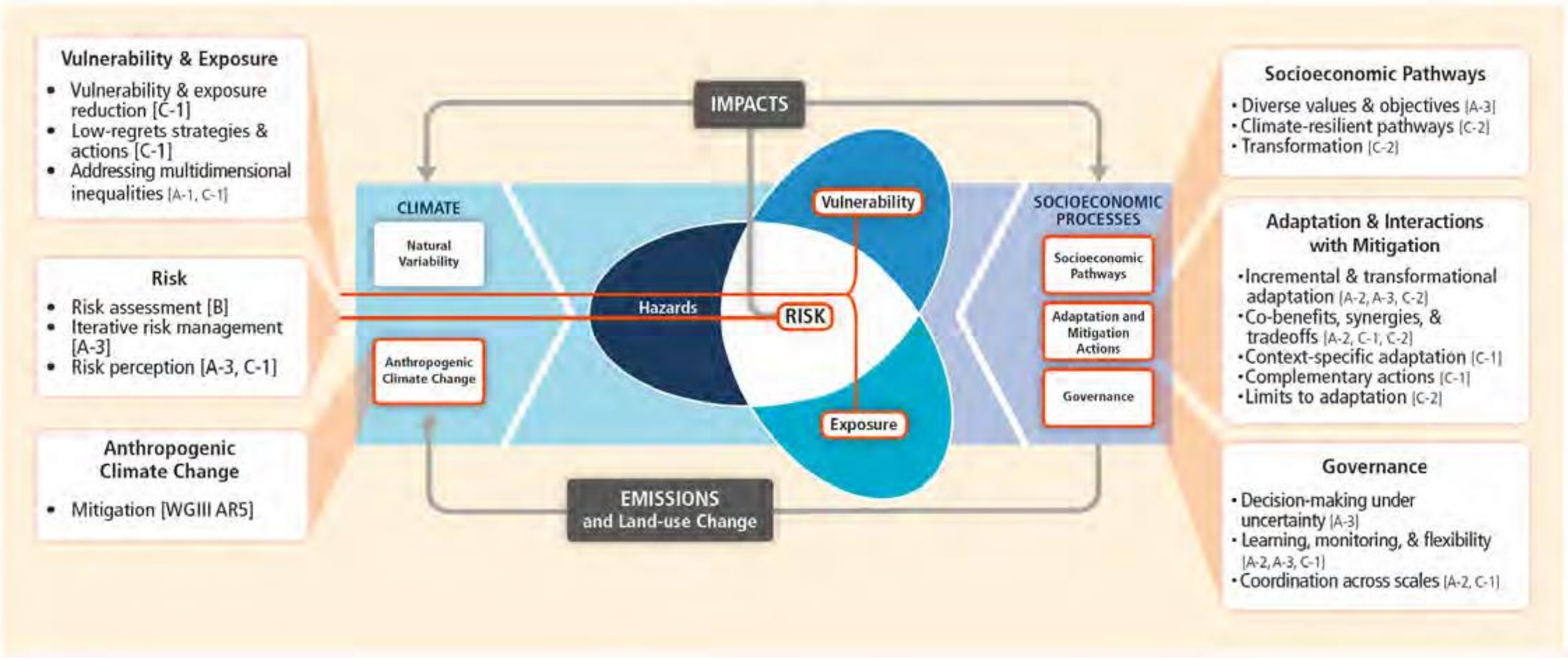
IPCC AR5 WG2:

Impacts, Adaptation, Vulnerability






(a) Our world
(b) Opportunity space
(c) Possible futures
Multiple stressors including climate change
Biophysical stressors
Resilience space
Social stressors
(e) CLIMATE-RESILIENT PATHWAYS
(d) Decision points
(f) PATHWAYS THAT LOWER RESILIENCE
High resilience
Low risk
Low resilience
High risk


Vulnerability & Exposure
• Vulnerability & exposure reduction [C-1]
• Low-regrets strategies & actions [C-1]
• Addressing multidimensional inequalities [A-1, C-1]
Risk
• Risk assessment [B]
• Iterative risk management [A-3]
• Risk perception [A-3, C-1]
Anthropogenic Climate Change
• Mitigation [WGIII AR5]
IMPACTS
CLIMATE
Natural Variability
Anthropogenic Climate Change
Hazards
Vulnerability
RISK
Exposure
SOCIOECONOMIC PROCESSES
Socioeconomic Pathways
Adaptation and Mitigation Actions
Governance
EMISSIONS and Land-use Change
Socioeconomic Pathways
• Diverse values & objectives [A-3]
• Climate-resilient pathways [C-2]
• Transformation [C-2]
Adaptation & Interactions with Mitigation
• Incremental & transformational adaptation [A-2, A-3, C-2]
• Co-benefits, synergies, & tradeoffs [A-2, C-1, C-2]
• Context-specific adaptation [C-1]
• Complementary actions [C-1]
• Limits to adaptation [C-2]
Governance
• Decision-making under uncertainty [A-3]
• Learning, monitoring, & flexibility [A-2, A-3, C-1]
• Coordination across scales [A-2, C-1]

Key risks from climate change in Europe and potential for reducing through mitigation and adaptation

Key risk	Adaptation issues and prospects	Climatic drivers	Supporting ch. sections	Timeframe	Risk for current and high adaptation
Increased economic losses and people affected by flooding in river basins and coasts, driven by increasing urbanisation and by increasing sea-levels and increasing peak river discharges (*high confidence*)	Adaptation can prevent most of the projected damages (high confidence). The experience in hard flood protection technologies is significant. Main issues include the high costs for increasing flood protection demand for land in Europe, and environmental and landscape concerns.		23.2.3, 23.3.1, 23.7	Present Near-term (2030-2040) Long-term (2080-2100) 2°C 4°C	Very low – Medium – Very high
Increased water restrictions. Significant reduction in water availability from river abstraction and from groundwater resources, combined to increased demands from a range of sectors (irrigation, energy and industry, domestic use) and to reduced water drainage and run-off (as a result of increased evaporative demand) (*high confidence*)	Proven adaptation potential from changes in technologies and adoption of more water efficient technologies and of water saving strategies (irrigation, crop species, land cover, industries, domestic use). Further adaptation possible through solar desalinization (to limit fossil fuel demand).		23.4.3, 23.4.4, 23.7.2	Present Near-term (2030-2040) Long-term (2080-2100) 2°C 4°C	Very low – Medium – Very high
Increased economic losses and people affected by extreme heat events: impacts on health, welfare (overheating in buildings), labour productivity, crop production, reduced air quality (*medium confidence*)	Implementation of warning systems, adaptation of dwellings and work places, and transport and energy infratructure. Reductions in emissions to improve air quality. Improved wild fire management.		23.3.2, 23.3.4, 23.3.3, 23.5, 23.6.1, 23.6.3, 23.7.4	Present Near-term (2030-2040) Long-term (2080-2100) 2°C 4°C	Very low – Medium – Very high

Climatic drivers of impacts

Warming trend | Extreme temperature | Extreme precipitation | Damaging cyclone | Sea level

Risk & potential for adaptation

Potential for adaptation to reduce risk

Risk level with **high** adaptation

Risk level with **current** adaptation

EU – answers/reactions to IPCC reports

•Interview EU-Kommissar Carlos Moedas (Research Funding: Basic research still needed, more systemic approach, innovation and practical solutions)

•European Roadmap for the Development of a European Market for Climate Services (Research, Innovation, Jobs: launched 2nd of March 2015, Workshop 17th of March)

•Copernicus Climate Change Service (European Services)

Worldwide

Since approx. 2000:
Discussion about the need for climate services

- First pilot studies have been started in order to initiate the **dialogue between climate sciences and users**.

2009 – 2014: Response of scientific community

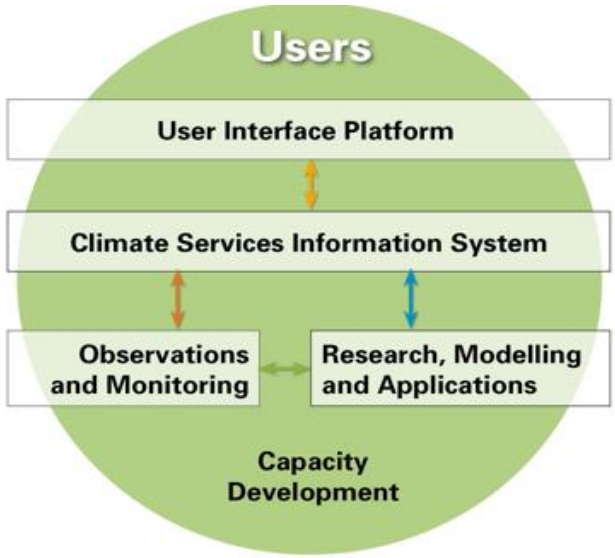
Establishment of
- different models of **Climate Service Institutions**
- several European **Funding Programmes**

Different models of Climate Service Institutions

1. Extension of Meteorological Services

- **Strong infrastructure**
  (in developing countries: often the only infrastructure)
- Main **focus on physical data; dissemination** process added.
- Limited **social and economic aspects**
- Cultural background: **Meteorology, hydrology**

Global Framework of Climate Services (GFCS)



Different models of Climate Service Institutions

2. Development by a University (group)

- Usually cross departmental groups: **Multi-disciplinary**
- Topics often include **social aspects** in addition to physical aspects
- **Strong research components**
- Cultural background: **Academic**

USA / Canada / South America

- NOAA Climate.gov
- IRI
- PICS
- $(CR)^2$

Climate Service UK

Climate Service UK creates framework that provides the support and advice for public and private sectors to manage climate-related risks and opportunities

UKCIP

Different models of Climate Service Institutions

3. Development of an Expert Group by the Private Sector

- **Strong interactions with customers** in the private sectors or public domain
- **Limited experience** with climate **research**
- **Good understanding** of the **economic** aspects
- Cultural background: **Business, government**

Global Climate Adaptation Partnership

Different models of Climate Service Institutions

4. Creation of a new institution

Canada/Québec

- **Very few cases** with no prior existence
- Climate Service Center 2.0 is one of them, playing a pioneering role as climate service institution.

Climate Service Center Germany 2.0
Eine Einrichtung des Helmholtz-Zentrums Geesthacht

- Cultural background of CS2.0:
  Long-term expertise in **regional climate modeling**

From climate change to adaptation

Adaptation to climate change is based on

climate change information

knowledge of climate impact

knowledge of climate risk

knowledge of vulnerability

realisation of the need to adapt

development of adaptation measures

implementation of adaptation measures

and money

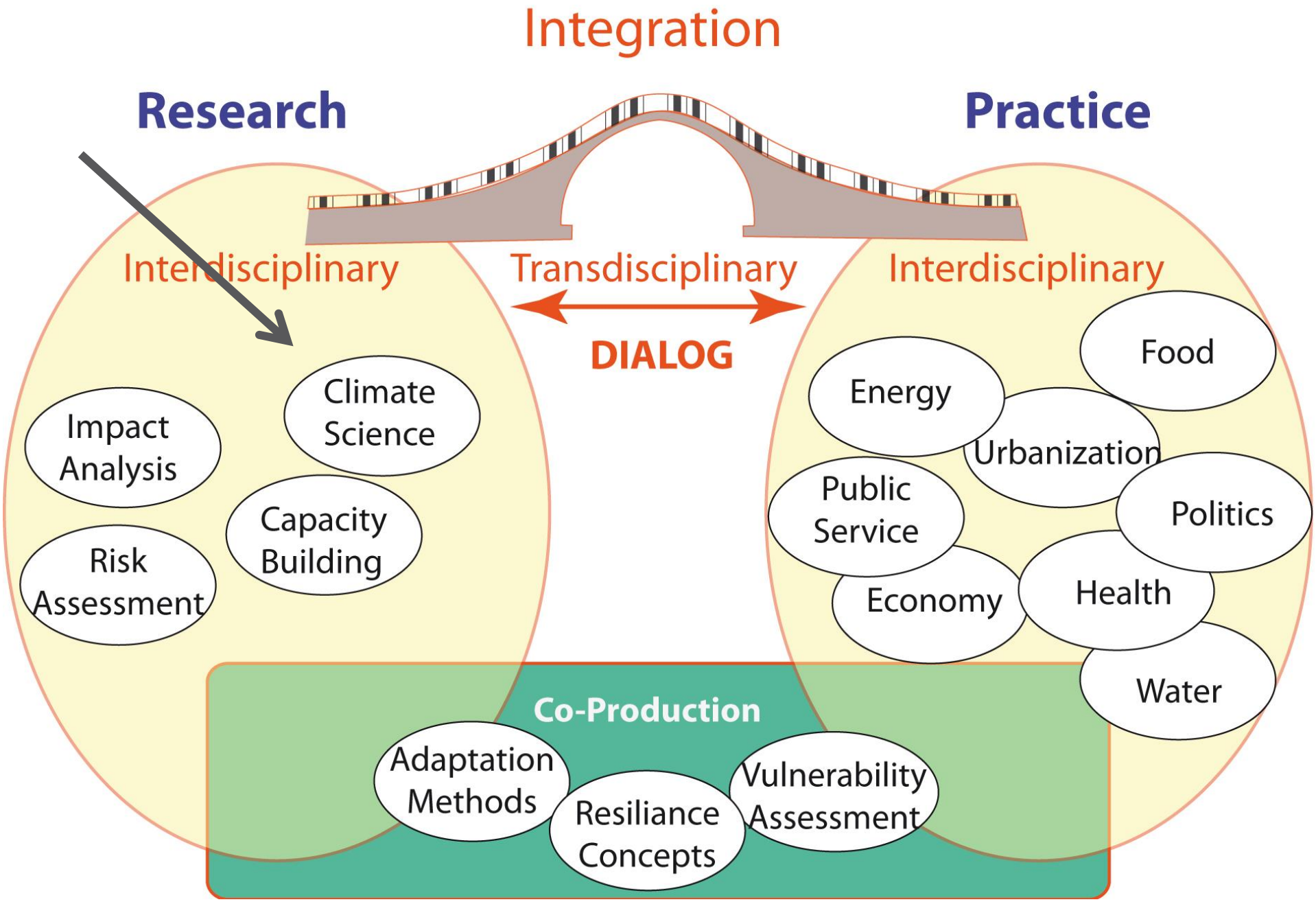
Adaptation to climate change is not cheap

in cases like: conversion of a company, urban water management, construction of dikes, …

the decision makers, the engineers and other stakeholders need interest in the topic and must be sure to have

the best available information on climate change

-> communication and trust are essential!



How should this work? What is needed?

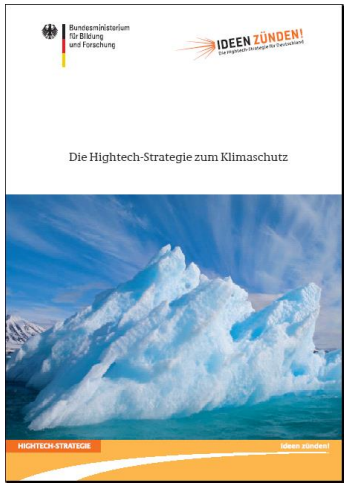
Innovation for smart solutions:

- **S pecific**
- **M easurable**
- **A ccurate**
- **R ealistic**
- **T imely**

→ **Task for Climate Services**

Climate Service Center - Germany

…was created in 2009 as part of the **Hightech-Strategy for protection against climate change** of the German Federal Government.



Initial mandate (2009)

- *To facilitate the transfer of state-of-the-art and easily accessible information between climate research and society.*
- *To build a network of partner institutions.*
- *To offer advises to decision-makers and other users from the scientific, economic, political communities and from civil society.*
- *To play a visible role in Europe.*

Our lessons learned

To be credible, Climate Services should be objective and neutral.

- **Neutrality** is key: Climate Services should be **independent** from governmental, business and political influences.

  - *However, this does not mean that Climate Services should not make **clear recommendations**.*

Our lessons learned

Service needs Science.

- The **interface between science and users** has to be improved.

➢ *Develop **"translation layer"** between different communities*

- ➢ ***Roles** of involved communities need to be specified and clarified.*
- ➢ *Constructive dialogue **requires mutual respect** between participants, innovative approaches, time and money.*

Our lessons learned

The user's needs are client specific and case specific.

- Climate Service products are **no "one size fits all"** products, but tailored to the user's needs ("made-to-measure").
  - ***Regional features*** *and specific circumstances have to be considered.*
  - *Development and entry into the market* ***takes time****.*

- Development of products in **close cooperation with customers**

Our lessons learned

Customers sometimes do not know which services and products fit their requirements.

- A **dialogue with customers** must be established.
  - ➢ *The relation with customers grows with time:*
    - *it starts with a conversation,*
    - *develops into a limited cooperation (**confidence building**),*
    - *moves to the co-production of knowledge (**transparent process**)*

    ⇨ long-term partnership

- We **learn** as much as the costumers do.

Our lessons learned

National conditions differ from one country to another.

- Exchange of experience is international, however, the development of climate services is organised at the **national level.**
  - ***National requirements*** *and conditions, laws and regulations differ from one country to another.*
  - ***National and sub-subnational climate services*** *are of high importance*

After 5 years of existence …..

- **Institutionalization of CS2.0** in Helmholtz Association from 1 June 2014 as a national institution
- **Interdisciplinary team** of natural scientists and socio-economists (approx. 40 staff members)
- **Strong partnership** with scientific institutions in Germany and abroad
- Located in **Hamburg**

www.climate-service-center.de

Chilehaus Hamburg

After 5 years of existence …..

From a broader mandate to a focused business model

CS2.0's activities can be structured in three specific fields:

- **Networking** (⇨ science / ⇨ users)
- **Development of prototype products and services**
- **Capacity Development** (⇨ multipliers, e.g. engineers)

Target groups:

- Decision-makers (mainly multipliers) from private and public communities

Sectors designated for priority in next years:

- Water, Energy, Ecosystems,Cities

*E*uropean *C*limate *S*ervice *P*artnership

Kick-off workshop in Hamburg (May 2014) on **initiative of CS2.0**

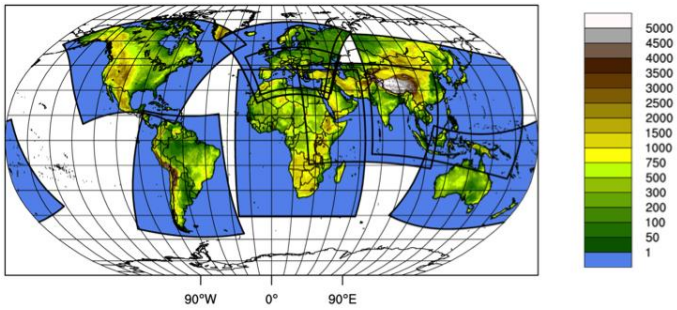
ESCP is co-chaired by Guy Brasseur and Chris Hewitt
About 60 Climate Services as well as members of the EU Commission attended the meeting.

- **encourage cooperation** between a wide range of active climate services across Europe (users, researchers, developers, providers, funders …)
- **provide a forum** for discussions, sharing, learning, promotion of good practices
- **facilitate initiatives** to share knowledge and resources, and develop joint products, methodologies and standards
- ensure that **Europe plays a visible role** in the international CSP

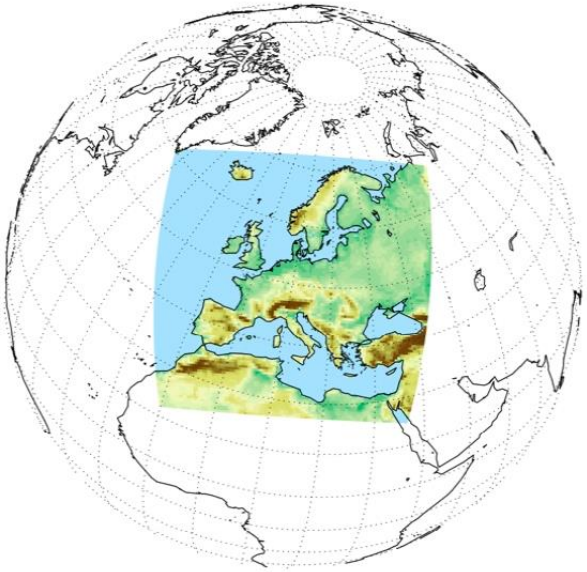
CS2.0 – International Engagement

WCRP CORDEX

COrdinated DOwnscaling EXperiment



EURO-CORDEX



European aspects of the CORDEX Initiative:

Common evaluation and analysis of the climate projections. - Interface with users.

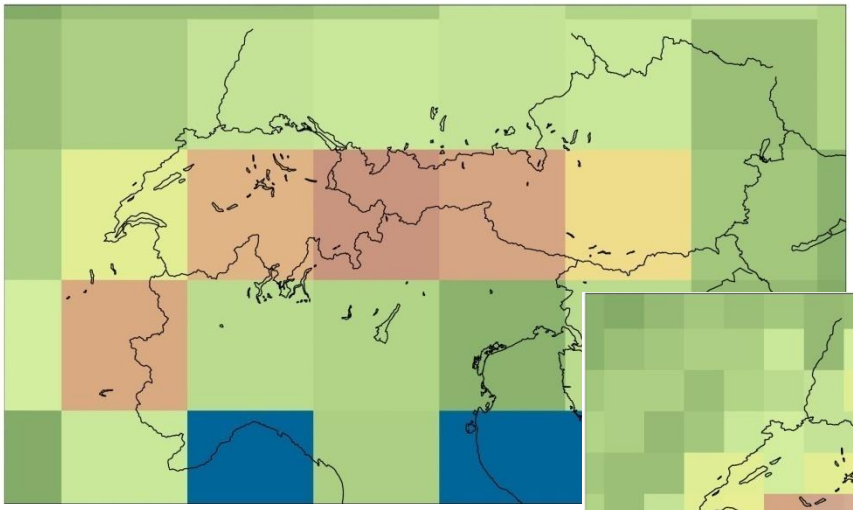
EURO-CORDEX Community:

26 modeling groups in Europe

Points of Contact:

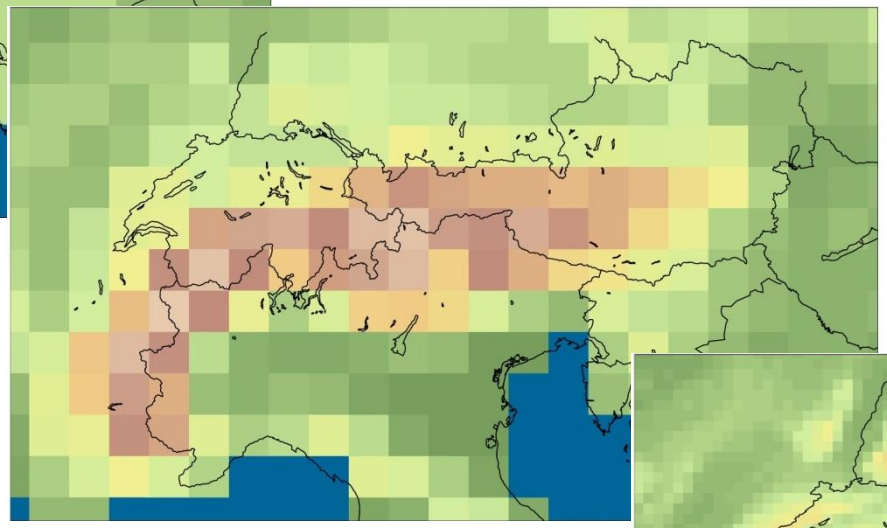
D. Jacob (D), S. Sobolowksi (N), E. Katragkou (GR)

From GCM to 0.11°

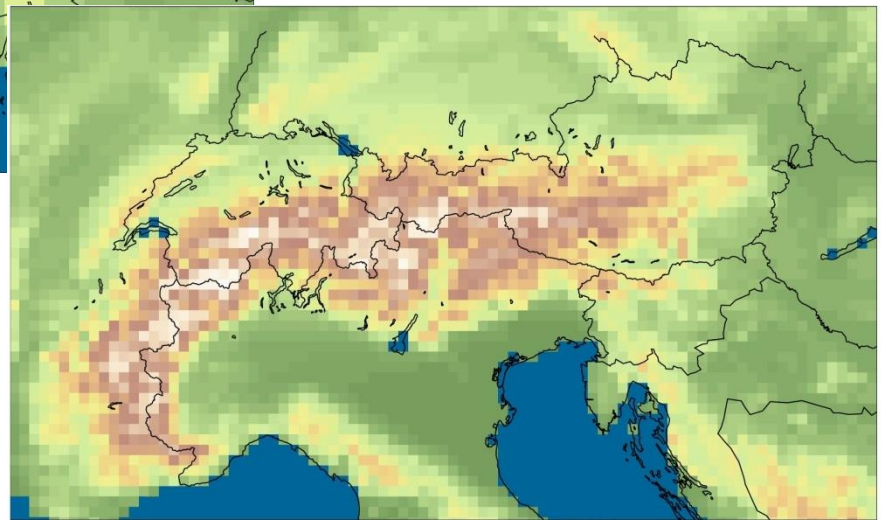


GCM
~150 km

EURO-CORDEX 0.44°
50 km



EURO-CORDEX 0.11°
12.5 km



Representation of orography,
e.g., European Alps

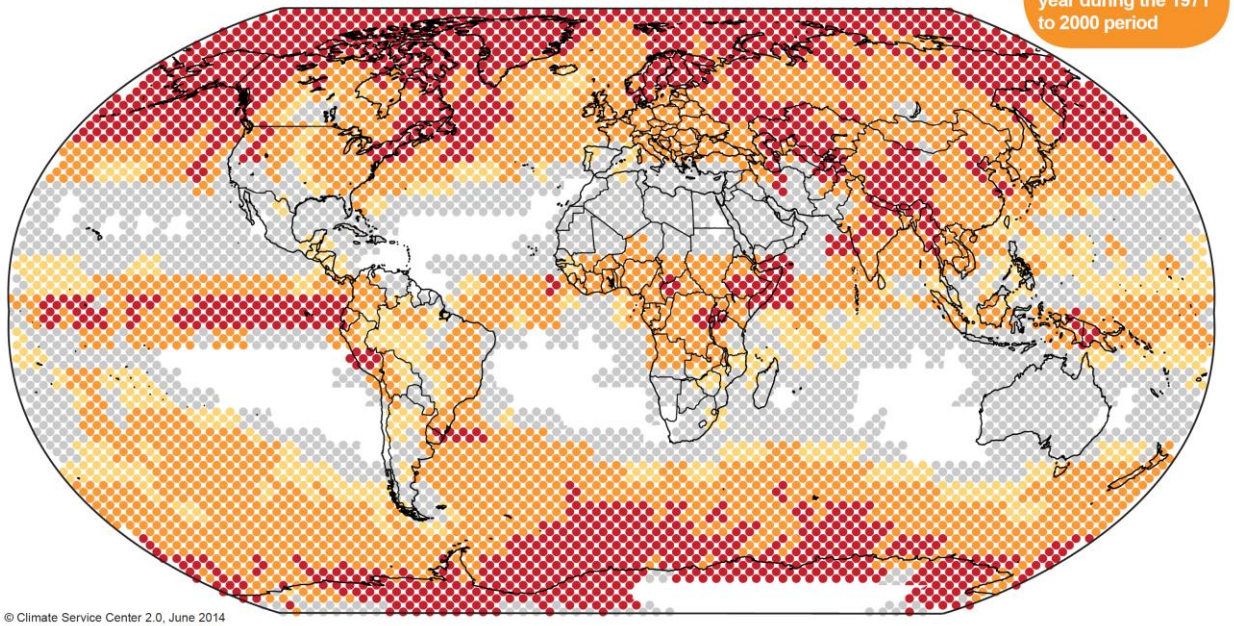
Climate-Change-Spot-Maps

Example: Prototype development and innovation

Climate-Change-Spot-Map

Increase in the occurence of extremely wet days per year

The amount of rain falling on a extremely wet day is reached only at five percent of all rainy days a year during the 1971 to 2000 period



Background information:

Climate-Change-Spot-Maps show the mean projected change of a climate parameter averaged for the time period 2036 to 2065 compared to the average of the time period from 1971 to 2100.

The map is based on a set of 66 climate change projections from a multitude of recent global climate models and combine simulations following three different emission scenarios.

Projected changes are regarded robust, if at least 2/3 of all model projections do project changes that are:
- in the same direction (decrease/increase), and
- statistically significant, and
- insensitive to small shifts of the reference time period.

All areas with robust climate change signals are highlighted with colored stipples.

All areas with non-robust changes are marked with grey stipples. White areas define regions with a change in the opposite direction than indicated in the map.

More details on the method can be found under www.climate-service-center.de/climate-signal-maps

Legend

- Decrease in occurence of extremely wet days
- Projected changes are not robust
- Increase in occurence of extremely wet days:
- less/equal than 10 percent
- more than 10 and less/equal 25 percent
- more than 25 percent

On behalf of KFW

Contact details of editors:

Climate Service Center 2.0
Fischertwiete 1
D-20095 Hamburg
Telephone: +49-(0)40-226 338 424
E-Mail: csc-anfragen@hzg.de
www.climate-service-center.de

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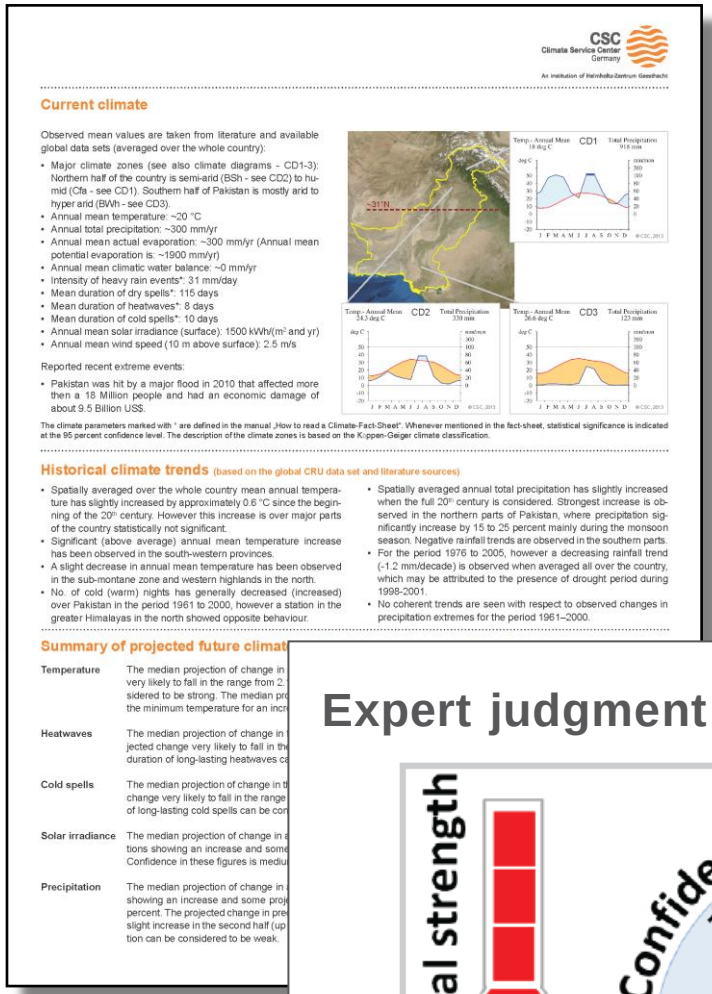
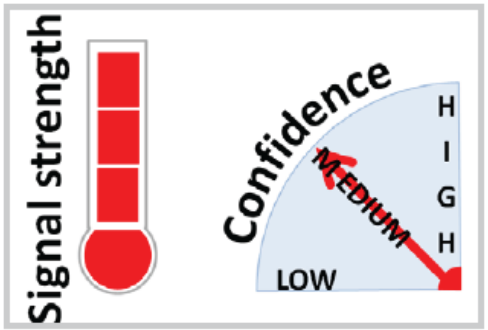
Examples: Prototype development

Climate-Fact-Sheets

Example pages of the Climate-Fact-Sheet for Pakistan

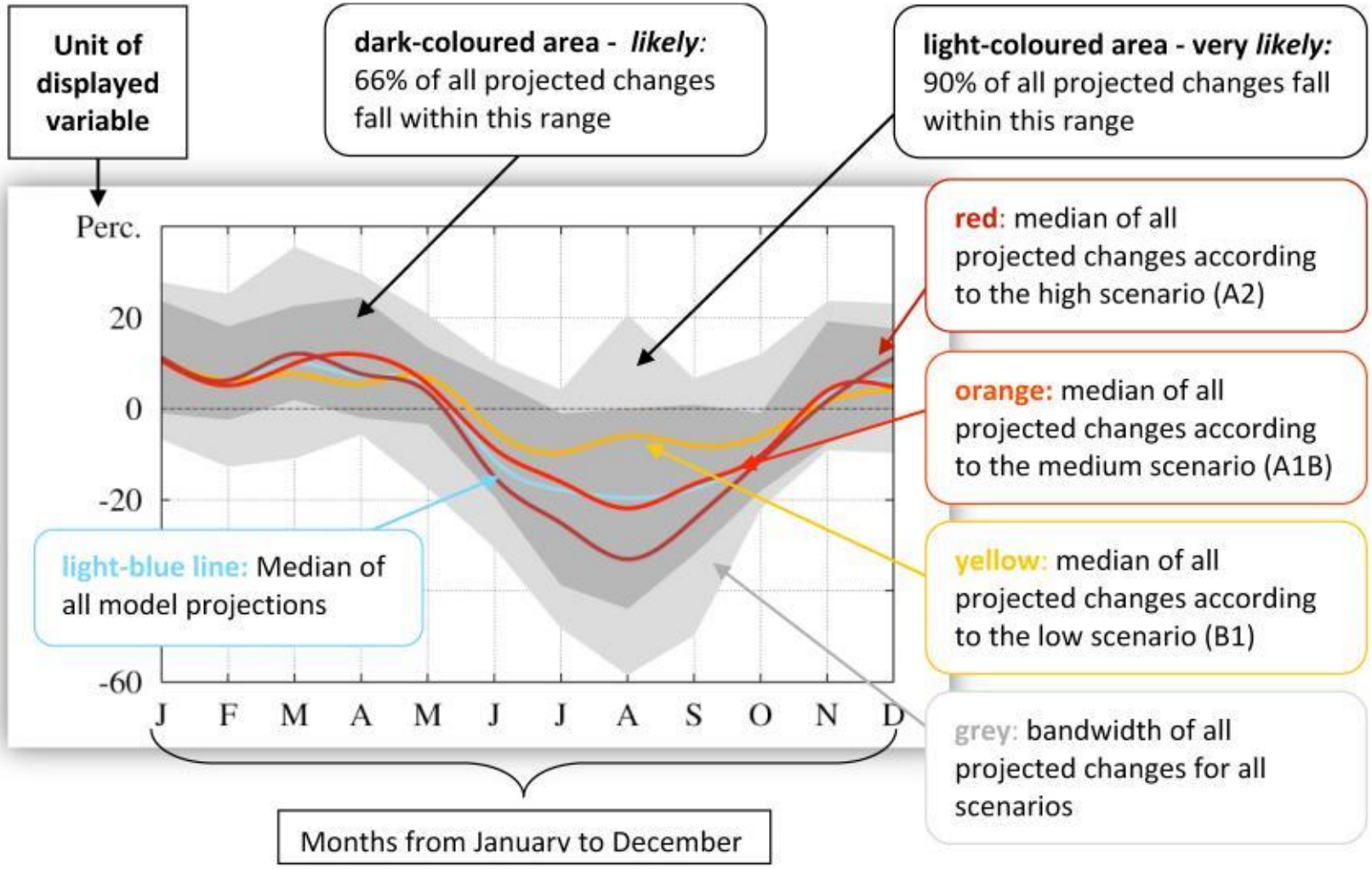


Expert judgment is provided



Aim: Concise summary of available state-of-the-art climate change information for a country/region

Examples: Prototype development



Information from complete available ensemble of climate simulations is used and plotted

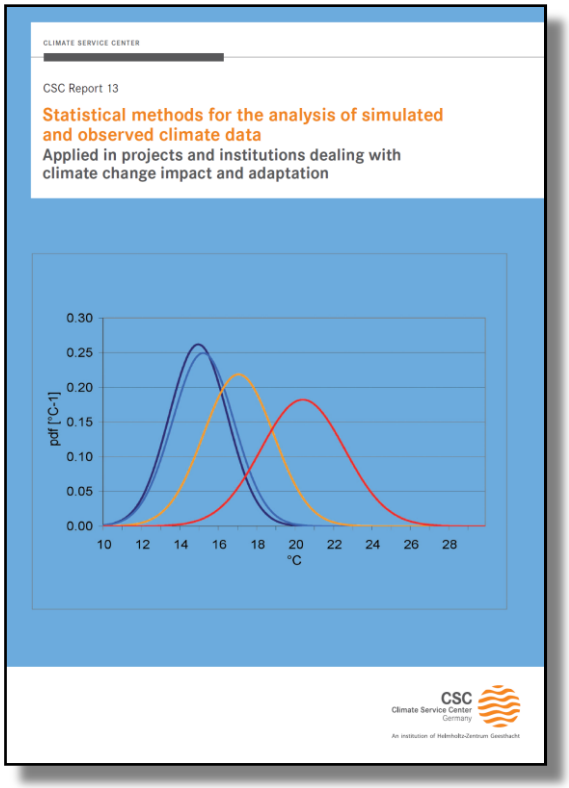
General Guiding Documents

Example: Prototype development and innovation

Brochure: Health and climate change

Comparative Lexicon

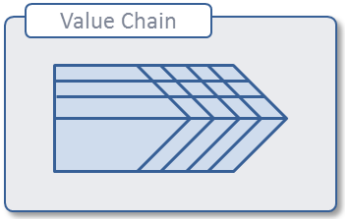
Regularly updated documents with terms used in transdisciplinary climate change research

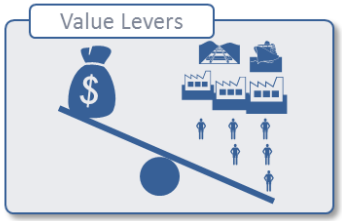


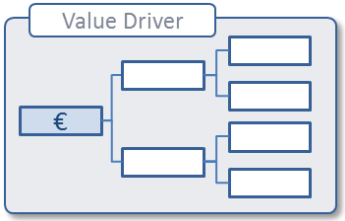
Brochure on statistical methods

Explanation of commonly used statistical methods and best practice examples for their use in climate change and climate impact and adaptation research

Business strategies under climate change







Current activities for the private sector focus on the integration of climate change information into business strategies:

I. Joint project with the German "Stiftung 2° ":

guidance tool for companies to learn about opportunities and risks of climate change in the areas of management and leadership, finance, market, infrastructure, logistics and human resources

The prototypical development started in 2013 and will continue until early 2015 in close cooperation with companies in different sectors in Germany.

II. Research on climate-related risk drivers and the private sector (based on CDP-Data)

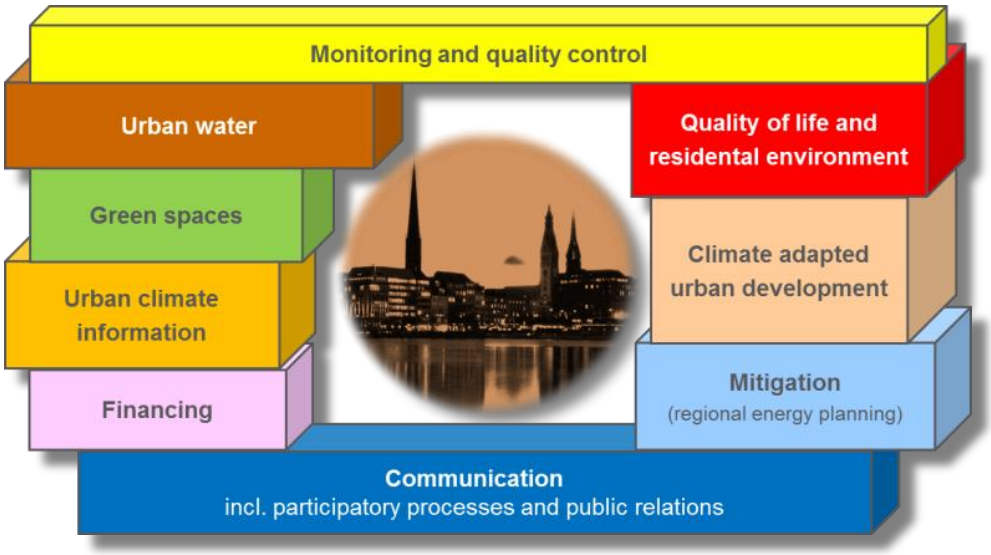
III. Focussing on critical energy infrastructure:

Analyses of possible government interventions regarding mitigation and adaptation strategies within the German „Energiewende" from an economic point of view

Examples: Prototype development

STADT BAUKASTEN

Adaptation toolkit for cities



Motivation/Aim

- Support cities in increasing their resilience to climate change (mitigation and adaptation)
- Develop tailored adaptation measures for specific requirements in cooperation with clients and partners

Focus / Goals

- Flexible, structured and transparent adaptation tool
- Modular design with flexible-to-use modules
- Modules are designed to integrate existing processes

Target groups / partners

- Cities and municipalities, local consultants and institutions

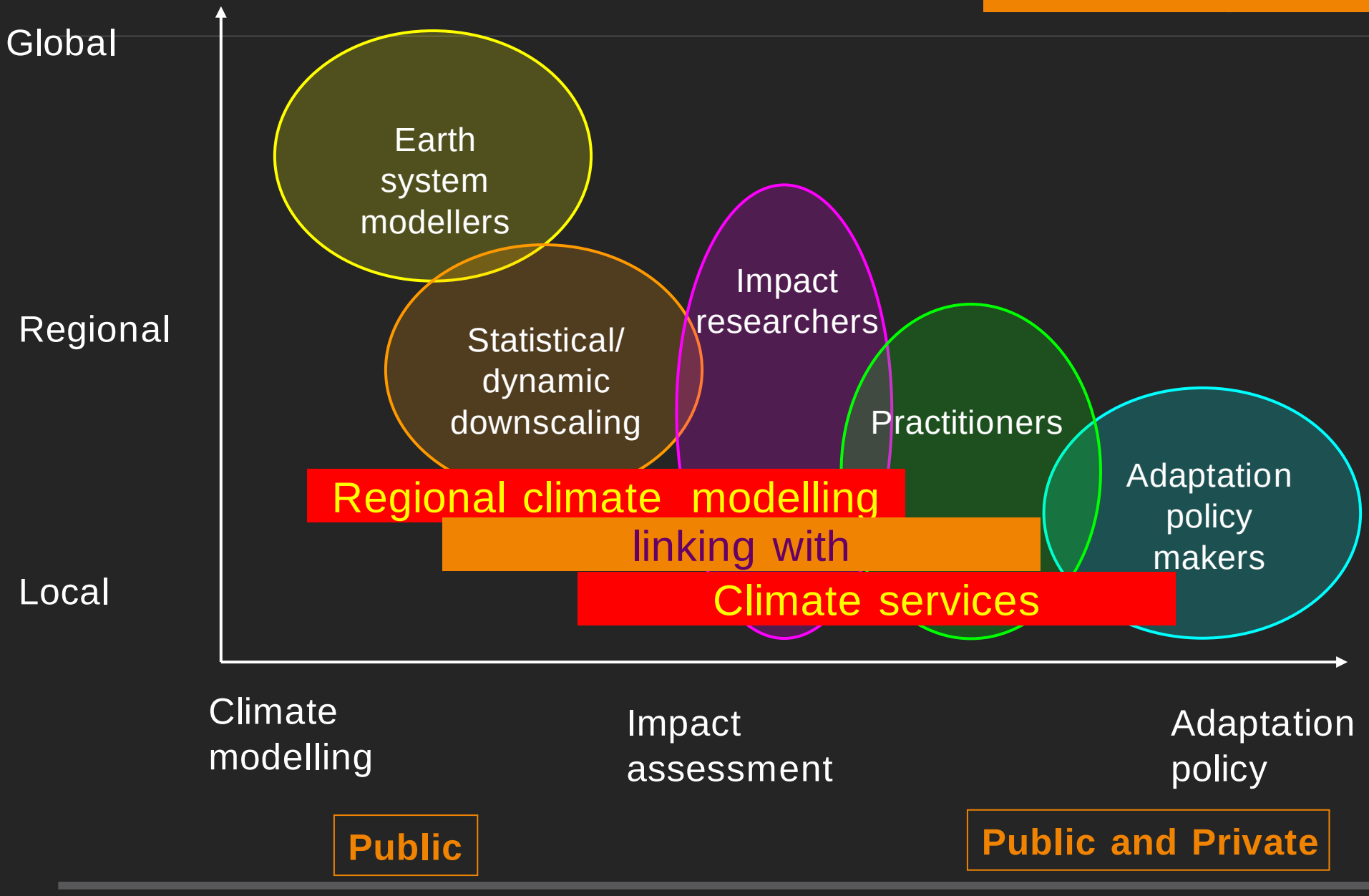
Summing up:

There is a need for climate services

- Refer climate knowledge to **local scale**
- Develop **interfaces** from generic large databases to individual applications
- Information on **robustness** of climate data and associated **uncertainties**
- **Expert judgement** on climate related information
- Support for regional and local **adapation processes**
- **General concepts** for climate services

Networking in science

Account for a diverse group of users.



Let us start networking and together

- define the roles of the involved communties (users, practitioners, science and more)
- define the linkages/interfaces/gaps
- develop products and close gaps through joint actvites in the translation layers

Towards a European Market on Climate Services!