

Research Unit 4: GERICS

Overview and Highlights



Daniela Jacob

Scientific Evaluation

Helmholtz-Zentrum Geesthacht, Centre for Materials and Coastal Research

■ Who we are and what we learned

Our history

- The **Climate Service Center started in 2009** as a five-year HZG project funded by BMBF, led by Prof. Guy Brasseur
- Tasks were
 - Assess the needs and options for climate services and products
 - Analyze business models for climate service institutes

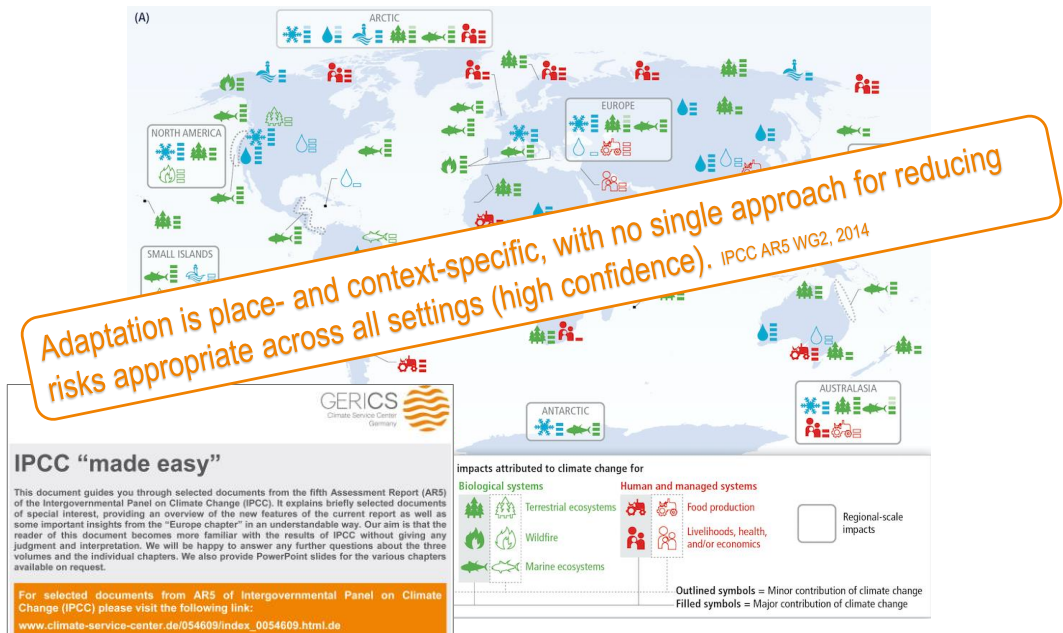


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Five years later

- Large variety of users and questions: Not just one solution!
- Interdisciplinary, transdisciplinary and international approaches are needed
- Many business models possible! GERICS: Prototype products and services
- Service needs science

From IPCC AR5 WGI & II



GERICS: science for solutions

Dimensions	Policies/tools
Global	Global goal on adaptation
Regional / Continental	Regional Strategies
National	National Adaptation Plans - Strategies National Communications
Subnational	Cities / Sectoral Adaptation Plans
Local	Adaptation implementation / undertaking / efforts

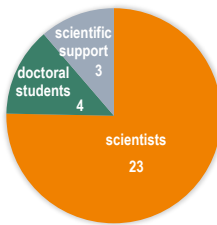
GERICS R&D strategy:

- Networking
- Modeling
- Prototype development
- Capacity building

→ service needs science

Selected Indicators

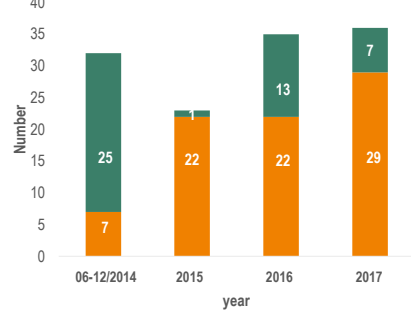
Staff 2016
(FTE, basic funding)



21 Disciplines



Publications Books / book chapters



Staff (persons, all) Oct. 2017 (male / female)

scientists: 37	(17 / 20)
doctoral students: 7	(6 / 1)
scientific support personnel: 5	(0 / 5)

Achievements (June 2014 – 2017)

Publications (WOS / Scopus):	80
Books & book chapters:	46
PhD theses completed:	3
Professor ship calls:	2

Definition of climate services

From: European Roadmap for Climate Services

In the context of the EC climate services initiative, the term has a broad meaning:

The transformation of climate-related data – together with other relevant information – **into customised products** such as projections, trends, economic analysis, **counselling on best practices, development and evaluation** of solutions and any other service in relation to climate that may be **of use for the society** at large.

These services include data, information and knowledge that support adaptation, mitigation and disaster risk management.



Expert group

Roger Street, Rapporteur
Director of the UK Climate Impacts Programme (UKCIP) / Univ. Oxford / Member of JPI Climate

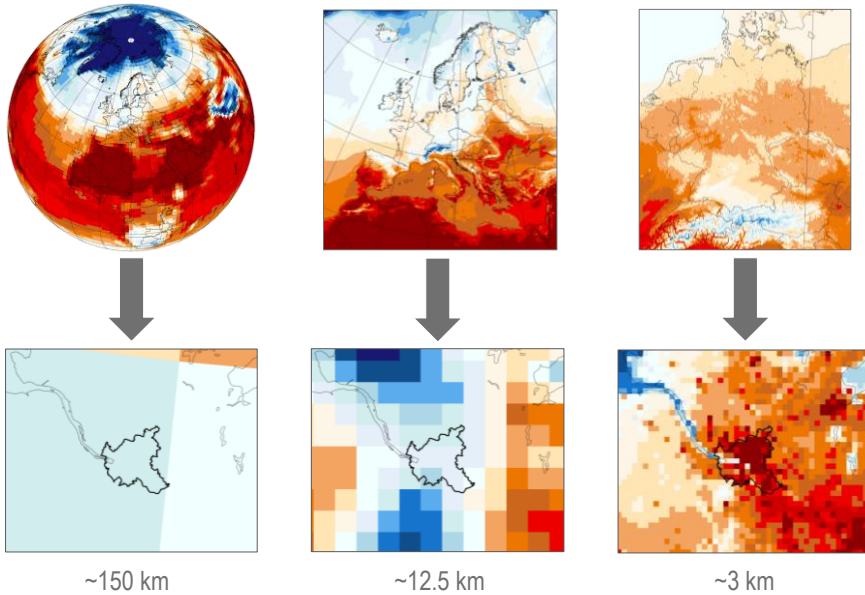
Martin Parry
Centre for Environment Policy, Imperial College London / University of Birmingham

Jesse Scott
Member of the Gas, Coal, and Power Markets Team / International Energy Agency, Paris

Daniela Jacob
Head of GERICS, Helmholtz-Zentrum Geesthacht

Tania Runge
Senior Policy Advisor, Copia Cogeca Secretariat

■ Grid Representation of Local Temperature (July 2, 1995)



■ From weather events to climate change

How will extreme events change in the future ?

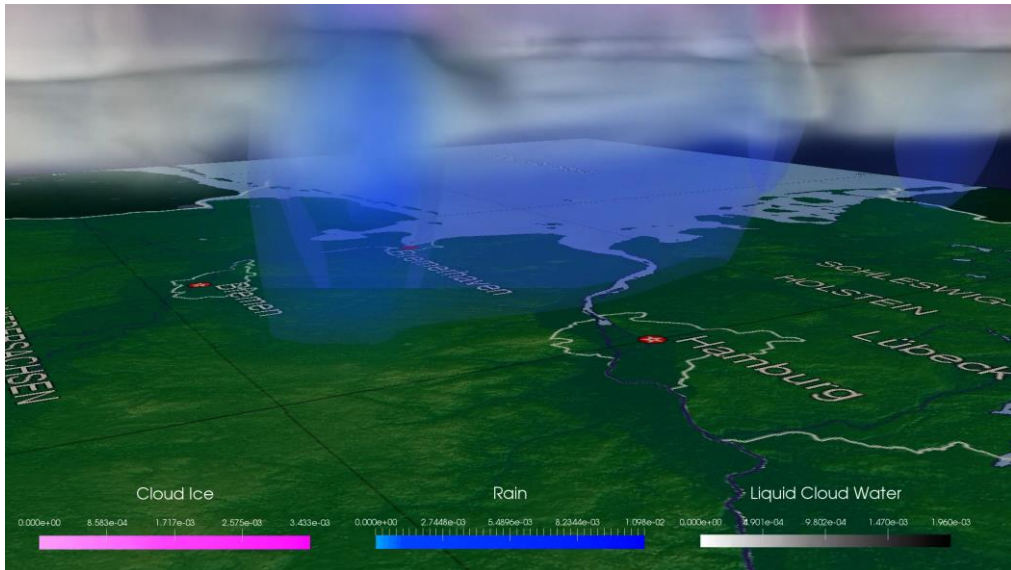
World Economic Forum
The Global Risks Report 2018:

"Extreme weather events were seen as the single
most prominent risk"

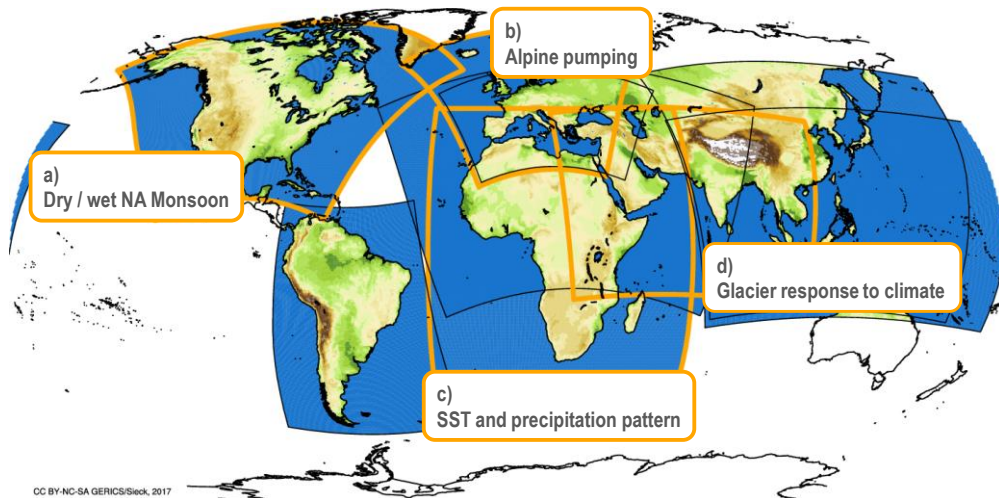
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Visualization of local precipitation in Northern Germany



REMO in WCRP-CORDEX – Selected scientific findings



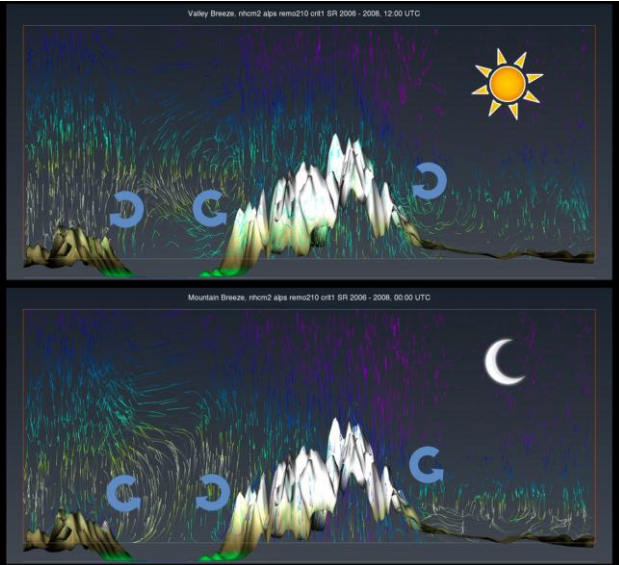
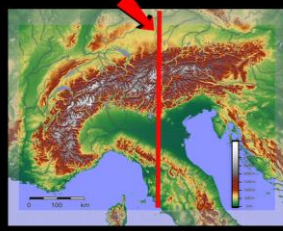
- a) Cerezo-Mota et al., Int. J. Climatol. 36 (2016)
b) Remedio et al., submitted to Clim. Dyn. (2017)

- c) Weber et al., Clim. Dyn. (2017)
d) Kumar et al., GRL (2015)

Visualization of alpine pumping

A **mountain breeze** and a **valley breeze** are two related, localized winds that occur one after the other on a daily cycle. Since these winds are caused mainly by **convection**, this wind system can only be modelled using **non-hydrostatic** models like, e.g., **REMO-NH**.

(Meridional Slice from NHCМ-2 Simulation with 3km spatial resolution)



Funded by:



- Provides **consistent and user-tailored information** on climate change.
- Generated **the largest database of high resolution regional climate model data** for Germany, using dynamical and statistical downscaling.
- **Public access** to data, climate change indices, manuals, graphics, and more.
- Forms the **scientific basis** for the **new German adaptation strategies**.
- Presented in the media in December 2017.



DER TAGESSPIEGEL

■ The benefits of strong mitigation action

ReKliEs-De area: Temperature and Precipitation changes, 2071-2100 minus 1971-2000

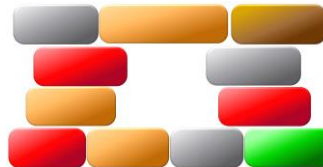
Change	Climate variable	RCP 2.6	RCP 8.5	Mitigation benefit
↑	Annual mean temperature (°C)	1	3,5	3 times smaller
↑	Number of heat days (Tmax > 30°C)	5	15	3 times smaller
↑	Number of warm days (p90)	7	28	4 times smaller
↓	Number of ice days (Tmax < 0°C)	-8	-18	2 times smaller

Change				Mitigation benefit
↑	Winter precipitation (%)	4	12	3 times smaller
↓	Summer precipitation (%)	-5	-15	3 times smaller
↑	Annual number of heavy precipitation events (10 mm/day)	0.5	2	4 times smaller
↑	Annual precipitation (mm) of heavy precipitation events (p95)	10	40	4 times smaller

■ Prototype product lines

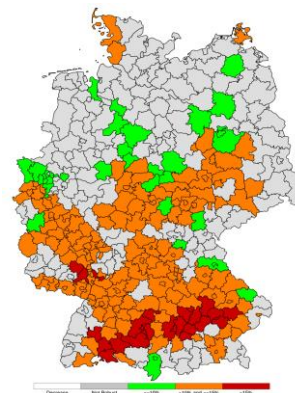
Toolkit-focused products:

- City Toolkit
- Adaptation toolkit for companies
- Regional Modeling Toolkit
- Coastal Toolkit
- Toolkit for rural adaptation

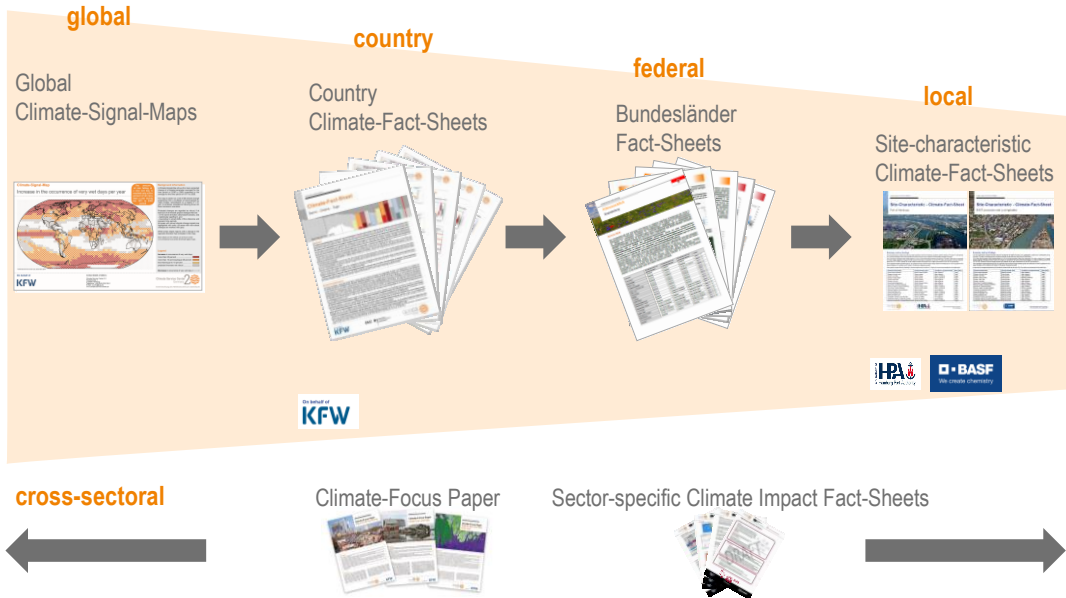


Data-focused products:

- Climate-Fact-Sheets
- Climate Focus-Papers
- Climate Signal Maps, Rain Map
- Climate Impact Hotspot Mapping



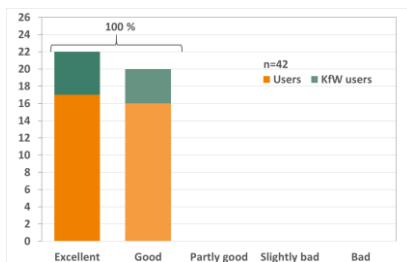
Climate facts from global to local scales



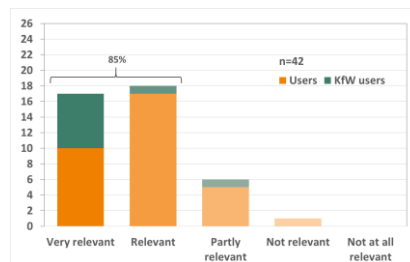
Evaluation of GERICS Climate-Fact-Sheets (CFS)

- Criteria and indicators developed in PACES II WG (AWI, HZG) in cooperation with **RU1**, **RU2**, **RU3**
 - Use of some methods developed in this frame
 - Applied to our CFS (which have been developed in cooperation with KfW)
- CFS have more than 290 users worldwide (except for KfW)

Indicator: trustworthiness

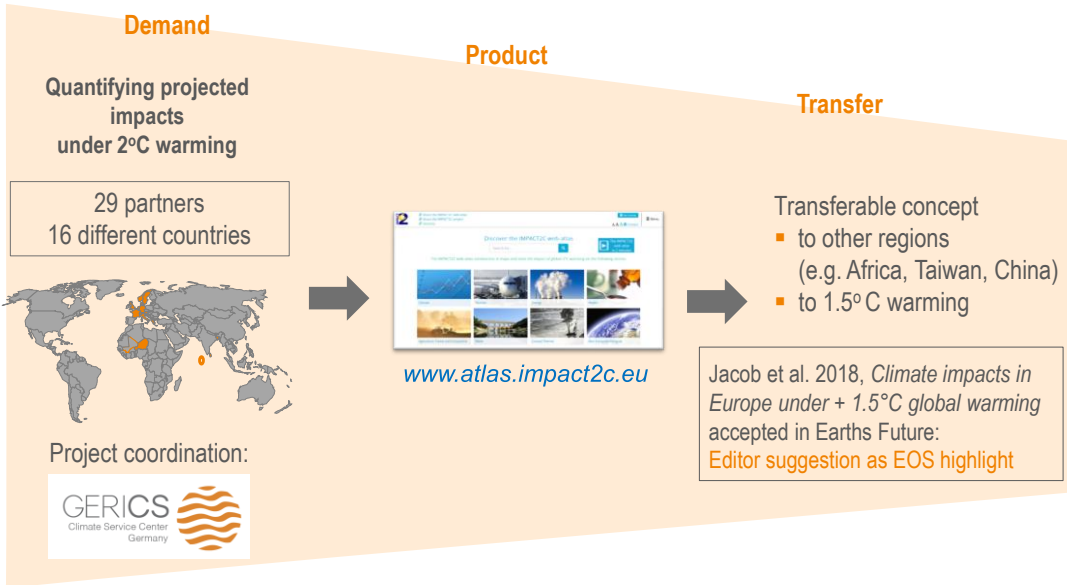


Indicator: relevance

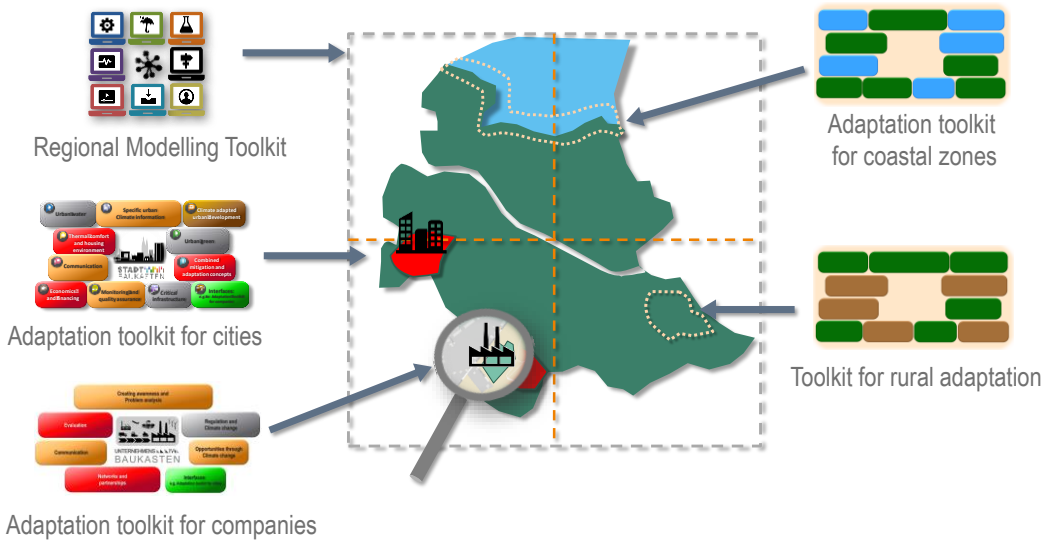


Number of users contacted: 108
Users (n=39) and KfW users (n=9): 44,5 % return (mean)

The IMPACT2C Story



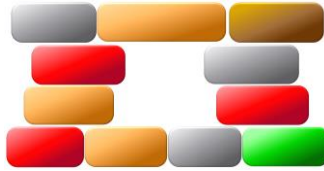
How to succeed in regional adaptation



Prototype product lines

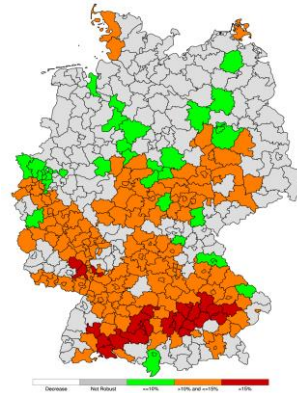
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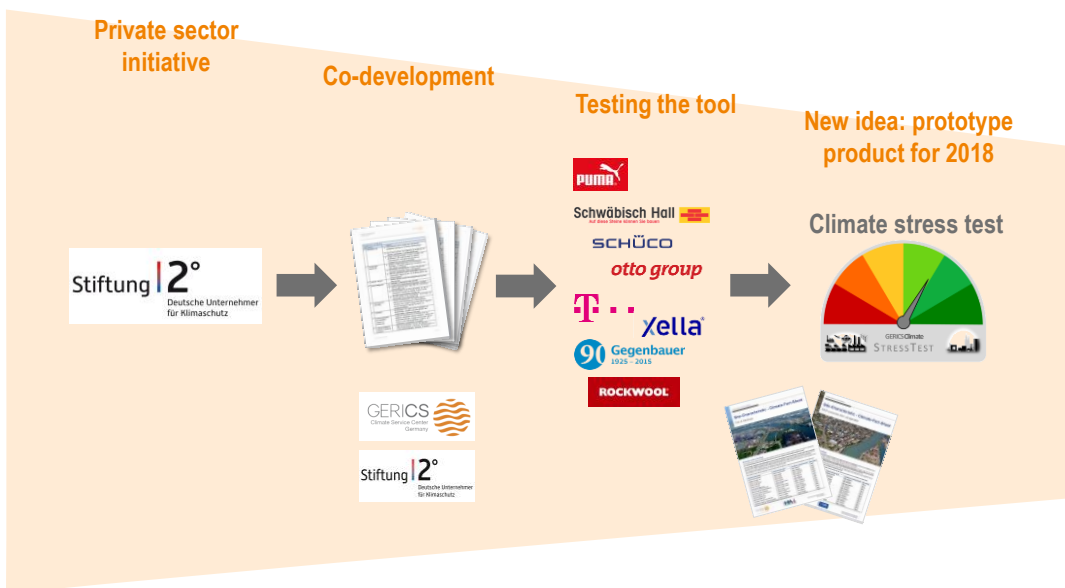


Data-focused products:

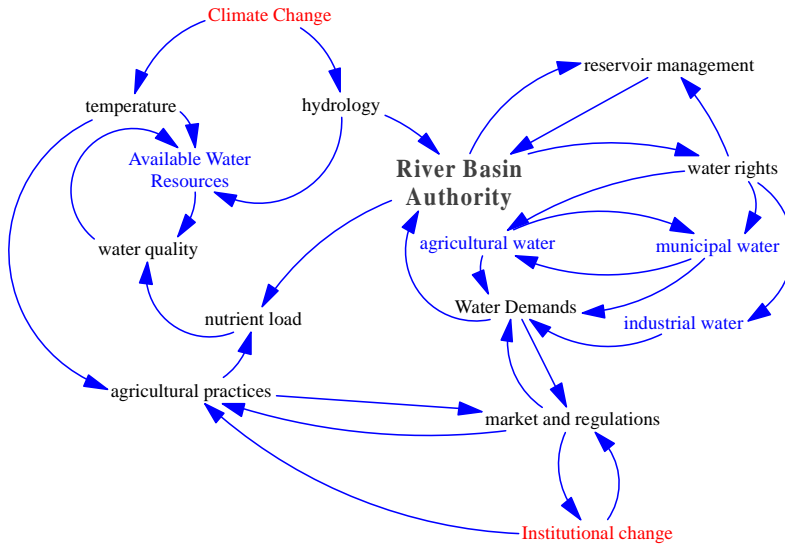
- Climate-Fact-Sheets
- Climate Focus-Papers
- Climate Signal Maps, Rain Map
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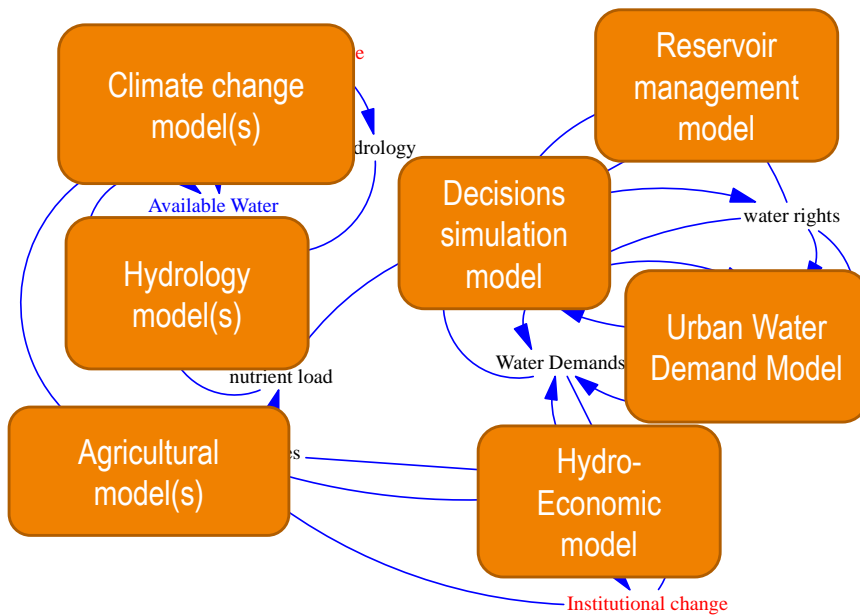
Adaptation toolkit for companies



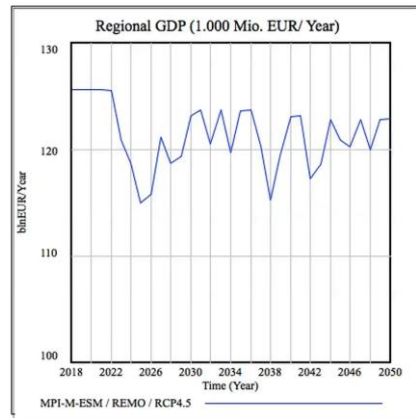
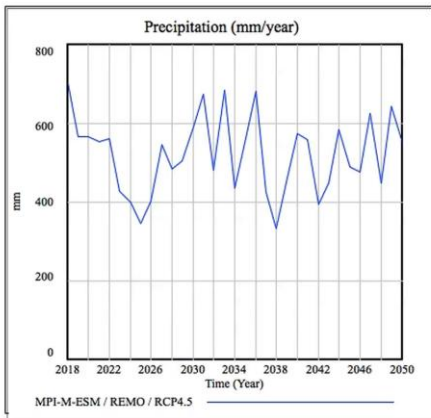
Qualitative system dynamics group model



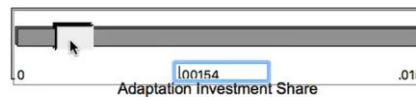
Quantitative system dynamics model components



Regional system modeling



Raising GDP by implementing adaptation measures



From projects to products: Examples

User requirements

DECM, SECTEUR, Clim4Energy, UseUClim

- Basis for development of new CS products
- Sector-specific Climate Impact Fact-Sheet
- Living Database

Standardized climate data

ReKliEs-De, Miklip, IMPACT2C, ClipC

- User-required analysis and indices
- IMPACT2C web-atlas
- Expert-based confidence information

Climate services market assessment

EU-MACS, MARCO, ERA4CS, JPI Climate

- Identification of barriers related to CS
- Climate Knowledge Hub



Supporting climate knowledge

SASSCAL, KNOWHOW, IMPREX, GLACINDIA

- Training concepts
- Data Discovery Platform
- EasyREMO

First journal dedicated exclusively to climate services

- Initiated by GERICS in 2015
- Chief Editor: Daniela Jacob
- Open access
- Eight issues published so far
- Issues no. 9, 10 and two special issues in preparation
- Aimed at scientists and climate service practitioners
- Extended abstract summarises the practical implications

climate SERVICES	
	
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GERICS: science for solutions



GERICS: science for solutions



Networks

Research

- Climate Services Partnership
- Earth League
- Future Earth
- WCRP/ EURO-CORDEX
- IPCC
- HICSS (with Universität Hamburg)

Policy

- UNFCCC
- Representatives of German federal states
- Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ)

Business and Finance

- Foundation 2°
- European Finance Institutions Working Group on Adaptation to Climate Change (EUFIWACC)
- Enterprise network
- Renewable energies cluster

Cities and municipalities

- National cities network
- Flooding Competence Center

■ Helmholtz-Institute for Climate Service Science (HICSS)

- Pooling of expertise (natural, social, economic sciences) for the new research field „climate service science“
- Joint research, promotion of young researchers, and knowledge transfer in the areas:

- (1) From knowledge to action
- (2) Modeling of complex systems
- (3) Evaluation of knowledge gained from climate and Earth system research

First projects

- **City modeling** (Prof. Heinke Schlünzen / Dr. Kevin Sieck)
- **Modeling of land-use change** (Prof. Jürgen Böhrner / Dr. Diana Rechid)
- **Integrative Modeling Lab** (Prof. Uwe Schneider / Prof. María Máñez Costa)

■ Challenges for the future

Support sustainable pathways into the future towards climate resilient regions and cities

- Quantifying the role of climate change and human action in understanding regional and local vulnerability
- Integrating human decisions into modeling at the regional to local scale: participatory modeling approaches towards regional earth system modeling
- Develop solutions for data sparse often highly vulnerable regions of the world
- Incorporating new scientific findings and holistic approaches into conceptually coherent prototype products that contribute to the achievement of the sustainable development goals (SDGs)
- **Go to the next level:** towards implementation and transformation of society