



# ClimEx

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Willkommen zum  
ClimEx-Symposium

7. Mai 2019



Leibniz-Rechenzentrum  
der Bayerischen Akademie der Wissenschaften





# Climate Change and Hydrological Extreme Events

Risks and Perspectives for Water Resources Management in Bavaria and Québec



Bavarian Environment Agency



**INRS**  
UNIVERSITÉ DE RECHERCHE

Centre d'expertise  
hydrique  
Québec



Leibniz-Rechenzentrum  
der Bayerischen Akademie der Wissenschaften

Ralf Ludwig, Marco Braun, Francois Brissette, Gilbert Britzke, Anton Frank, Anne Frigon, Dieter Kranzlmüller, Holger Komischke, Simon Lachance-Cloutier, Martin Leduc, Alain Mailhot, Jean-Luc Martel, Magdalena Mittermeier, Simon Ricard, Fabian von Trentini, Richard Turcotte, Jens Weismüller, Florian Willkofer, Raul Wood

gefördert durch  
Bayerisches Staatsministerium für  
Umwelt und Verbraucherschutz





Major flood events in Québec  
1996/2011/2017/2019



Major flood events in Bavaria  
1999/2002/2005/2013/2016

« Extreme precipitation events over most of the mid-latitude land masses and over wet tropical regions will *very likely* become more intense and more frequent. » - IPCC AR5 report

## Research objectives

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Provide unprecedented high-resolution climate model datasets to ...

- Confirm knowledge on whether and how climate change contributes to higher magnitudes and frequencies of extreme events
- Distinguish between the effects of internal variability and a 'clear' climate change signal
- Improve methods to analyse hydro-meteorological extreme events and provide robust estimates of HQx floods

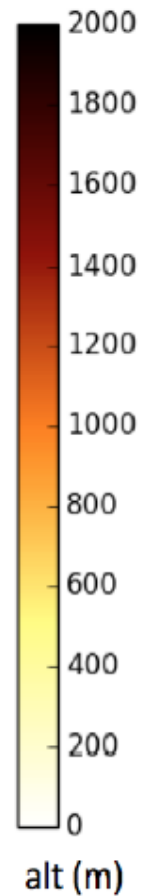
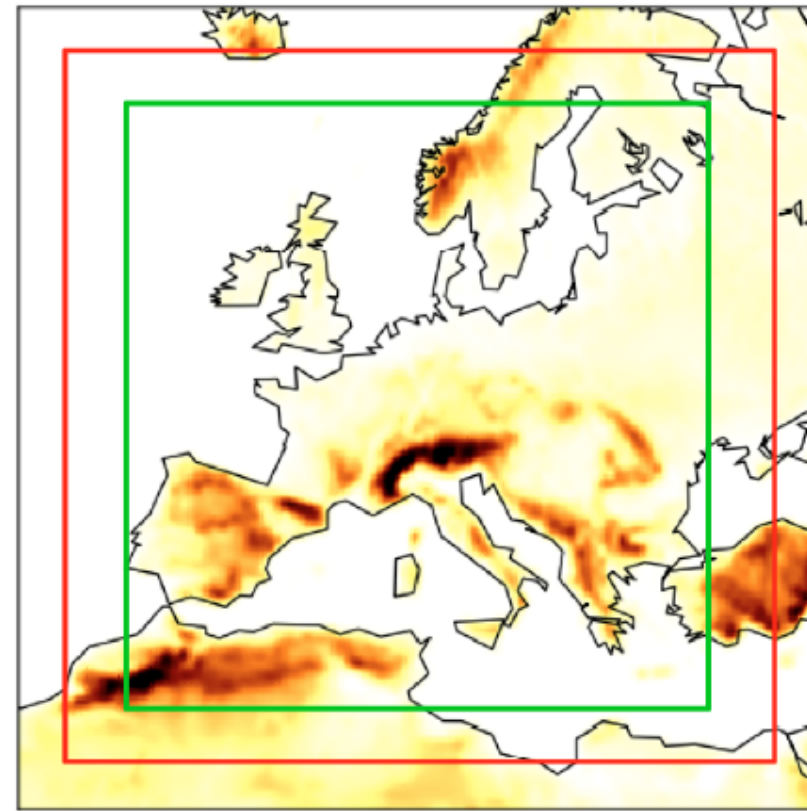
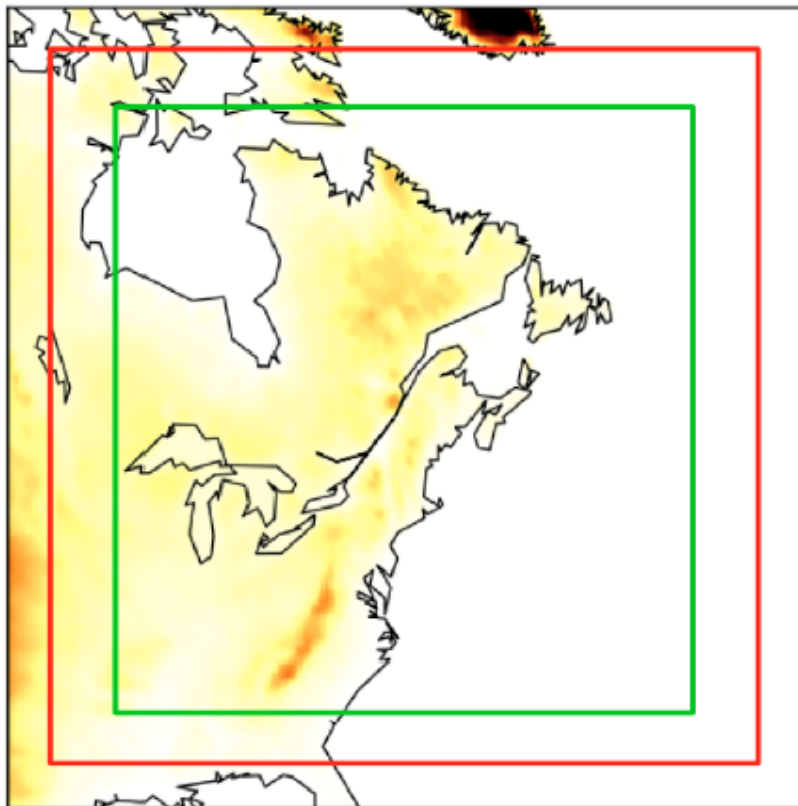
### ClimEx...

- employs High Performance Computing (HPC) to produce a large scale single model ensemble (CanESM2-CRCM5, 50 members), resulting in a high-resolution ( $0.11^\circ$ , up to 1h), transient climate dataset (1951-2100) under RCP8.5 (7500 model years)
- will provide, for the first time, a statistically robust analysis and comparison of extremes under climate variability and climate change

# Case studies - Climate model domains

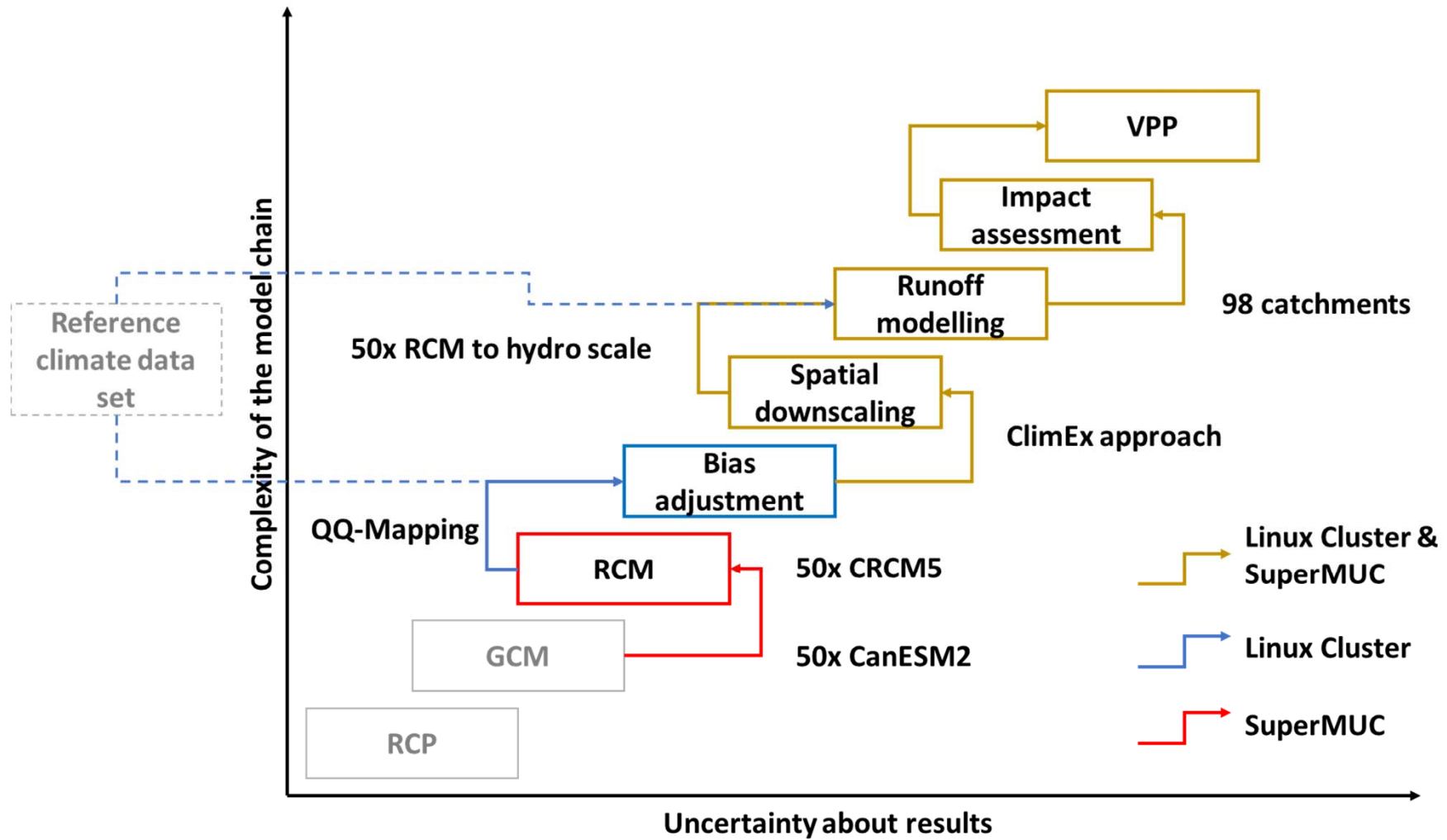
## North American Domain

## European Domain



"free domain" (340x340)  
"analysis domain" (280x280)

# Project structure - workflow



# Program of the Symposium

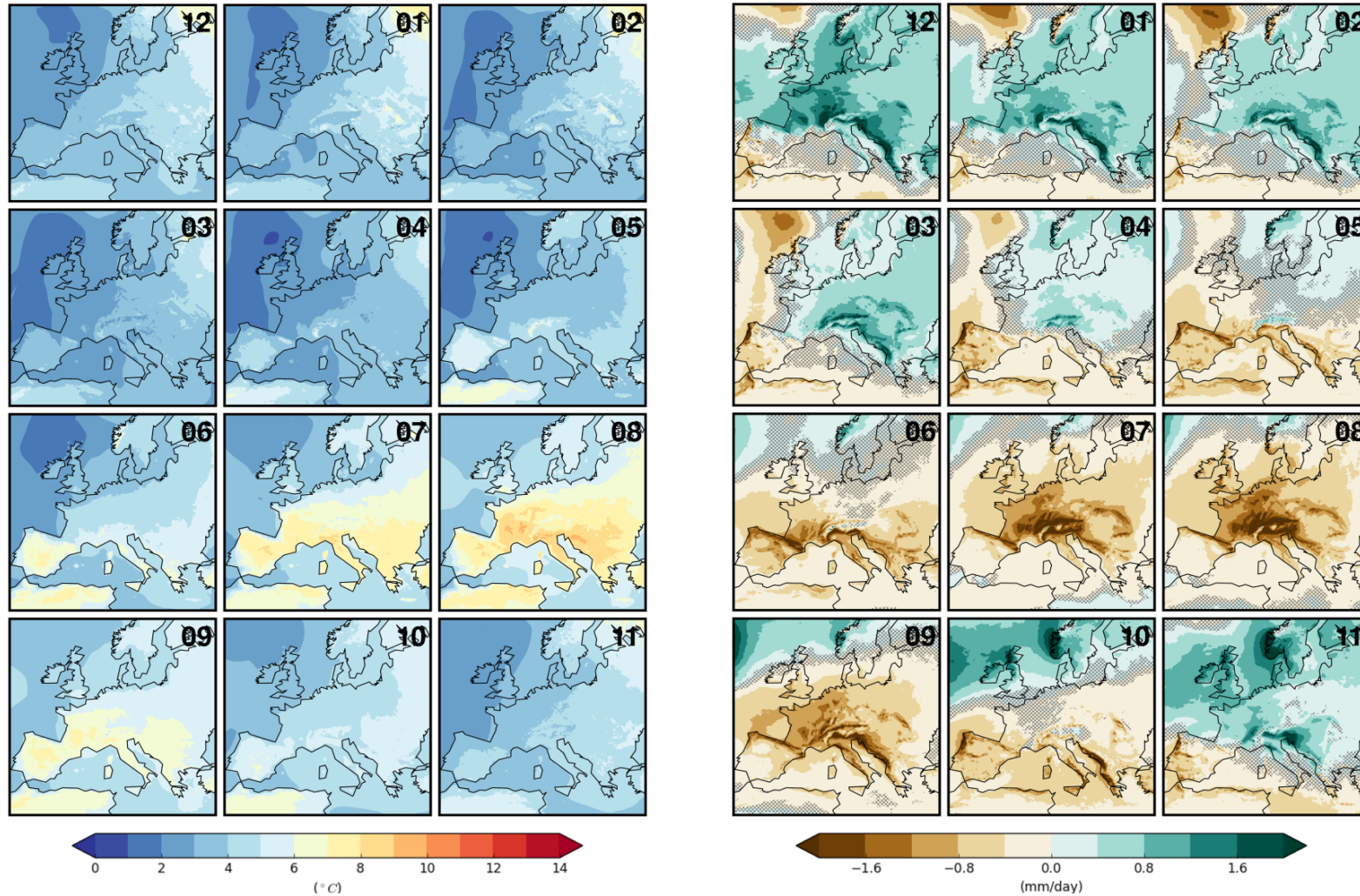
06 May 2019 – ClimEx Policy Day Bavarian Academy of Sciences	
13.00 – 13.45	Welcome and Introduction
13.45 – 14.30	Keynote by Prof. Friederike Otto
14.30 – 15.00	Coffee Break
15.00 – 17.00	ClimEx – Results
17.00 – 18.00	Tea Time & Poster Session & Visualization
18.00 – 19.00	Panel Discussion (Dr. M. Altmayer) Friederike Otto, Felix Finkbeiner, Martin Grambow, Peter Höpfe, Ralf Ludwig
19.00 –	Reception

➔ “Angry weather? How to find out to what extent climate change is affecting extreme weather.”

➔ Eight short talks to highlight some of the ClimEx findings

➔ “Ist der Zug schon abgefahren? – Klimawandel, Extremereignisse und was wir (noch) dagegen tun können.”

# Climate change - Temp & Precip in Europe



Monthly change of temperature and precipitation (2080-2099 vs. 2000-2019)  
(50 member mean)

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# Key messages

## ClimEx ...

- employs HPC to analyze *climate variability* and *climate change* over Eastern North America and Europe
- provides robust estimates for the dynamics of hydrometeorological extremes in Québec and Bavaria
- delivers simulation and visualization tools to support water resources management and civil security
- makes data and results available to the scientific community and stakeholders
- uses data from a sensitive climate model under an extreme climate change scenario



Bavaria 2013



Québec 2017



Québec 2019



Bavaria 2016

# Program and Logistical Information

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# Program of Day 2

An in-depth view on ClimEx results



Four parallel workshops to discuss scientific advance and novel applications of ClimEx and related data



Sign-up for guided tours to SuperMUC-NG (identification required)



07 May 2019 – ClimEx Science Day Leibniz Rechenzentrum	
08.30 – 08.40	Welcome
08.40 – 10.30	A scientific view on ClimEx data and applications
10.30 – 11.00	Coffee Break
11.00 – 12.45	Parallel Workshops A – Large Model Ensembles B – Climate Services and Science Communication C – Hydrologische Extreme und Anpassung in der Wasserwirtschaft D – Klimawandel und erneuerbare Energien
12.45 – 13.45	Lunch Break
13.45 – 14.15	Parallel Workshops - Summary
14.15 – 15.15	Synthesis and Outlook
15.15 – 16.00	Network Café and Farewell
16.00 – 17.00	Guided Tours to SuperMUC-NG (on demand)

# Program of Day 2

An in depth-view on ClimEx data and applications...

08:30-08:40	10 min	Introduction	Ralf Ludwig	Introduction to ClimEx – Challenges and Perspectives (and Summary of Day 1)
08:40-09:00	20 min	A scientific view on the ClimEx data and applications	Alain Mailhot	What does the ClimEx large ensemble tell us about the future evolution of extreme precipitation?
09:00-09:20	20 min		Fabian von Trentini	<i>Relations of ClimEx to CORDEX and other large ensembles</i>
09:20-09:40	20 min		Raul Wood	Regional Patterns of Precipitation Extremes on Various Timescales
09:40-10:00	20 min		Magdalena Mittermeier	<i>Exploring the CRCM5-LE using machine learning techniques</i>
10:00-10:20	20 min		Simon Lachance-Cloutier	<i>Application of ClimEx data for flood analysis</i>
10:20-10:30	10 min		François Brisette	<i>Summary and Conclusions</i>
10:30-11:00	30 min	Coffee break		

