



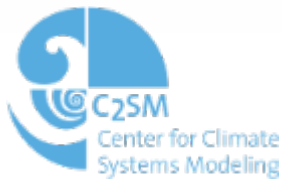
Future climate projections for impact studies

Christof Appenzeller, Reto Knutti, Andreas Fischer, Martin Funk, Jürg Fuhrer, Pierluigi Calanca, Niklaus Zimmermann, Harald Bugmann and others (!)

MeteoSwiss, IACETH, VAW, Agroscope, WSL

C2SM Community Day
Zurich, 12 June 2013





CH2016



Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

Eidgenössisches Departement des Innern EDI
Bundesamt für Meteorologie und Klimatologie
MeteoSchweiz



Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich

C. Appenzeller, I. Bey, T. Bosshard, T. Corti, M. Croci-Maspoli, A. Fischer, E. Fischer, J. Fuhrer, S. Kotlarski, R. Knutti, A. Kress, C. Kull, M. Liniger, A. Lustenberger, P. Pall, C. Schär, S. Scherrer, A. Weigel



Release am 28. September 2011
www.ch2011.ch



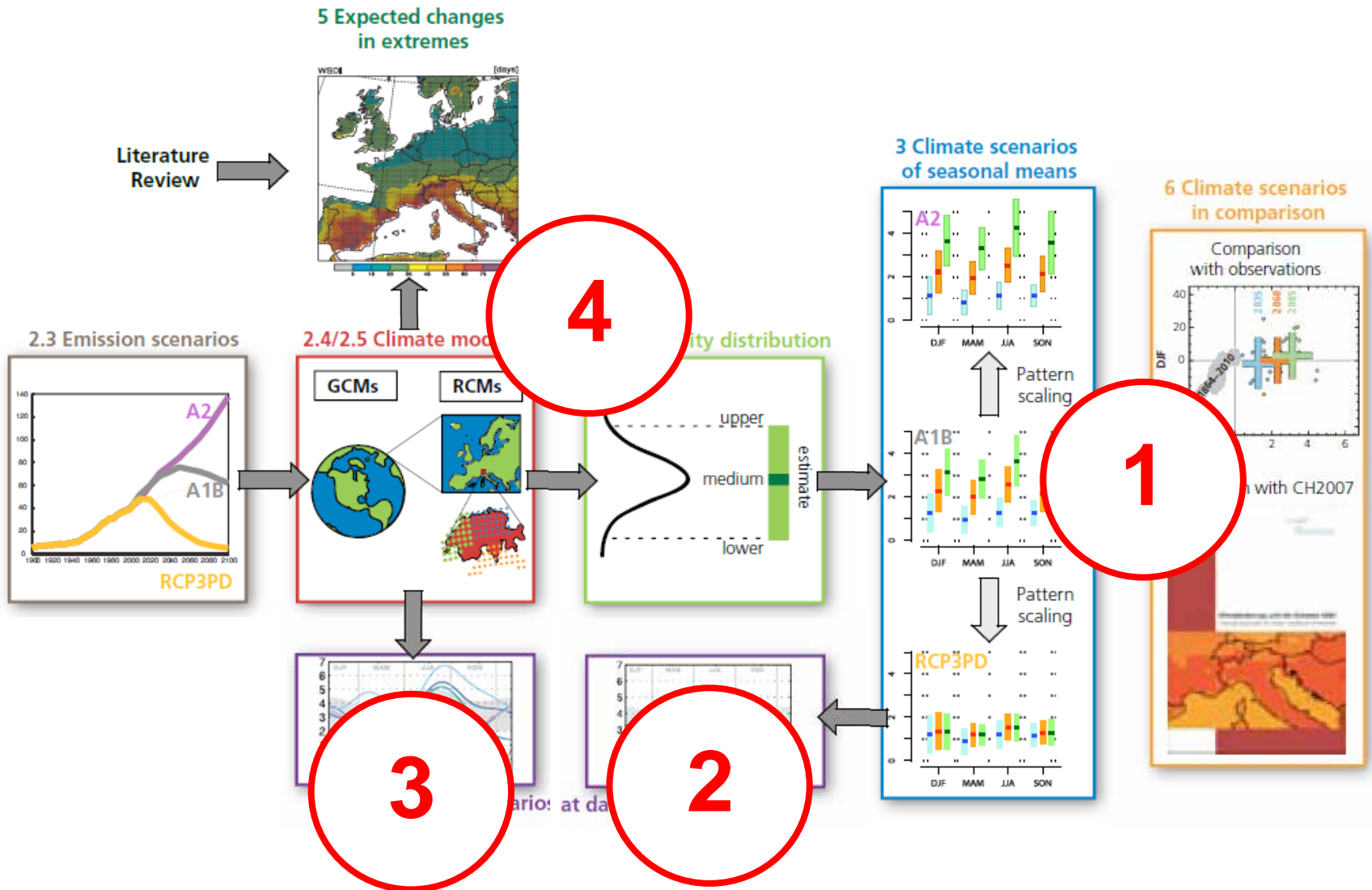
NCCR CLIMATE
Swiss Climate Research

OcCC

Organe consultatif sur les changements climatiques
Beratendes Organ für Fragen der Klimaänderung



Starting point: CH2011





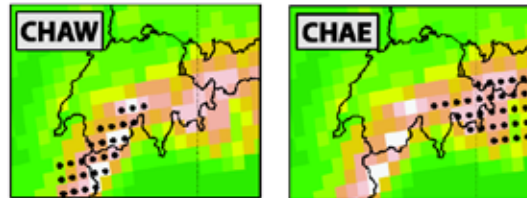
Products from CH2011plus



Continuous release of user-oriented climate scenario activities in a consolidated and scientific form



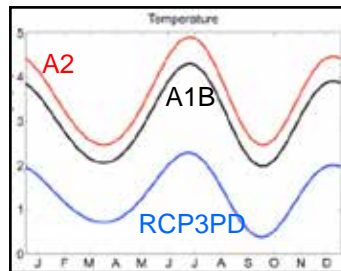
2 Alpine regions



Andreas Fischer et al.



Local Scenarios for A2 and RCP3PD

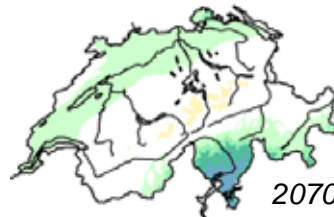


Sven Kotlarski et al.



Gridded Scenarios at daily resolution

Winter Precipitation Change



2070-99 (A1B, medium)

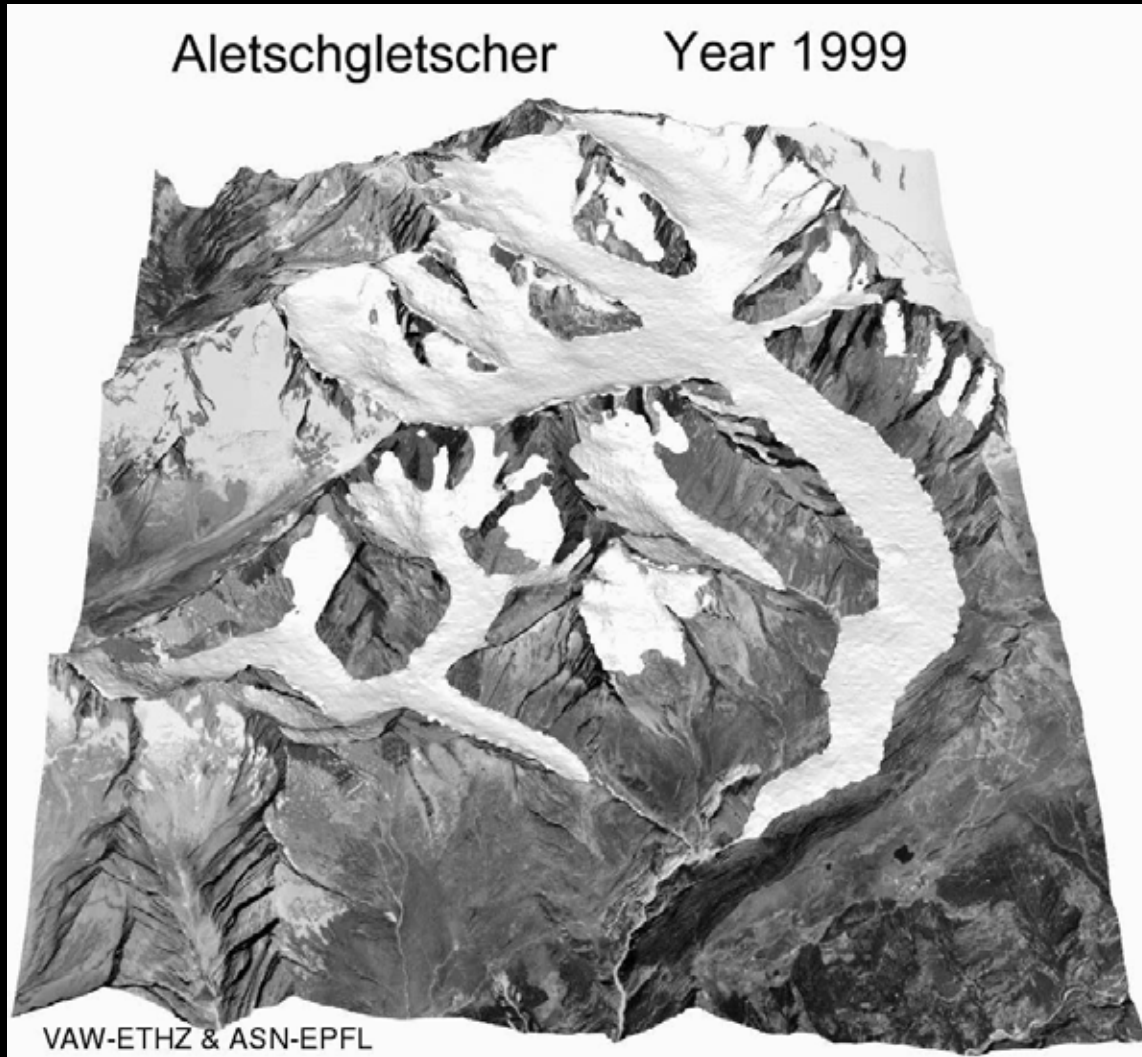
Elias Zubler et al.



Further needs in Downscaling



Need for localized climate change information



Courtesy
Martin Funk



Further needs in Downscaling



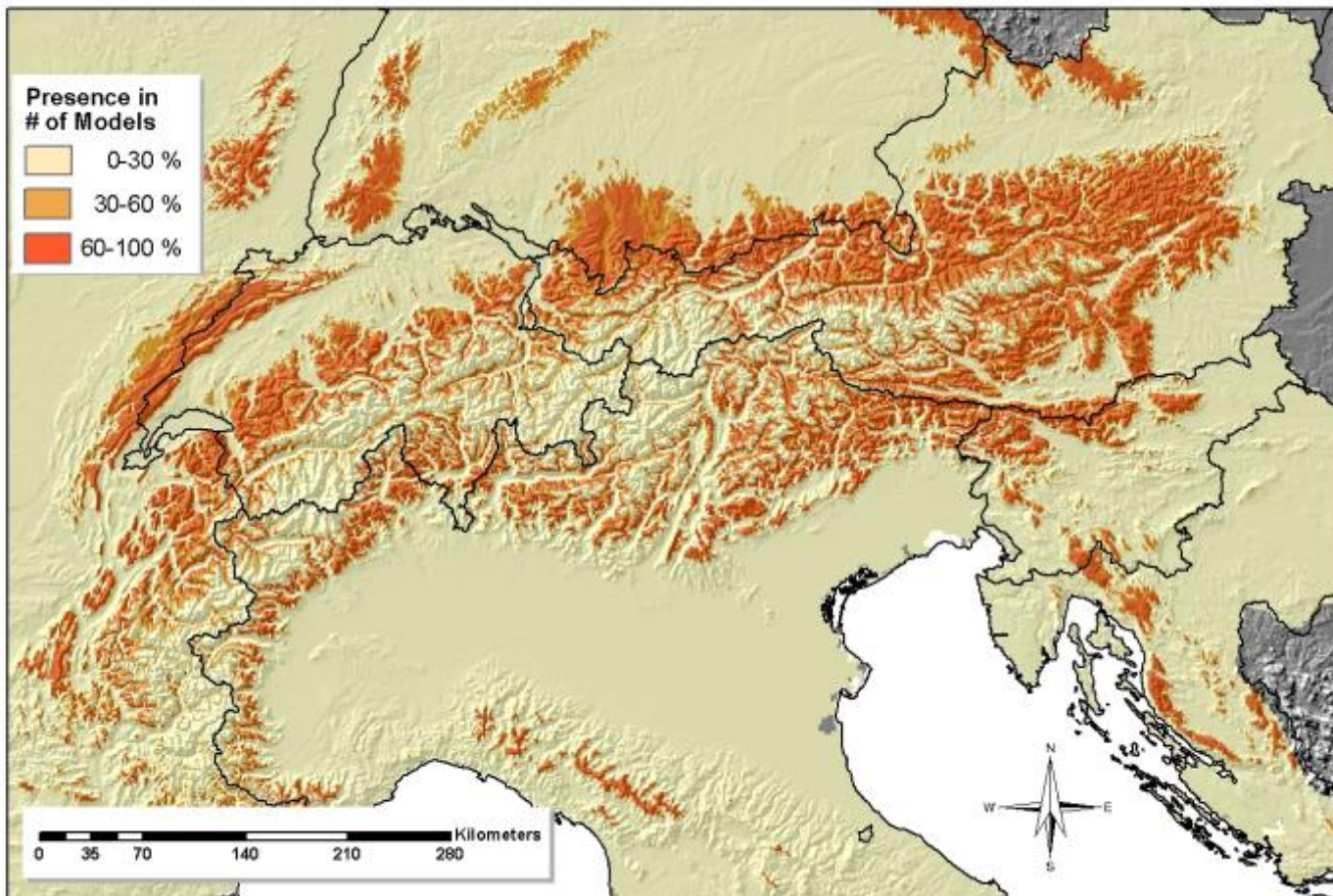
Need for

(Nik Zimmermann et al., in prep.)

Localized climate change information

Fagus sylvatica

2080





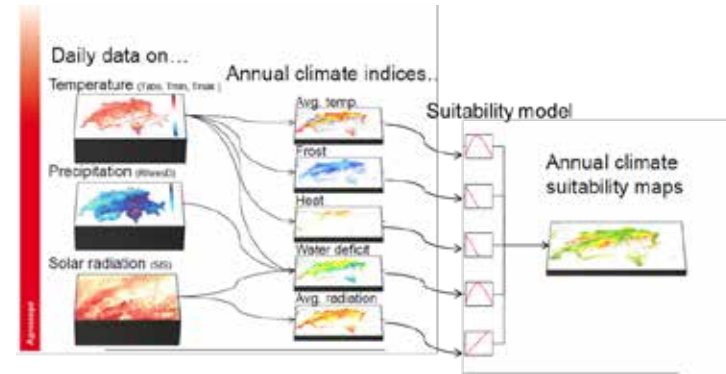
Further needs in Downscaling



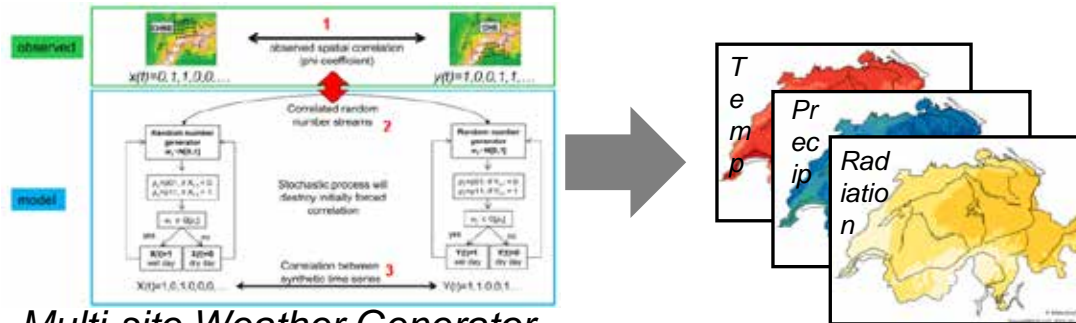
“Impact Models mostly require FUTURE (daily) WEATHER timeseries as input”

Pierluigi Calanca et al.

Suitability maps



Generating future daily pseudo WEATHER FIELDS



Multi-site Weather Generator

PhD Thesis of Denise Keller

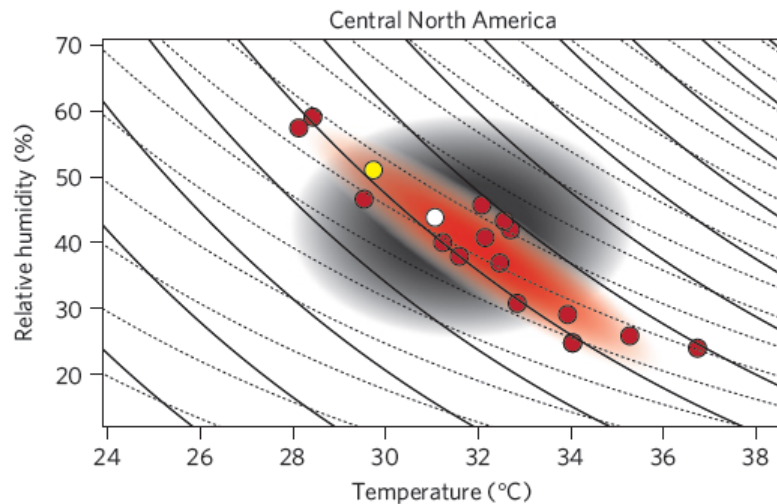


Further needs in Downscaling

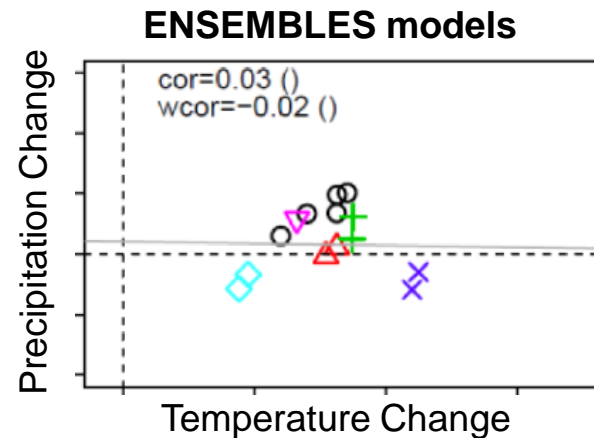
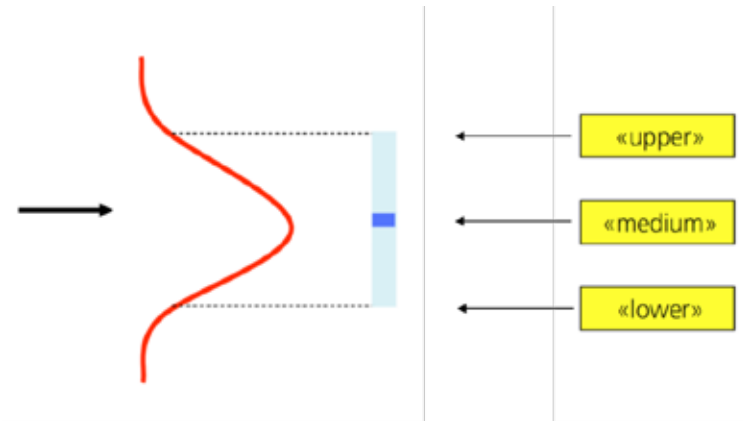


Better understanding of joint probabilities

...across variables



(Fischer and Knutti 2012)





Possible Future Research Directions



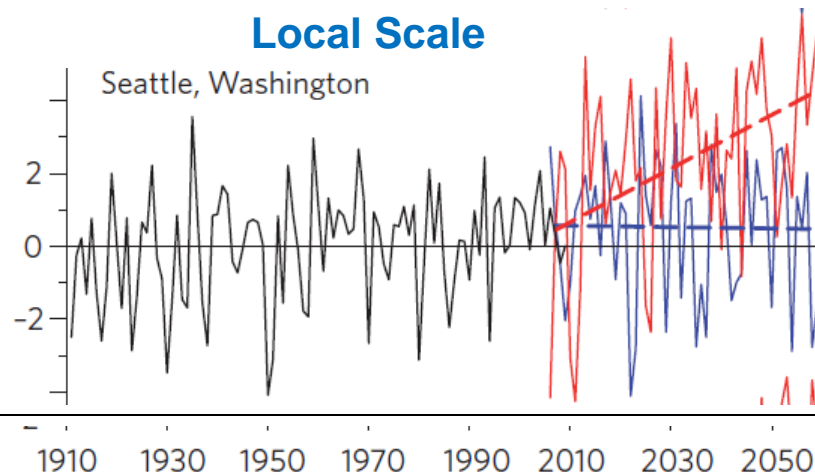
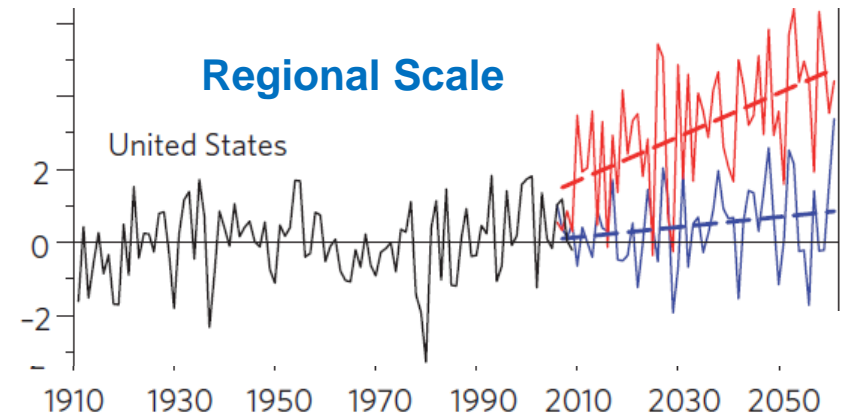
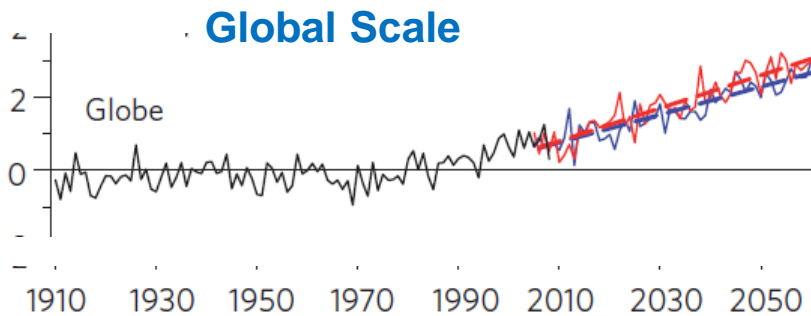
Impact-relevant downscaling approaches to meet end-user needs
(localised info, future weather, multi variables & joint probability)



Further needs



Natural climate variability poses inherent limits to climate predictability in particular on local scales

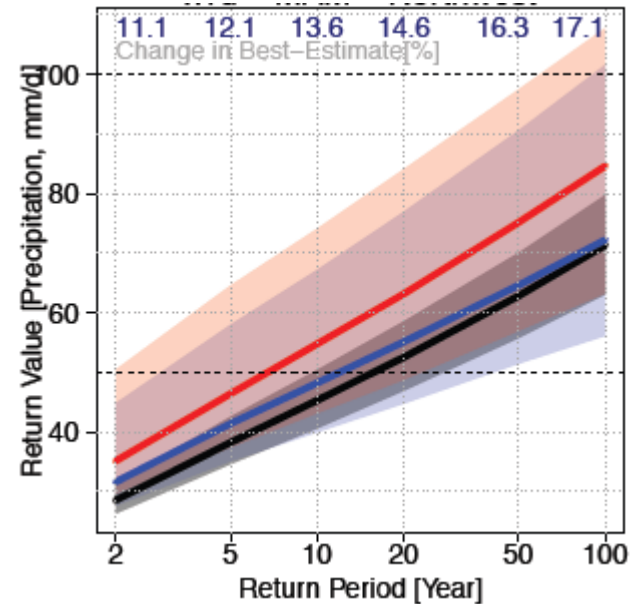
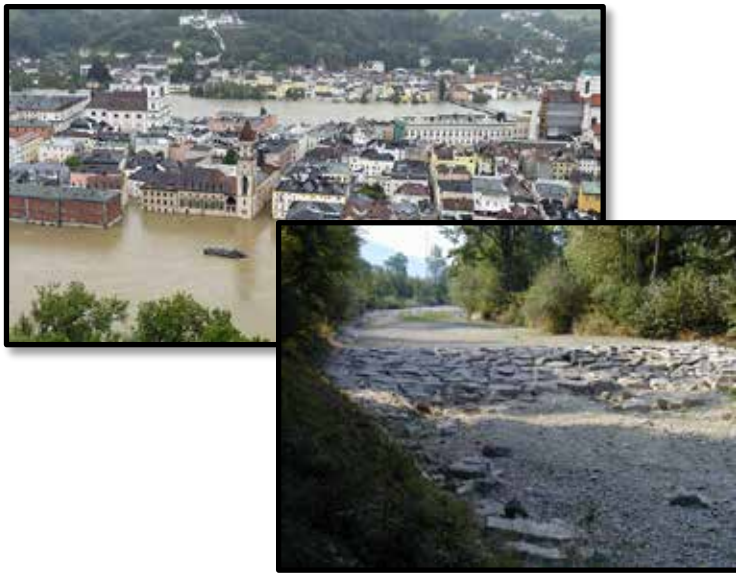




Further needs

Need for Assessment of extreme changes

Changes in extreme precipitation



(Rajczak, Schär et al. 2012)



Possible Future Research Directions



Impact-relevant downscaling approaches to meet end-user needs
(localised info, future weather, multi variables & joint probability)

The role of natural variability and extremes on the local-to-regional
scale and its implication for impact models.



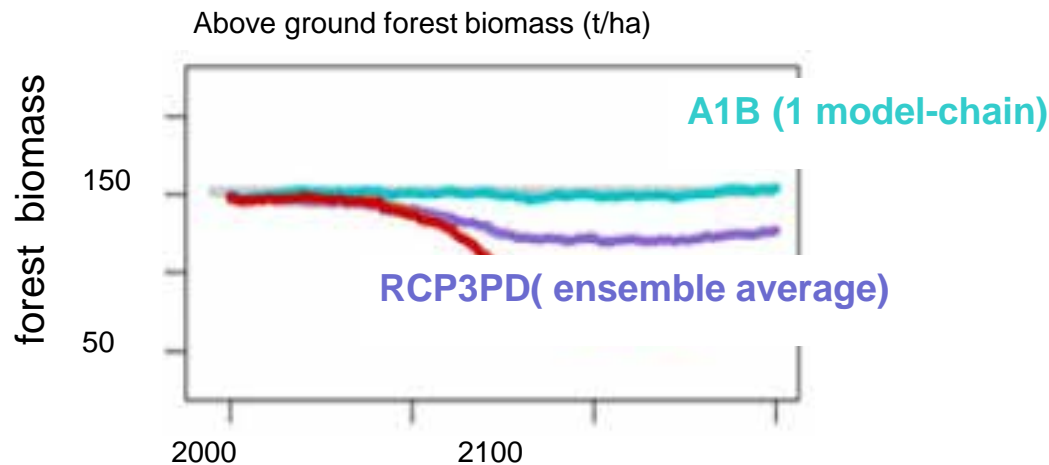
Further needs



How to include ensemble mean climate information into impact models?

Harald Bugmann et al.

Probabilistic end-to-end modeling vS ensemble averaged scenarios



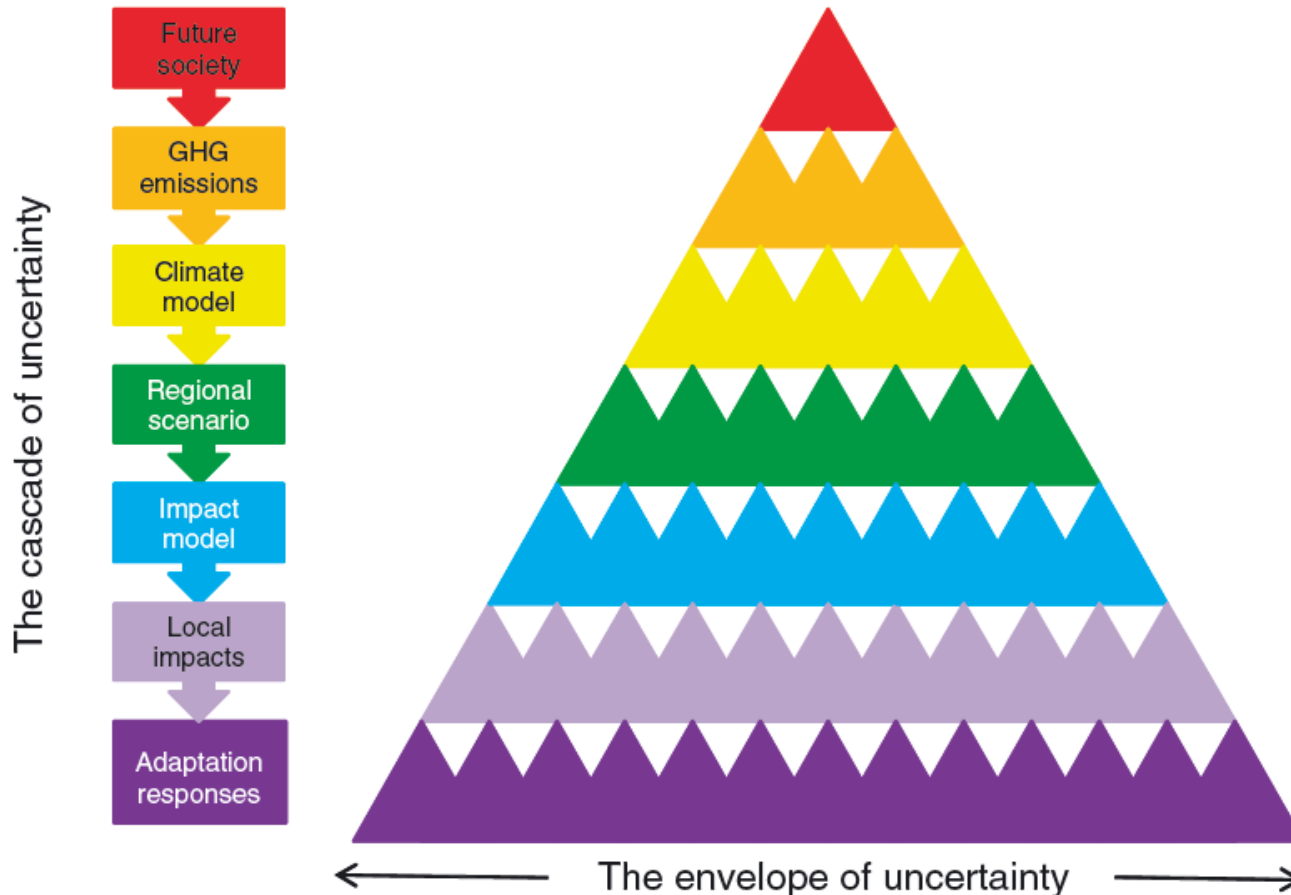
(Elkin, Bugmann et al. 2013)



Further needs: The cascade of uncertainty



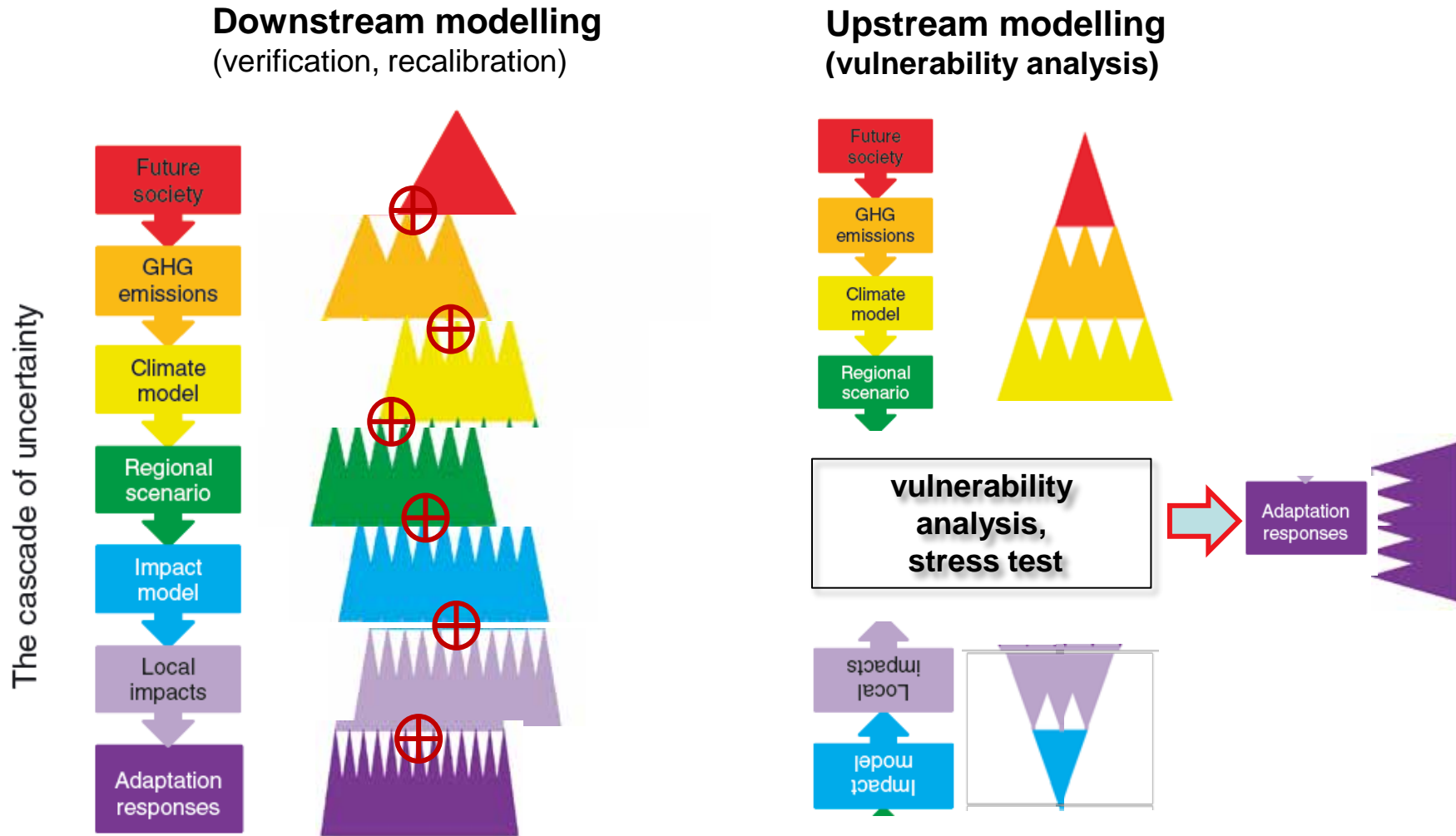
downstream» modelling approach





«downstream» vs «upstream» modelling approach

Some thoughts on the cascade of uncertainty





Possible Future Research Directions



Impact-relevant downscaling approaches to meet end-user needs
(localised info, future weather, multi variables & joint probability)

The role of natural variability and extremes on the local-to-regional scale and its implication for impact models.

The cascade of uncertainty, end to end modelling or vulnerability analysis → what about a practical example?