Regionalization of future extreme hydro-meteorological events in Austria

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Idea and concept

Extreme meteorological events:
- causal weather events differ throughout the seasons and in different regions of Austria
- occur in certain synoptic situations - weather (circulation) types
Idea and concept

Future extreme events?

General flow is represented in GCM, extreme precipitation on regional scale not well predicted.

Establish relation between circulation types and extreme events in the past - same weather types then in the past cause extreme events in the future.

If general flow well represented and a significant relation between extreme events and weather types is established > tell sth about future extreme events (the part caused by circulation).

Probability forecast
Data: Observation time series

~ 150 Stations with daily precipitation data of 40 years (1961 - 2000)

Regions defined upon climatology

Defining extreme events

Regional station mean exceeds percentile
Data: Model data

Reanalysis data:
ERA 40 reanalysis

Global Climate Models 2061 - 2080:
ECHMA5 A1B & B1, HADCM3C A1B

WLK733: Mean direction of flow, cyclonality in different levels (A,C)

4AC:
Southwesterly, anticyclonic in lower level cyclonic in upper level
Methodology

Select extreme events from observation data

Appoint the WLK733 from ERA40 to each extreme event
- How frequently is an extreme events caused by a CT
Methodology

Frequency of CT in extreme events

Effectiveness of a CT to produce an extreme event

Frequency of extreme events in CT
Methodology

Calculate frequency of CT in the GCM’s 20th century control runs and in the 21st century runs

Hypothesis: Changes in CT distribution cause changes in the extreme events distribution
Results: Effectiveness of CT

Most effective CT in Regions

- **West Jahr**
- **Innenpaß Jahr**
- **Adria Jahr**

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Extreme Environmental Events
Cambridge, 13. – 17.12.2010
Results: Change of CT in the future

Difference: \( (freq(\text{future}) - freq(\text{past})) \times 365 \) change in days/year

Extreme Environmental Events
Cambridge, 13. – 17.12.2010

A1B

expected change in extreme WL (scheme A1B)

B1

expected change in extreme WL (scheme B1)
Results: Change of CT in the future

Change of CT in the future

Extreme Environmental Events
Cambridge, 13. – 17.12.2010
Summary

Most effective CT in Regions

No similar and significant trend for all the year, spring, autumn

In winter in the inner alpine region possibly an increase of extreme events (no significant negative trend in any of the CT causing extreme events)

Summertime decrease of extreme events seems likely, except for adriatic region

No general hint for increase of the CT’s that are efficiently responsible for extreme events
THANKS
for your attention