Zentralanstalt für Meteorologie und Geodynamik

Regionalization of future extreme hydro-meteorological events in Austria:

Using weather type classification for down-scaling from global climate models to regional extreme events.

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Overview

Idea and concept

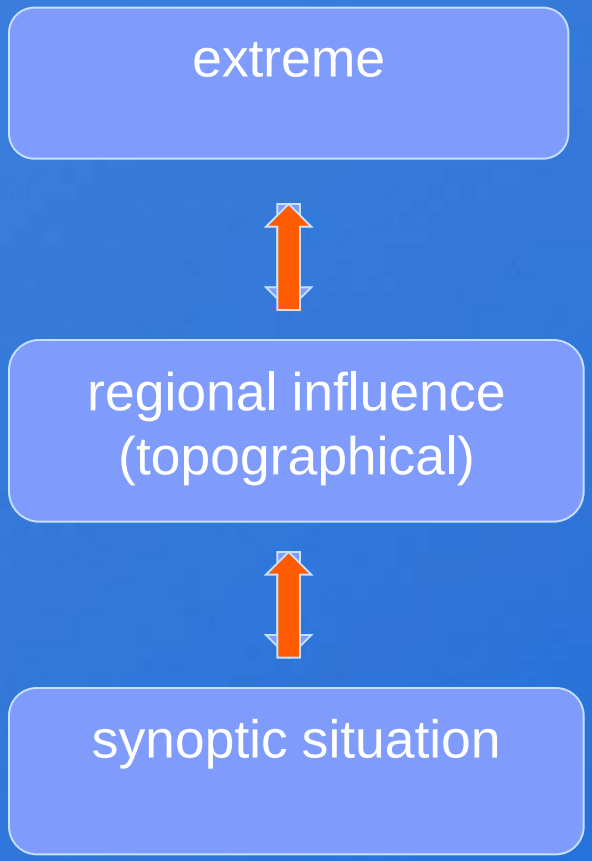
Data situation: Models and station data

Methodology

Results

Summary

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 types

Future extreme events?

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

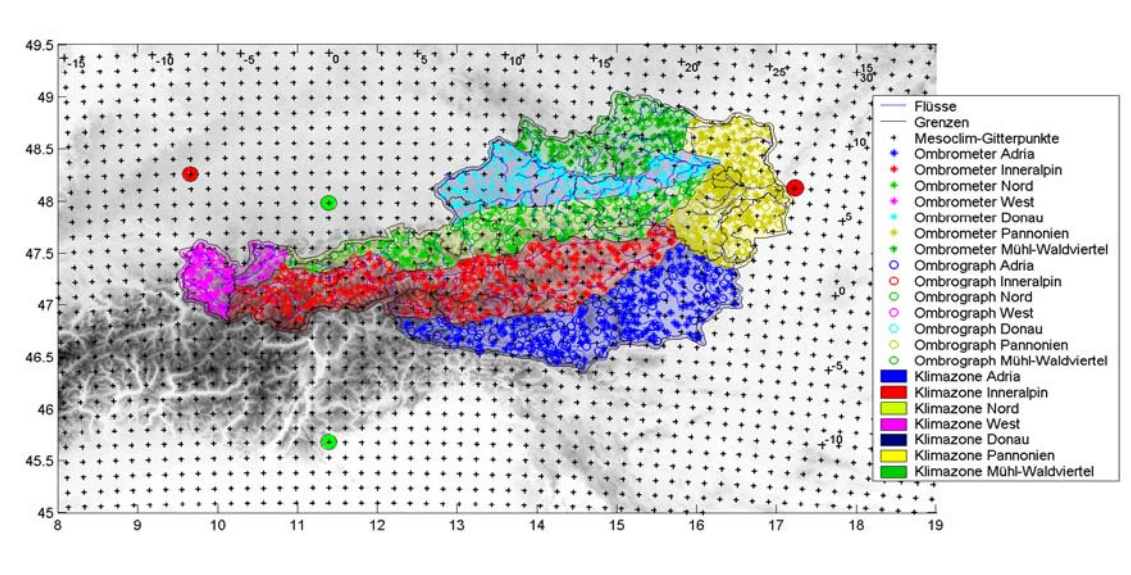
Establish relation between circulation types and extreme events in the past - same weather types then in the past cause extreme events in the future

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 precipiation data of 40 years (1961 - 2000)



Regions defined upon climatology

Defining extreme events

More than 50% of the stations are in their upper percentiles

Data: Model data

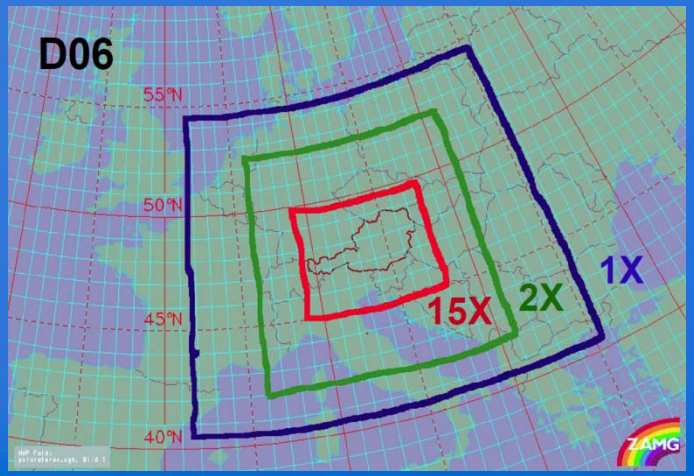
Reanalysis data:

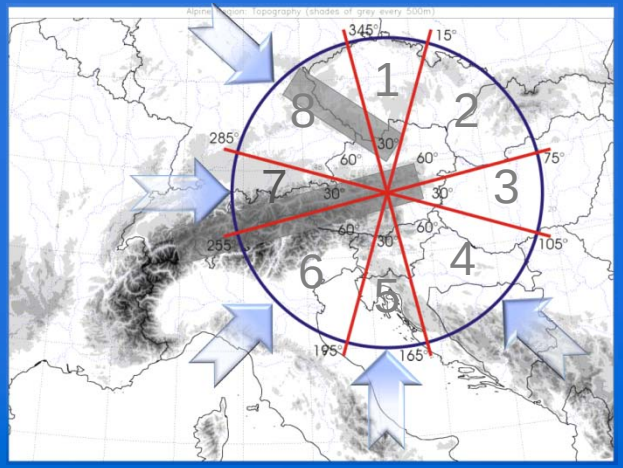
ERA 40 reanalysis

Global Climate Models 2061 - 2080:

ECHMA5 A1B & B1, HADCM3C A1B

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



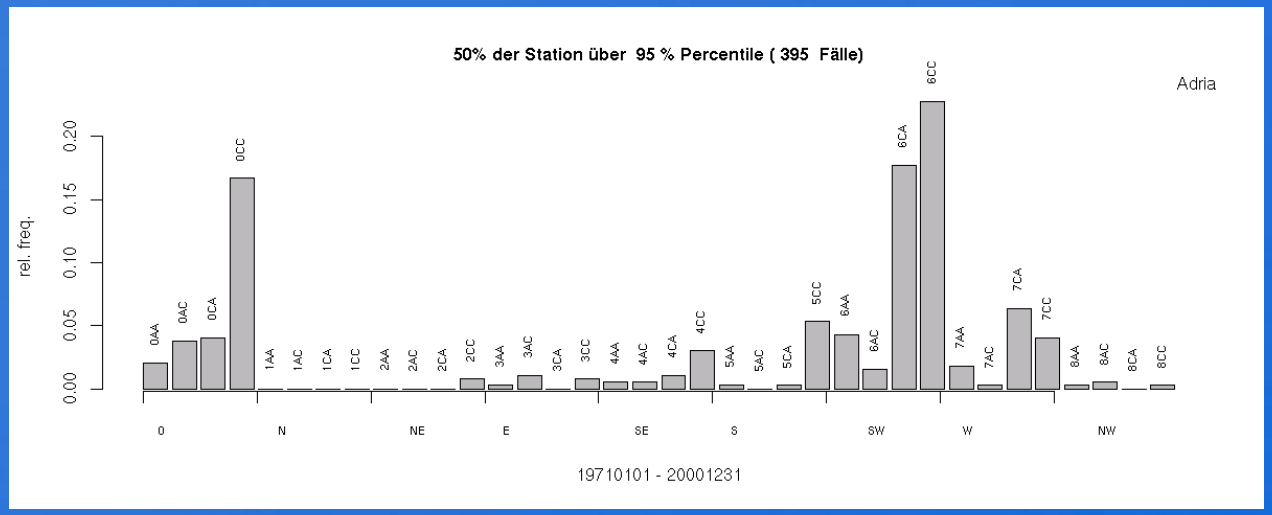


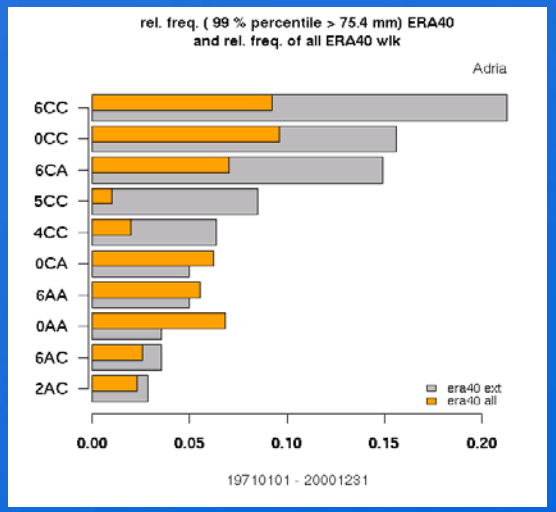
Methodology

Select extreme events from observation data

Appoint the WLK733 from ERA40 to each extreme event

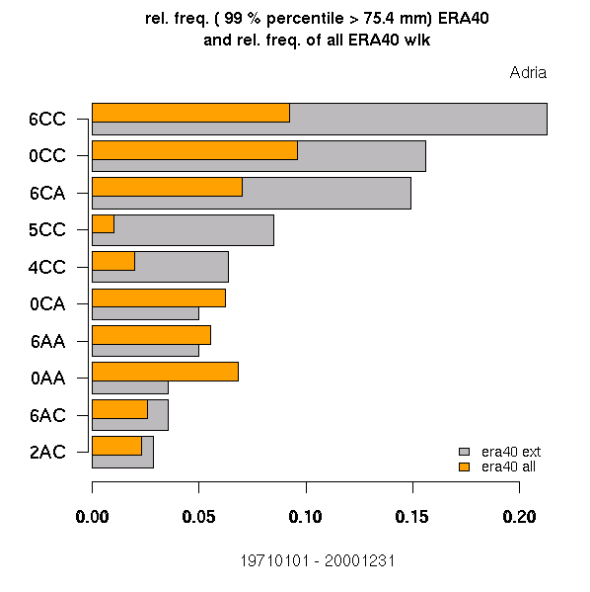
- How frequently is an extreme events caused by a CT



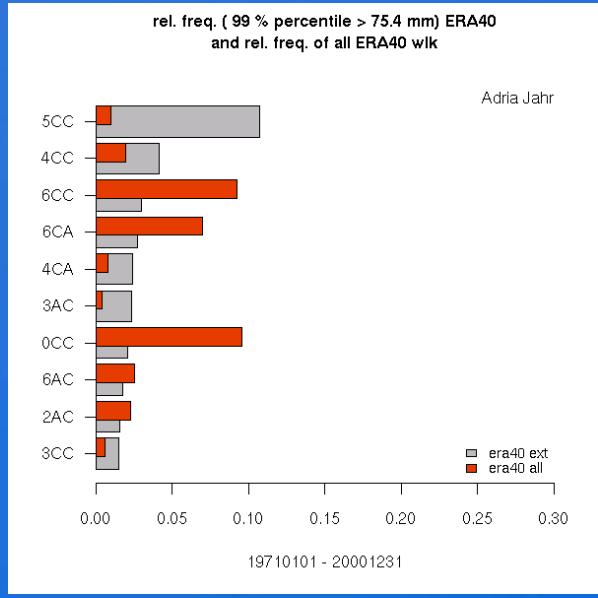


Methodology

Frequency of CT in extreme events



Frequency of extreme events in CT

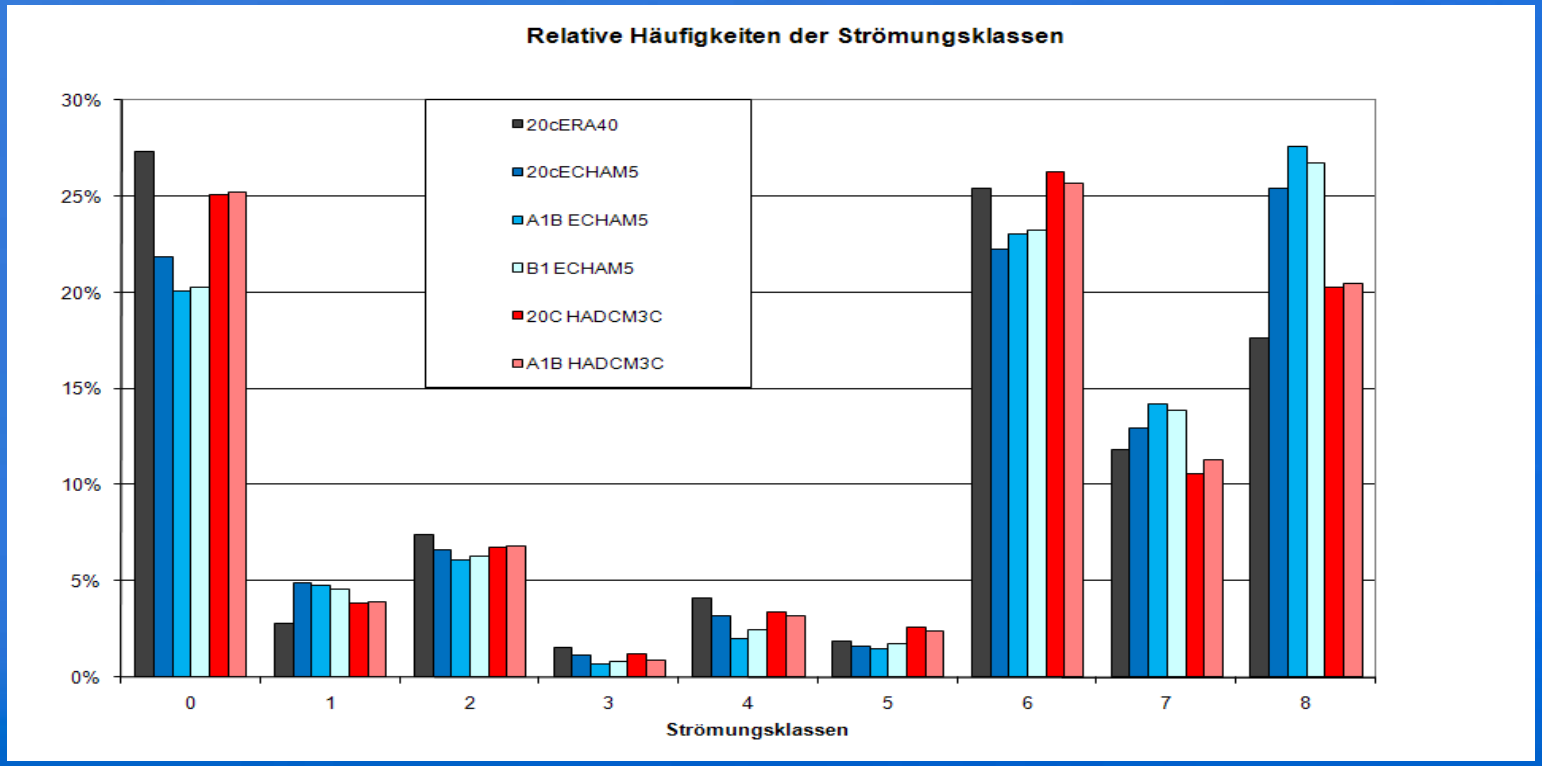


Effectiveness of a CT to produce an extreme event

Methodology

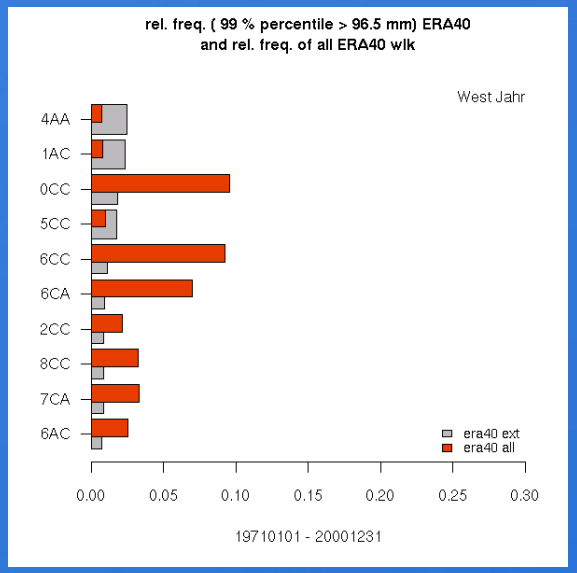
Calculate frequency of CT in the GCM's 20th century control runs and in the 21st century runs

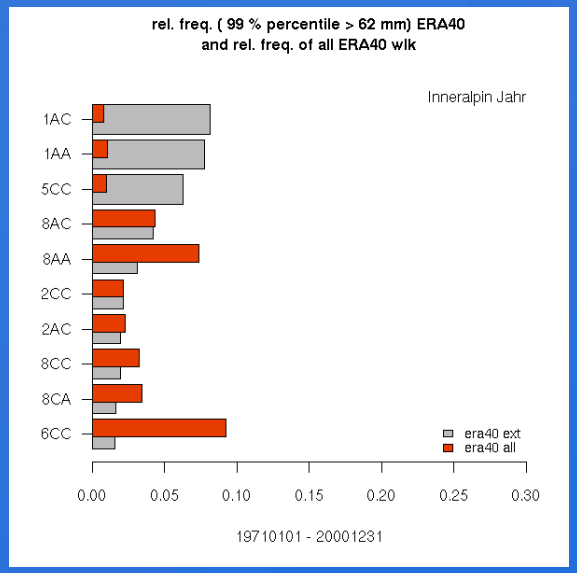
Hypothesis: Changes in CT distribution cause changes in the extreme events distribution

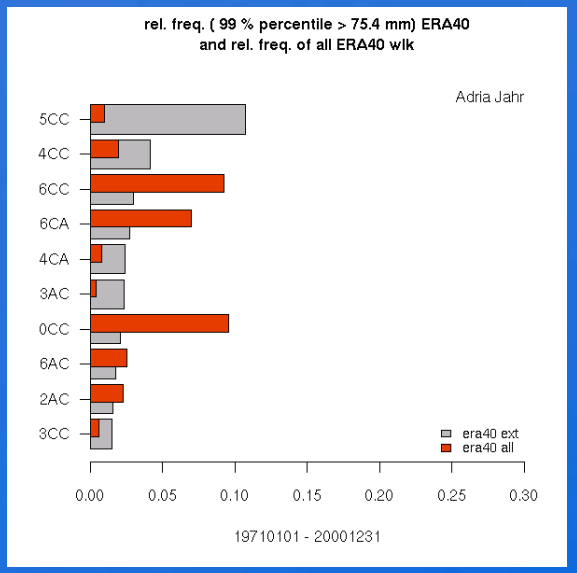


Results: Effectiveness of CT

Most effective CT in Regions



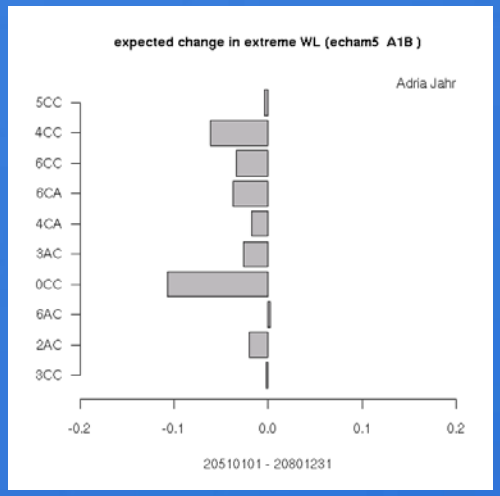


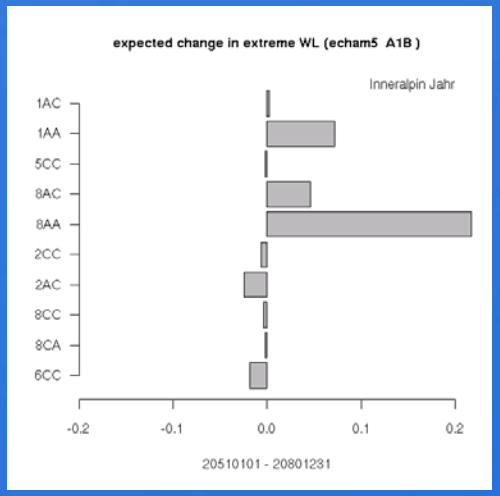


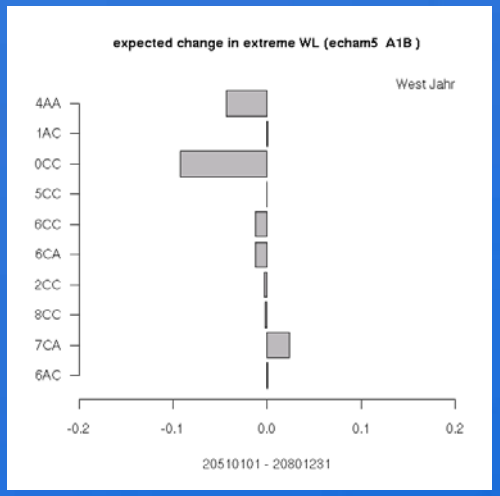
Results: Change of CT in the future

Difference: (freq(future) – freq(past)) * 365 change in days/year

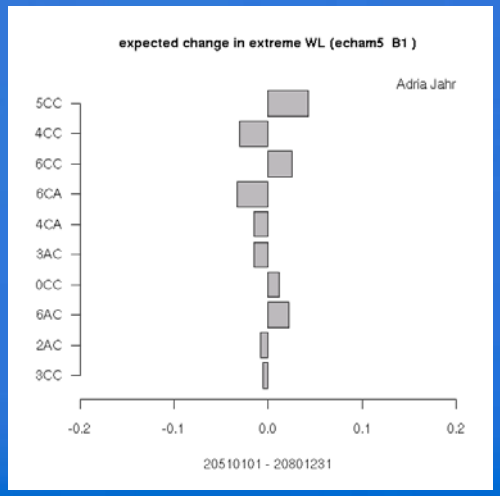
A1B

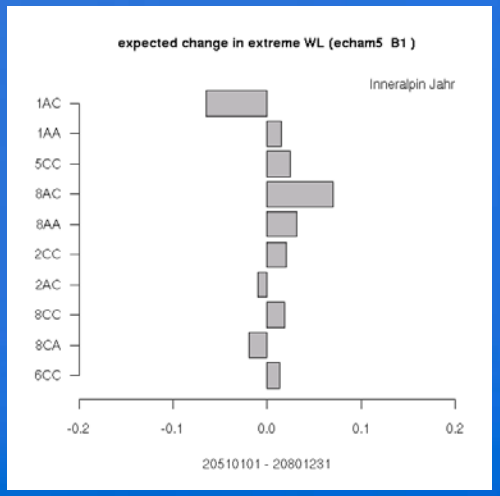


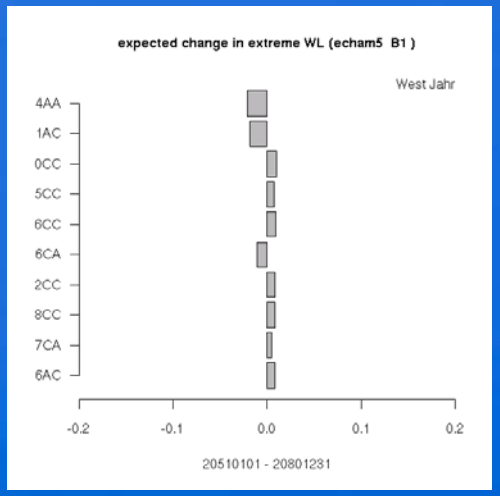




B1



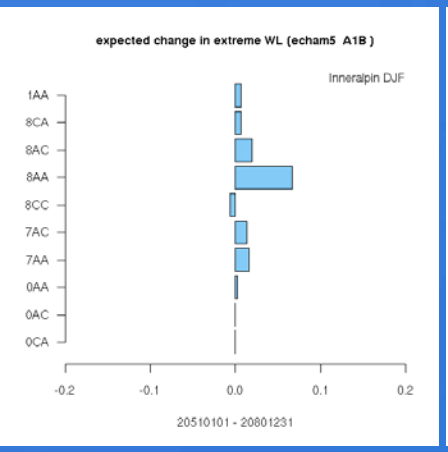


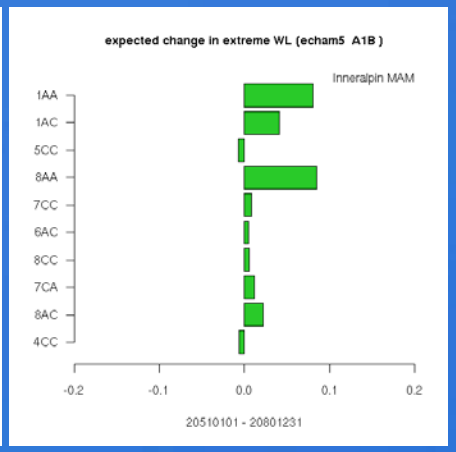


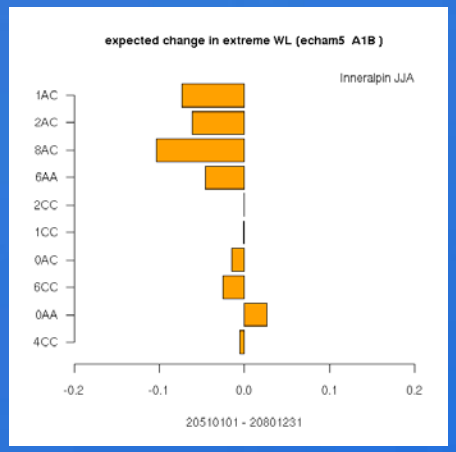
Results: Change of CT in the future

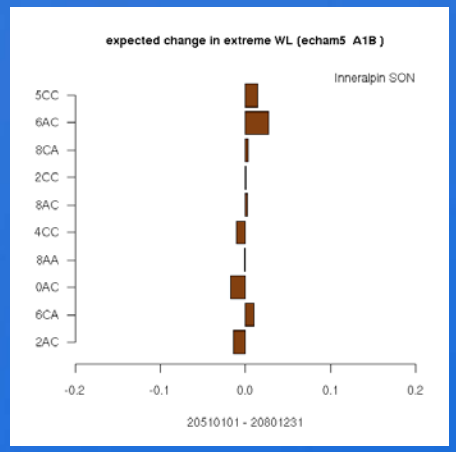
Change of CT in the future

A1B



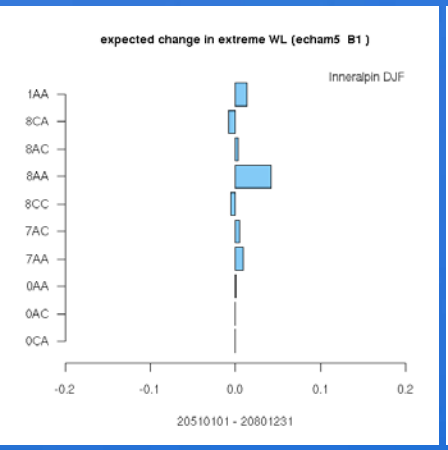


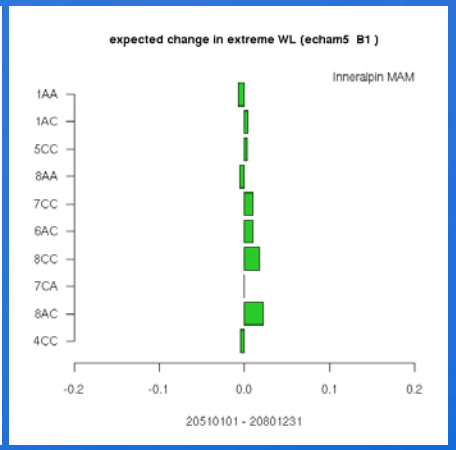


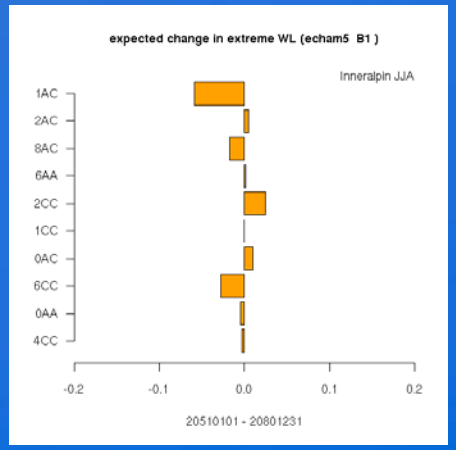


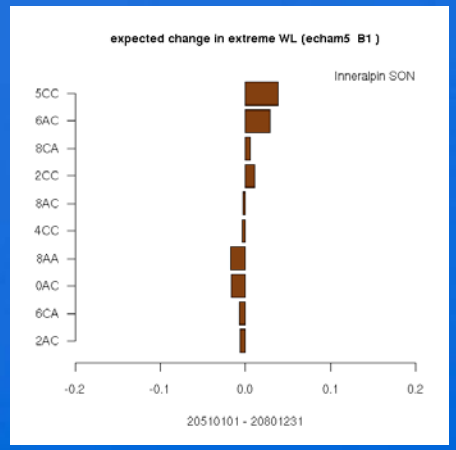
winter spring summer autumn

B1









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 negativ 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