RT4:

Understanding the processes governing climate variability and change, climate predictability and the probability of extreme events

Coordinators:

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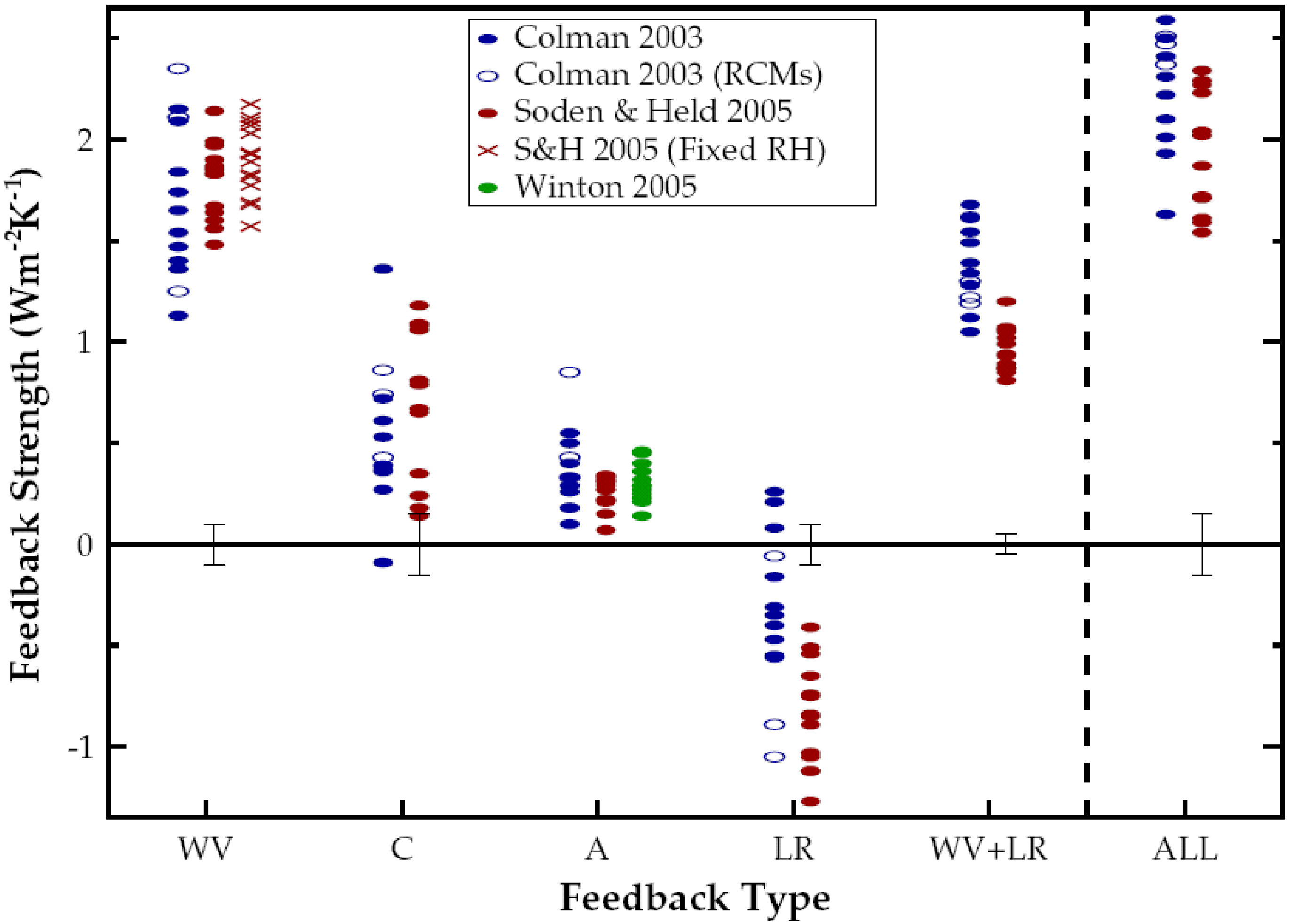
- **CNRS-IPSL** (Jean-Louis Dufresne),

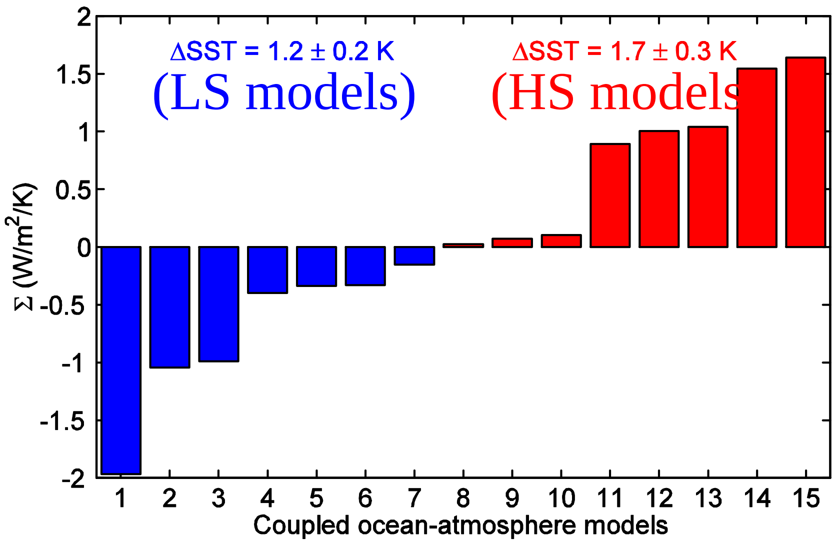
Deliverable D4.1.1:
Characterisation of the water vapour and cloud feedbacks in response to anthropogenic forcing



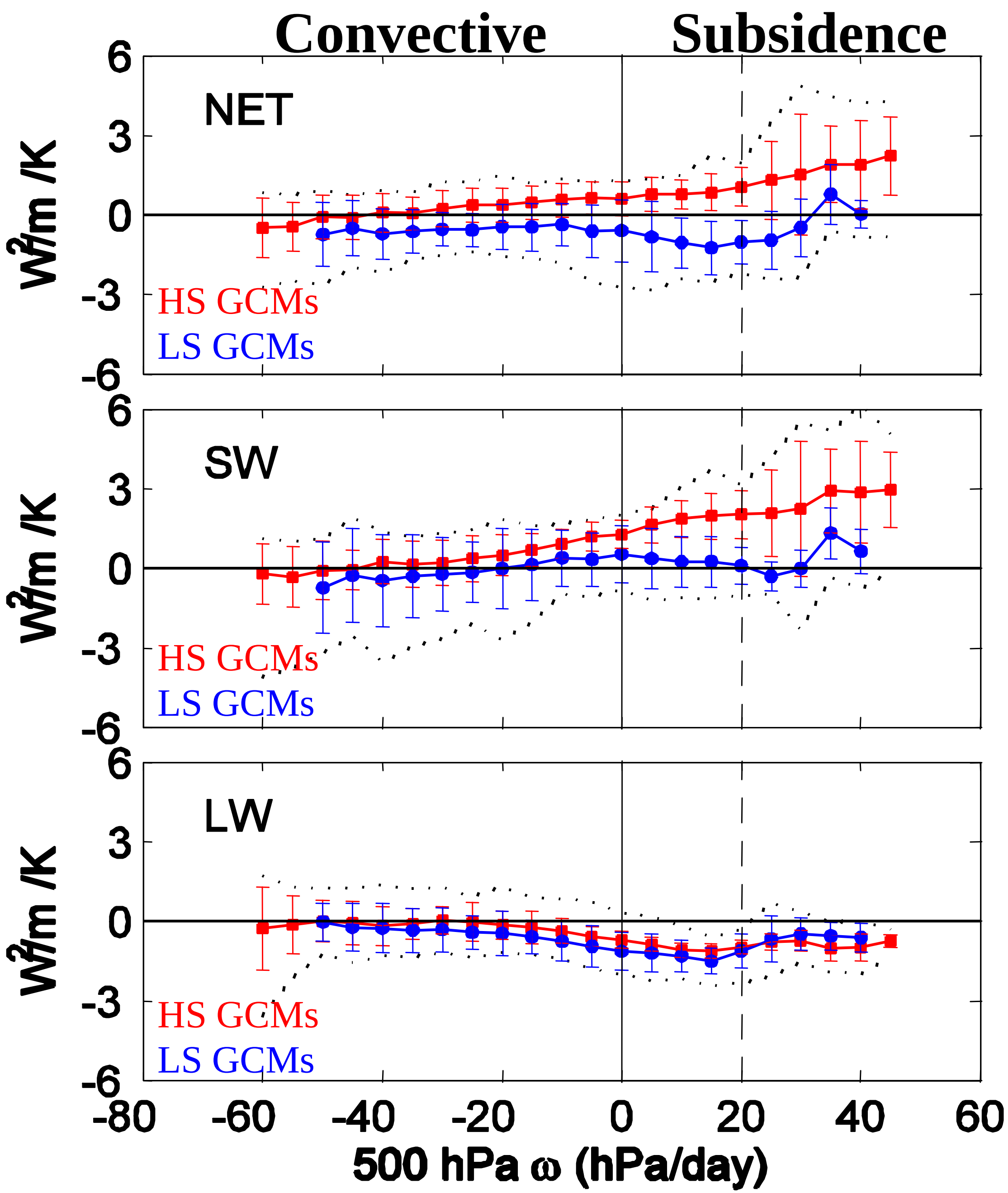
Comparison of GCM climate feedback parameters (in Wm−2K−1) for water vapour (WV), cloud (C), surface albedo (A), lapse rate (LR) and the combined water vapour + lapse rate (WV+LR). ALL represents the sum of all feedbacks. [From Bony et al. 2006]

Deliverable D4.1.1: (continue)

Tropically-averaged



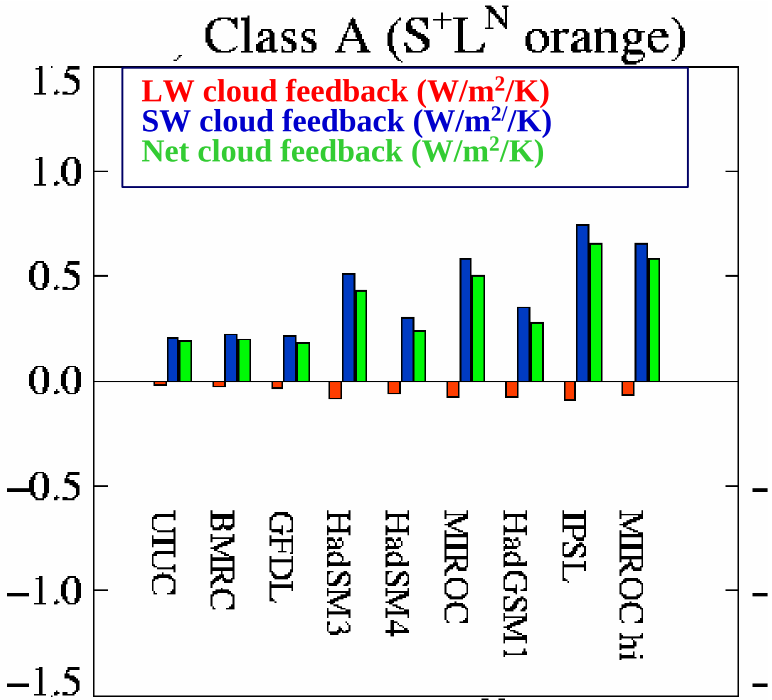
Composited by dynamical regimes

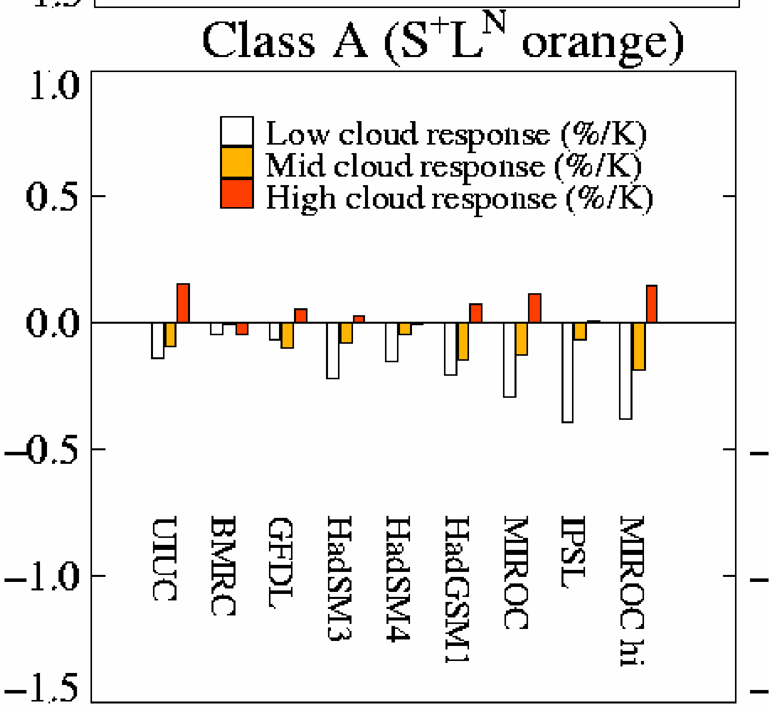


Currently, the **spread of climate change** cloud feedbacks stems primarily from differences in the **SW radiative response of boundary-layer clouds** to climate warming.

[Bony and Dufresne, 2005]

Deliverable D4.1.1: (continue)





CFMIP
Cloud Feedback and Cloud Response

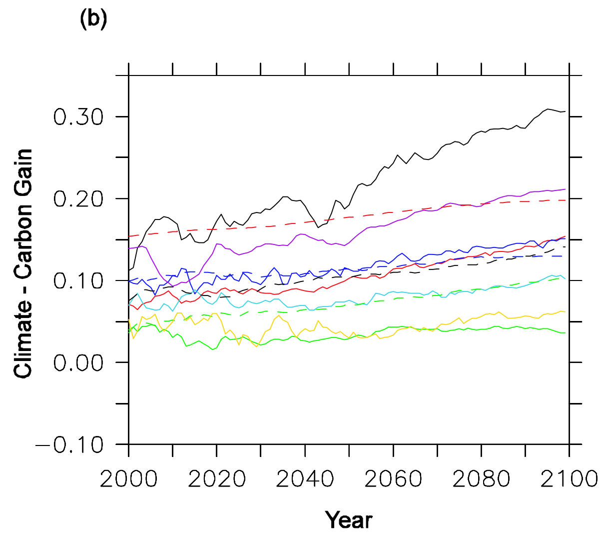
Areas with positive SW and neutral LW cloud feedbacks explain more than half the variance in the global NET cloud feedback.

Cloud feedbacks in these areas are dominated by reductions in **low-level cloud amount**.

(Webb et al., 2006, Clim. Dynamics)

Recommendation: OAGCM use ISCCP simulator to generate clouds diagnostics

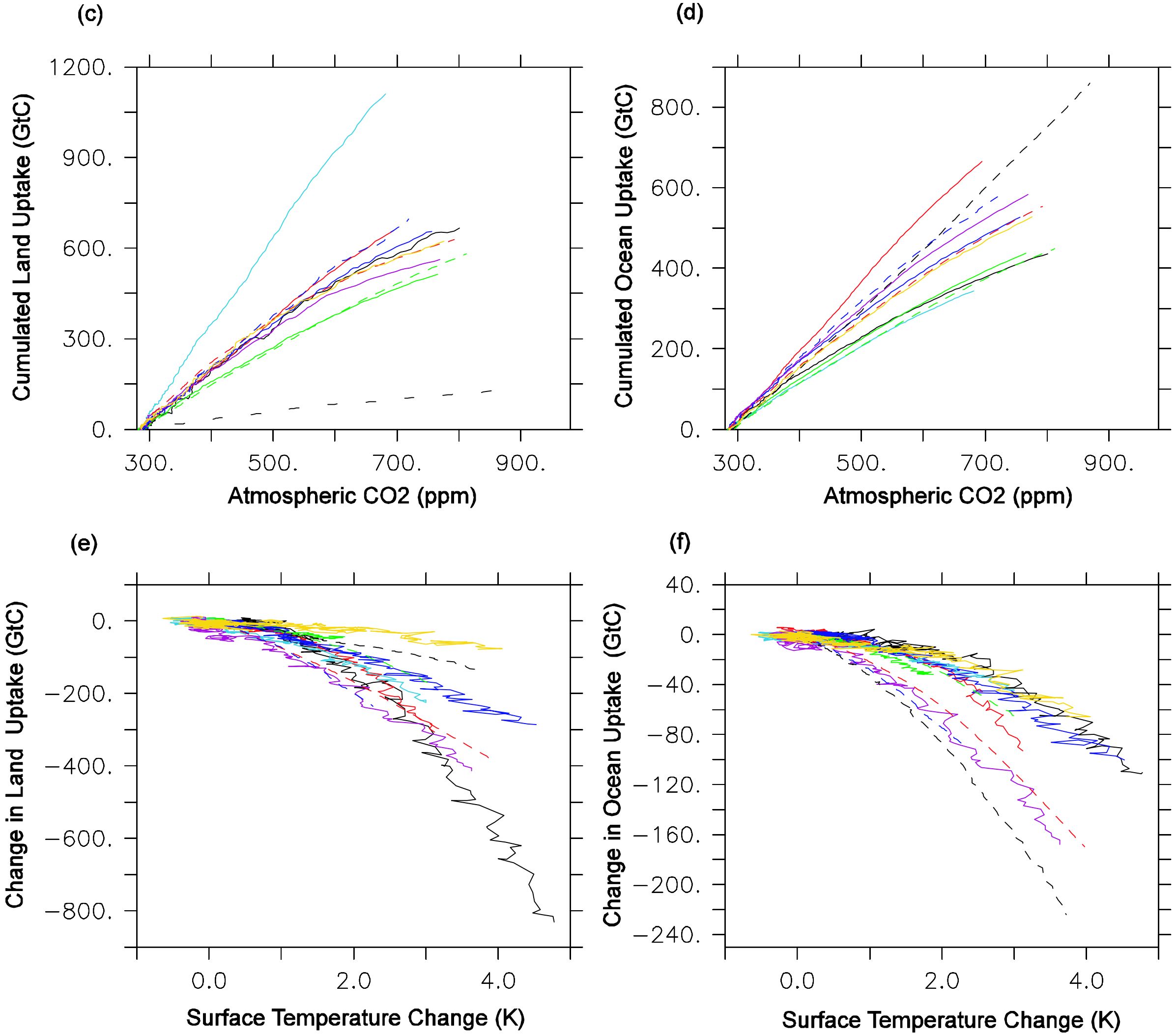
Deliverable D4.1.2: Analysis of the results from the first phase of the Coupled Climate Carbon Cycle Intercomparison Project (C4MIP)



Climate change will tend to release land and ocean carbon to the atmosphere.

All but one model produce a positive climate-carbon gain in the range 0. to 0.2.

For most models climate induced reduction of land carbon uptake



Deliverable D4.2.1:
Characterization of modes of large scale, low frequency climate variability in existing climate model control simulations.

1) N**atural variability in the Tropics**

- the mechanisms that might determine the characteristics of ENSO are explored. For example, interaction between ENSO- the mean state and the seasonal cycle

- the impact of the atmospheric model component horizontal resolution on the characteristics of the simulated ENSO

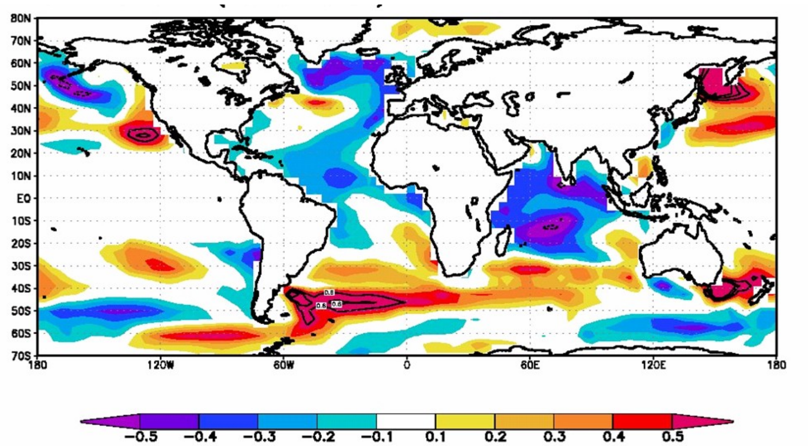
- the relationship between Tropical Indian Ocean (Indian sub-continent and monsoon) and Tropical Pacific is also discussed.

2) N**atural variability in the extra-tropics**

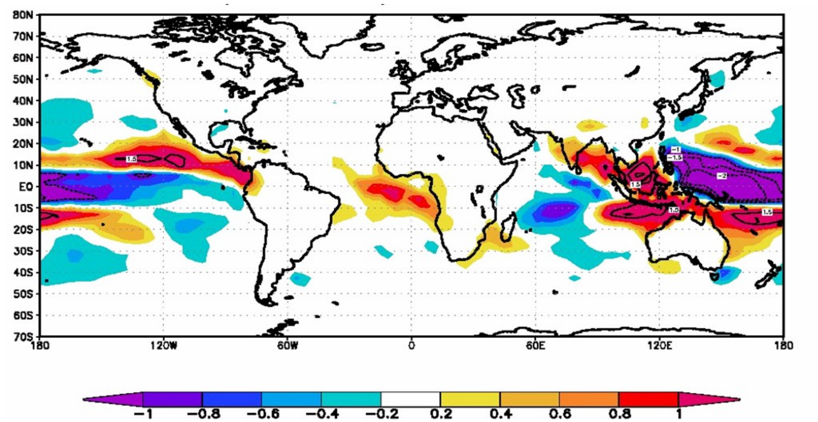
Impact of tropical climate variability on the Atlantic THC. Run where the inter-annual variability in the tropical (20S-20N) Pacific (TP) is suppressed

Annual mean changes (500 years means, TP-control) of

(a) SST (K) and



(b) precipitation (mm/day).



Deliverable D4.3.1:

Software for exploring extreme events in gridded data sets

Software has been developed to perform analysis of extreme climate and weather events in gridded datasets (part of the RCLIM intiative, R software for CLIMate analysis) and is freely available at http://www.met.reading.ac.uk/cag/rclim/.

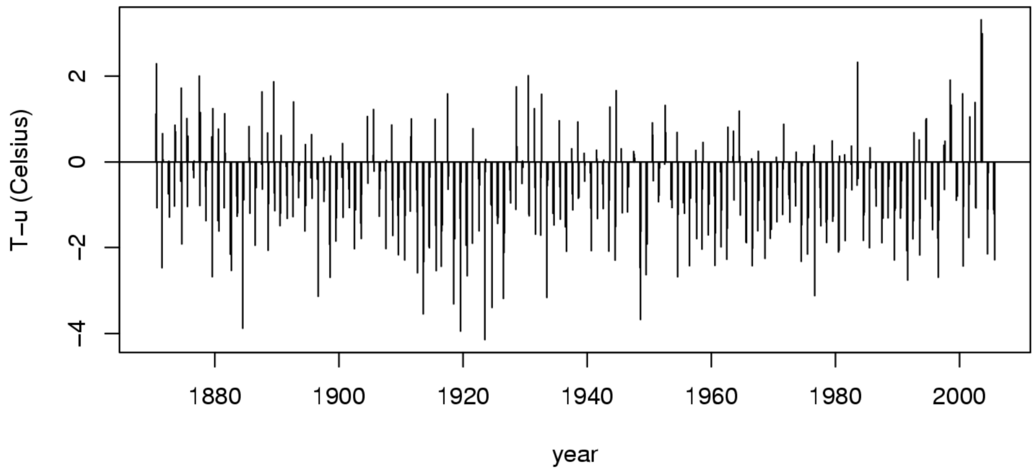
These tools allow :

- exploratory analysis of spatial patterns of extremes,
- the investigation dependence of extremes on factors such as time and ENSO,
- the analysis of clusters of extremes and also spatial extreme dependence analysis (teleconnection patterns of extremes).

The demonstration of the methods has been performed using summer (June-July-August) monthly mean temperature.

Deliverable D4.3.1: (continue)

Summer month differences *Ty,m - uy,m* (75% time-varying threshold) for central Europe



Mean of excesses *E(Ty,m – uy,m | Ty,m > uy,m)*