

THE REGIONAL CLIMATE MODEL STAR II (1)

A new model was developed to calculate regional climate scenarios. The basis for these scenarios are daily meteorological data measured at the stations in the region of interest and trend in temperature for the future, derived e.g. from a GCM-run. Large sets of scenarios facilitate the estimation of the range of future developments.

IDEA

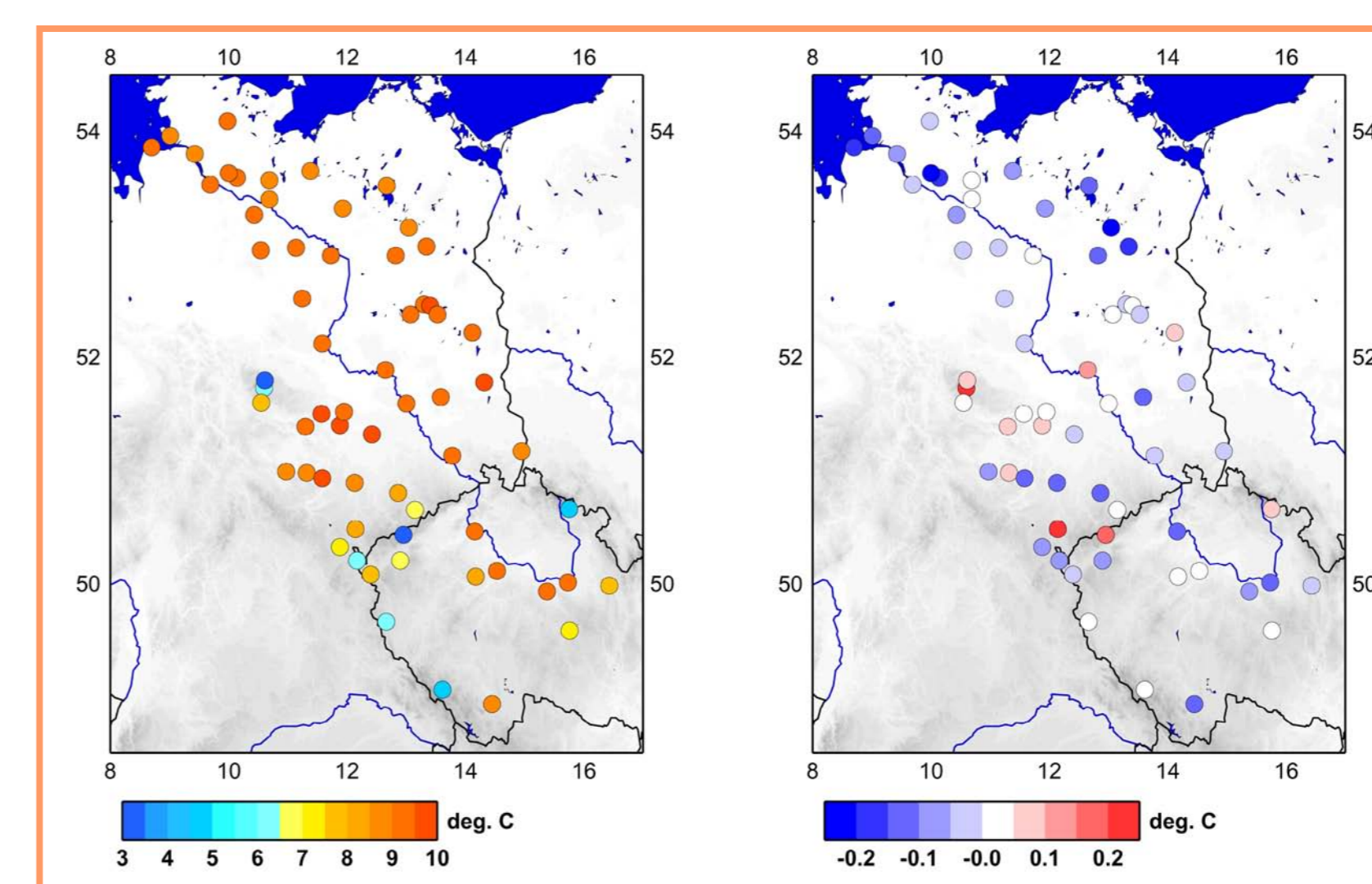
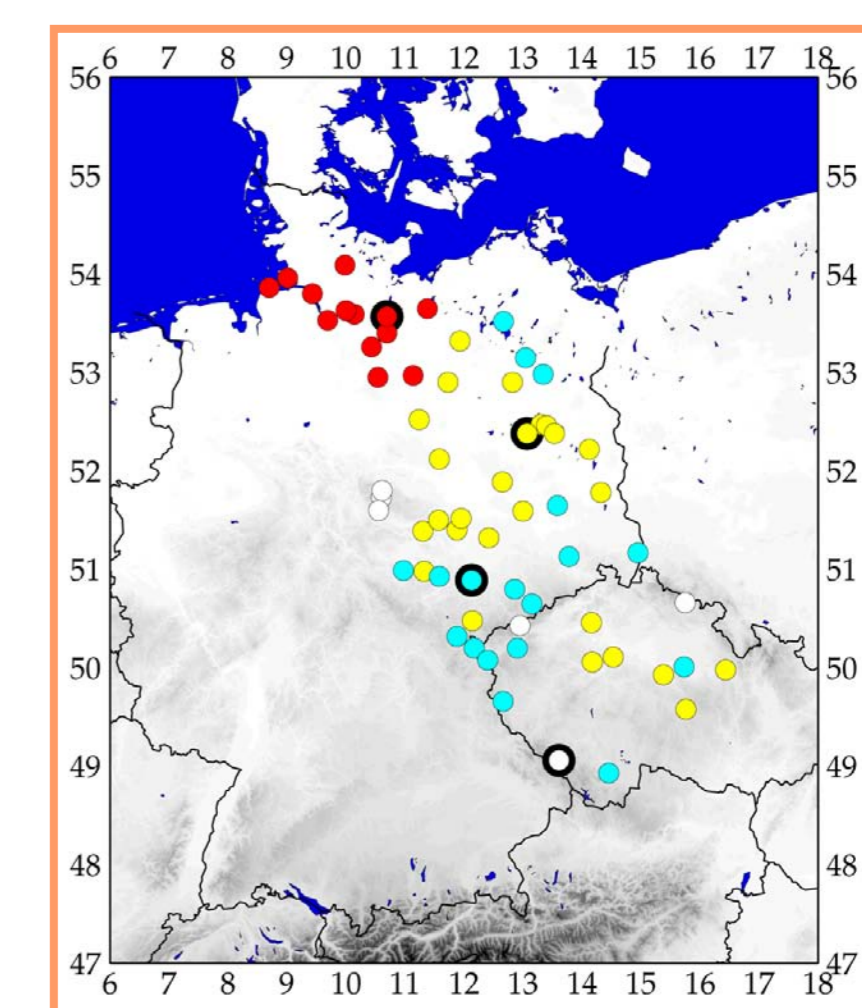
The daily data sets from the past, consisting of the measured variables (temperature, precipitation, pressure, ...) at all stations, are **complete** in the sense that every future day can be sufficiently well approximated by an unaltered daily data set from the past. This transforms the problem into finding a **permutation of unaltered daily data sets** from the past. Thereby, realistic interdependencies between variables are ensured, both between different variables at a single station and spatially. Additionally, in order ...

1. to make sure that **persistence properties** are reproduced realistically in the scenarios, the entire scenario construction uses **6 day blocks** rather than single days.

2. to allow for **spatially differentiated developments**, climatologically similar stations are grouped, where for each group a representative station is chosen. For each of these groups a separate temperature trend is prescribed.

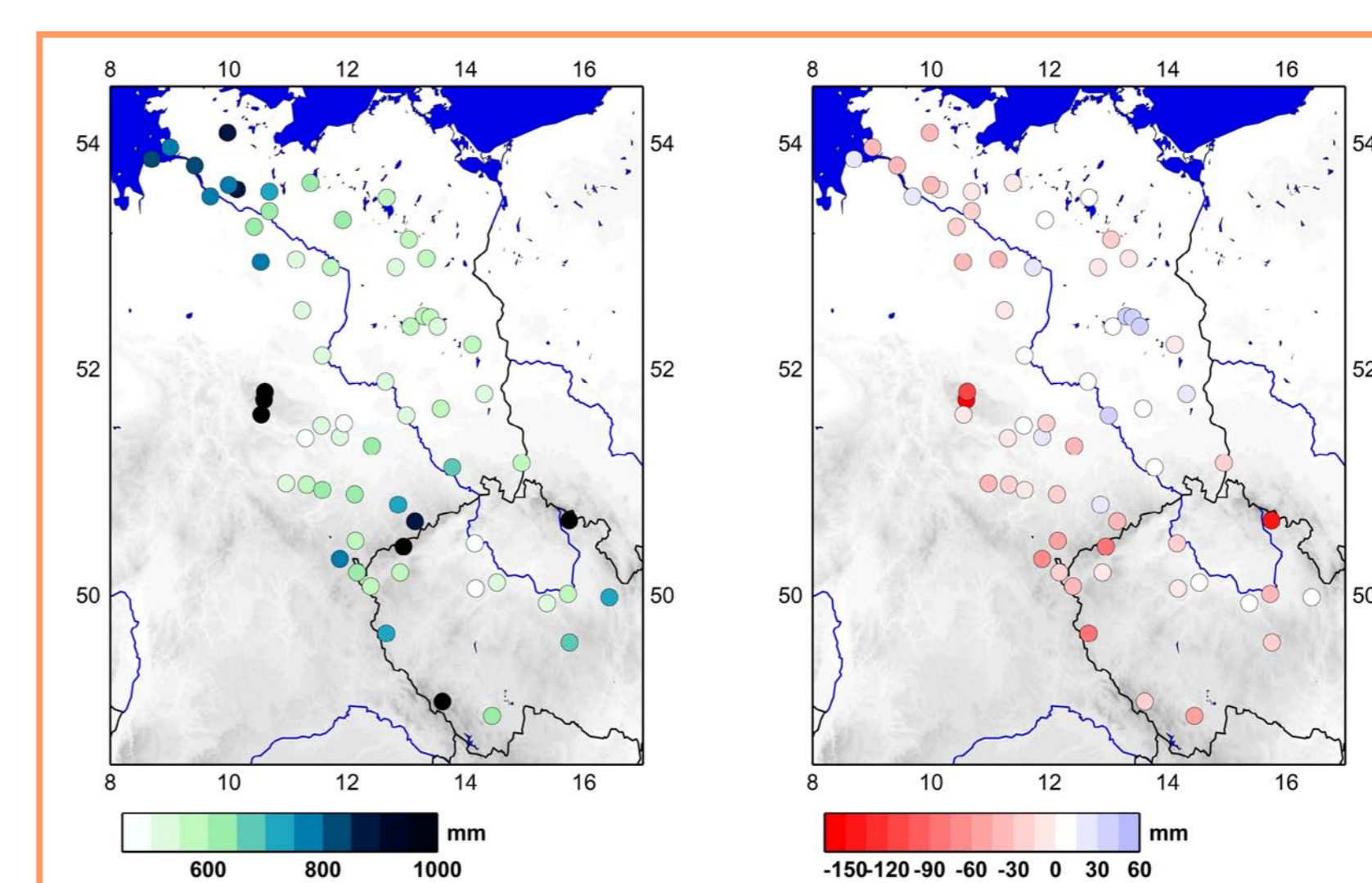
1. **1951-1980** as training data and
2. **1981-2003** to be simulated prescribing the observed temperature trends of this period and using the data from 1951-1980.

The map shows four groups of climatologically similar stations, the representative stations for each group being highlighted by black rings.



Mean air temperature

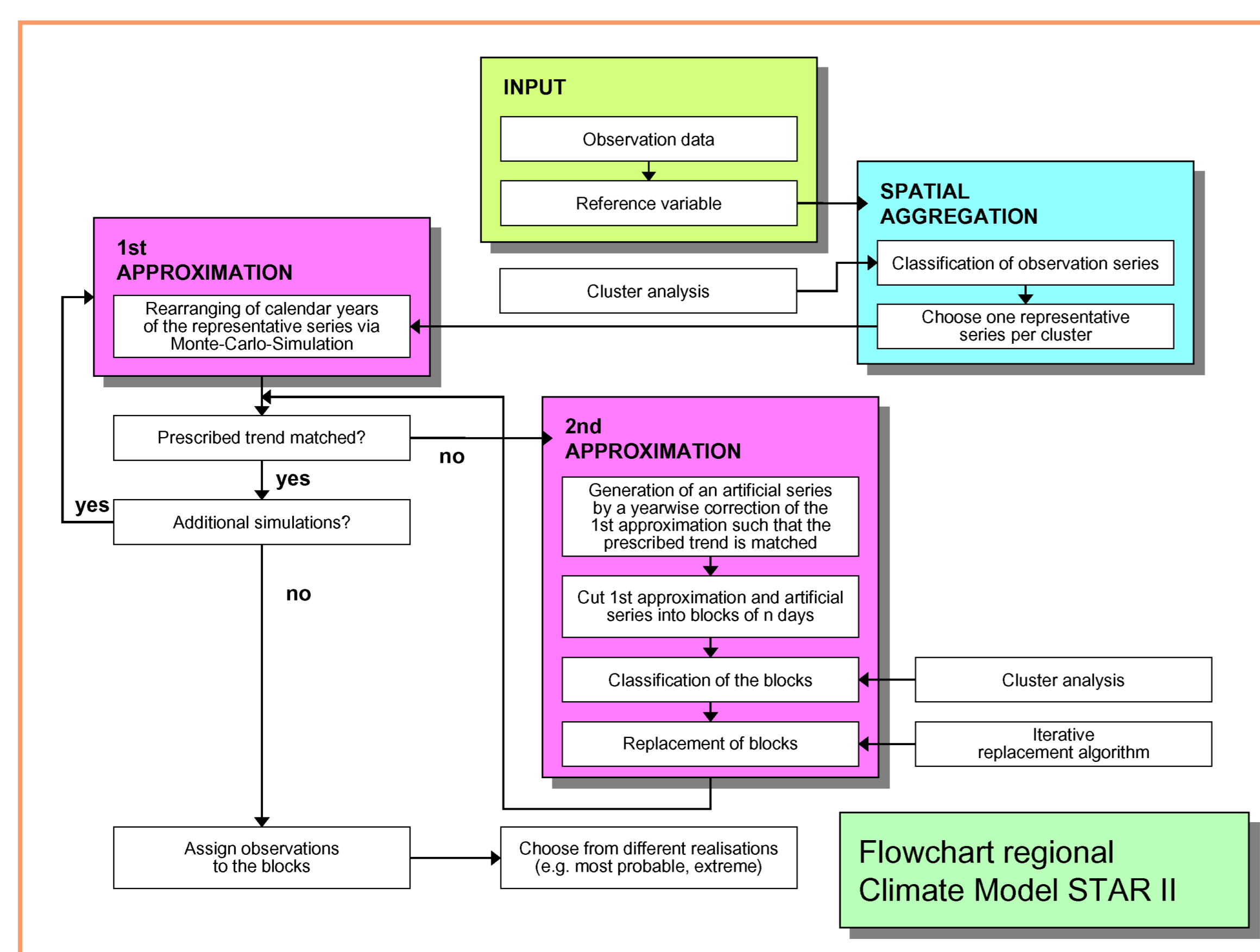
Left: observed mean temperatures for 1981-2003. **Right:** deviation for each station for our scenario. They range in [-0.2..0.2] and don't show any spatial patterns, which means that our scenario reproduces the spatial temperature patterns realistically.



Mean annual precipitation sum

Left: mean observed annual sums for 1981-2003. **Right:** deviations for our scenario. The sums for some stations in the mountains are underestimated by more than 100 mm, but in general deviations are in a much smaller range. All relative deviations are within the 10%-range.

SCENARIO CONSTRUCTION



VALIDATION

Daily data from 63 climate stations from the Elbe river catchment 1951-2003, divided into two subsets: