

# Soil control on land-atmosphere feedback in Europe

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**Abstract** A set of ensemble GCM experiments is analyzed in terms of the degree to which the state of the soil contributes to the variability in atmospheric circulation patterns in Europe. Special emphasis is put on the occurrence of atmospheric blockings in summer. Two ensembles with different degrees of land-atmosphere coupling are compared. The impact on the statistical distribution of a blocking index is modest. A hint for increased blocking persistence emerges. Further analyses address the various ways spatial and temporal patterns of soil moisture may affect the atmospheric circulation.

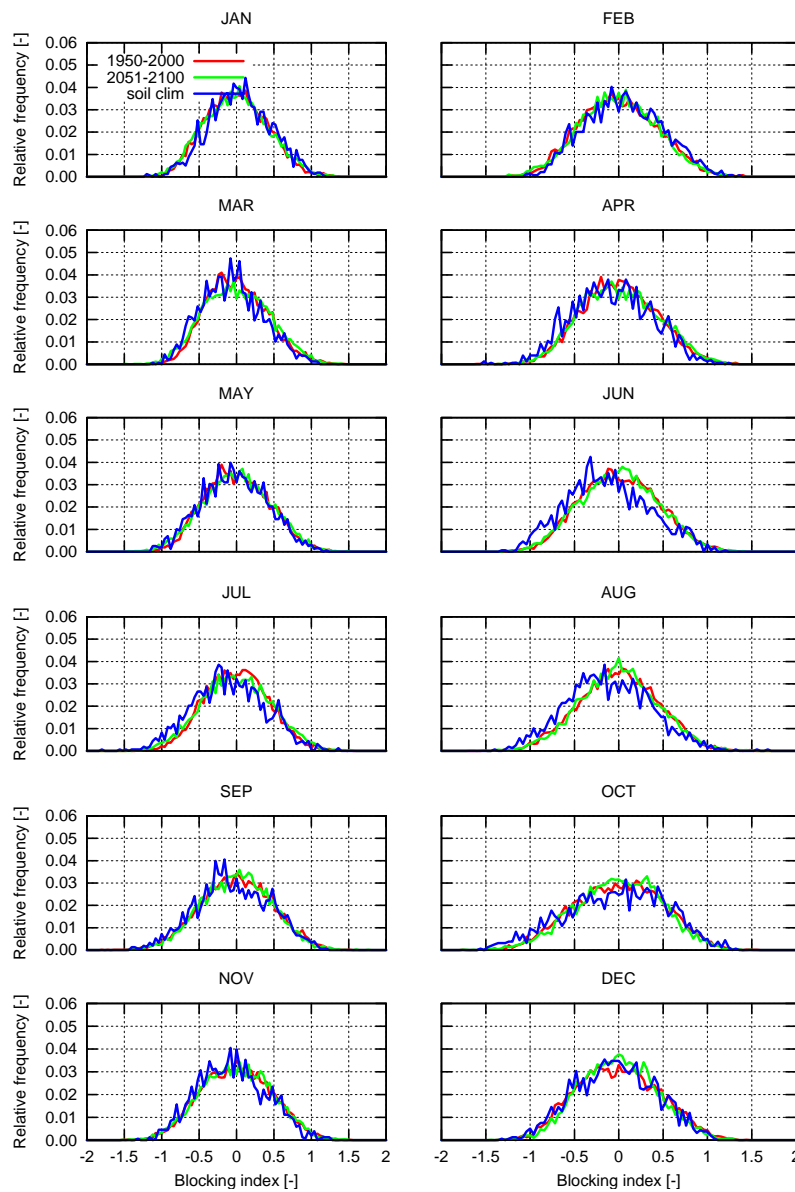


Figure 1: Frequency distribution of blocking index for the ensemble simulations for present day climate, future climate, and present day climate with climatological prescribed soil fields

## Simulations and main results

Three sets of simulations have been executed with the ECHAM5/OM1 GCM. The first set is a 17-member fully coupled simulation covering the period 1950-2100. Soil moisture and snow fields generated from one of these members are used to force a smaller ensemble covering the same period. Finally, a third simulation is carried out in which a climatological soil evolution is prescribed. For each ensemble and for each of the time periods 1950-2000 and 2050-2100 statistical distributions and persistence measures of a blocking index are calculated.

Figure 1 shows the blocking frequency distributions for the present day (1950-2000), future (2050-2100) and present day with climatological soil. It appears that the future frequency distribution is only marginally changing. For the present day climate, the prescribed soil moisture/snow fields hint at a lower occurrence of blockings mainly in June and July.

In Figure 2 the persistence of the blockings is shown. Here, the number of subsequent days with a blocking index  $> 0.5$  is displayed. The persistence seems to increase a bit in the future simulations, and the fixed soil conditions have a clear effect mainly in June.

Further results and discussions will be presented.

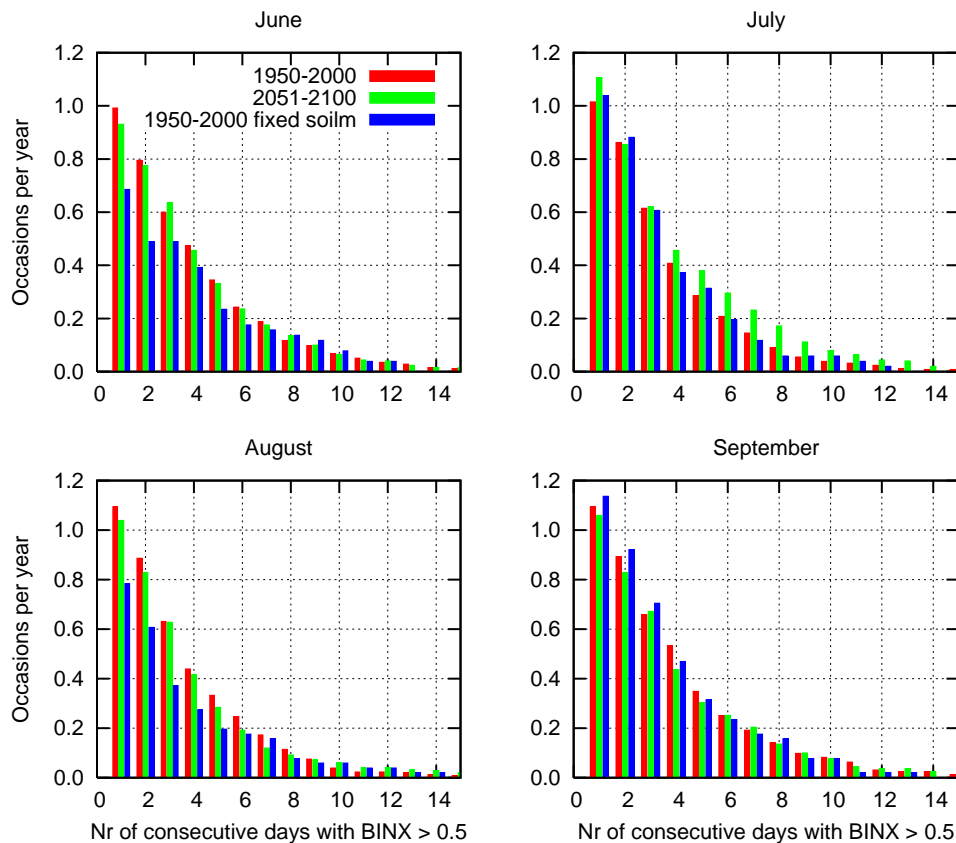


Figure 2: Number of consecutive days with a blocking index  $> 0.5$  for the same simulations as in Figure 1.