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Modelling Changes in Mediterranean Potential Vegetation in the Last 6000 Years Employing a Time-Slice Technique

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Due to the high computational costs long climate simulations, e.g. of the last 6000 years, using comprehensive atmosphere-ocean general circulation models [AOGCMs] are currently carried out either for selected time slices with high spatial resolution or transiently with a low resolution.
This study aims at regionalization of transient AOGCM simulations of the Holocene focussing on the Mediterranean region. Sea surface temperatures and sea ice coverage of a coarsely resolved T30 transient simulation of the Holocene are used as lower boundary conditions for time slice experiments for different higher horizontal resolutions with the atmospheric model ECHAM5 for selected time slices in the Holocene.
In the low resolution simulations the climate in transition zones, e.g. ranging from the summer-dry Mediterranean climate to the desert climate, is poorly reflected. This is not only due to orographic effects but also due to averaging over large areas. In the horizontally higher resolved time-slice experiments the simulated potential vegetation, represented by biomes, generally improves.
Our time-slice experiments indicate that in most parts of the Mediterranean area the potential vegetation is close to thresholds and therefore very sensitive to small temperature or precipitation changes. According to this model study, over the northern part of the region Mid-Holocene minus Pre-industrial biome changes are similar in the spatial structure to the anthropogenically influenced Present-day minus Pre-industrial patterns. Implications for a future climate will be discussed.