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Consensus and disagreement among models on Mediterranean climate changes from the last glacial maximum to future high emission scenarios

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Here we analyze the climate change signal in the Mediterranean region in an ensemble of six models (CCSM4 , CNRM-CM5 , FGOALS-g2 , IPSL-CM5A-LR , MIROC-ESM , MRI-CGCM3), which, as apart of the PMIP3 and CMIP5 experiments, allow to compare quite different climate conditions: the last glacial maximum (LGM), the pre-industrial period (PIC, Control) and a high emission Representative Concentration Pathway (RCP8.5, period 2071-2100). Changes of temperature, evaporation and precipitation are considered. These three variables behave differently, in terms of variations among climate conditions and agreement among models.
There is a strong quantitative consensus among models on a progressive temperature increase from LGM to PIC and from PIC to RCP8.5. The consensus is substantial also on evaporation, which is lower during LGM than during PIC and it further moderately increase from PIC to RCP8.5. Precipitation behaves quite differently, being larger during PIC than during both LGM and RCP8.5. Though the sign of precipitation changes is consistent among models, quantitative differences are large. However, models agree on a) decreased evaporation in the LGM, which overcompensates for the decreased precipitation, therefore LGM is appreciably wetter then PIC, and b) reduced precipitation, which lead to much drier conditions in RCP8.5 and larger water deficit of the Mediterranean basin with respect to PIC.
Changes of the hydrological budget are consequence of different mechanisms leading changes of the mean atmospheric circulation, mean atmospheric moisture content and moisture transport by eddies. Quantitative differences among models on these aspects are not negligible. However, there are consistent indications that both changes of moisture content in the atmosphere and large scale mean circulation have comparable importance for explaining the wet LGM and future dry conditions.