EMS Annual Meeting Abstracts
Vol. 15, EMS2018-211, 2018

Learning about climate change in the Mediterranean region by comparing past and future climates

Piero Lionello (1,2) and Roberta D'Agostino (3)

(1) University of Salento, DiSTeBA, Lecce, Italy , (2) EuroMediterranean Center on Climate Change, Lecce, Italy, (3) Max Plank Institute for Meteorology, Hamburg, Germany

The past and future climate changes in the Mediterranean region are analyzed considering four different climate conditions: the last glacial maximum (LGM), the mid-Holocene (MidH), the preindustrial period (PIC) and the Representative Concentration Pathway 8.5 scenario (RCP8.5). Data were provided by an ensemble of 11 different models, three of them covering all four different climate conditions. Regional climate variables have been analyzed as function of the global temperature anomaly with respect to PIC. The Mediterranean region is shown to moderately amplify future global warming and to shift from wet LGM to dry RCP8.5 conditions. However, evaporation and precipitation do not show consistent changes. Evaporation increases with global temperature (being lower during LGM than during PIC, when it is in turn lower than during RCP8.5), while precipitation during PIC is larger than during both LGM and RCP8.5. As a result, the decreased evaporation in the LGM overcompensates for the decreased precipitation, so that LGM is appreciably wetter then PIC. On the contrary, both increased evaporation and reduced precipitation lead to much drier conditions in RCP8.5 and larger water deficit of the Mediterranean basin ,with respect to PIC. These changes of the hydrological budget are mainly caused by changes of the mean atmospheric circulation dynamics and of the transient atmospheric eddies moisture transport, with thermodynamics playing a minor role. The MidH shows contrasting changes with respect to PIC along the annual cycle: the MidH summer is warmer than PIC, while the rest of the year is mildly colder; the MidH spring is wetter, while the rest of the year is slightly drier than PIC.