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Moisture source changes of precipitation in Europe under SSP1-2.6 and SSP3-7.0 warming

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When global temperature increases, the atmosphere will be able to hold more water, as described by the Clausius-Clapeyron equation. It is thus hypothesised that the global water cycle will intensify under a warming climate. This might lead to more intense and more frequent extreme precipitation events and might also affect the atmospheric circulation. This project investigates how moisture sources of precipitation over the European continent will change under SSP1-2.6 and SSP3-7.0 warming, using the atmospheric general circulation model ECHAM6-wiso. A present day simulation (1990-2020), nudged to ERA5 reanalysis, and a future simulation for each investigated SSP (2070-2099), nudged to respective CMIP6 coupled model output, are conducted. Using numerical water tracers, the model is able to trace precipitation back to its point of evaporation, characterised by latitude and longitude.
Our results suggest that, under warming, the source latitude and longitude of precipitation in Europe will change across all seasons. The magnitude of change depends on the strength of the warming. These changes in source latitude and longitude reflect changes in the mid-latitude wind patterns and atmospheric circulation.