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Causes of future Mediterranean precipitation decline depend on the season

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The Mediterranean is among the global 'hot-spots' of climate change, where severe consequences of climate change are expected. Changes in the atmospheric water cycle are among the leading causes of the vulnerability of the Mediterranean to greenhouse gas-driven warming. Specifically, precipitation is projected to decrease year-round, which is expected to have major impacts on hydrology, biodiversity, agriculture, hydropower, and further economic sectors that rely on sufficient water supply.

We investigate possible causes of the Mediterranean drying in regional climate simulations. To isolate the influence of multiple large-scale drivers on the drying, we sequentially add the respective drivers from global models to regional climate model simulations. We show that the causes of the Mediterranean drying depend on the season. We will present in detail how the summer drying is driven by the land-ocean warming contrast, lapse-rate and other thermodynamic changes, while it only weakly depends on circulation changes. In contrast, changes in the circulation are the primary driver for the projected winter precipitation decline. Since land-ocean contrast, thermodynamic and lapse-rate changes are more robust in climate simulations than circulation changes, the uncertainty associated with the projected drying should be considered smaller in summer than in winter.

Reference: Brogli, R., S. L. Sørland, N. Kröner, and C. Schär, 2019: Causes of future Mediterranean precipitation decline depend on the season. *Environmental Research Letters*, 14, 114017, doi:10.1088/1748-9326/ab4438.