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Regional modeling reveals summer precipitation trend signals over the European Alps consistent with trends observed in recent decades

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We analyze an ensemble of high resolution regional climate model (RCM) projections for the 21st century (RCP8.5 scenario) over the European Alps from the EURO-CORDEX and MED-CORDEX experiments. We find that, while the driving global models project a reduction in future summer precipitation over the region, the RCM ensemble project an increase in precipitation over the highest elevations of the Alpine chain. This positive precipitation change signal is associated with an increase of convective precipitation driven by increased potential instability induced by high elevation surface heating. An analysis of observed summer precipitation trends over the region during the historical period 1975-2004 shows a precipitation trend signal consistent with the late 21st century RCM projections and with the RCM-simulated late 20th century trends. These multiple lines of evidence challenge the picture of a decreasing summer precipitation change signal over the Alps found in most GCM projections and point to the added value of high resolution RCMs in providing future climate information over mountainous regions.