



Wintertime Mediterranean trigger of summer drought and heat in Europe

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Several models predict a larger frequency of extreme weather events as we increase human influence on climate. The risk of extreme heatwaves in Europe like the unprecedented one of summer 2003 is likely to increase in the future. The key mechanisms driving these heatwaves are largely unknown and must be elucidated. Here we show, from an observational study, that temperature and drought anomalies of the 10 hottest European summers of the past 57 years cannot be due only to their anticyclonic atmospheric circulation. Hot summers are preceded by a winter rainfall deficit over Southern Europe leading to a drought spreading throughout Europe in early summer. Our analysis suggests that northward drought propagation results from atmospheric transport of anomalously warm and dry air from Southern Europe. More generally winter and early spring precipitation in Mediterranean regions is shown to be correlated with summer temperatures in Europe, and can even be used as a successful predictor of summer temperatures. These results emphasize the critical role of the water reservoir in the soil of continental Mediterranean areas for the maintenance of European climate, and pinpoint the need of an accurate representation of soil processes in climate models for the prediction of regional climate change.