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Drought beyond the horizon drawing new borders along spatial clusters of agriculturally relevant extreme weather

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Abstract

Climate variability and extreme weather events severely impair crop and livestock production worldwide. Coordinated adaptation efforts among policy makers and farmers are crucial to make the agricultural sector more resilient to these weather shocks. Here, we bridge the current understanding of extreme weather impacts on agriculture with climate science's understanding of the interconnectedness and synchronicity of climate patterns across the globe. More specifically, our global analysis identifies spatial clusters in which agriculturally relevant extreme droughts tend to occur at the same time in arable areas. We find that spatial clusters of extreme drought events do not necessarily coincide with agricultural climate zones. Moreover, a considerable number of clusters span across political borders indicating collaboration potential among countries involved (around 60 % of the total number of the spatial clusters). In terms of transnational cooperation per continent, Africa (84 %), Europe (64 %) and South America (57 %) are the top three continents where the majority of extreme clusters share spans across country borders. We therefore offer a new perspective for coordinated adaptation efforts within regions of similar extreme weather exposure. In a global comparison, we find that in some regions, political unions such as the European Union, Mercosur or the African Union would enable a swift adjustment of political cooperation to better fit actual extreme weather exposure. In other regions however, extreme weather clusters span across political borders that promise little coordination between countries such as between Russia and Ukraine, Israel and Syria, or North Korea and South Korea. Among the coordinated adaptation strategies, we suggested the use of financial mechanisms such as weather index-based insurance.

Keywords: Coordinated adaptation, drought, spatial clusters, weather extremes

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