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Predicting compound dry-hot events over global land areas based on large-scale climate indices

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Compound events/extremes may lead to larger impacts than that from the individual extreme. Recent decades have witnessed a variety of compound dry-hot events that have resulted in tremendous losses to the crop yield, water supply, ecosystems and human health. Understanding and predicting compound dry-hot events is thus of particular importance for mitigating their impacts. Previous studies have shown that persistent large scale circulation anomalies (e.g., El Nin˜o–Southern Oscillation, ENSO) are responsible for certain drought and hot events/extremes (including compound dry-hot events) depending on regions and seasons. However, efforts on the prediction of compound dry-hot events have been rather rare. In this study, we develop a statistical model for the compound dry-hot event prediction over global land areas. The relationship between large scale circulation anomalies and occurrences of compound dry-hot events is explored, which is then employed for the probabilistic prediction of compound dry-hot events over global land areas. This study is expected to be useful for providing early warning information of compound events and reducing their impacts.