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Land-atmosphere coupling metrics from satellite remote sensing as a global drought-monitoring tool

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Drought causes significant economic impact to society that can be reduced through preparations made possible by monitoring and prediction. Most drought monitoring systems utilize a variety of metrics to assess and understand drought. Feedbacks induced through land-atmosphere interactions are an important mechanism of drought intensification and persistence that is often not considered in current drought monitors due to a lack of spatially consistent observations. Recent work has developed a new classification of land-atmosphere interactions that summarizes the net impact of these interactions on drought intensification and recovery through the Coupling Drought Index (CDI). One thing that makes the CDI unique is that it can be calculated based on estimates from satellite remote sensing, which makes it particularly useful for global drought monitoring. Furthermore, the persistent nature of these coupling regimes provides a means of prediction through a Markov Chain Coupling Statistical Model (CSM). Previous work has shown that the CDI based on satellite remote sensing compares well with the U.S. Drought monitor in terms of drought intensification and recovery. On the other hand, the skill of the CSM forecasts over the U.S. is limited and still needs improvement. In this work the extent to which the CDI and CSM can be extended to other areas of the globe are explored. In particular, the ability of the satellite remote sensing based CDI to capture drought intensification and recovery over Africa and Europe are assessed. The benefits and limitations of using a metric of land-atmosphere interactions for global drought monitoring are also discussed.