On the coupling between vegetation and rainfall inter-annual anomalies: possible contributions to seasonal rainfall predictability over land areas

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It's well known that rainfall affects vegetation through its effect on soil moisture content, but the extent to which vegetation could in turn impact precipitation occurrence is poorly understood. Here we focus on the assessment, from observations, of the reciprocal forcing of seasonal-mean vegetation and rainfall interannual anomalies over land areas using the coupled manifold technique. Considering global lands, we estimate at the 1% significance level that 19% (12%) of the vegetation (precipitation) variance is forced by precipitation (vegetation). Our analysis reveals that the dominant component of the vegetation forced rainfall variability is a delayed response to ENSO cycles. Vegetation appears to provide a biophysical memory of ENSO and is supposed to act through delayed feedbacks on rainfall. As ENSO cycles are currently well predicted by dynamical seasonal forecasting systems, this result displays the potential for a reliable soil moisture-vegetation initialization to improve rainfall prediction over lands.