



Drought timing affects growth reduction and recovery of forests

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Intensified drought events have been increasingly observed across many regions, imposing profound impacts on forests. However, it remains unclear whether and how drought timing influences growth reduction and recovery at a large spatial-temporal scale. In this study, we collected a global database of tree stem growth from 1929 forest sites, comprising 83,107 site-years, to investigate whether and how the drought timing influences the growth pattern of forests. We found that forests showed significant lower resistance (R_t) to extreme droughts occurred in dry seasons (DS) than that occurred in wet seasons (WS). In contrast, the recovery (R_c) of forests after DS droughts is significant quicker than that after WS droughts, whereas there was no significant difference between the resilience (R_s) of forests from DS and from WS droughts. The higher growth reduction from DS droughts may be explained by the direct drought-induced physiological disorders of trees in the growing season, yet the influences of WS droughts may come from an indirect way (soil water depletion and/or reduction of soil microorganism), thus smaller in magnitude compared to that from DS droughts. Our results thus highlighted that the drought timing significantly influences the growth pattern of forests both during and after the drought events.