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Revegetation modifies patterns of temporal soil respiration responses to extreme-drying-and-rewetting in a semiarid ecosystem

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Changes in climate and land-use are altering soil respiration patterns and thus affecting C sequestration rates globally. This study aims to understand the effect of revegetation induced land-use change on the response of soil respiration to precipitation pulses during an extreme-drying-and-rewetting period. Soil respiration (SR) in cropland, grassland, shrubland, and orchard were intensively monitored along with environmental variables during an extreme drought period with precipitation pulse on China's Loess Plateau. SR was strongly correlated to soil water content for all land-uses. However, the relationship was highly dependent on land-use types: SR was only strongly suppressed in cropland and orchard when moisture content exceeded 10.8% and 13.7%, respectively, whereas no clear suppression was observed under other land-uses. As a result, the C loss in grassland and shrubland was 49.1-78.9% higher than in cropland following significant precipitation events. In addition, SR was negatively and weakly correlated with soil temperature, indicating the change in the dominant control on SR due to extreme drought. Land-use change alters the response of soil respiration to soil moisture during extreme-drying-and-rewetting periods in this revegetated ecosystem. Its effect on respiration pulses will amplify as extreme climate events increase in the future, which may potentially alter the existing C balance.