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The effects of extreme rainfall events on carbon release from Biological Soil Crusts covered soil in fixed sand dunes in the Tengger Desert, northern China

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How soil cover types and extreme rainfall event influence carbon (C) release in temperate desert ecosystems has largely been unexplored. We assessed the effects of extreme rainfall (quantity and intensity) events on the carbon release from soils covered by different types of biological soil crusts (BSCs) in fixed sand dunes in the Tengger Desert, Shapotou regionof northern China. We removed intact crusts down to 10 cm and measured them in PVC mesocosms. A Li-6400-09 Soil Chamber was used to measure the respiration rates of the BSCs immediately after the rainfall stopped, and continued until the respiration rates of the BSCs returned to the pre-rainfall basal rate. Our results showed that almost immediately after extreme rainfall events the respiration rates of algae crust and mixed crust were significantly inhibited, but moss crust was not significantly affected. The respiration rates of algae crust, mixed crust, and moss crust in extreme rainfall quantity and intensity events were, respectively, 0.12 and 0.41 μmolCO_2/(m2•s), 0.10 and 0.45 μmolCO_2/(m2•s), 0.83 and 1.69 μmolCO_2/(m2•s). Our study indicated that moss crust in the advanced succession stage can well adapt to extreme rainfall events in the short term.
Keywords: carbon release; extreme rainfall events; biological soil crust