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Summer rain pulses impact on soil respiration and photosythesis in desert halophyte communities

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The response of plants and soil to rain pulses determines seasonal variations in the exchange of materials and energy at the ecosystem scale in arid and
semi-arid regions.We assessed how the ecosystem carbon exchange (NEE) of desert halophyte communities of different plant functional-types responds to summer precipitation pulses in Tamarix and Haloxylon communities. Plant water status, photosynthetic gas exchange, soil respiration and net ecosystem carbon exchange were measured to test the hypothesis that high physiological sensitivity may induce a greater changes in NEE resulting from the summer precipitation pulses in Haloxylon community. Results Plant water status and photosynthetic assimilation did not differ before and after summer precipitation pulses in either community. In contrast, soil respiration and NEE responded strongly to summer precipitation events in both communities. At the ecosystem level, precipitation pulses induced a pulse of CO_2 release, rather than absorption. The NEE response to summer precipitation was less in the deep-rooted Tamarix community, compared to the shallow-rooted Haloxylon community, which was even converted into a carbon source after summer precipitation inputs. As a result, the effect of summer precipitation inputs on soil respiration was more important than the plant (carbon assimilation)
response in determining the ecosystem response to episodic precipitation pulses.