Geophysical Research Abstracts
Vol. 19, EGU2017-11841-2, 2017
EGU General Assembly 2017

Raindrop Impact, Disaggregation & CO_2 emissions

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On the Chinese Loess Plateau, heave storms often occur from July to September, which happens to be fallow season. Without protections from crop coverage, soil surface is completely exposed to rainfalls, receives much more enhanced raindrop impact, thus potentially experience advanced disaggregation. After breaking into smaller fragments, and exposing those previously encapsulated soil organic carbon (SOC), soil surface is very likely to release additional CO_2 emissions. However, the possible addition of CO_2 emissions from fallow season on the Chinese Loess Plateau, and its potential contribution to local carbon balances, have not yet been systematically investigated.
In order to compare the effects of raindrop impacts to CO_2 emissions on bare soil during fallow season, two erosion plots (100 cm * 40 cm *35 cm) were set up. Both plots were filled with the loess soil. One plot was covered with two meshes (1 mm * 1mm)overlapping each other, to simulate crop coverage; the other plot was directly exposed to raindrops. Both plots were placed underneath simulated rainfalls (intensity of 90 mm h-1), for 5 min and 10 min. After 24 hours post rainfalls, soil moisture and CO_2 emissions from both plots were measured every day for one week. Soil particle size distributions from surface soil were also determined to compare the changes of soil composition. Our results show that raindrop impacted soil in general released more CO_2 emissions than the covered soil, and this pattern was more pronounced after experiencing longer period of rainfall events (20.6% more after 5 min; 48.3% more after 10 min). This agreed well with the increase of soil particles < 0.01 mm observed on the raindrop impacted soil surface.