

Extreme drought alters the vertical distribution but not the total amount of grassland root biomass

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Abstract

Extreme drought impacts ecosystem function and processes dramatically. However, a comprehensive understanding of how extreme drought affects root biomass at regional scales remains elusive. Here, we investigated the effects across six grasslands with extreme drought treatment replicated across a precipitation gradient in Inner Mongolia, China. We found the root biomass and belowground net primary productivity (BNPP) were significantly positively correlated with precipitation at the regional scale. Extreme drought decreased the slope of this correlation in 0-10 cm and increased in 10-20 cm. Root biomass and BNPP increased by extreme drought in the four relatively arid sites and decreased in the two relatively mesic sites in 0-10 cm, and the reverse pattern showed in 10-20 cm. These shifts were driven by the response of soil moisture. Our findings suggest that including vertical responses of belowground primary productivity to extreme drought should improve models predictions of plant roots to future climate change.

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