Geophysical Research Abstracts
Vol. 21, EGU2019-13170, 2019
EGU General Assembly 2019
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Explaining temperature sensitivity of surface and deep soils using a microbial-mineral model coupled to E3SM

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Soils are the largest terrestrial pool of actively cycling carbon. Therefore, the response of soils to warming can substantially affect the overall terrestrial response to warming and feedbacks to climate change. Temperature sensitivity of surface soils has been widely studied with warming experiments, but fewer data exist to constrain the temperature response of subsurface soils. We applied a vertically-resolved microbe-explicit soil model integrated in the Earth System Model E3SM land model (ELM) to a site-level deep ($\sim$1 m) warming experiment at Blodgett Experimental Forest near Georgetown, CA, USA. We compared modeled CO_2 production in the soil to CO_2 production profiles estimated from measured gas concentrations in order to model the temperature sensitivity of soil organic carbon over the depth profile and identify the dominant biogeochemical reactions (microbial and mineral) contributing to subsoil temperature sensitivity.