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## Contrasting patterns in the temperature dependence of wetland CH<sub>4</sub> and CO<sub>2</sub> emissions across globally geographic climate gradients

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Determining the temperature dependence of wetland CH<sub>4</sub> and CO<sub>2</sub> emissions is critical for predicting the impacts of climate change on greenhouse gas (GHGs) emissions in wetland ecosystems. However, the spatial variation for temperature dependence of wetland CH<sub>4</sub> and CO<sub>2</sub> emissions is poorly understood, especially at the global scale. Here, we investigate the temperature dependencies of wetland CH<sub>4</sub> and CO<sub>2</sub> emissions across large-scale climatic gradients using 56,271 daily paired observations of ecosystem-level CH<sub>4</sub> and CO<sub>2</sub> emissions in 45 widely distributed wetlands from the FLUXNET-CH<sub>4</sub> database. The temperature dependencies of CH<sub>4</sub> and CO<sub>2</sub> emissions show contrasting spatial patterns across globally geographic climate gradients. Specifically, the temperature dependence of CH<sub>4</sub> emissions increased with increasing mean annual temperature (MAT), but the opposite was true for that of CO<sub>2</sub> emissions. The ratio of CH<sub>4</sub> to CO<sub>2</sub> emissions was positively dependent on temperature when only MAT and mean annual precipitation were greater than 4.7 °C and 483 mm, respectively. Our results imply that the relative contribution of CH<sub>4</sub> to total GHG emissions increases with ambient temperature increases in a warmer and wetter climate region and could act as a positive feedback mechanism in the future.