

Methane uptake in global forest and grassland soils over the period 1981-2010

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Methane (CH₄) is one of the most potent greenhouse gases. It is generally recognized that forest and grassland soils consume the atmospheric CH₄, but the quantities and spatiotemporal changes in the CH₄ uptake remain largely uncertain as far as global forest and grassland are concerned. Here, we estimated CH₄ uptake in global forest and grassland soils over the period of 1981-2010 using an empirical model developed in this study. We show that the mean values of CH₄ uptake were 9.16 (±3.83) Tg yr⁻¹ in forest soils, and 3.76 (±1.42) Tg yr⁻¹ in grassland soils, respectively. Tropical forest and grassland soils are the largest CH₄ sink, contributing 58% to the total sink. Methane uptake in cool temperate dry and warm temperate dry soils, and in polar/boreal grassland soils showed a significant increase, while a significant decrease was found in tropical dry grassland soils over the thirty years. Our findings highlight the quantities of CH₄ uptake in global forest and grassland soils, and underline the spatiotemporal changes in CH₄ uptake over the thirty years so as to better understand the impact of climate change on soil CH₄ sink.

Keywords: methane uptake, climate change