
The impacts of ENSO on the methane emissions of tropical wetlands

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Abstract

Methane emission from tropical/subtropical wetlands contributed about 78% global methane emission from nature wetlands. Decreased wetland CH₄ emissions could act as a negative feedback to future climate warming and vice versa. Recent study suggested that powerful warming events in the eastern equatorial region, known as El Niños, are likely to double as greenhouse-gas emissions rise this century. However, the impact of ENSO on wetland emission variability has been paid less attention and remained poorly quantified at both regional and global scales. Here, we used an improved global greenhouse gases dynamic model of TRIPLEX-GHG to investigate the impacts of interannual variations on CH₄ emissions in tropical wetlands during the period 1950 to 2012. Our modeled results suggest that CH₄ emissions from tropical wetlands respond strongly, with larger negative anomalies during El Niño years and larger positive anomalies in La Niña years, to repeated ENSO events throughout 1950s- 2000s, which has probably contributed to the recent decrease in the atmospheric growth rate of CH₄ concentration during 1980s-1990s and stabilized observed atmospheric CH₄ concentrations during 1999-2006.

Keywords: Climate change, process model, wetlands, methane cycle

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