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稻田CH₄和N₂O综合排放对控制灌溉的响应

CH₄ and N₂O emissions response to controlled irrigation of paddy fields

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中文关键词: [灌溉](#), [节水](#), [温室效应](#), [排放](#), [CH₄](#), [N₂O](#), [稻田](#)

英文关键词: [irrigation](#) [water conservation](#) [greenhouse effect](#) [emission](#) [CH₄](#) [N₂O](#) [paddy fields](#)

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中文摘要:

为了揭示水稻控制灌溉对稻田CH₄和N₂O综合排放的影响, 该文采用静态暗箱-气相色谱法对控制灌溉稻田CH₄和N₂O排放进行原位观测, 分析稻田CH₄和N₂O综合排放对控制灌溉水分调控的动态响应。结果表明, 控制灌溉稻田CH₄排放通量多低于常规灌溉稻田, 且主要集中在水稻分蘖前期, 峰值出现在土壤脱水后第1~2 d, 排放总量较常规灌溉稻田减少81.2%~82.8%; N₂O排放通量多高于常规灌溉稻田, 峰值出现在肥后且土壤脱水后3~4 d, 排放总量较常规灌溉稻田增加了121.8%~144.3%。控制灌溉稻田CH₄和N₂O的综合全球增温潜势较常规灌溉稻田显著减少 (p<0.05), 减少幅度为15.0%~34.8%。控制灌溉显著降低了稻田CH₄和N₂O的综合温室效应。

英文摘要:

In order to study the effects of controlled irrigation on variations of CH₄ and N₂O emissions from paddy fields, CH₄ and N₂O emissions from paddy fields under controlled irrigation were investigated by the method of static chamber/gas chromatography. The results showed that CH₄ emissions from controlled irrigation paddy fields were lower than those from traditional irrigation paddy fields during most of the rice growing season. The high CH₄ emissions from controlled irrigation paddy fields were mainly observed during the former tillering period of rice, and the peaks were observed 1-2 days after soil dehydration. Compared with the traditional irrigation paddy fields, cumulative emission of CH₄ from controlled irrigation paddy fields reduced by 81.2%-82.8%. The N₂O emissions from controlled irrigation paddy fields were mostly higher than those from traditional irrigation paddy fields, and the peaks were observed 3-4 days after soil dehydration. Compared with the traditional irrigation paddy fields, cumulative emission of N₂O from controlled irrigation fields increased by 121.8%-144.3%. However, the integrative global warming potential of CH₄ and N₂O on a 100-year horizon was significantly decreased by 15.0%-34.8% in the controlled irrigation paddy fields (p<0.05). These results suggest that controlled irrigation can significantly mitigate the integrative greenhouse effect caused by CH₄ and N₂O from paddy fields.

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