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Methane plume over south Asia during the monsoon season: satellite observation and model simulation

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Abstract. Satellite retrievals of methane (CH_4) using the Atmospheric Infrared Sounder (AIRS) on the EOS/Aqua platform from 2003–2007 show a strong, plume-like enhancement of CH_4 in the middle to upper troposphere over South Asia during July, August and September, with the maximum occurring in early September. Simulations using the global tracer model version 3 (TM3) also show similar seasonal enhancement of CH_4 in the same region. The model results also suggest that this enhancement is associated with transport processes and local surface emissions, thus the observations of tropospheric CH_4 during the monsoon season may be used to constrain the models for a better estimation of Asian CH_4 sources. Further comparisons between the AIRS retrievals and the model simulations suggest a possible overestimate of emissions from rice paddies in Southeast Asia in the scenario with the global emissions from rice of 60 Tg yr^{-1}. Moreover, the observed tropospheric CH_4 enhancement from AIRS provides evidence for the strong transport of atmospheric pollutants from the lower to the upper troposphere in Asia during the monsoon season. The observed rapid disappearance of the local CH_4 maximum in September may provide valuable information for studying the dissipation of the Tibetan anticyclone and the withdrawal of monsoon.

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