

Measuring Greenhouse Gas Exchange from Paddy Field Using Eddy Covariance Method in Mekong Delta, Vietnam

Authors : Vu H. N. Khue, Marian Pavelka, Georg Jocher, Jiří Dušek, Le T. Son, Bui T. An, Ho Q. Bang, Pham Q. Huong

Abstract : Agriculture is an important economic sector of Vietnam, the most popular of which is wet rice cultivation. These activities are also known as the main contributor to the national greenhouse gas. In order to understand more about greenhouse gas exchange in these activities and to investigate the factors influencing carbon cycling and sequestration in these types of ecosystems, since 2019, the first eddy covariance station has been installed in a paddy field in Long An province, Mekong Delta. The station was equipped with state-of-the-art equipment for CO₂ and CH₄ gas exchange and micrometeorology measurements. In this study, data from the station was processed following the ICOS recommendations (Integrated Carbon Observation System) standards for CO₂, while CH₄ was manually processed and gap-filled using a random forest model from methane-gapfill-ml, a machine learning package, as there is no standard method for CH₄ flux gap-filling yet. Finally, the carbon equivalent (C_e) balance based on CO₂ and CH₄ fluxes was estimated. The results show that in 2020, even though a new water management practice - alternate wetting and drying - was applied to reduce methane emissions, the paddy field released 928 g C_e.m⁻².yr⁻¹, and in 2021, it was reduced to 707 g C_e.m⁻².yr⁻¹. On a provincial level, rice cultivation activities in Long An, with a total area of 498,293 ha, released 4.6 million tons of C_e in 2020 and 3.5 million tons of C_e in 2021.

Keywords : eddy covariance, greenhouse gas, methane, rice cultivation, Mekong Delta

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