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The annual net ecosystem exchange in a subtropical broadleaf plantation in southern Taiwan.

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Carbon flux of regenerating vegetation is considered as a major factor in determining the sequestration strength and associated uncertainty of terrestrial ecosystems and its role in slowing down the increase of atmospheric CO₂ concentration. In the purpose to quantify the long-term net exchanges of carbon, water, and energy between the broadleaf plantation and the atmosphere, this study picked an existed reforested sugar cane farm which was reforested by multiple broadleaf species from 2002 to 2005 in Pingdong, southern Taiwan as a field site and installed an open-path eddy-covariance tower since 2008. The tower-based annual net ecosystem exchange (NEE) were -1.0, 1.3, 0.5, and -1.0 Mg C ha⁻¹yr⁻¹ for 2009-2012, respectively. However, these results were conflicted with biometric investigation. A further study using Hsieh's footprint model (Hsieh et al., 2000) combined with geographic information system (GIS) showed most of the flux sources were within the range of 250 m and monsoon and periodic winds existed clearly. The tower-based NEE could be mis-explained because the daytime and nighttime flux sources actually came from different plantations/species. The tower-based Re (ecosystem respiration) was over-estimated about 0.56 umol m⁻²s⁻¹. The annual mean NEE in plot no.10 and no.11 was -3.12, -0.87, -1.58, -3.09 Mg C ha⁻¹yr⁻¹ for 2009 to 2012, respectively after a simple revision.

キーワード: carbon dioxide flux, eddy covariance, net ecosystem exchange (NEE), plantations of multiple broadleaf species, footprint

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