



Differential responses of mangrove forests to environmental factors determine the characteristics of ecosystem carbon fluxes in subtropical China

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Abstract:

Net ecosystem exchange of CO₂ (NEE) was monitored over one year period in 2015-2016 for two different mangrove ecosystems of subtropical China using eddy covariance technique to measure the carbon fluxes, - one composed of *Bruguiera gymnorrhiza*, *Aegiceras corniculatum* and *Kandelia obovate* in Gaoqiao (GQ), and the other one composed mainly of *Sonneratia apetala* in Leizhou (LZ). The difference of gross primary production (GPP) between GQ (2186.42±132.94 g C m⁻² y⁻¹) and LZ (2111.65±142.83 g C m⁻² y⁻¹) was not statistically significant, but the ecosystem respiration (Re) at GQ (1286.67±29.56 g C m⁻² y⁻¹) was significantly higher than LZ (957.43±20.82 g C m⁻² y⁻¹) and NEE for GQ (-923.37.13±82.64 g C m⁻² y⁻¹) was significantly higher than that for LZ (-1155.73±150.92 g C m⁻² y⁻¹). Given that the climates were similar between the two sites, we hypothesized that the differences of carbon fluxes were likely caused by the differential responses of plants to the climate. Seasonal changes in the light use efficiency (LUE) were similar between GQ and LZ site, but LUE values were significantly higher in GQ than that of LZ site during the wet season. Moreover, the values of Q10 suggested the respiration at GQ site was more sensitive to temperature than LZ site. Salinity variations due to tidal regime significantly influenced LUE of these subtropical mangroves. Our results suggest that differential responses of mangrove forests to environmental factors determined the characteristics of ecosystem CO₂ exchange of subtropical mangrove ecosystems.

Keywords: CO₂ fluxes; Coastal wetlands; Tidal regulation; Primary productivity, China