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Insights into CO₂ simulations from the Irish Blackwater peatland using ECOSSE model

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Abstract

Non-degraded peatlands are known to be important carbon sink; however, if they are exposed to anthropogenic changes they can act as carbon source. This study forms a part of the larger AUGER project (<http://www.ucd.ie/auger>). It uses the ECOSSE process-based model to predict CO₂ emissions [heterotrophic respiration (Rh)] associated with different peatland management (Smith et al., 2010). The work aims to provide preliminary insights into CO₂ modelling procedures for drained and rewetted sites from Blackwater, the former Irish raised bog. After drainage in 1950's (due to peat-extraction) and cessation of draining in 1999, the landscape developed drained 'Bare Peat' (BP), and rewetted 'Reeds' (R) and 'Sedges' (S) sites (Renou-Wilson et al., 2019). Modelling of CO₂ from these sites was done using ECOSSE-v.6.2b model ('site-specific' mode) with water-table (WT) module (Smith et al., 2010), and default peatland vegetation parameters. The other model-input parameters (including soil respiration, WT and other soil parameters) were obtained from measurements reported in Renou-Wilson et al. (2019). Simulations on drained BP site were run starting from 1950 and on rewetted R and S sites starting from 1999 (which is the year of cessation of drainage). The climate data inputs (2010-2017) were obtained from ICHEC (EPA_Climate-WRF, 2019). The long-term average climate data for model spin-up were obtained from Met Éireann (2012) with potential evapotranspiration estimated by Thornthwaite (1948) method. Daily ecosystem respiration (Reco) data for May/June 2011 to Aug 2011 obtained from raw CO₂ flux measurements (Renou-Wilson et al., 2019) were used. For vegetated sites Rh was estimated from Reco using method explained in Abdalla et al. (2014). Daily CO₂ simulations were compared to Reco for BP site ($r^2 = 0.20$) and to Rh for R site ($r^2 = 0.35$) and S site ($r^2 = 0.55$). The preliminary results showed some underestimation of simulated CO₂ indicating the need for further modelling refinements for satisfactory results. The results from BP site further indicated on the importance of including long-term drainage period (i.e. from 1950 on) because avoiding this step resulted in a large overestimation of predicted CO₂.

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Literature

Abdalla, M., et al. 2014. Simulation of CO₂ and attribution analysis at six European peatland sites using the ECOSSE Model. *Water Air Soil Pollut* 225:2182.

EPA_Climate-WRF (2019). ERDDAPv.1.82. ICHEC.
https://erddap.ichec.ie/erddap/files/EPA_Climate/WRF/

Met Éireann. 2012. 30 year averages. Met Éireann - The Irish Meteorological Service, Ireland.

Renou-Wilson, F., et. al. 2019. Rewetting degraded peatlands for climate and biodiversity benefits: Results from two raised bogs. *Ecol. Eng.* 127:547-560.

Smith, J., et al. 2010. ECOSSE. User Manual.

Thorntwaite, C.W. 1948. An approach toward a rational classification of climate. *Geog. Review* 38, 55-94.