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Application of the JULES-ECOSSE model to simulate the change in soil organic carbon in Great Britain

Hon Man Wong
University of Aberdeen, UK

Soils contain about 1500 Pg of organic carbon worldwide, which is the largest terrestrial carbon pool. Whether soil carbon acts as a sink or a source is important to budgeting greenhouse gases and predicting climate change. Two national-scale soil surveys have been conducted in Great Britain since 1970s, providing invaluable science evidence to the status of soil carbon. However, the two surveys disagreed with each other. One was suggesting massive loss at 0.6% year-1 and the other one was suggesting no significant change generally. To provide independent evidence, process-oriented numerical models have been applied to simulate soil carbon change but the models which have been applied are simple and the simulations were on mineral soils only. To account the complex dynamics of coupled land-vegetation-soil ecosystems and the more complex mechanisms of organic soils, recent advancement has established the coupled JULES-ECOSSE model (JULES-ECOSSE) to simulate soil carbon change in both mineral and organic soils. JULES is a process-based model that simulates the fluxes of carbon, water and energy between the land surface and the atmosphere, and vegetation growth and dynamics. It is used in the UK Hadley Centre General Circulation Model to predict climate change. ECOSSE advances on the classic RothC model to simulate the more complex dynamics in organic soils. This presentation will achieve the following three tasks: (1) review the key science findings in literature about soil carbon change in GB (2) discuss why we need a new coupled model and simulation study, and (3) present the simulated change in the past and the future subject to key environmental factors, including but not limited to climate change.

Biography

Hon Man Wong is a modelling Scientist of terrestrial biogeochemical cycles and is at his final year of PhD. His track record includes one award of Outstanding Academic Papers by Students, two full scholarships for his master's and PhD studies and two published papers in ISI journals. Before his Postgraduate studies, he was a Manager in a leading international consultancy firm for corporate social and environmental responsibility.

honman.wong.09@aberdeen.ac.uk