ECOLOGY & BIODIVERSITY

SEMINAR SERIES

Date: Weds, Nov 20th
Time: 16:00 (UTC+8)
Venue: 3N01 + Zoom

Squaring the circle of land fragmentation and ‘infection’ processes

Simon Bowring

Simon Bowring is a junior scientist in the global terrestrial biogeochemical theory & modelling group led by Philippe Ciais at the Laboratoire des Sciences du Climat et de l’Environnement, the French national Climate and Environmental science laboratory, where he works on modelling of the global land surface with respect to unforeseen shocks to the carbon cycle, whose quantification has to date proven elusive. He works mainly with the land surface model ORCHIDEE, which is part of the fully coupled earth system model IPSL used in CMIP6/IPCC exercises. He leads the fire science component of the CALIPSO (Schmidt Sciences), and the scientific analysis work package of the X-FIRES (European Space Agency), projects, and is a contributor to the FirEURisk (EU H2020) and RECCAP2 (ESA) projects. Simon received his PhD in ocean, atmosphere, terrestrial biogeochemistry and spatial observations from University Paris-Saclay in 2019, working mainly on global modelling of permafrost carbon leakage into inland aquatic systems and atmospheric/oceanic flux through soil leaching and alkalinity (weathering) reactions. His first postdoc was at Zurich University on biochar/black carbon formation and its role in the global fire carbon cycle. His current focus is on theory and prediction of human-wildfire impacts on the earth system. He holds prior degrees in environmental economics (MSc) and Economics & Philosophy (BA).

Land use change – the conversion of ‘natural’ vegetation to human uses – is of the clearest manifestations of humankind’s impact on the natural world. This change of land use results in a gradual physical ‘break-up’ of the landscape, referred to as landscape ‘fragmentation’, which has been strongly correlated with changes in fire activity, the spread of infectious disease, the loss of biological, cultural and linguistic diversity, amongst others. To date, the impact of fragmentation on global fire activity has been poorly understood and is attributed, using statistics alone, to both increases and decreases in fire. This is possible because fire is an emergent result of complex land surface and human agency interactions. This presentation will outline how theoretical inference of fire-land fragmentation interactions is possible by leveraging the emergent dynamics of fire-enabled coarse resolution global land surface models. Using a parsimonious and universal yet process-based approach, we reproduce statistically-observed increases and decreases in fire activity as a function of fragmentation. These depend on biome, location, population and fragmentation density, and its interaction with vegetation, soil, wind and fragment size. The reduction of two processes of high cause-effect complexity (land fragmentation, fire) to something theoretically and empirically consistent, and analytically manageable, at very large scales, provides the method a certain degree of predictive power. The theoretical and conceptual analogies between fire and the spread of infectious diseases (ignition/infection, spread rate, plant/vector types, concentration) due to fragmentation suggest a potential opportunity to expand this work into this domain, which will be explored.

ALL ARE WELCOME!

SCHOOL OF BIOLOGICAL SCIENCES
THE UNIVERSITY OF HONG KONG
香港大學生物科學學院

SHKU Science