EGU22-6466, updated on 05 Oct 2022
https://doi.org/10.5194/egusphere-egu22-6466
EGU General Assembly 2022

Global attribution of microclimate dynamics to industrial deforestation sites using thermal remote sensing and machine learning

Nataliya Tkachenko[1] and Laura Garcia Velez[2]
[1]Smith School of Enterprise and the Environment, School of Geography and the Environment, Oxford University Centre for the Environment, University of Oxford, South Parks Road, Oxford, OX1 3QY, United Kingdom
[2]Lombard Odier (Europe) S.A. UK, Queensberry House, 3 Old Burlington Street, London, W1S 3AB, United Kingdom

Microclimate is a relatively recent concept in atmospheric sciences, which started drawing attention of engineers and climatologists after proliferation of the open thermal (infrared, middle- and near-infrared) remote sensing instruments and high-resolution emissivity datasets. Rarely mentioned in the context of global climate change reversing, efficient management of microclimates nevertheless can be considered as a possible solution. Their function is bi-directional; On one hand, they can perform as 'buffers' by smoothing out effects of the already altered global climate on people and ecosystems, whilst also acting as the structural contributors to perturbations in the higher layers of the atmosphere.

In the most abstract terms, microclimates tend to manifest themselves via land surface temperature conditions, which in turn are highly sensitive to the underlying land cover and use decisions. Forests are considered as the most efficient terrestrial carbon sinks and climate regulators, and various forms, configurations and continuity of logging can substantially alter the patterns of local temperature fluxes, precipitation and ecosystems. In this study we propose a novel heteroskedastic machine learning method, which can attribute localised forest loss patches due to industrial mining activity and estimate the resulting change in dynamics of the surrounding microclimate(s).