Geophysical Research Abstracts
Vol. 18, EGU2016-7043, 2016
EGU General Assembly 2016

Coevolution of soil and vegetation in the South Eastern Australian uplands with variable climate and fire regimes

Assaf Inbar, Nyman Petter, Lane Patrick, and Sheridan Gary

School of Ecosystems and Forest Sciences, Faculty of Science, The University of Melbourne, Australia (ainbar@student.unimelb.edu.au)

The south east Australian forested uplands are characterized by complex and inter-correlated spatial patterns in forest types, soil depths and fire regimes, even within areas with similar sedimentary geology and catenary position. The ecohydrology of these system-state combinations varies markedly, and is difficult to predict. Here we present preliminary results from a soil and vegetation co-evolutionary framework that represents the key feedbacks that have resulted in the current quasi-equilibrium system states of standing biomass, soil depth and fire frequency. The model is based on a modification of an existing mechanistic model, and includes an ecohydrological engine that drives a vegetation dynamics and a geomorphic submodels. Five sites with similar parent material and slope along a rainfall gradient and opposing aspects were chosen to test the model outputs: soil depth and above-ground biomass. In three of the sites, microclimate conditions were extensively monitored in a clear ridge-top (Open), and North and South facing aspects. The data was used to calibrate and test the ecohydrology modelling according to landscape position. Geomorphic processes that control soil depth were modeled using existing transport functions which varied with climate and forest type, and fire regime was set to be a function of biomass state and water deficit. In the next step, the model will have the potential to be incorporated into a 2D landscape evolution model in order to route sediment and water in a dynamic landscape. Using this model allows us to explore how, and in what rate, did each of the different systems evolve into their current state, and what is the unique and combined part of climate and fire regimes in the coevolution process, and predict the response of the current systems to change in a changing climate.