Geophysical Research Abstracts
Vol. 20, EGU2018-12438, 2018
EGU General Assembly 2018


# Quantifying carbon allocation to fine roots and ecosystem drought resilience: a model-data fusion approach

Thomas Smallman (1,2), David Milodowski (1), Jean-François Exbrayat (1,2), Mathew Williams (1,2)

(1) University of Edinburgh, School of GeoSciences, Edinburgh, United Kingdom (t.l.smallman@ed.ac.uk), (2) National Centre for Earth Observation, University of Edinburgh, School of GeoSciences, Edinburgh, United Kingdom

The state and dynamics of the terrestrial carbon cycle remain highly uncertain. In particular global patterns of carbon allocation strategies and their evolution over time remain poorly defined in response to environmental drivers. Global trait databases and satellite based remotely sensing increasingly provide estimates (with uncertainty) for tissue nitrogen content, leaf area and above ground biomass etc. While model process representation has improved based on detailed site level analyses. However, many components remain challenging to observe particularly across large spatial domains such as dead organic matter and below ground allocation of plant carbon to roots. A poor understanding of the size of root stocks but also their vertical structure (e.g. rooting depth) introduces substantial uncertainty in water availability to ecosystems and thus their susceptibility to drought. Using a model data-fusion approach we combine a simple yet realistic model of the terrestrial ecosystem carbon and water cycles with information from satellites and databased information. Our analysis framework requires simulation of observable ecosystem states which are consistent with prior ranges for ecosystem traits, meteorological inputs and evaporative demand. These constraints collectively necessitates development and maintenance of root stocks and structure needed to provide the required water. Our framework is able to infer rooting depths, providing valuable information needed for future simulation in Earth System Models.