



Global distribution of ecosystem model parameters of water and carbon exchange

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To understand the global variation in carbon and water balances and to predict the ecosystem responses to climate changes it is important to identify the processes driving the differences and make progress beyond the simple regressions and empirical relationships that have been found. This study presents a method using the FLUXNET data and a simple ecosystem model to obtain five model parameters for 240 sites. Two parameters (reference respiration and activation energy) are related to ecosystem respiration and three parameters (carboxylation capacity, water use efficiency and light use efficiency) to photosynthesis and transpiration. The model is constrained by both the observed carbon and water fluxes. The main question is how the parameters are varying in time and space and how this is related to environmental variation.

The distribution of the parameters is normal for all sites together in the temperate region. The model is able to simulate the observed fluxes for the majority of the sites with a correlation coefficient above 0.7. The sites in the tropics and a number of sites in the boreal region fall outside this normal distribution, indicating differences in the processes of ecosystem water and carbon exchange. For these sites the model also fails to simulate the observed fluxes. The model parameters are compared within and between vegetation types and climate regions. The group of sites which is distinctively different is located in a dry or Mediterranean climate. These sites have the lowest values for all five model parameters. Within the other climate regions, there is more differentiation of parameter values.