Biogeosciences Discuss., 11, C3468–C3470, 2014
www.biogeosciences-discuss.net/11/C3468/2014/


Biogeosciences Discussions
Open Access



# *Interactive comment on* "Impact of droughts on the C-cycle in European vegetation: a probabilistic risk analysis using six vegetation models" *by* M. Van Oijen et al.

**Anonymous Referee #2**

Received and published: 14 July 2014

The manuscript reports on applying the probabilistic risk analysis to evaluate the "risk" of ecosystem to survive possibly increased droughts in climate change scenarios. This is a very important question in understanding ecosystem fortunate in global climate change. The approach of the study is quite interesting. It is appreciable to apply different approaches in ecosystem studies. However, the method needs more thought when applied in studies related to vegetation photosynthesis and respiration. Although super computing powers are involved in the analysis and the manuscript is readable overall, the study needs to be done more carefully, rather than ambitiously, because the results are suspicious for several reasons.

(1) Have the six vegetation models considered adaptation and acclimation of vegeta-



Full Screen / Esc
Printer-friendly Version
Interactive Discussion
Discussion Paper

tion when they are run for the period of 2071-2100? Maybe I missed, but I bet not. If so, it means that the rest of the analysis is assuming that ecosystem today remains no change within the 100 years. The assumption leads the model outputs are suspicious because at least it is known that acclimation occurs all the time in ecosystem processes. For example, species composition in grasslands changes from year to year, especially differences in dry and wet years. Due to changes in species, temperature and water dependence are changeable. Because vegetation or ecosystem has the property of adaptation and acclimation to environment variability, the vulnerability of ecosystem may be less than that expected.

(2) Each vegetation model requires different parameters (plants, soils, phenology, etc.). How did these parameters specify for the period of 2071-2010? Which parameters are remained as the same as those set up for current situations?

(3) Authors emphasized that the results of six vegetation models have been checked by positive correlations to the spatial patterns of NDVI. Why not to compare the simulated NEP directly with the measurements of eddy-covariance towers within the same pixel? Flux data are rich in Europe.

(4) The drought index, SPEI, is a function of the difference between precipitation and potential evapotranspiration. The problem is that potential evapotranspiration is not calculated based on “real” species donminated in each pixel. It is possible that the reality is not a drought at all when SPEI indicates a drought situation, if water-saving species succeed in extreme dry years.

(5) The result of 0.25 gC m-2 d-1 in risk is too tiny to mean anything because uncertainties in model simulation, which are not investigated in this study, may be much larger than this result.

(6) P(H) values need to be reported in Tables.

(7) Results of this study does not agree with general foundations of biology. In southern



BGD
11, C3468–C3470, 2014





Europe, tree or grass species have adapted to year-to-year seasonal drought successfully. From Darwin's evolution point of view, these species should have better chance to survive in dry conditions; they probably have more risks surviving in extreme wet years. In climate change, we expect not only higher probability of extreme drought events, but also higher probability of extreme wet events.

---

Interactive comment on Biogeosciences Discuss., 11, 8325, 2014.