Geophysical Research Abstracts
Vol. 13, EGU2011-13290, 2011
EGU General Assembly 2011

Changes in fire risk in boreal biomes from earlier foliage acticvity

Jörg Kaduk (1) and Sietse Los (2)

(1) University of Leicester, Department of Geography, Leicester, United Kingdom (jk61@le.ac.uk), (2) Swansea University, School of the Snvironment & Society, Swansea, United Kingdom (s.o.los@swan.ac.uk)

Recent remote sensing data and ground observations have shown earlier leaf out in spring in the northern hemisphere, which is believed to result from climate warming. The advance of leaf out to earlier times could be limited, however, as controlled experiments show that temperate and boreal trees require chilling in winter for rapid leaf out in spring. If the amount of chilling falls below a species specific threshold then an exponentially increasing amount of warming is required to initiate leaf out – potentially actually delaying it in a future warmer climate. Implications of these chilling requirements for a delayed greening of vegetation at the biome level are not clear. We investigate if evidence for chilling requirements can be found at the biome level by fitting a range of phenology models to green-up dates determined from 12 years of the FASIR normalized difference vegetation index. We obtained reliable estimates for the model parameters as well as for their prediction error. The models predict that in northern middle and high latitudes future advance of green-up to earlier times in the year will on average be limited to four to five days (but up to 15 days regionally) as estimated using temperature data from two contrasting climate change simulations. This results from the exponentially increasing warming requirements for leaf out when winter chilling falls below a threshold as shown by a comparison with the predictions of models that consider only spring warming which suggest an advance of more than six days average. The observed relationship between chilling and warming at the time of green-up indicates an element of regional adaptation of the warming required for leaf out in biomes covering large areas. The phenology models have been implemented into the land surface model JULES. In JULES The advance in green up results in a longer summer dry period in areas where soil moisture is mainly fed by spring rain and snow melt. Also determining the Canadian Fire weather Index within JULES indicates that the longer dry summers lead to an increase in the forest fire risk in considerable areas.