Biogeosciences Discuss., 9, C171–C173, 2012
www.biogeosciences-discuss.net/9/C171/2012/

Biogeosciences Discussions

Interactive comment on "Factors promoting larch dominance in Eastern Siberia: fire versus growth performance and implications for carbon dynamics" *by* E.-D. Schulze et al.

A. Spessa

allan.spessa@mpic.de

Received and published: 27 February 2012

The paper examines the relative role of precipitation and fire in determining the distribution of dark and light taiga species in east Siberia. This is the first study I'm aware of that has examined both factors simultaneously based on extensive field measurements. This is to be commended.

The paper provides evidence that boreal deciduous conifers (light taiga: larch species) are more fire resistant than boreal evergreen conifers (dark taiga: Siberian spruce, Siberian fire, Siberian stone pine etc), and this is not reflected in parameterisation in SPITFIRE model. [noted: I will fix this parameterisation in new version of SPITFIRE as

part of LPJ-GUESS work.]. Given this difference between the two conifer groups, then it is no surprise that both fire frequency and larch biomass increases along a gradient of high precipitation in the west to relatively lower precipitation in the east. What is not clear from the paper, however, is what is driving changes in fire frequency across the study region.

1. Clearly warmer drier conditions are more conducive to fire, but the study is hampered by the lack of good quality weather station data, and the use of longitude as an indicator of both temperatures and precipitation associated with continental climates (i.e. cold wet winters, dry hot summers). This reduces the certainty of the conclusions. What is the evidence that longitude is a good indicator of continental climates, and finer resolution site-based meterological data in Siberia?

2. Not only the amount but also the distribution of precipitation throughout the summer months is important for determining fire occurrence. The Nesterov Index (used by the Russian forest service) accounts for this. Apart from partitioning precipitation into annual and summer amounts at sites, you should try to analyse the daily data from the available weather stations. An alternative would be to go to re-analysis data. BTW why does Vanavara (light taiga) have exactly the same precipitation statistics as Velmo (dark taiga) (Table 1)? If the statistics are correct, then this changes your conclusions, or?

3. It is well-established that fire frequency is also driven by human- and lightning-caused ignitions. But the paper provides no evidence as to how these human- and lightning-caused fires might change across the gradient studied. This is an important omission, and should be addressed. A dry forest will not burn without an ignition source, obviously.

4. Fig 1 shows from Vanavara northwards, the forest is dominated by larch, but south of Vanavara Scots pine predominates in a region centred on ca. 102 deg lon, 61 deg lat. Like larch, Scots pine is fire resistant (apparently because of its thick bark). Using the

BGD
9, C171–C173, 2012

paper's methods, the region south of 102 deg lon has the same level of 'continentality' as the region north of 102 deg lon. So, apart from fire and climate how can you explain these species distributions? In other words, if continental climate surrogacy is correct and if fire is prevalent in both regions; then what other factors operate here to maintain the distributions of these two species?

Allan Spessa, MPI-Chemistry, Mainz, Germany.

Interactive comment on Biogeosciences Discuss., 9, 21, 2012.