



## ***Interactive comment on “Impact of 40 years poplar cultivation on soil carbon stocks and greenhouse gas fluxes” by C. Ferré et al.***

### **Anonymous Referee #1**

Received and published: 8 August 2005

The paper describes measurements of soil to atmosphere gas exchange, soil carbon stocks and other soil parameters in a natural forest and in a nearby poplar plantation, which has been established 40 years ago, on a site previously also covered by natural forest.

Although not stated explicitly, the assumption is made that gas fluxes and soil carbon stocks would be exactly the same at both sites today, if one of them had not been converted to a poplar plantation. Therefore, differences between both sites found today are fully attributed to their different land use during the past 40 years. I find this the most problematic aspect of the paper. At the scale of transects at each site, large spatial variability has been identified in terms of gas fluxes and soil properties. Thus, why should variability at the scale of distance between both sites (>1000 m) not be even larger than at transect-scale (100 m)? In fact, I think it might be large enough to

Full Screen / Esc

Print Version

Interactive Discussion

Discussion Paper

explain nearly all of the differences between both sites found today.

Another problem constitutes the small number of sampling points on which estimates of soil carbon stocks are based and how these results are discussed. There are 4 sampling points at each site. One of them (plot 10) at the poplar plantation has been identified as an outlier (page 913, line 15) because of its extremely sandy texture. Omitting this plot from the analysis and assuming a bulk density of 1.0 where no data is available in Table 1, I calculated mean soil carbon stocks for the full profile (surface to 60 to 65 cm). The results are 5.2 and 5.4 kg C/m<sup>2</sup> for the poplar plantation and for the natural forest, respectively. This is surprisingly close for such a small sample number, the relatively large distance between both sites and the large spatial variability within each site. Therefore, I find it difficult to accept the conclusion that "...changes in carbon stocks and related fertility are the most visible phenomena after 40 years of land use change from a pristine forest to a fast growing poplar plantation." (last paragraph of abstract).

From my point of view, the significantly smaller carbon stocks in the uppermost 10 cm of soil at the poplar plantation is the only finding that can be attributed with some confidence to the transformation of a natural forest to a plantation. The site has been ploughed three times to a depth of 45 cm during the past 40 years. Each time, material poor in carbon will have been brought from depth to the surface and material rich in carbon will have been buried at greater depth. Therefore, I would not say the surface horizon has been depleted in carbon but rather that carbon has been trans-located from the surface to greater depth. Some indication of this can be found in Figure 6.

There certainly is information worth publishing in the flux and soil data. Especially in sections 3.2.1 and 3.2.2. However, it should be presented along a completely different storyline.

---

Interactive comment on Biogeosciences Discussions, 2, 897, 2005.

[Full Screen / Esc](#)[Print Version](#)[Interactive Discussion](#)[Discussion Paper](#)