

## ***Interactive comment on “Analysis of the energy balance closure over a FLUXNET boreal forest in Finland” by J. M. Sánchez et al.***

### **Anonymous Referee #2**

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The energy balance closure problem is a relevant issue, including for the readers of HESS. The authors have carried out, after a careful analysis of most of the available references, investigations of the energy balance closure of the Finnish FLUXNET station Sodankylä for the year 2002. Unfortunately the paper has some shortcomings. The instrumentation of the station is not state of the art (not even for 2002). The sonic anemometer has some deficits and was later replaced and the net radiometer is of low accuracy (Halldin and Lindroth, 1992; Kohsiek et al., 2007; Mauder et al., 2007). Therefore, the residual of the energy balance closure might even be larger. Furthermore, the data analysis system by McMillen (1988) is not state of the art and a block average is recommended (Finnigan et al., 2003; Lee et al., 2004) as well as a different rotation method (Wilczak et al., 2001). The reviewer is wondering why the authors have not reviewed the papers of the Finnish colleagues, mainly by J.-P. Tuovinen and

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M. Aurela (for overview see e. g. PhD thesis by M. Aurela, Finnish Meteorological Institute, Contributions No. 51, 2005, available online), where the shortcomings are also discussed. As well, a footprint analysis of the station is available (Göckede et al., 2008).

The special investigation of the energy balance closure problem does not include any new aspects. The separation of the friction velocity problem from the stratification problem is not very helpful, because both parameters are connected with the Obukhov length, which does not allow an independent analysis. An analysis of very stable and nighttime data requires a careful analysis of the data quality to enable selection of non-turbulent data. Such an analysis (Foken and Wichura, 1996; Foken et al., 2004; Vickers and Mahrt, 1997) is missing. In the case of no turbulence, the energy is balanced between the net radiation, the ground heat flux and the storage term. The turbulent fluxes cannot be taken into account because of the absence of turbulence and because the fluxes are below the detection limit.

At the present time, papers are recommended which investigate the possible reasons for the energy balance closure problem discussed in recent years (Finnigan et al., 2003; Foken, 2008; Inagaki et al., 2006; Kanda et al., 2004). Energy balance analyses like the one presented more or less provide an additional remark on another issue, but the authors have already done this in their paper published in *AgForMet* 149 (2009), 1037-1049.

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