

Interactive comment on “Heat storage in forest biomass significantly improves energy balance closure particularly during stable conditions” by A. Lindroth et al.

Anonymous Referee #1

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The paper is interesting and important in respect to the role of storage terms in tall vegetation and its influence on energy balance closure. For low vegetation several papers are already available which found that during night time the energy can be closed by accurate determination of the storage terms. They are in agreement with the authors' conclusions that the eddy-covariance method is not the reason for the unclosed energy balance. But the paper is also important in respect to the recent discussion about the energy balance closure problem with secondary circulations proposed as a possible reason (Foken 2008; Inagaki et al. 2006; Kanda et al. 2004). Because such circulations do not exist at night time, the different closure conditions for night and day can be explained. The authors should discuss these recent findings together with their

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results.

A weak point of this paper is the calculation of the soil heat storage because of missing temperature sensors up to a depth of 10 cm. Is there a reference for the method used or was the method developed by the authors? In the latter case an error analysis with another data set should be presented, in the former case a reference would be helpful. For the determination of the heat capacity the effect of the soil moisture (de Vries 1963), should be discussed and included because it is relevant at the Norunda site.

In contrast to most of the other papers about energy balance closure the authors do not determine the ground heat flux at the surface (Liebethal and Foken 2007) as the sum of the heat flux at a certain depth and the energy storage between the surface and the heat flux plate. The authors include the ground heat flux together with all storage terms into a general storage term. It would be helpful to separate the storage terms above the ground and the heat flux at the ground surface because there are some papers available which report that under certain circumstances the energy can be closed when the ground heat flux was accurately determined (e.g. Heusinkveld et al. 2004). Because the authors want to show the storage term in tall vegetation this separation is evident for comparison with other results and should not need much work.

The authors found that the energy storage in the air is also relevant. This should be discussed in respect to other findings (Oncley et al. 2007).

Small remarks:

P: 8535, line 6: Please use eddy-covariance instead of eddy-correlation so that no misunderstanding is possible.

P: 8537, line 1: Dr. Bruno Lange GmbH & Co. KG is a company in Berlin, the modification was done by Dr. Däke at the Meteorological Observatory Hamburg of the German Meteorological Service (since 1994 not in existence)

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P 8544, line 15: Please use another symbol for the potential temperature than for the temperature T as "theta".

References:

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