GENERAL INFORMATION

author(s)	Samson R, Lemeur R
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ABSTRACT

Five different heat storage terms were studied in a mixed deciduous forest. All terms should be taken into account for the calculation of the overall heat storage, because they all can be significant during certain weather conditions and hours. Heat storage in biomass is estimated using surface temperatures measured with an infrared radiometer, which seems to be a good method. The often neglected photosynthetic heat storage may not be omitted. On a seasonal basis soil heat storage seems to be the most important term. The overall heat storage shows a small tendency for releasing heat to the atmosphere during fall. Fluctuations in overall heat storage are a result of complex changes of several climatic parameters. Due to the high degree of coupling of the forest to the atmosphere, accurate measurements of overall heat storage for the determination of big leaf forest evapotranspiration are not of the utmost importance.

MATERIALS & METHODS

study area	5n
time period	15–23 August 1998 (energy balance storage terms, evapotranspiration) 15 August – 31 October (seasonal evolution of the daily storage terms)
goal	Analysis of the different canopy storage terms of a small mixed deciduous forest on hourly, daily, and seasonal basis. Examination of these storage terms vs. net radiation. Analysis of the impact of the storage terms on the evaporation, calculated with the big-leaf approach.
set-up	measuring tower
data collection	level 5: net radiation, incoming/reflected short-wave radiation, free field precipitation - 8 cm: soil heath each level + 1 m above the soil: temperature level 4 + 1 m above the soil: relative humidity 4 height levels: wind speed level 2, 3: leaf wetness 6 depths: soil water potential surface temperature
remarks	Fig. 1 p 229: set-up data collection

RESULTS

The diurnal behaviour of sensible and latent heat storage in the canopy layer, soil heat flux, heat storage in the biomass, heat stored by net photosynthesis, and the overall heat storage are described for three sample days: clear sky and dry canopy, variable cloud and dry canopy, variable cloud and wet canopy.

The daily and daytime totals of the five considered storage terms and the total storage are shown, as well as the seasonal storage pattern and the big leaf evapotranspiration.

For ecosystems strongly coupled to the atmosphere, the determination of the heat storage, and thus of the available energy, seems to be less crucial for the determination of latent heat exchange using the Penman-Monteith approach. For less coupled ecosystems (such as in greenhouses) an accurate determination of the heat storage, and more precisely of the available energy will be much more important. Also, if the Bowen-ratio technique is used for the calculation of latent heat exchange the exact hourly determination of the overall heat storage becomes much more important.