

## GENERAL INFORMATION

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## ABSTRACT

The net ecosystem exchange (NEE) of CO<sub>2</sub> between temperate forests and the atmosphere governs both carbon removal from the atmosphere and forest growth. In recent years, many experiments have been conducted to determine temperate forest NEE. These data have been used by forest modellers to better understand the processes that govern CO<sub>2</sub> fluxes, and estimate the evolution of these fluxes under changing environmental conditions. Nevertheless, it is not clear whether models capable of handling short-term processes, which are mostly source-driven, can provide an accurate estimate of long-term forest growth, which is potentially more influenced by sink- and phenology-related processes. To analyse the interactions between short- and long-term processes, we developed the ASPECTS model, which predicts long-term forest growth by integrating, over time, hourly NEE estimates. Validation data consisting of measurements of NEE by eddy-covariance and forest carbon reservoir estimates were obtained from mixed deciduous and evergreen experimental forests located in Belgium. ASPECTS accurately estimated both: (1) the NEE fluxes for several years of data; and (2) the amount of carbon contained in stems, branches, leaves, fine and coarse roots. Our simulations demonstrated that: (1) NEE measurements in Belgian forests are compatible with forest growth over the course of the 20th century; and (2) that forest history and long-term processes need to be considered for accurate simulation of short-term CO<sub>2</sub> fluxes.

## MATERIALS & METHODS

<b>study area</b>	Gontrode, Vielsalm, Brasschaat
<b>time period</b>	
<b>goal</b>	Study, through simulation models, of the coherence between hourly eddy-covariance NEE measurements and the long-term accumulation of carbon in leaves, branches, stems and roots of deciduous and evergreen trees of temperate forests.
<b>set-up</b>	model calibration with Gontrode data; model validation with data from Vielsalm and Brasschaat
<b>data collection</b>	data BELFOR project

remarks	data from Gontrode used for model calibration
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## RESULTS

The ASPECTS model produces coherent predictions of short-term NEE fluxes and long-term forest growth. Our simulations suggest that the species composition of the forest surrounding the measuring tower and the history of site management are two important parameters that need to be considered for proper modelling and extrapolation of NEE data.