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carbon gain and leaf phenology

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Introduction

- Recurrent droughts and rising temperature are predicted to occur in the tropics because of climate change.
- But, little is known about trees response to these changes.
- Understanding trees response to current short-term variations of climate could help to predict trees performance and forest resilience under future conditions.
- Continuous monitoring of stem size variations helps predictions of tree responses to the current environment (Deslauriers et *al*. 2007, *Dendrochronologia* 25: 113-124).

Materiels and methods

- 15 trees selected in the Biosphere Reserves of Yangambi and Luki in the Democratic Republic of the Congo (Congo Basin).
- High-resolution (30-minutes interval) monitoring of tree growth and climate (T, RH, PAR) using automated radius dendrometers and weather station.
- Daily monitoring of leaf phenology using timelapse cameras and monthly measurements of carbon gain (wood formation) using microcores.

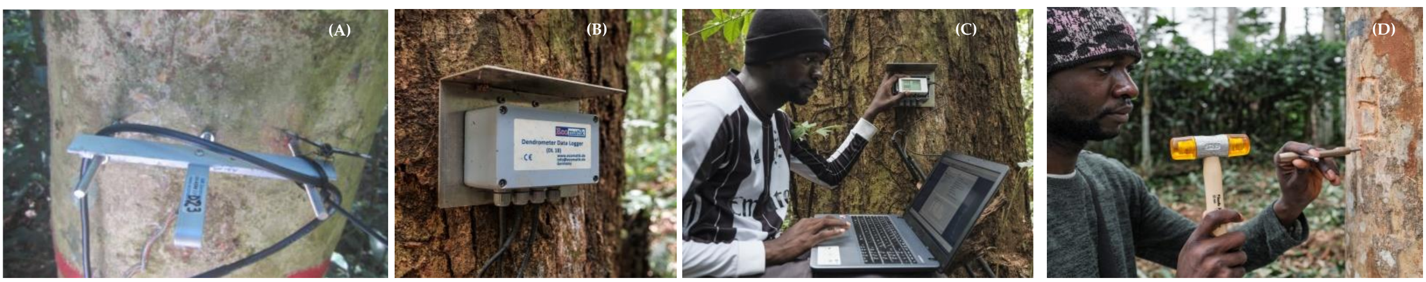

Fig. 1 Radius dendrometer installed on an individual of *Pericopsis elata* in the Biosphere Reserve of Yangambi (A) and connected to a data logger (B) from where dendrometer growth series can be retrieved (C). Microcores are also collected (D) to assess the monthly pattern of wood formation

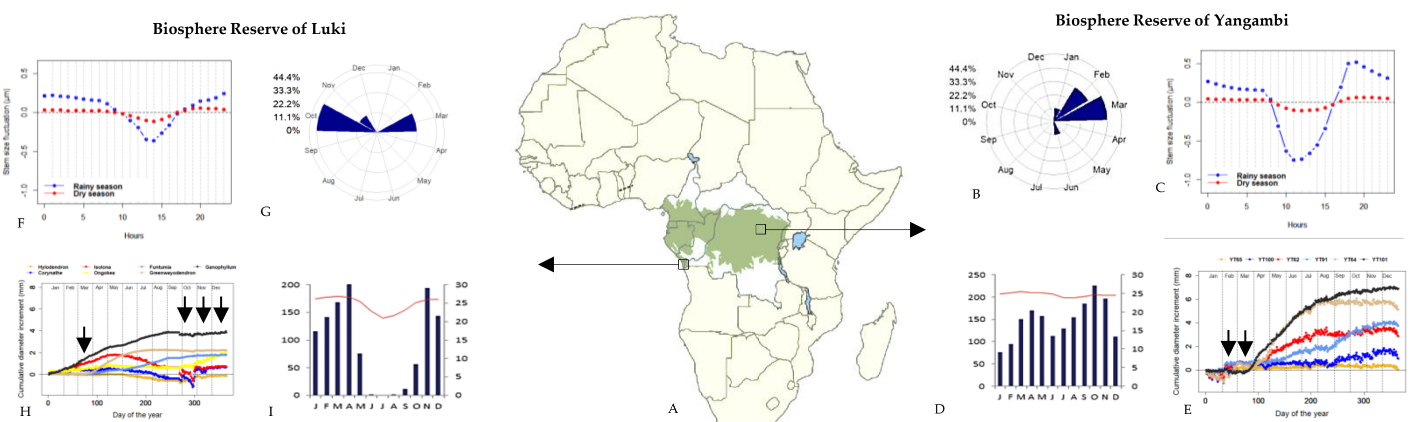

Fig. 2 Localisation of the study sites (Yangambi and Luki) within the Congo Basin in the central Africa (A), monthly repartition of total rainfall in Yangambi (D) and Luki (I), Cumulative diameter increment trees in Yangambi (E) and Luki (H) and daily pattern of stem size fluctuations for the rainy season (blue) and dry season (red) in Yangambi (C) and Luki (F) and circular histogram of the onset of tree growth in Yangambi (B) and Luki (G). All the studied trees in Yangambi are from the flagship species *Pericopsis elata*.

Results

In Yangambi, tree growth starts in February/March, ends in November and lasts 178 ± 48 days. In Luki, tree growth starts in October/November, ends in May and last 139 ± 44 days. Foliar and reproductive phenology of the species tend to synchronize with stem growth phenology. The growing season begins when trees start to produce new leaves and flowers and finishes when leaf shedding starts. In addition to this seasonal pattern, a daily pattern of stem size variations was also detected. The highest stem size increment is observed between 17:00 and 08:00, with a maximum between 19:00 and 21:00. The lowest and negative stem size increment is observed between 08:00 and 17:00 corresponding to the moment of maximum light availability, higher temperature and lower relative humidity. During this moment, stem size variation showed to be rather determined by relative humidity than temperature.

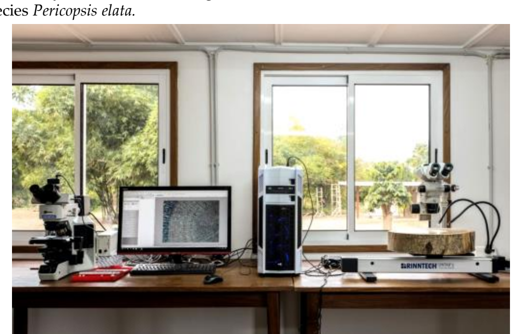

Fig. 3 Laboratory of wood biology and carbon assessments (Yangambi, DRC)

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