Abstract template for the conference "A century of national forest inventories – informing past, present and future decisions"

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Abstract title:		Biomass ratio varies along geographic gradients and forest stands composition: an analysis based on wood density data collected by the French NFI
Take-home message:		
Presenter name:		Baptiste Kerfriden
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General topic, see website: (please double click on the check box and activate the relevant one)	☐	Improving future NFIs by learning from the past
	☒	NFIs today and in the future
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Biomass ratio varies along geographic gradients and forest stands composition: an analysis based on wood density data collected by the French NFI

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Introduction: Biomass ratio is a state variable allowing the conversion of the forest growing stock into biomass (Kauppi et al., 2006). This variable is most often considered constant per tree species despite the huge range of intraspecific variability of basic density. Indeed, the factors that influence wood density are numerous: tree growth and age, competition (e.g. forest structure), genetics as well as intra and inter annual climatic variations. In light of such diversity, scientific research into forest biomass characteristics is required to better incorporate the heterogeneity of forests in the forest carbon accounting methods (Bowen et al., 2011).

Materials and methods: In 2016 and 2017 over fifty five thousands increment cores were collected in the field by the French NFI. Wood density measurements were performed at INRA (Leban et al., 2019, this conference) and combined with the French NFI calculation system, biomass ratio can now be computed as a standard. This quantity can now be depicted over stratification variables such as tree species, stand composition and structure, NFI ecological regions, elevation class, and volume increment. An exploratory and ANOVA-assisted analysis of these gradients was performed.

Results: Biomass ratio was found strongly related to ecological regions, with an increase from colder to warmer regions. Also, within species elevation gradients showed a general negative correlation with biomass ratio, indicating a decrease at colder elevations. Average specific biomass ratio by species further strongly correlated with average specific growth, evidencing a growth-density trade-off across a set of 70 species.

Conclusion: Wood density data acquired on the French NFI allow major steps forward toward the proper estimate of forest biomass resources and of carbon sequestration. Biomass ratio was found correlated with climatic contexts, suggesting that biomass sequestration at constant volume may increase in a warmer climate. Also, the growth-biomass ratio evidenced is a confirmation of an ecological fact often evidenced in tropical and temperate forests (Chave et al., 2009, Woodall et al., 2015). Handling the issue of what are the tree species optimising biomass sequestration is at hand.

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