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Dynamics of methane emission from dying trees

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Summary

Context —
Methane (CH_4) is one the most important greenhouse gases, responsible for c. 20% of global warming (IPCC 2022). Forest soils are one of the main methane sinks. But tree stems can potentially be sources of methane emission to the atmosphere (Covey et al., 2016) and then reduce the methane sink when considering forest ecosystem. Various *climatic and biotic constraints* have led to the weakening of trees in recent years. These stresses will make them even more vulnerable especially to pests and diseases and possibly promote methane emissions from trees

Objectives —
Objectives of the project, whether excess methane is emitted in uplands, by dying and dead trees compared to healthy trees, to quantify this excess emission, and to determine what are the key drivers of this excess emission.

Approaches —
Trees stem methane fluxes on dying, dead and healthy trees will be measured. Measurements will be performed on different species, at different dates and in different sites to determine if methane emissions are driven by tree phenology, meteorological and/or edaphic conditions. To determine whether variations in methane emissions are related to increased methane production in stem, cores of the monitored trees will be incubated and microbial diversity and abundance determined.

Expected results and impacts —
The influence of trees has been recognized as the largest source of uncertainty in the global methane budget (Saunois et al. 2020). Our project is expected to make major advances on the role of dead and dying trees on methane emissions and thus provide a better estimate of the methane budget of forests.