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A global distribution of the ignitability component of flammability based on climatic drivers

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Fire regime is the result of complex interactions among ignition, topography, weather and vegetation. Even though the influence of vegetation varies regionally, it remains the only component that can be directly managed in order to reduce the negative impacts of wildland fires. Therefore, reliable information on vegetation flammability is required, making it one of the essential components of fire risk assessment and management.

Specific Leaf Area (SLA [cm2 g-1], the ratio of leaf area to leaf dry mass) has received little attention regarding its relationship with ignitability and, thus, flammability. However, recent studies on a regional scale have shown that leaves of higher SLA are more ignitable. Thus, in the framework of the current study, the ignitability, as a function of SLA on global scale, is explored.

In order to calculate SLA, a linear regression model combining SLA and climate data has been used (Maire et al., 2015). The climate data used for its calculation include the maximum monthly fractional sunshine duration, the maximum monthly temperature and the number of days with daily mean temperature above 0°C for each grid cell, obtained from the ERA-Interim gridded observations database. Subsequently, the ignitability component of flammability is calculated on a global scale using a bivariate regression relationship with SLA based on experimental burns of leaf materials (Grootemaat et al., 2015).

The global distribution of ignitability can subsequently be combined with fire weather index (FWI) values for the development of an integrated index of forest fire vulnerability for the current and future climate, using CMIP5 climate model outputs. This will enable the integration of functional biogeographic data with widely applied fire risk assessment methodologies at regional to global spatial scales.