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Development of a framework for fire danger assessment using Remote Sensing and Geographic Information System tecnologies

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This paper presents the input variables and the integration scheme developed within a national research project (funded by the Spanish Ministry of Science) to map wildland fire danger probability at regional and national scale.

The system includes the comprehensive consideration of the main variables associated to both fire ignition and fire propagation. The former includes a component to account for socio-economic aspects associated to starting fires, as well as lightning and fuel moisture status, both considering live and dead fuels. Statistical and spatial analyses were applied to generate the input variables and develop methods for integrating them into single fire danger indices. Fire propagation was considered into a static way, by taking into account average temperature and wind conditions. The fuel types were derived from the national forest inventory map.

The integration of the variables was based on physical models and statistical techniques, adapting some ideas commonly considered into multicriteria evaluation systems.

All the variables were mapped at 1 sq km spatial resolution, and were organized into a dedicated geographic information system.

The input variables and the final indices were sent to the regional end-users through e-mail and a dedicated webmapping service developed within the project, based on OpenGIS standards.

The assessment of the index has been restricted to a single fire campaign (2007), when the system was run in a semi-operational condition. Fire ignition points and hot-spots derived from MODIS were used in this regard.