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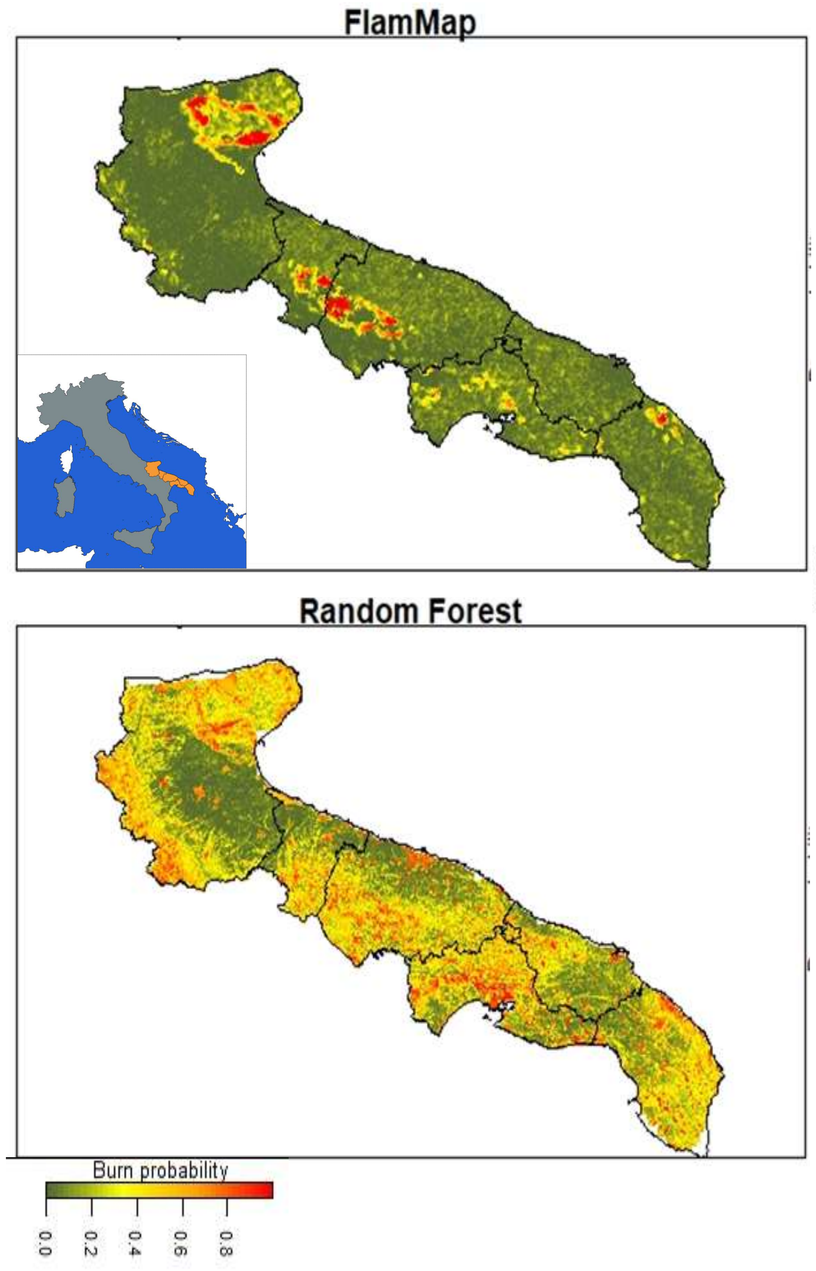
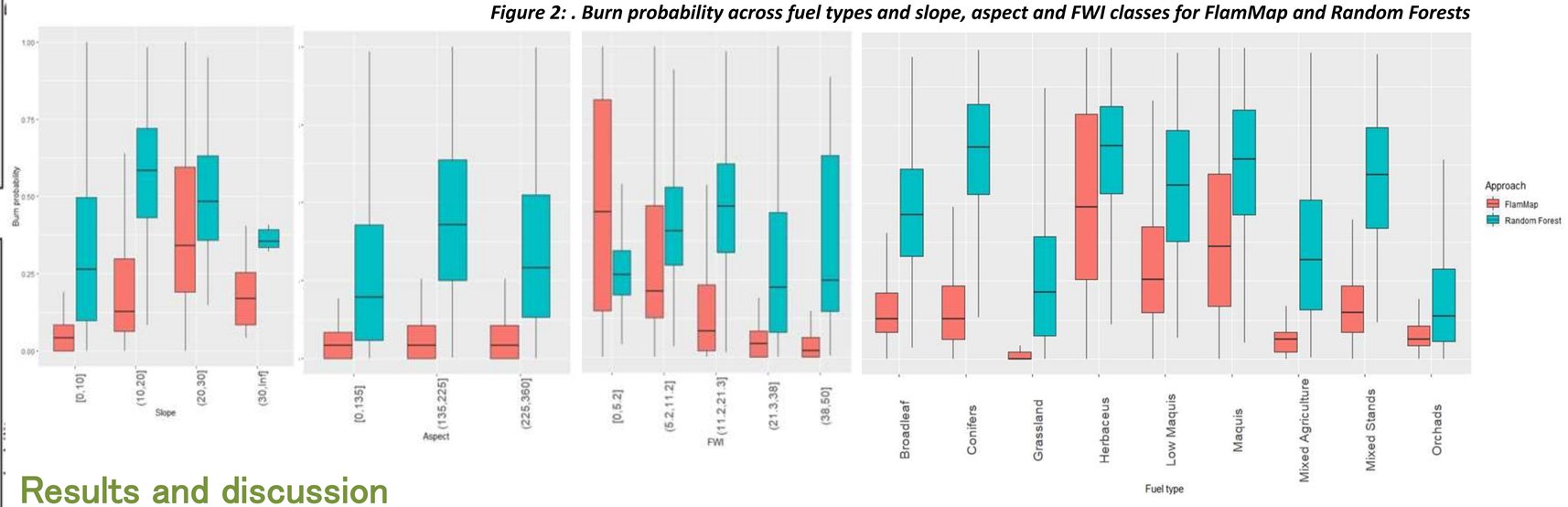
*Contrasting *patterns* and *interpretations* between *fire spread simulators* and *machine learning models* when mapping burn probability

Introduction Two main approaches are commonly used to map burn probabilities: fire spread simulators and machine learning models. Despite they based mostly on the same environmental variables, they differ on how they handle them. Thus, since fire ***managers sometimes mostly focus on the outputs without acknowledging the difference between approaches***, it makes worthy to assess for differences on both results and ***interpretations.***



Methods Burn probabilities were calculated for the Apulia region, Southern Italy, using ***FlamMap*** and Random Forest. Data required for Flammap simulations (i.e., fuel types and distribution, and dominant weather conditions during fires) were retrieved from the project OFIDIA2. We select the ***Random Forest*** algorithm since preliminary analysis showed that RF performed better than logistic regression in terms of Area Under the ROC curve. We also present how burn probabilities in both approaches change across topographical conditions (slope and aspect classes), FWI classes (based on European Forest Fire Information System, i.e., EFFIS, Fire Danger categories), and fuel types.

Figure 2: . Burn probability across fuel types and slope, aspect and FWI classes for FlamMap and Random Forests



Results and discussion

Results showed that ***RF project more uniformly distributed results (both spatially and statistically)*** than Flammap, which concentrate most of its values close to zero except for some locations with medium-high probabilities. In addition, burn probabilities from Flammap and RF change across fuel types and environmental conditions. Interpreting results suggest that ***decisions based on fire simulators might be more tightly linked with actions preventing fire spread***, whereas those based on machine learning might be more linked with fire occurrence that is not necessarily related to spreading, e.g., socioeconomic causes.

*Under review on *Environmental modelling and technology*

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