

## **An integrated system for Estimation and Visualization of Fire Propagation and Verification of its Predictions by Exploiting Data of Real Fire Behaviour for Fires in Greece and Turkey**

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### **Abstract**

Within the framework of the EU-co-funded research project “FIRESENSE: Fire Detection and Management through a Multi-Sensor Network for the Protection of Cultural Heritage Areas from Risk of Fire and Extreme Weather Conditions”, an interactive application has been developed (Estimation of Fire Propagation, EFP) allowing users to define simulation parameters, perform fire propagation simulations and display results to a user-friendly 2-D/3-D environment that is based on Google Earth<sup>TM</sup>. Calculations are based on the popular algorithms of the BEHAVE fire behavior prediction system, but many additional functionalities and extensions are also supported. The application produces visualizations of fire propagation output data: ignition times are displayed as colour-coded cell grids, while 3-D animations of flame length are also generated. The estimation and use of spatially variable wind-fields is also supported using the WINDNINJA software, while temporal weather (wind/fuel moisture) variations can also be specified. Finally, a model for predicting the probability of spread of surface fires to the crowns of the vegetation was also implemented.

The system was successfully evaluated with data collected from 3 fires in Greece and Turkey where there was minimal or no human intervention. In this paper, the EFP system is briefly presented and quantitative characteristics of the real fire behaviour are provided for the fire in Isthmia at 1/8/2009, which was documented in the field by the third author for the evaluation of the predictions of the system.