



## **Development and Sensitivity Analysis of a Frost Risk model based primarily on freely distributed Earth Observation data**

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The ability to map the spatiotemporal distribution of extreme climatic conditions, such as frost, is a significant tool in successful agricultural management and decision making. Nowadays, with the development of Earth Observation (EO) technology, it is possible to obtain accurately, timely and in a cost-effective way information on the spatiotemporal distribution of frost conditions, particularly over large and otherwise inaccessible areas.

The present study aimed at developing and evaluating a frost risk prediction model, exploiting primarily EO data from MODIS and ASTER sensors and ancillary ground observation data. For the evaluation of our model, a region in north-western Greece was selected as test site and a detailed sensitivity analysis was implemented. The agreement between the model predictions and the observed (remotely sensed) frost frequency obtained by MODIS sensor was evaluated thoroughly. Also, detailed comparisons of the model predictions were performed against reference frost ground observations acquired from the Greek Agricultural Insurance Organization (ELGA) over a period of 10-years (2000-2010).

Overall, results evidenced the ability of the model to produce reasonably well the frost conditions, following largely explainable patterns in respect to the study site and local weather conditions characteristics. Implementation of our proposed frost risk model is based primarily on satellite imagery analysis provided nowadays globally at no cost. It is also straightforward and computationally inexpensive, requiring much less effort in comparison for example to field surveying. Finally, the method is adjustable to be potentially integrated with other high resolution data available from both commercial and non-commercial vendors.

**Keywords:** Sensitivity analysis, frost risk mapping, GIS, remote sensing, MODIS, Greece