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A methodological framework for mapping frost occurrence utilizing a cloud-based platform & geospatial data

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Frost is one of the most damaging hazards in agriculture as its impacts negatively cropland yield and agro-ecosystems, affecting price commodities of agricultural products. Locating the spatiotemporal patterns of frost events can be a challenging and costly task since a dense network of weather stations is required to accurately characterize frost distribution. The recent advancements in geoinformation technology have enhanced our ability to retrieve parameters that are critical to the development of frost conditions such as land surface temperature (LST). In addition, the availability of cloud-based imagery processing platforms allows to easily acquire and process LST data over large scales setting the EO field as the optimal mean for frost risk mapping. The present study imprints the frost's spatial patterns analyzing geospatially referenced frost incident field-based data conducted by the Greek National of Agricultural Payments Agency (ELGA) during the period 2015-2020. In addition, a cloud-based methodological framework is introduced herein based on a time series analysis with LST data from ESA's Sentinel-3 LST operational product to map frost occurrence. The proposed approach was implemented for the same time period as that of the ELGA data. The frost frequency maps developed by the two approaches were compared using appropriate geospatial data analysis methods in order to determine their correspondence. Results generally demonstrated the added value of EO data in identifying the frost risk degree and geographical extent for all the years analysed. Our proposed methodology has a promising potential to be used at operational scale to map frost risk conditions and to also support decision making in frost hazard mitigation.

KEYWORDS: *cloud-based platform, LST, Sentinel 3, frost risk, geospatial analysis*