

EGU22-2444

<https://doi.org/10.5194/egusphere-egu22-2444>

EGU General Assembly 2022

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Possible precursory indicators for the devastating fire in North Evia island during August 2021, using remotely sensed and Earth-observation data

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The present work aims at unveiling possible precursory signals of the devastating fire in North Evia island, during August 2021, that destroyed approximately 400 km² of forest and cultivated land. Therefore, the time series of two environmental parameters known to be related to wild fire occurrence, i.e. soil moisture and Normalized Difference Vegetation Index (NDVI) were extracted and analyzed. Soil moisture in the top soil layer from 0 to 7cm was extracted from the ERA5-Land Monthly Averaged - ECMWF Climate Reanalysis data set at a spatial resolution of 9 km. The time series of remotely sensed NDVI was accessed through the Landsat 8 mission, at a spatial resolution of 30m, with a 32-day time step. Both time series covered the period from January 2015 to October 2021. Results indicated two specific patterns in the examined time series. Soil moisture time series in the affected areas demonstrated a sharp declining trend since 2018, reaching its lowest value just prior the fire events in North Evia. The NDVI time series did not show any distinctive trend during the examined period in the affected sites, however comparing it to surrounding unaffected areas with the same extent, occupied from the same land cover types, an alarming finding was revealed; the NDVI time series in the affected sites demonstrated statistically significant lower variability compared to unaffected ones. This difference corresponds to a more homogeneous vegetation and possible absence of fire breaks in the burned areas compared to the ones that were not affected. Findings of the present work may help in highlighting areas with specific characteristics related to soil moisture and NDVI, that indicate a high risk of fire occurrence.