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## Are fire probabilistic products an effective early warning tool in the management of prevention fire activities? – the case of Monchique 2018 wildfire.

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At the beginning of August 2018 Portugal experienced extreme fire prone meteorological conditions with very hot and dry air, driven by the occurrence of a severe fire event in Southern Portugal, known as Monchique wildfire. The severe wildfire probability occurrence was re-enhanced by the substantial fuel amount accumulated since the last extreme wildfire occurred over this region in August 2003. On the 2<sup>nd</sup> August 2018, extreme fire danger conditions were predicted for Monchique region and the fire started on the 3<sup>rd</sup> and lasting till the 10<sup>th</sup> of August, with the evacuation of people from several villages and the associated burnt area of 27000 ha (ICNF, <https://www.icnf.pt/>). This event posed hard challenges on suppression activities due to its exceptional severity, related to high values of fire radiative energy released. This work aims to study the driving factors of Monchique wildfire in 2018 and assessing the usefulness of fire probabilistic products disseminated up to 72 hours in advance, as an early warning tool in fire prevention and suppression activities. The assessment of fire danger conditions was done based on ensemble forecasts fire products of the Ensemble Prediction System (EPS), provided by Copernicus Atmosphere Monitoring Service (CAMS); and based on fire danger metrics produced by Copernicus Emergency Management Service (CEMS) for the European Forest Fire Information System (EFFIS). Fire Weather Index (FWI) and Fine Fuel Moisture Code (FFMC) were selected from the Canadian Forest Fire Weather Indices System (CFFWIS) to describe the meteorological fire danger of Monchique event.

The assessment of fire severity was based on the Fire Radiative Energy (FRE) released by the fire, computed from the Fire Radiative Power (FRP) product delivered in near real-time by EUMETSAT Land Surface Analysis Satellite Applications Facility (LSA SAF) (<https://landsaf.ipma.pt/en>).

FWI and FFMC ensemble results based on CAMS dataset, 24 hours before the ignition, showed Monchique region above the 95<sup>th</sup> percentile of the ensemble, with ensemble maximum values, for both indices, being achieved on the period 6<sup>th</sup>-9<sup>th</sup> August 2018. FWI and FFMC, obtained from ERA5 data, registered the highest daily anomalies on the 3<sup>rd</sup> August 2018, recording values that are classified from very high to the extreme over Monchique region. The fire severity/intensity assessment based on the FRE product showed very high amounts of energy released during this

fire event, daily maximum amounts of 10000 MW during 5<sup>th</sup> -8<sup>th</sup> August. Total FRP (MW) and FRE (GJ) values accumulated per pixel over the duration of the event achieved maximum values of  $7 \times 10^4$  and  $6 \times 10^4$ , respectively, in certain pixels, illustrating the severity of this event and the hard challenge that was developed on suppression activities by Portuguese authorities. Therefore, obtained results show that selected products were able to properly assess fire danger and fire severity for Monchique region over those days.

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