



Assessing Fire Weather Index using statistical downscaling and spatial interpolation techniques in Greece

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Forest fires have always been present in the Mediterranean ecosystems, thus they constitute a major ecological and socio-economic issue. The last few decades though, the number of forest fires has significantly increased, as well as their severity and impact on the environment. Local fire danger projections are often required when dealing with wild fire research. In the present study the application of statistical downscaling and spatial interpolation methods was performed to the Canadian Fire Weather Index (FWI), in order to assess forest fire risk in Greece. The FWI is used worldwide (including the Mediterranean basin) to estimate the fire danger in a generalized fuel type, based solely on weather observations. The meteorological inputs to the FWI System are noon values of dry-bulb temperature, air relative humidity, 10m wind speed and precipitation during the previous 24 hours.

The statistical downscaling methods are based on a statistical model that takes into account empirical relationships between large scale variables (used as predictors) and local scale variables. In the framework of the current study the statistical downscaling portal developed by the Santander Meteorology Group (<https://www.meteo.unican.es/downscaling>) in the framework of the EU project CLIMRUN (www.climrun.eu) was used to downscale non standard parameters related to forest fire risk.

In this study, two different approaches were adopted. Firstly, the analogue downscaling technique was directly performed to the FWI index values and secondly the same downscaling technique was performed indirectly through the meteorological inputs of the index. In both cases, the statistical downscaling portal was used considering the ERA-Interim reanalysis as predictands due to the lack of observations at noon.

Additionally, a three-dimensional (3D) interpolation method of position and elevation, based on Thin Plate Splines (TPS) was used, to interpolate the ERA-Interim data used to calculate the index. Results from this method were compared with the statistical downscaling results obtained from the portal.

Finally, FWI was computed using weather observations obtained from the Hellenic National Meteorological Service, mainly in the south continental part of Greece and a comparison with the previous results was performed.