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Abstract

Modelling Present and Future Wildfire Risk with Use of a Fire Weather Index, Spatial Weather Generator and Regional Climate Models †

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To construct time series for a Fire Weather Index (FWI), input weather series may come from various sources. Observed weather station data or gridded series interpolated from observations are commonly used to produce FWI series representing the present climate. FWI series representing the future may be based on RCM-simulated data or on series synthesized by a stochastic weather generator (WG). In the latter case, WG parameters are calibrated with observed weather data and modified using the climate change (CC) scenarios derived from GCM or RCM simulations. The application of a WG implies some advantages, including: (a) arbitrarily long series may be produced, allowing us to make a probabilistic assessment of CC impacts on the FWI. (b) only selected characteristics of the multi-variate multi-site weather series may be modified when modifying WG parameters before producing the weather series representing the modified climate (the complete CC scenario consists of changes in averages and standard deviations of weather variables, and changes in the temporal and spatial structure of weather series); this allows us to assess the sensitivity of the FWI to changes in individual statistical characteristics of the weather series.

We use the spatial daily weather generator SPAGETTA (Dubrovsky et 2020, Theor. Appl. Climatol.) to produce a synthetic weather series representing present and future climates for Czechia (125 weather stations) and Sardinia (15 stations). FWI time series are constructed using both present-climate and future-climate weather series, and the changes in FWI characteristics due to climate change are assessed. The future climate weather series are produced with WG modified using the CC scenarios derived from a set of RCMs. In assessing the results, we focus on high FWI values, spatial extent of the area with high FWI values, and the duration of the periods with a high FWI. The results based on the WG-synthesized weather series are compared with those based on the RCM-simulated series.

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