



Forecasting European Wildfires Today and in the Future

Ignasi Porras Alegre (1), Maria Navarro Abellán (1), Josep María Solé (1), Pedro Gálvez (1), Conrad Bielski (2), Kaisa Ylinen (3) and Pertti Nurmi (3)

(1) Meteosim S.L., Barcelona, Spain, (2) EOXPLORE UG, Weil am Rhein, Germany, (3) Finnish Meteorological Institute, Helsinki, Finland

INTRODUCTION

The increased frequency of wildfires is not only a result of a changing climate, but wildfires themselves also produce a significant amount of greenhouse gases that, in-turn, further contribute to global warming.

I-REACT (www.i-react.eu) is an innovation project funded by the European Commission, which aims to use social media, smartphones and wearables to improve natural disaster management by integrating existing local and European services into a platform that supports the emergency management cycle.

GOALS

The aim of this work is to design 2 different System Processes (SP) to be integrated into the I-REACT service, providing wildfire information on short, medium and future projection time scales.

The Canadian Forest Fire Weather Index (FWI) is used to compute the six components that account for the effects of fuel moisture and wind on fire behaviour over Europe. This information will improve the currently available information to several end-users (fire departments, civil protection, local authorities, etc.), where accurate and reliable information is vital for improving risk management.

RESULT

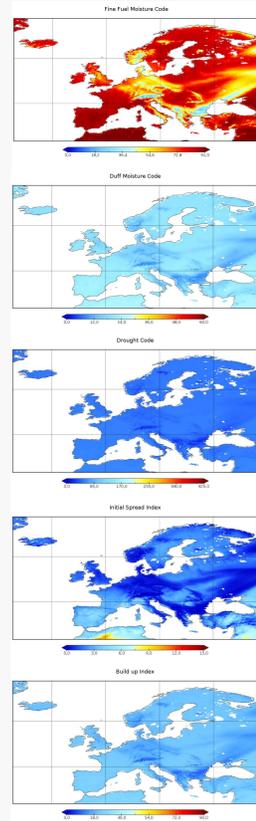


Figure.1 Fuel moisture codes and fire behaviour indices used to calculate the FWI.

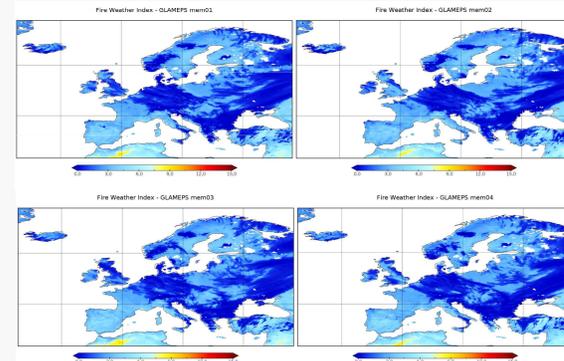


Figure.2 Fire Weather Index forecast (valid time 2017/04/17 at 12UTC) for some individual ensemble members (52 in total) for the GLAMEPS model.

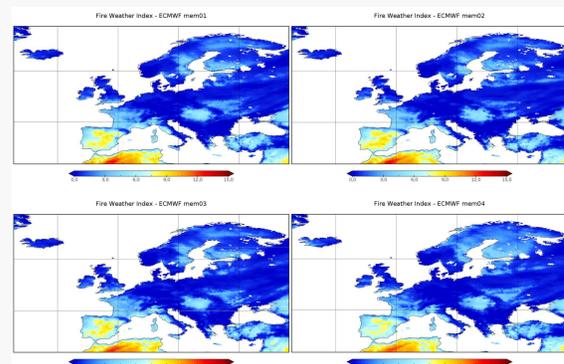


Figure.3 Fire Weather Index forecast (valid time 2017/04/17 at 12UTC) for some individual ensemble members (51 in total) for the ECMWF model.

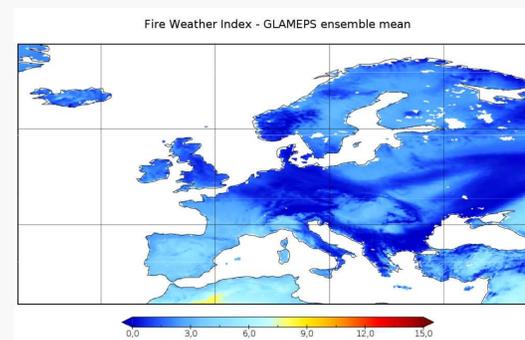


Figure.4 Ensemble mean forecast of the Fire Weather Index (valid time 2017/04/17 at 12UTC) for the GLAMEPS model.

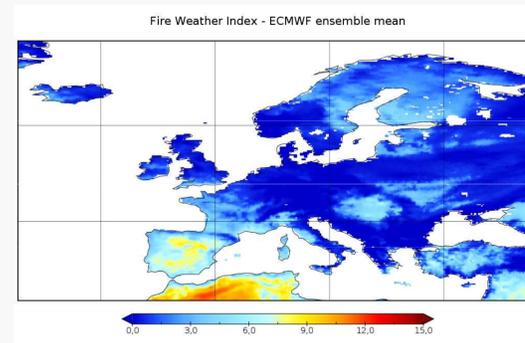


Figure.5 Ensemble mean forecast of the Fire Weather Index (valid time 2017/04/17 at 12UTC) for the ECMWF model.

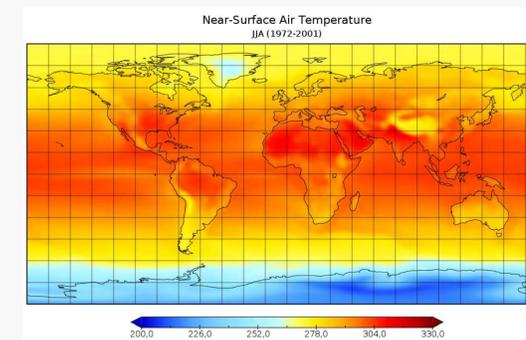


Figure.6 Ensemble mean of the surface temperature using CMIP5 models for historical period (1972-2001).

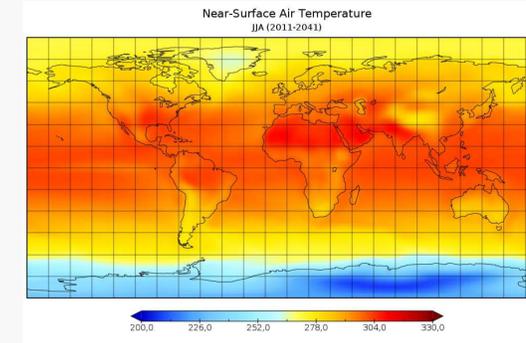


Figure.7 Ensemble mean of the surface temperature using CMIP5 models for future projection (2011-2041) for scenario RCP4.5

METHODS

SP1 – Future projections

Analysis of the climate variables related to fires is made by building an ensemble based on the Coupled Model Intercomparison Project Phase 5 (CMIP5) data. Calculations in trends of temperature, precipitation, wind, relative humidity and FWI are done for three time scales: 2011-2040, 2041-2070 and 2071-2100.

SP2 – Operational daily forecast

Ensemble mean forecast using ECMWF and GLAMEPS model data (supplied by the Finnish Meteorological Institute) are used to compute the FWI for each ensemble member from a few hours up to 10 days ahead.

CONCLUSIONS

In order to estimate fire danger in a generalized fuel type, computation of the Canadian Forest Fire Weather Index (FWI) over Europe is being done for short term forecast from a few hours to 2 days ahead using GLAMEPS ensemble data (8 km), in the medium-range up to 10 days ahead by using ECMWF ensemble system data (16 km) and future projection for three different periods (2011-2040, 2041-2070 and 2071-2100) using CMIP5 models data for scenarios RCP4.5 and RCP8.5.



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