Geophysical Research Abstracts
Vol. 16, EGU2014-4178, 2014
EGU General Assembly 2014

Sensitivity analysis of a FMC model for improving forecasting forest fires: Comparison with real fires in Spain

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Forest fires continue to be a very dangerous and extreme violent episode jeopardizing the human lives and owns. Spain is plagued by forest and brush fires every summer, when extremely dry weather sets in along with high temperatures. The use of fire behavior models requires the availability of high resolution environmental and fuel data; in absence of realistic data, errors on the simulated fire spread con be compounded to produce o decrease of the spatial and temporal accuracy of predicted data. In this work we have carried out a sensitivity analysis of different components of the fire model and particularly the fuel moisture content (FMC) such as microphysics and solar radiation model. Three different real fire models have been used: Murcia (September, 7, 2010 19h09 and 9 hours duration), Gabiel (March, 7, 2007, 22h15 and 38 hours duration) and Culla (Marzo, 7, 2007, 23h36 and 37 hours duration). We use the 100 m European Corine Land Cover map. We use the WRF-Fire model developed by NCAR (USA). The WRF mode is run using the GFS global data and over the Iberian Peninsula with 15 km spatial resolution. We apply the nesting approach over the fires areas (located in the South East of the Iberian Peninsula) with 3 km, 1 km and 200 m spatial resolution. The Fire module included into WRF is run with 20 m spatial resolution and the landuse is interpolated from the Corine 100 m land use map. The results show that the Thompson et al. microphysics scheme and the RRTM solar radiation scheme are those with the best combination using a specific counting score to classify the goodness of the results compare with the real burned area. Those pixels not burned by the simulations but burned by the observational data sets are penalized double compare with the vice versa process. The NDVI obtained by satellite on the day of starting the fire is included in the simulations and a substantial improving in the final score is obtained.