Geophysical Research Abstracts
Vol. 21, EGU2019-1667, 2019
EGU General Assembly 2019


# On the relevance of the atmospheric-chemistry processes for droughts modeling over Europe

Miguel Ángel Torres Vázquez (1), Amar Halifa-Marín (1), Raquel Lorente-Plazas (1), Marco Turco (1,2), Jose María López-Romero (1), Laura Palacios-Peña (1), Sonia Jerez (1), Juan Pedro Montávez (1), and Pedro Jiménez-Guerrero (1)

(1) Regional Atmospheric Modelling Group, Department of Physics, University of Murcia, Murcia, Spain (miguelangel.torres@um.es), (2) Barcelona Supercomputing Center, Earth Sciences, Barcelona, Spain, Barcelona, Spain

In a warmer climate scenario, droughts are predicted to be more severe increasing in intensity, frequency and persistency. To reconcile existing difference between observed and modeled in drying patterns, model fidelity needs to increase. According to IPCC AR5, one of the most uncertain forcing agent is the aerosol treatment. How aerosol-radiation (ARI) and aerosol-clouds interactions (ACI) affect to climatological extremes is still poorly understood due to the high computational cost of the online chemistry-climate simulations.

Here, two identical regional climate simulations are performed covering a 20-year period (1991-2010) with the only difference that of one takes into account anthropogenic, natural and biogenic emissions, and also aerosols effects (ARI and ACI). Simulations are conducted by the Weather Research and Forecast (WRF) model coupled with Chemistry (WRF-Chem) in the framework of ACEX project. The dynamical downscaling is performed to ERA-20C reanalysis over Euro-CORDEX compliant domain with 50 km spatial resolution. The simulations are evaluated by comparing with the observational database E-OBS. To characterize the role of the aerosols-climate feedbacks on droughts, SPEI and SPI index are computed.

Results show that droughts increase over eastern Europe when indirect aerosol effects are simulated. This signal is mainly associated to differences in temperature, meanwhile changes in precipitation due to ACI are more difficult to interpret and consequently to associate with drought changes. This work evidence how simulating online aerosol-meteorology interactions could modify the modeled droughts over the target region.

ACKNOWLEDGMENTS:
The authors acknowledge the project ACEX (CGL2017-87921-R) of the Spanish Ministry of Economy and Competitiveness, the Fundación Biodiversidad of the Spanish Ministry for the Ecological Transition, and the FEDER European program. A.H-M. also thanks to the University of Murcia for his scholarship to begin a research career. R.L-P. and S.J. also thanks to the University of Murcia for their postdoctoral contract. M.T. has received funding from the European Union's Horizon 2020 research and innovation programme under the Marie Skłodowska-Curie grant agreement No. 740073 (CLIM4CROP project). L.P-P. thanks to the scholarship FPU14/05505 from the Spanish Ministry of Education, Cultura and Sports.