A global wildfire emission and atmospheric composition: refinement the Integrated System for wild-land fires IS4FIRES

Speakers

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Ms. Joana Soares graduated from Aveiro University (Portugal) in 2004 as an Environmental Engineer and after a Masters degree in Environmental Sciences at the University of Wageningen in the Netherlands, started working at the Finnish Meteorological Institute (FMI) in 2006. At FMI, she has been contributing to several EU-funded and other international research projects, mainly concerning mathematical air quality and exposure modelling. She has assessed the IT and human resources available for the implementation of regional chemical transport models and advised and instructed local experts how to use chemical transport models for assessment and operational forecast purposes. She is currently enrolled in PhD studies at the University of Helsinki.

Summary
The quantification of fire emissions and its impact, in terms of atmospheric composition, air quality, human health and climate forcing, is a continuous challenge due to numerous uncertainties and stochastic behaviour of wild-land fires. The IS4FIRES provides spatially and temporally resolved emission fluxes originated from wild-land fires. The emissions were obtained by utilising remote-sensing products of MODIS instruments: Temperature Anomalies and Fire Radiative Power. The system relies on direct scaling from fire intensity to emission fluxes, avoiding uncertainties of burnt-area based approaches and allowing explicit considerations of individual or closely-located fires. The primary scaling is based on emission factors for PM2.5, with further conversion to total PM and gaseous species using literature-reported scaling factors. The fire plumes are classified according land-use classes. The current IS4FIRESv2 distinguishes between boreal, temperate and tropical forests, residual crop, grass, shrub and peat. The emission factor for each land-use classes obtained via fitting the modelled PM concentrations and AOD into the observed ones. Upon obtaining the emissions factors, the bottom-up calculation of emission from each observed fire is performed, finally ending up with daily biomass-burning emission maps. Recent analysis of MISR and SEVIRI data allowed the derivation of a more accurate formula for fire plume top position and more accurate description of the diurnal variation of fire intensity.