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Uncertainty Quantification of RANS dispersion modeling in Oklahoma City during the Joint Urban 2003 campaign CLARA GARCIA-SANCHEZ, von Karman Institute for Fluid Dynamics, University of Antwerp, CATHERINE GORLE, Stanford University, University of Antwerp, JEROEN VAN BEECK, von Karman Institute for Fluid Dynamics, GIANLUCA IACCARINO, Stanford University — The high expansion rate of urban areas makes realistic predictions of dispersion within cities an important research topic. The transport of pollutants is influenced by wind flows that are affected by the large scale variability of the atmospheric boundary layer (ABL). In order to improve the predictive capabilities of Computational Fluid Dynamics simulations (CFD) of the ABL, this atmospheric variability should be included. This work focuses on representing this variability in the inflow boundary conditions using an uncertainty quantification framework for the Joint Urban 2003 experiment. The simulations focus on the Intensive Observation Period number 9, where a continuous release of SF6 took place in downtown Oklahoma. The RANS simulations with the k-epsilon turbulence model were performed with the code OpenFOAM, and an equation for passive scalar transport is solved, using a standard gradient diffusion model for the turbulent dispersion, to obtain the SF6 concentration. To define the inflow boundary conditions three uncertain parameters are used: wind speed, wind direction, and ABL roughness height. To propagate these uncertainties a tensor grid Clenshaw-Curtis Stochastic Collocation approach was used, and a polynomial chaos representation of the velocity and concentration at different field measurement locations was constructed to extract the mean and standard deviations.

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