**Short abstract. 19th International Conference on
Harmonisation within Atmospheric Dispersion Modelling for Regulatory Purposes
3-6 June 2019, Bruges, Belgium**

_____

Abstract title: JRII Special sonic anemometer study: A first comparison of building wakes measurements with simple and high resolution numerical modelling

Name and Affiliation of the First Author: Bertrand Carissimo (CEREA-ENPC, EDF R&D)

Email of first author: Bertrand.Carissimo@enpc.fr

Names and Affiliations of the Co-authors:

Steve Hanna (Hanna Consultants)

Silvia Trini Castelli (ISAC-CNR)

Michael Pirhalla (US EPA ORD/NHSRC/DCMD)

Steven Perry (US EPA ORD/NERL/CED)

David Heist(US EPA ORD/NERL/CED)

Joseph Chang (RAND Corporation)

Abstract text

After the summer 2015 chlorine releases during the Jack Rabbit II field experiment at Dugway Proving Ground, a special sonic anemometer study was carried out in November 2015 and March 2016. The goal was to provide documented wind fields in similar conditions to the actual releases and to study building wakes. For this last goal, a special emphasis was given to flow around both a single CONEX and a 2 by 3 CONEX tower. This study included 34 sonic anemometers that were placed around these "buildings" to best capture the recirculating regions. Upstream there is a 32 m instrumented tower which gives the incoming flow conditions.

Building wakes are important for the dispersion of pollutants in cities and around industrial plants. To account for their effect on dispersion numerical modeling, several levels of sophistication are possible. They range from very simple empirical formulas to very detailed CFD simulations, with possibly intermediate modeling.

Here we have selected a few time periods during March 2016 as case studies, in order to present some examples of analysis of this dataset, together with accompanying simulations using a CFD model and simple and intermediate models.

The CFD calculations are performed with all 80 CONEXs in the array present, and with the boundary conditions based on the upstream 32 m tower data. Detailed comparisons are carried out for the wind speed and direction and for the turbulence level, with special emphasis on the wake regions. Preliminary tests are carried out to investigate how the wake resolving method can affect the dispersion in the different modelling approaches.

Motivation

The ultimate goal of this study is to assess and determine appropriate approaches to resolve building wakes in numerical models at different levels of complexity, from simplified empirical models to advanced CFD models. In this sense, the results of the study can contribute to reaching a consensus and harmonizing the approaches for dispersion modelling in complex geometries.

Key Topic

Special session: Model evaluation and comparison: Jack Rabbit II case study

Oral Presentation