ESTIMATION OF SHORT ODOR EVENTS BY USING CHEMICALLY REACTIVE ODORANTS ATMOSPHERIC DISPERSION MODELLING AROUND A PULP PAPER MILL

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ABSTRACT
Oder episodes control due to low threshold perception odors, as H2S, is extremely difficult, as they are detected in very low concentrations. Traditionally, pulp paper mills using Kraft process produceTRS(Total Reduced Sulphur) odorants emissions, so their environment can be affected by odors. A model-based operational odor forecast system, namely ProOl, was developed, tested and applied around ENCE pulp paper mill at Pontevedra estuary in order to prevent any short odor event (less than 1 hour). This system includes WRF model coupled to CALMET model, to provide meteorological inputs to CALPUFF model. Both surface wind and temperature WRF and CALMET models outputs were validated against surface measurements, and statistics calculated by Openair software usually accomplished valid ranges. About CALPUFF performance, estimated odorant ground level concentrations were converted to short odor event intensity applying both peak-to-mean approach and Steven’s Law. When forecast short odor events were compared to the 34 short odor events registered, 32 of them were caught by ProOl.

RESULTS

Data Analysis / Application

WRF-ARW setup

CalWRF

WRF, ARW

Max. Horiz. Res.: 1.3 km

DEM

Spanish Geogr. Survey, CNIG

Land Use

True Marble GLCD

CalMET (v. 6.334)

Horiz. Res.: 250 m

CALMET/CALPUFF domain & setup

IKINE and IOBR options

12 vertical layers

Calpuff2NetCDF

TRС EMISSIONS

Chromatech MEDOR

TRS CS1000

CalPUFF (v. 6.42)

Output Grid Horiz. Res.: 250 m

ODOR ESTIMATION

Odor level (Steven’s Law)

Hourly TRS diffusion with chemical decay and deposition

C[OU/m^3] = 2000×CH2S [ppm]

Peak-to-mean (short events)

\[ \frac{C_p}{C_m} = \left( \frac{T_m}{T_p} \right)^d \]

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References


