**Data Dictionary for Data Set D-2bvz**

(Neutral boundary layer urban dispersion in scaled uniform and nonuniform residential building arrays, Retter et al. 2024, *Boundary Layer Meteorology*)

**Figure 1:**

No data

**Figure 2a, 2b, 3a, 3b:**

*HCA* = hydrocarbon analyzer concentration points

*x-position* = distance downwind from the origin (mm)

*y-position* = lateral distance from the origin centerline (mm)

* ***array-type\_source\_WD.csv*** *– s*eries of files containing the *x* and *y* positions of the lateral HCA measurements profile with the following naming convention*:* 
  + *“array-type”* represents either the uniform or non-uniform building arrays, “*source*” is hydrocarbon emission source 1, 2, 3 or 4, and “*WD*” is the incoming wind direction of either 0° or 30°.

**Figures 4-5:**

No data

**Figure 6:**

*x* = nondimensional distance with respect to H (60 mm)

*z* = nondimensional height with respect to H (60 mm)

*uw* = vertical shear stress (m^2/s^2)

*uu* = normal shear stress (m^2/s^2)

*ww* = normal shear stress (m^2/s^2)

*U* = velocity (m/s)

*id* = classifies the measurement plane for the average profile

* ***Figure6ab\_contour\_plots.csv –*** velocity and turbulence data for the uniform building array contour plots in Figure 6a and b.
* ***Figure6c\_velocity.csv –*** data for the uniform building array velocity profiles in Figure 6c.
* ***Figure6cd\_nobuilding.csv –*** data for velocity and vertical shear stress profiles for the no-building case in Figure 6c and d.
* ***Figure6d\_shear\_stress.csv –*** data for the uniform building array shear stress profiles in Figure 6d.

**Figure 7:**

Same as Figure 6 but for the non-uniform building array containing eight unique PIV planes.

**Figure 8:**

*XH* = nondimensional distance with respect to H (60 mm)

*YH* = nondimensional distance with respect to H (60 mm)

*ZH* = nondimensional height with respect to H (60 mm)

*CHI* = nondimensional concentration

*style* = uniform or nonuniform

*nam* = name of source location

* **Figure8a\_uniform.csv** – nondimensional concentration data for the uniform building case by wind direction and source in Figure 8a.
* **Figure8b\_nonuniform.csv** – nondimensional concentration data for the non-uniform building case by wind direction and source in Figure 8b.

**Figure 9:**

*XH* = nondimensional distance with respect to H (60 mm)

*YH* = nondimensional distance with respect to H (60 mm)

*ZH* = nondimensional height with respect to H (60 mm)

*CHI* = nondimensional concentration

*an* = wind direction angle

*style* = building configuration

*nam* = name of source location

*fit* = Gaussian (or biGaussian) fit to data

* ***Figure9a.csv –*** concentration and gaussian fit data for lateral profiles in Figure 9a.
* ***Figure9b.csv –*** concentration and gaussian fit data for lateral profiles in Figure 9b.
* ***Figure9c.csv –*** concentration and gaussian fit data for vertical profiles in Figure 9c.
* ***Figure9d.csv –*** concentration and gaussian fit data for vertical profiles in Figure 9d.

**Figures 10 and 11:**

*x* = x distance in mm

*zp* = z bar, vertical center of mass

*xshift* = yp

*sy* = sigma-y

*an* = wind direction angle

*style* = building configuration

*nam* = name of source location

* ***figure10\_11\_y\_properties.csv*** – lateral plume shift and spread parameters as shown in Figures 10 and 11.
* ***figure10\_11\_z\_properties.csv*** – vertical plume shift and spread parameters as shown in Figures 10 and 11.

**Figure 12:**

*z* = nondimensional height with respect to H (60 mm)

*U* = velocity (m/s)

syn = mean PIV velocity (m/s)

* ***figure12\_arrayWD.csv*** – *s*eries of files containing the nondimensional height and velocity for the PIV measured values and experimental fits with the following naming convention*:* 
  + *“array”* represents either the uniform or non-uniform building arrays, and “*WD*” is the incoming wind direction of either 0° or 30°.
* ***figure12\_arrayWD\_model.csv*** *- s*eries of files containing the nondimensional height and velocity for the AERMOD model results with the following naming convention*:*
  + *“array”* represents either the uniform or non-uniform building arrays, “*WD*” is the incoming wind direction of either 0° or 30°, and “*model*” is the AERMOD log law velocity profiles (aermod) and scaled AERMOD profiles (aermodscaled).

**Figure 13:**

*XH* = nondimensional distance with respect to H (60 mm)

*YH* = nondimensional distance with respect to H (60 mm)

*ZH* = nondimensional height with respect to H (60 mm)

*CHI* = nondimensional concentration

* ***figure13.csv* –** concentration data for the wind tunnel no-building case.

**Figure 14:**

*XH* = nondimensional distance with respect to H (60 mm)

*YH* = nondimensional distance with respect to H (60 mm)

*ZH* = nondimensional height with respect to H (60 mm)

*CHI* = nondimensional concentration

*nam* = name of source location

*x* = nondimensional distance with respect to H (60 mm)

y = nondimensional lateral distance with respect to H (60 mm)

*z* = nondimensional height with respect to H (60 mm)

c = nondimensional concentration

* ***figure14ab.csv* –** concentration data for the wind tunnel uniform building case for source 3 and the 0° wind direction.
* ***figure14c.csv* –** concentration data for the wind tunnel uniform building case at the lateral profile at *x*= 3.9H.
* ***figure14de.csv* –** concentration data for the wind tunnel non-uniform building case for source 1 and the 0° wind direction.
* ***figure14f.csv* –** concentration data for the wind tunnel non-uniform building case at the lateral profile *x*= 3.9H.

**Figure 15:**

*nam* = name of source location

*fb =* fractional bias

*fac2 =* factor of two error

*vp =* name of fit

*nmse =* normalized mean square error

*XH* = nondimensional distance with respect to H (60 mm)

*YH* = nondimensional distance with respect to H (60 mm)

*ZH* = nondimensional height with respect to H (60 mm)

*CHI* = nondimensional concentration

*CHI* = nondimensional concentration

*nam* = name of source location

* ***figure15a\_part1.csv* –** statistical data for each source and velocity profile for the uniform building array.
* ***figure15a\_part2.csv* –** statistical data for each source and velocity profile for the uniform building array.
* ***figure15b\_part1.csv* –** statistical data for each source and velocity profile for the non-uniform building array.
* ***figure15b\_part2.csv* –** statistical data for each source and velocity profile for the non-uniform building array.
* ***figure15c\_part1.csv* –** concentration data for the uniform building array based on source and wind direction.
* ***figure15c\_part2.csv* –** concentrationdata for the uniform building array.
* ***figure15d\_part1.csv* –** concentration data for the non-uniform building array based on source and wind direction.
* ***figure15d\_part2.csv* –** concentrationdata for the uniform building array.

**Figure 16:**

Same format as Figure 15 but for model performance values for the urban velocity profile compared to the suggested improvements for *y/H* < 3.33.

**Figure A1:**

*z* = nondimensional height with respect to H (60 mm)

*uw* = vertical shear stress (m^2/s^2)

*uu* = normal shear stress (m^2/s^2)

*ww* = normal shear stress (m^2/s^2)

syn = mean PIV velocity (m/s)

* ***figureA1\_uu\_nonuniform.csv –*** functional form of normal *uu* shear stress profiles for the non-uniform building array in Figure A1a.
* ***figureA1\_uu\_uniform.csv –*** functional form of normal *uu* shear stress profiles for the uniform building array in Figure A1c.
* ***figureA1\_uumean\_nonuniform.csv –*** functional form of average normal *uu* shear stress profiles for the non-uniform building array in Figure A1a.
* ***figureA1\_uumean\_uniform.csv –*** functional form of average normal *uu* shear stress profiles for the uniform building array in Figure A1c.
* ***figureA1\_uusyn\_nonuniform.csv –*** average PIV *uu* shear stress profiles for the non-uniform building array in Figure A1a.
* ***figureA1\_uusyn\_uniform.csv –*** average PIV *uu* shear stress profiles for the non-uniform building array in Figure A1c.
* ***figureA1\_ww\_nonuniform.csv –*** functional form of normal *ww* shear stress profiles for the non-uniform building array in Figure A1b.
* ***figureA1\_ww\_uniform.csv –*** functional form of normal *ww* shear stress profiles for the uniform building array in Figure A1d.
* ***figureA1\_wwmean\_nonuniform.csv –*** functional form of average normal *ww* shear stress profiles for the non-uniform building array in Figure A1b.
* ***figureA1\_wwmean\_uniform.csv –*** functional form of average normal *ww* shear stress profiles for the uniform building array in Figure A1d.
* ***figureA1\_wwsyn\_nonuniform.csv –*** average PIV *ww* shear stress profiles for the non-uniform building array in Figure A1b.
* ***figureA1\_wwsyn\_uniform.csv –*** average PIV *ww* shear stress profiles for the uniform building array in Figure A1d.