

# **Modelers' Data Archive – A Collection of Atmospheric Transport and Dispersion Data Sets**

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# Outline

- **Introduction**
- **History**
- **Data sets included in archive**
- **Condensed MDA file format and raw data**
- **Data sets usage**
- **Other data sources**
- **Conclusions**

# Introduction

- **Atmospheric Transport and Dispersion (ATD) field and laboratory data sets are valuable resources for**
  - **Understanding ATD processes**
  - **Developing new algorithms**
  - **Evaluating model performance**
- **Many experiments conducted since the 1950s, but systematic efforts in archiving these data generally lacking**
- **Hence, locating appropriate data sets for research often challenging**

# History (1/2)

- In early 90s, Steve Hanna, Dave Strimaitis, and Joe Chang conducted a dense-gas model evaluation project sponsored by American Petroleum Institute (API) and Air Force (AF)
- Project used field data from
  - 6 dense gas (Burro, Coyote, Desert Tortoise, Goldfish, Maplin Sands, and Thorney Island) and
  - 2 tracer gas (Prairie Grass and Hanford Kr<sup>85</sup>) experiments
- Raw data condensed into a common Modelers' Data Archive (MDA) file format that contains enough information to run 15 dense-gas models, including DEGADIS, HGSYSTEM, SLAB, CHARM, PHAST, and TRACE

# History (2/2)

- Data archive continued to grow after API/AF project
- Recognizing the value of archiving not just **condensed** “MDA files” but also original **raw data**, began to call the entire collection of data sets **MDA**
- Added **derived** data (e.g., QA, time averages, tabulation, reformatting, model inputs, etc.) when appropriate
- Strived to combine data and any documentation into single package; sometimes necessary to scan old reports
- Through word of mouth, began to distribute data sets free of charge to any scientists who requested them
- Other scientists also contributed to the archive
- Collected 50+ data sets thus far

*Reference: Chang, J.C., and S.R. Hanna, 2010: Modelers’ Data Archive—a collection of atmospheric transport and dispersion data sets. 16<sup>th</sup> Conference on Air Pollution Meteorology, American Meteorological Society, Atlanta, Georgia*

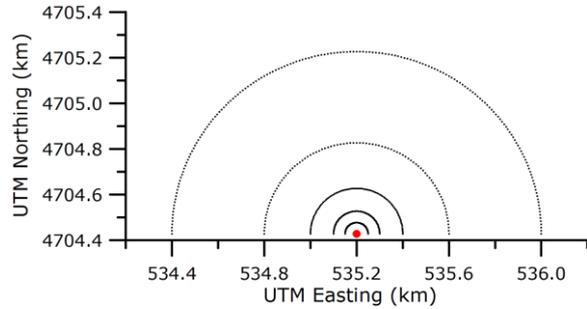
# Data Sets Included in MDA

1. Dense Gas MDA (including Burro, Coyote, Desert Tortoise, Goldfish, Lyme Bay, Maplin Sands, and Thorney Island)
2. Prairie Grass
3. Hanford Kr<sup>85</sup>
4. Ocean Breeze
5. Dry Gulch
6. Green Glow
7. Kit Fox
8. EPA CO<sub>2</sub>
9. DSWA Phase I
10. DP26 (Dipole Pride 26)
11. OLAD (Overland Alongwind Dispersion)
12. MVP (Model Validation Program)
13. Ventura
14. Pismo Beach
15. Cameron
16. Carpinteria
17. LROD (Long-Range Overwater Diffusion)
18. MADONA (Meteorology And Diffusion Over Non-Uniform Areas)
19. ACURATE (Atlantic Coast Unique Regional Atmospheric Tracer Experiment)
20. ANATEX (Across North America Tracer Experiment)
21. METREX (Metropolitan Tracer Experiment)
22. CAPTEX (Cross Appalachian Tracer Experiment)
23. ETEX (European Tracer Experiment)
24. INEL74
25. OKC80
26. Birmingham
27. Urban 2000 (Salt Lake City)
28. Joint Urban 2003 (Oklahoma City)\*
29. Madison Square Garden 2005\*
30. Midtown Manhattan 2005\*
31. MUST (Mock Urban Setting Test)
32. EMU (Evaluation of Model Uncertainty)
33. DPG Barrel
34. LA 2001
35. Barrio Logan (San Diego)
36. Porton Down 1977
37. Macdonald (water tunnel)
38. SMEDIS (Scientific Model Evaluation of Dense Gas Dispersion Models)
39. TRAPOS (Optimization of Modeling Methods for Traffic Pollution in Streets)
40. REDIPHEM (Review and Dissemination of Physical Effects Models)
41. FLADIS (Research on the Dispersion of Two-Phase Flashing Releases)
42. Kincaid
43. Bull Run
44. Indianapolis
45. Clifty Creek
46. Tracy
47. Martins Creek
48. Westvaco
49. SARMAP (San Joaquin Valley Air Quality Study, Regional Meteorological and Air Pollution)
50. LMOS (Lake Michigan Ozone Study)
51. OTAG (Ozone Transport Assessment Project)

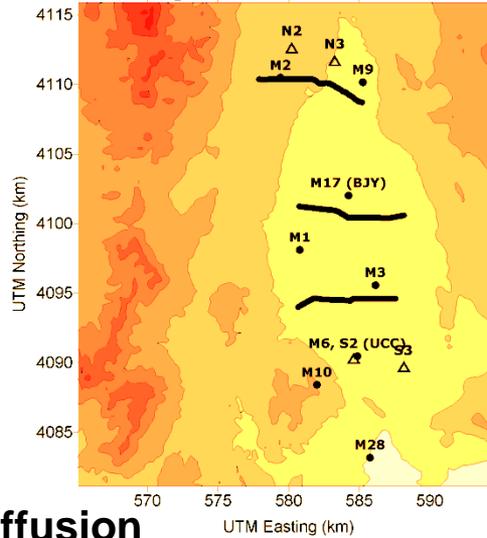
*\*Need to be requested from DoD*

# PG, DP26, OLAD, LROD, & ETEX

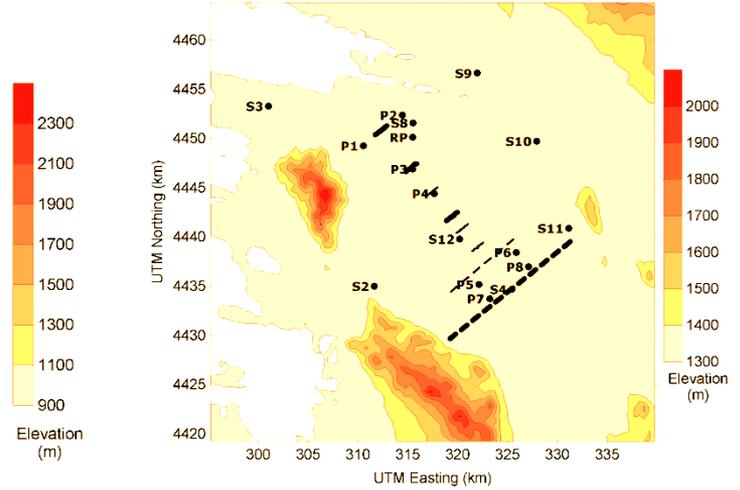
## Prairie Grass



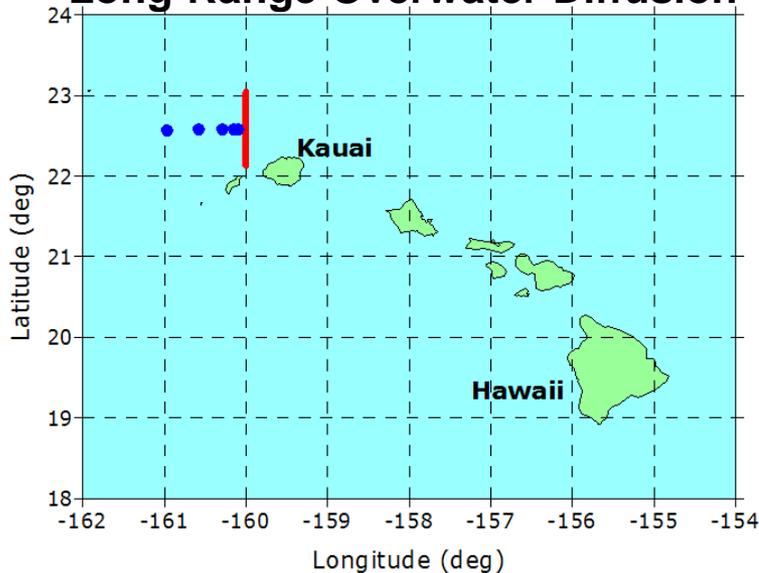
## Dipole Pride 26



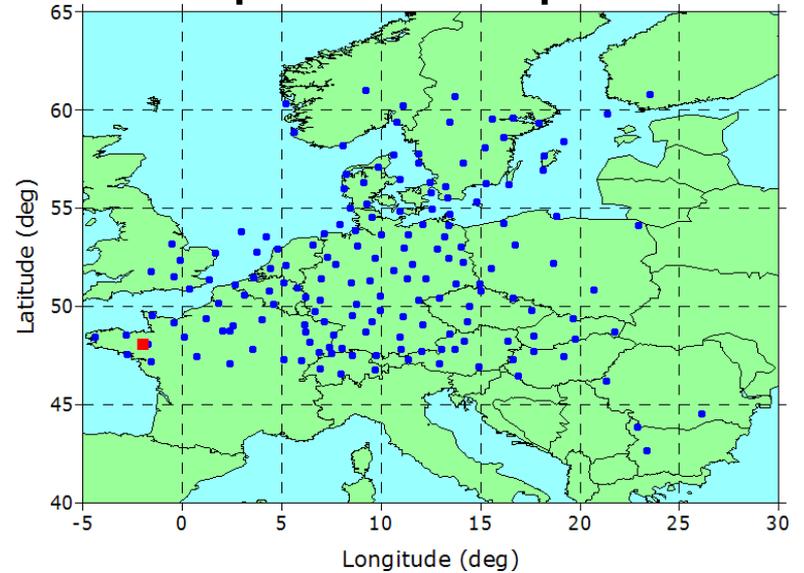
## Over-Land Alongwind Dispersion



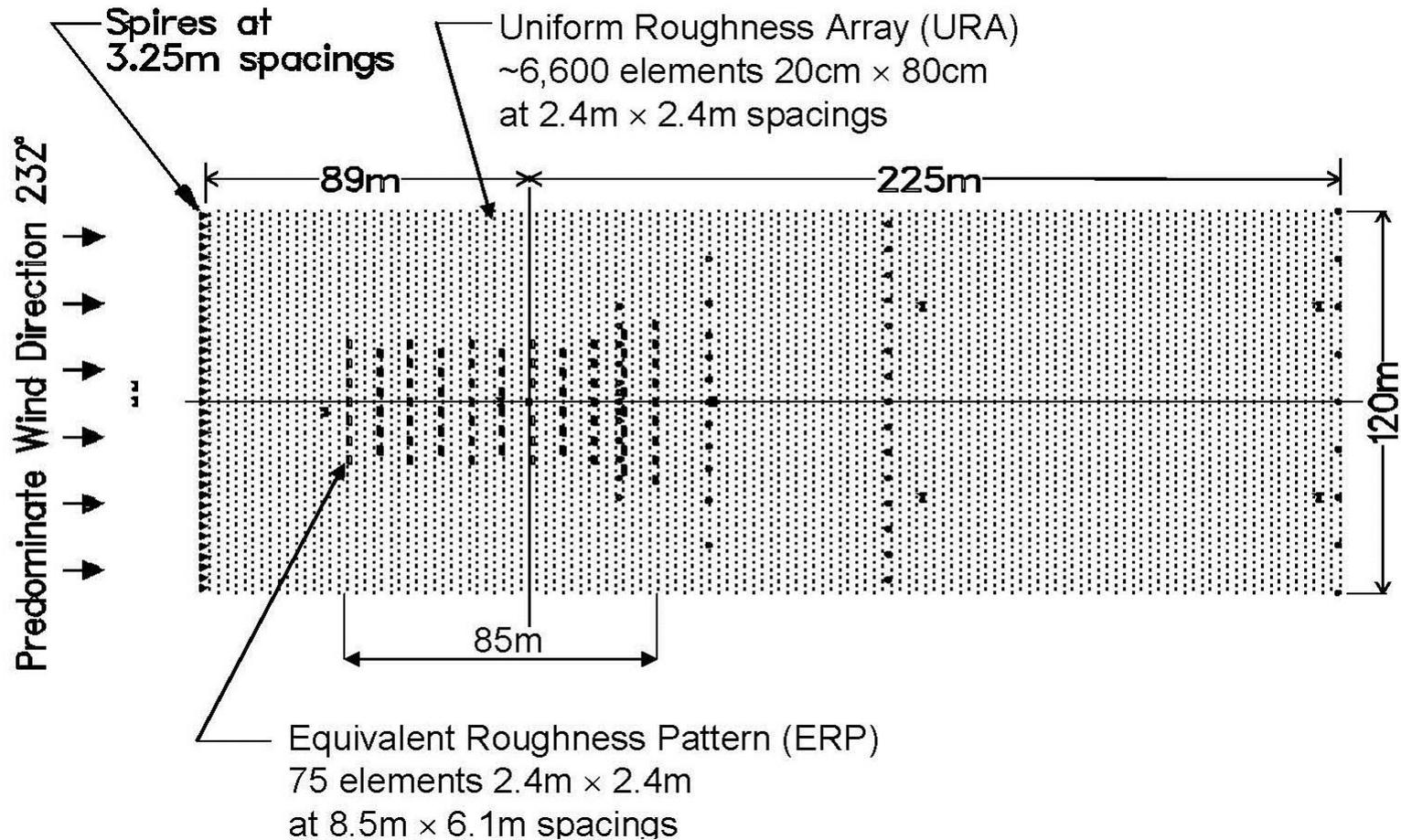
## Long-Range Overwater Diffusion



## European Tracer Experiment



# Kit Fox



- **Finite-duration CO<sub>2</sub> area-source in a nested roughness array**

# Desert Tortoise (Trial 2)

0.8 m 

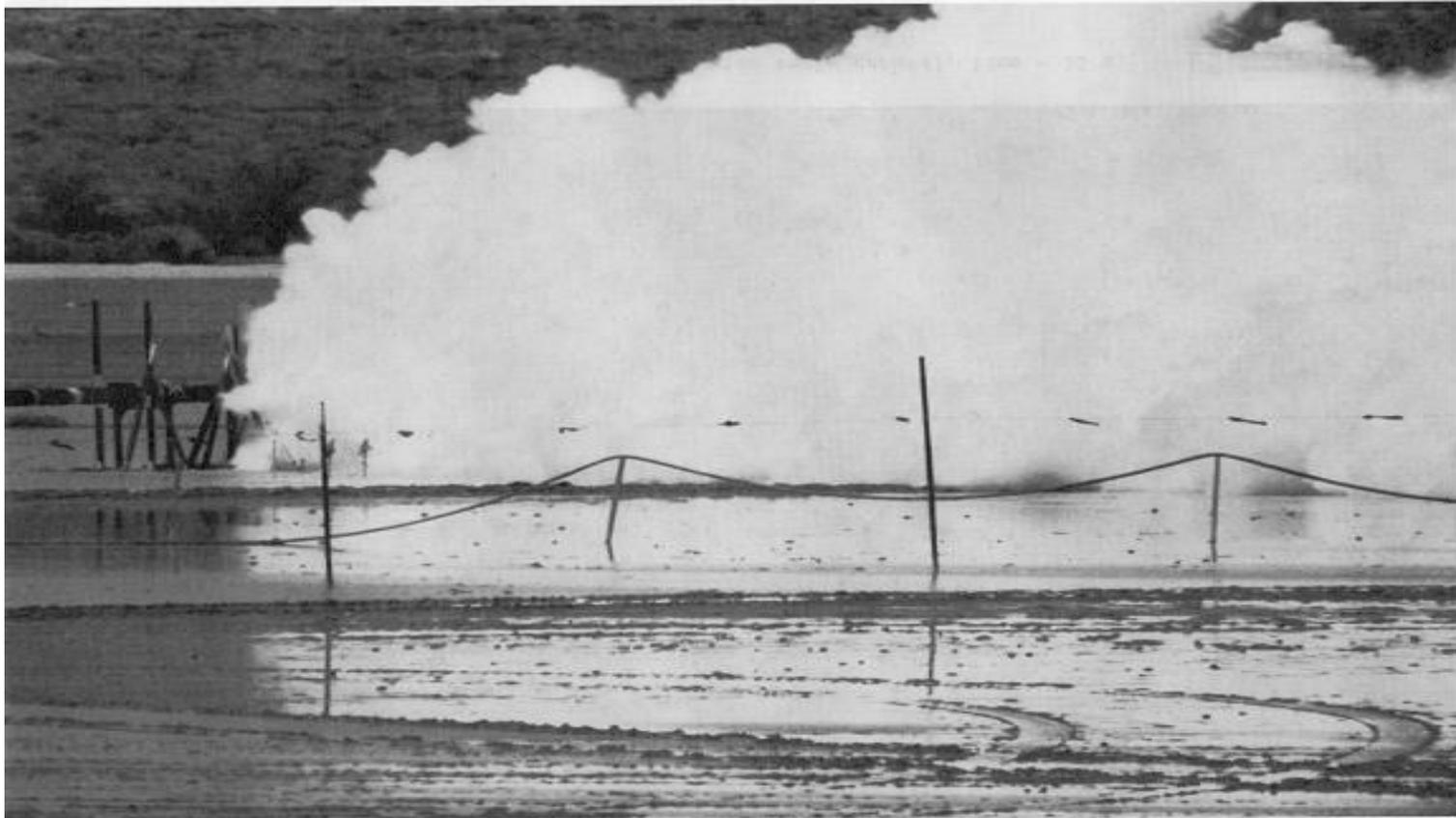
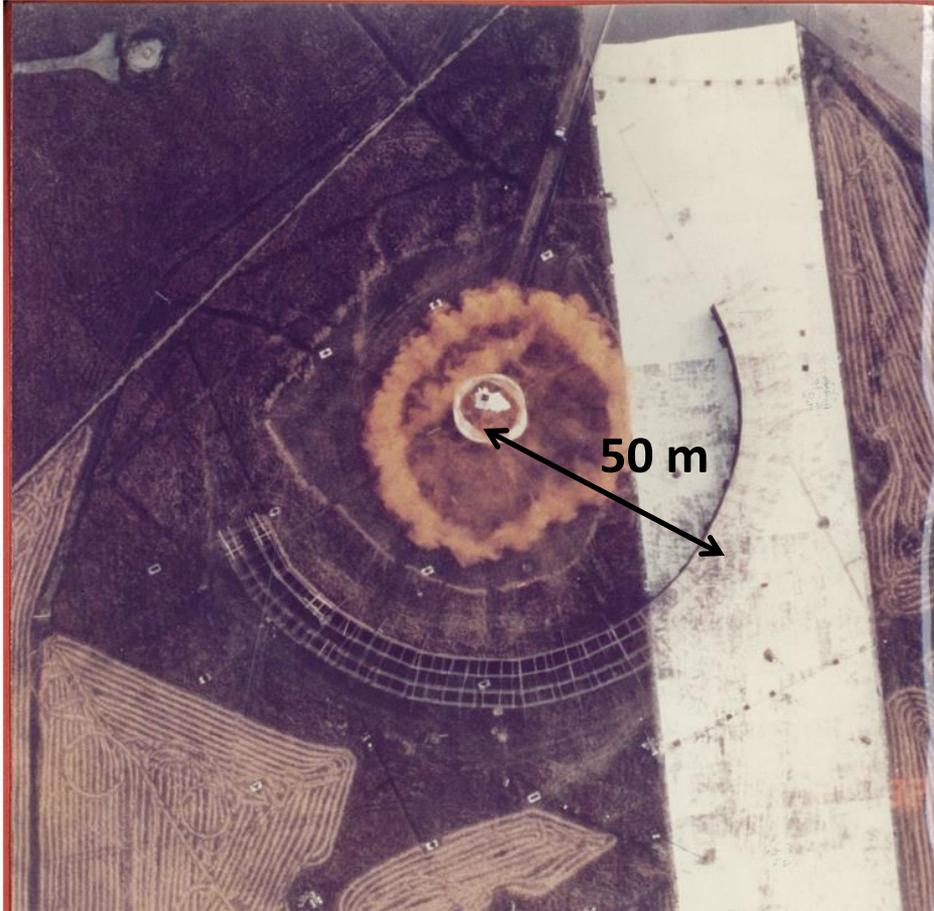


Fig. 18. Desert Tortoise 2 (crosswind narrow angle camera). Time = 35 s.

 Lawrence Livermore  
National Laboratory  
University of California Modesto, WISCONSIN

- Pressurized 2-phase anhydrous  $\text{NH}_3$  release

# Thorney Island (Trial 21)

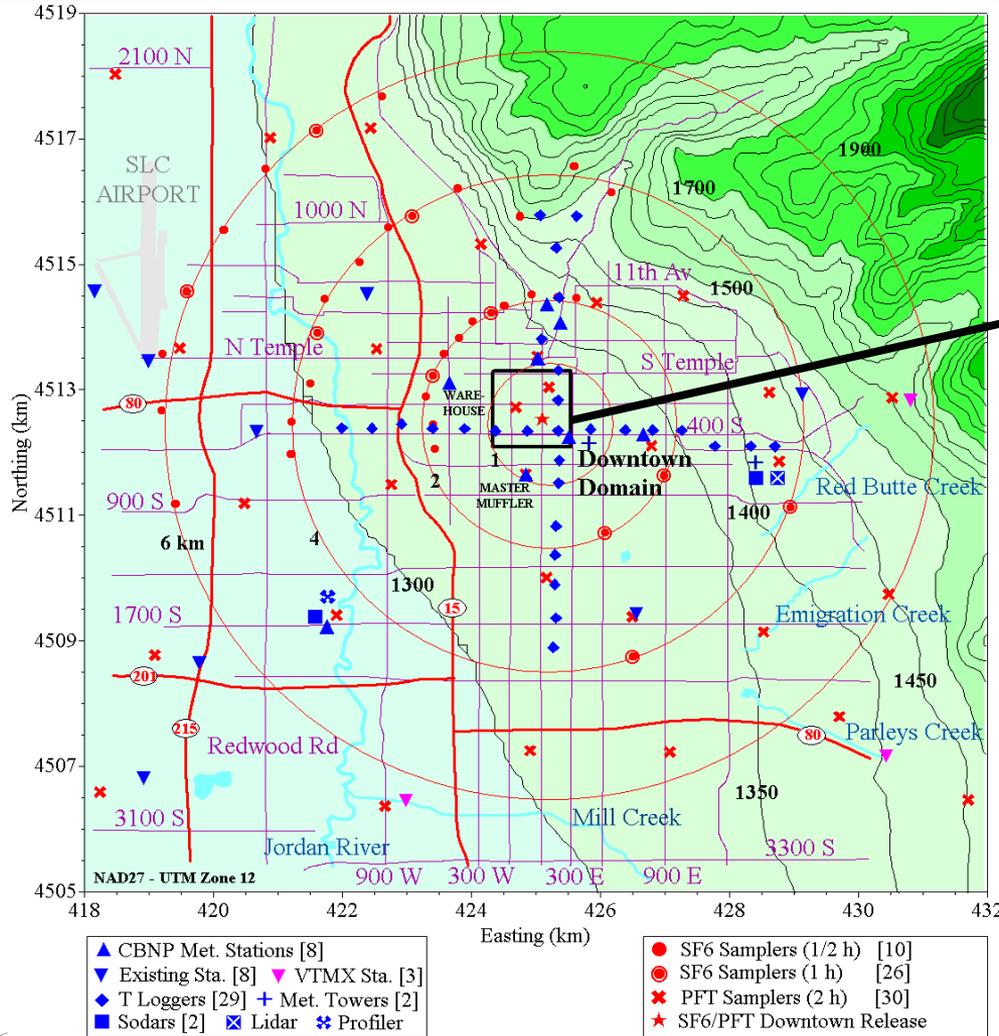


- Sudden collapse of a cylindrical dense cloud consisting of freon-12 and nitrogen
- Picture shows 6 s after the release

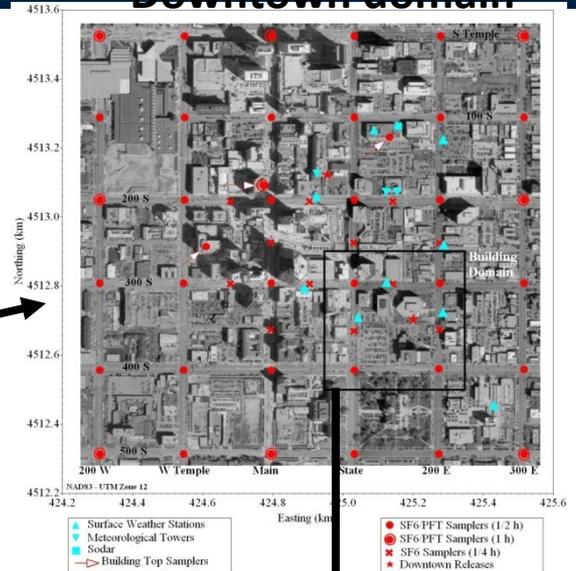
Figure courtesy: McQuaid and Roebuck 1984

# Urban 2000 (Salt Lake City)

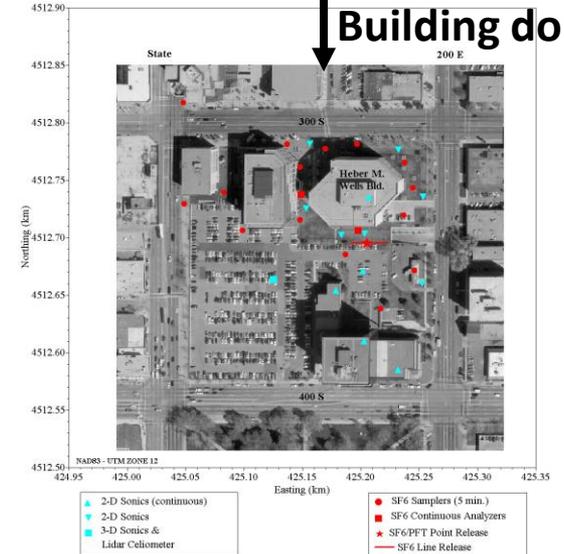
## Urban domain



## Downtown domain



## Building domain



# Data Sets Characteristics

- Experiments conducted over six decades from 1956; plus Lyme Bay in 1927
- Full, 1/10, and laboratory scales
- Length scales 100 m to 1,000 km for field experiments
- Many source types
  - Neutrally buoyant, buoyant, and dense
  - Release rates 0.01 mg/s to 100 kg/s
  - Continuous and instantaneous
  - Stationary and moving
  - Surface and elevated
  - Point and line
- Flat terrain, complex terrain, and urban
- Overland, overwater, and coastal
- Special field campaigns (*i.e.*, many samplers with short time periods) and regular observations (*i.e.*, fewer samplers with long time periods)

# Sample MDA (Condensed) File for Desert Tortoise

|                   |          |          |          |   |
|-------------------|----------|----------|----------|---|
| Desert Tortoise   |          |          |          |   |
| Anhydrous Ammonia |          |          |          |   |
| NH3               |          |          |          | 3-char. abbreviation of chemical          |
| 4                 |          |          |          | number of trials included in MDA          |
| 8                 |          |          |          | time zone designation                     |
| DT1               | DT2      | DT3      | DT4      | trial ID                                  |
| 8                 | 8        | 9        | 9        | month                                     |
| 24                | 29       | 1        | 6        | day                                       |
| 83                | 83       | 83       | 83       | year                                      |
| 16                | 11       | 15       | 18       | hour                                      |
| 37                | 20       | 37       | 15       | minute                                    |
| 17.03             | 17.03    | 17.03    | 17.03    | mol. weight (g/mole)                      |
| 239.7             | 239.7    | 239.7    | 239.7    | normal boiling point (K)                  |
| 1.37E+06          | 1.37E+06 | 1.37E+06 | 1.37E+06 | latent heat of evaporation (J/kg)         |
| 2190              | 2190     | 2190     | 2190     | heat capacity - vapor (J/kg-K)            |
| 4490              | 4490     | 4490     | 4490     | heat capacity - liquid (J/kg-K)           |
| 682.8             | 682.8    | 682.8    | 682.8    | density of liquid (kg/m**3)               |
| 10.31499          | 10.31499 | 10.31499 | 10.31499 | coefficient A for vapor pressure equation |
| 2132.52           | 2132.52  | 2132.52  | 2132.52  | coefficient B for vapor pressure equation |
| 10                | 11.02    | 11.23    | 11.64    | exit pressure (atm)                       |
| 294.7             | 293.3    | 295.3    | 297.3    | source temperature (K)                    |
| 0.081             | 0.0945   | 0.0945   | 0.0945   | source diameter (m)                       |
| 0.79              | 0.79     | 0.79     | 0.79     | source elevation (m)                      |
| HJ                | HJ       | HJ       | HJ       | source type (IR,HJ,AS,EP)                 |
| C                 | C        | C        | C        | source phase (L,C,G)                      |
| -99.9             | -99.9    | -99.9    | -99.9    | source containment diameter (m)           |
| 79.7              | 111.5    | 130.7    | 96.7     | spill/evaporation rate (kg/s)             |
| 126               | 255      | 166      | 381      | spill duration (s)                        |
| -99.9             | -99.9    | -99.9    | -99.9    | total released (kg)                       |
| 1.00E+06          | 1.00E+06 | 1.00E+06 | 1.00E+06 | initial concentration (ppm)               |
| 0.897             | 0.898    | 0.895    | 0.891    | ambient pressure (atm)                    |
| 13.2              | 17.5     | 14.8     | 21.3     | relative humidity (%)                     |
| 302.03            | 303.63   | 307.07   | 305.63   | ambient temperature #1-lower (K)          |
| 0.82              | 0.82     | 0.82     | 0.82     | measurement height for temperature #1 (m) |
| 303.31            | 304.31   | 307.05   | 306.9    | ambient temperature #2-upper (K)          |

(Cont'd)

|       |        |       |       |   |
|-------|--------|-------|-------|---|
| 16.19 | 16.19  | 16.19 | 16.19 | measurement height for temperature #2 (m)       |
| 304.8 | 303.8  | 304.8 | 304   | soil temperature (K)                            |
| 3     | 3      | 2     | 1     | soil moisture (1:dry,2:moist,3:water)           |
| 7.73  | 5.54   | 7.6   | 4.64  | wind speed (m/s)                                |
| 3.36  | 3.36   | 3.36  | 3.36  | measurement height for wind speed (m)           |
| 7.4   | 5.8    | 7.4   | 4.5   | domain-avg wind speed (m/s)                     |
| 1.2   | 0.7    | 1     | -99.9 | domain-avg sigma-u (m/s)                        |
| 5.7   | 7.5    | 8.3   | 5     | domain-avg sigma-theta (deg)                    |
| 2     | 2      | 2     | 2     | measurement height for domain-avg wind data (m) |
| 180   | 180    | 180   | 180   | averaging time for domain-avg data (s)          |
| 0.003 | 0.003  | 0.003 | 0.003 | roughness length z0 (m)                         |
| -99.9 | -99.9  | -99.9 | -99.9 | friction velocity u-star (m/s)                  |
| -99.9 | -99.9  | -99.9 | -99.9 | bowen ratio estimate                            |
| -99.9 | -99.9  | -99.9 | -99.9 | inverse Monin-Obukhov length (1/m)              |
| 1     | 4      | 70    | 1     | cloud cover (%)                                 |
| 4     | 4      | 4     | 5     | Pasquill-Gifford stability class (A=1;D=4;F=6)  |
| 36.7  | 36.7   | 36.7  | 36.7  | latitude (deg)                                  |
| 116   | 116    | 116   | 116   | longitude (deg)                                 |
| 1     | 1      | 1     | 1     | averaging time for peak concentration (s)       |
| 80    | 160    | 120   | 300   | averaging time for averaged concentration (s)   |
| 100   | 100    | 100   | 100   | concentration of interest for modeling (ppm)    |
| 1     | 1      | 1     | 1     | suggested receptor height for modeling (m)      |
| 2     | 2      | 2     | 2     | number of distances downwind                    |
| 100   | 100    | 100   | 100   | distance downwind                               |
| 800   | 800    | 800   | 800   | distance downwind                               |
| -99.9 | -99.9  | -99.9 | -99.9 | distance downwind (terminal record: -99.9)      |
| 63260 | 109580 | 97250 | 84260 | max. conc. (ppm) based on tpeak                 |
| 10950 | 18590  | 15630 | 20910 | max. conc. (ppm) based on tpeak                 |
| 49943 | 83203  | 76881 | 57300 | max. conc. (ppm) based on tavg                  |
| 8843  | 10804  | 7087  | 16678 | max. conc. (ppm) based on tavg                  |
| 11.83 | 14.72  | 15.24 | 15.67 | sigma-y (m) based on tavg                       |
| 61.79 | 88.19  | 73.4  | 85.99 | sigma-y (m) based on tavg                       |

# Raw Data Snapshot for Desert Tortoise 4

## Heat Flux

## Concentration

## Humidity

## Temperature

| heat flux dt4 g04 |             |
|-------------------|-------------|
| time              | a09         |
| -1.99180e+02      | 1.92400e-01 |
| -1.98180e+02      | 1.92400e-01 |
| -1.97180e+02      | 1.92400e-01 |
| -1.96180e+02      | 1.92400e-01 |
| -1.95180e+02      | 1.92400e-01 |
| -1.94180e+02      | 1.92400e-01 |
| -1.93180e+02      | 1.92400e-01 |
| -1.92180e+02      | 1.92400e-01 |
| -1.91180e+02      | 1.92400e-01 |
| -1.90180e+02      | 1.92400e-01 |
| -1.89180e+02      | 1.92400e-01 |
| -1.88180e+02      | 1.92400e-01 |
| -1.87180e+02      | 1.92400e-01 |
| -1.86180e+02      | 1.92400e-01 |
| -1.85180e+02      | 1.92400e-01 |
| -1.84180e+02      | 1.92400e-01 |
| -1.83180e+02      | 1.92400e-01 |
| -1.82180e+02      | 1.92400e-01 |
| -1.81180e+02      | 1.92400e-01 |
| -1.80180e+02      | 1.92400e-01 |
| -1.79180e+02      | 1.92400e-01 |
| -1.78180e+02      | 1.92400e-01 |
| -1.77180e+02      | 1.92400e-01 |
| -1.76180e+02      | 1.92400e-01 |
| -1.75180e+02      | 1.92400e-01 |
| -1.74180e+02      | 1.92400e-01 |
| -1.73180e+02      | 1.92400e-01 |
| -1.72180e+02      | 1.92400e-01 |
| -1.71180e+02      | 1.92400e-01 |
| -1.70180e+02      | 1.92400e-01 |
| -1.69180e+02      | 1.92400e-01 |
| -1.68180e+02      | 1.92400e-01 |
| -1.67180e+02      | 1.92400e-01 |
| -1.66180e+02      | 1.92400e-01 |
| -1.65180e+02      | 1.92400e-01 |
| -1.64180e+02      | 1.92400e-01 |
| -1.63180e+02      | 1.92400e-01 |
| -1.62180e+02      | 1.92400e-01 |
| -1.61180e+02      | 1.92400e-01 |
| -1.60180e+02      | 1.92400e-01 |
| -1.59180e+02      | 1.92400e-01 |
| -1.58180e+02      | 1.92400e-01 |

| Desert Tortoise 4 concentration row 11 |       |       |       |       |       |      |       |
|--|-------|-------|-------|-------|-------|------|-------|
| 9/06/83                                |       |       |       |       |       |      |       |
| 09/24/85u 15:45:13                     |       |       |       |       |       |      |       |
| 09/24/85 15:46:30                      |       |       |       |       |       |      |       |
| time                                   | g021  | g031  | g041  | g051  | g061  | g071 | g081  |
| 1.00                                   | 0.    | 0.    | 0.002 | 0.    | 0.017 | 0.   | 0.014 |
| 2.00                                   | 0.    | 0.    | 0.002 | 0.    | 0.    | 0.   | 0.014 |
| 3.00                                   | 0.    | 0.    | 0.    | 0.    | 0.    | 0.   | 0.014 |
| 4.00                                   | 0.    | 0.253 | 0.002 | 0.    | 0.    | 0.   | 0.014 |
| 5.00                                   | 0.    | 0.119 | 0.    | 0.    | 0.    | 0.   | 0.014 |
| 6.00                                   | 0.    | 0.    | 0.002 | 0.    | 0.017 | 0.   | 0.014 |
| 7.00                                   | 0.    | 0.229 | 0.    | 0.    | 0.017 | 0.   | 0.014 |
| 8.00                                   | 0.    | 0.021 | 0.    | 0.    | 0.    | 0.   | 0.014 |
| 9.00                                   | 0.    | 0.119 | 0.    | 0.    | 0.    | 0.   | 0.014 |
| 10.00                                  | 0.006 | 0.045 | 0.002 | 0.    | 0.    | 0.   | 0.014 |
| 11.00                                  | 0.006 | 0.045 | 0.    | 0.    | 0.    | 0.   | 0.014 |
| 12.00                                  | 0.    | 0.    | 0.002 | 0.    | 0.    | 0.   | 0.014 |
| 13.00                                  | 0.    | 0.    | 0.002 | 0.    | 0.017 | 0.   | 0.    |
| 14.00                                  | 0.013 | 0.094 | 0.002 | 0.    | 0.    | 0.   | 0.014 |
| 15.00                                  | 0.    | 0.    | 0.002 | 0.    | 0.    | 0.   | 0.    |
| 16.00                                  | 0.    | 0.009 | 0.002 | 0.    | 0.    | 0.   | 0.014 |
| 17.00                                  | 0.006 | 0.    | 0.002 | 0.    | 0.    | 0.   | 0.014 |
| 18.00                                  | 0.006 | 0.    | 0.002 | 0.    | 0.017 | 0.   | 0.014 |
| 19.00                                  | 0.    | 0.094 | 0.    | 0.    | 0.    | 0.   | 0.014 |
| 20.00                                  | 0.    | 0.033 | 0.002 | 0.    | 0.    | 0.   | 0.014 |
| 21.00                                  | 0.    | 0.    | 0.002 | 0.011 | 0.017 | 0.   | 0.014 |
| 22.00                                  | 0.    | 0.094 | 0.002 | 0.    | 0.017 | 0.   | 0.    |
| 23.00                                  | 0.013 | 0.131 | 0.002 | 0.    | 0.    | 0.   | 0.014 |
| 24.00                                  | 0.    | 0.009 | 0.002 | 0.    | 0.    | 0.   | 0.014 |
| 25.00                                  | 0.    | 0.155 | 0.    | 0.    | 0.    | 0.   | 0.014 |
| 26.00                                  | 0.006 | 0.119 | 0.    | 0.    | 0.    | 0.   | 0.014 |
| 27.00                                  | 0.013 | 0.070 | 0.    | 0.    | 0.    | 0.   | 0.014 |
| 28.00                                  | 0.    | 0.    | 0.044 | 0.    | 0.    | 0.   | 0.014 |
| 29.00                                  | 0.    | 0.045 | 1.706 | 0.    | 0.109 | 0.   | 0.    |
| 30.00                                  | 0.    | 0.045 | 3.194 | 0.    | 1.146 | 0.   | 0.014 |
| 31.00                                  | 0.    | 0.    | 3.744 | 0.022 | 2.815 | 0.   | 0.    |
| 32.00                                  | 0.    | 0.546 | 4.362 | 0.453 | 4.421 | 0.   | 0.    |
| 33.00                                  | 0.    | 2.096 | 4.555 | 2.157 | 6.715 | 0.   | 0.    |
| 34.00                                  | 0.    | 2.133 | 5.236 | 4.014 | 5.457 | 0.   | 0.014 |
| 35.00                                  | 0.    | 2.619 | 5.387 | 4.237 | 4.276 | 0.   | 0.    |
| 36.00                                  | 0.    | 2.575 | 6.025 | 3.939 | 4.820 | 0.   | 0.    |
| 37.00                                  | 0.    | 1.852 | 5.255 | 4.608 | 5.909 | 0.   | 0.014 |
| 38.00                                  | 0.    | 1.596 | 4.912 | 5.685 | 7.054 | 0.   | 0.014 |
| 39.00                                  | 0.    | 1.828 | 5.574 | 6.671 | 4.462 | 0.   | 0.014 |

| --- table d4humc01 --- |      |              |     |
|------------------------|------|--------------|-----|
| testid                 | stnm | time         | a06 |
| nh304                  | c01  | -1.02018e+03 | 0.  |
| nh304                  | c01  | -1.01918e+03 | 0.  |
| nh304                  | c01  | -1.01818e+03 | 0.  |
| nh304                  | c01  | -1.01718e+03 | 0.  |
| nh304                  | c01  | -1.01618e+03 | 0.  |
| nh304                  | c01  | -1.01518e+03 | 0.  |
| nh304                  | c01  | -1.01418e+03 | 0.  |
| nh304                  | c01  | -1.01318e+03 | 0.  |
| nh304                  | c01  | -1.01218e+03 | 0.  |
| nh304                  | c01  | -1.01118e+03 | 0.  |
| nh304                  | c01  | -1.01018e+03 | 0.  |
| nh304                  | c01  | -1.00918e+03 | 0.  |
| nh304                  | c01  | -1.00818e+03 | 0.  |
| nh304                  | c01  | -1.00718e+03 | 0.  |
| nh304                  | c01  | -1.00618e+03 | 0.  |
| nh304                  | c01  | -1.00518e+03 | 0.  |
| nh304                  | c01  | -1.00418e+03 | 0.  |
| nh304                  | c01  | -1.00318e+03 | 0.  |
| nh304                  | c01  | -1.00218e+03 | 0.  |
| nh304                  | c01  | -1.00118e+03 | 0.  |
| nh304                  | c01  | -1.00018e+03 | 0.  |
| nh304                  | c01  | -9.99180e+02 | 0.  |
| nh304                  | c01  | -9.98180e+02 | 0.  |
| nh304                  | c01  | -9.97180e+02 | 0.  |
| nh304                  | c01  | -9.96180e+02 | 0.  |
| nh304                  | c01  | -9.95180e+02 | 0.  |
| nh304                  | c01  | -9.94180e+02 | 0.  |
| nh304                  | c01  | -9.93180e+02 | 0.  |
| nh304                  | c01  | -9.92180e+02 | 0.  |
| nh304                  | c01  | -9.91180e+02 | 0.  |
| nh304                  | c01  | -9.90180e+02 | 0.  |
| nh304                  | c01  | -9.89180e+02 | 0.  |
| nh304                  | c01  | -9.88180e+02 | 0.  |
| nh304                  | c01  | -9.87180e+02 | 0.  |
| nh304                  | c01  | -9.86180e+02 | 0.  |
| nh304                  | c01  | -9.85180e+02 | 0.  |
| nh304                  | c01  | -9.84180e+02 | 0.  |
| nh304                  | c01  | -9.83180e+02 | 0.  |
| nh304                  | c01  | -9.82180e+02 | 0.  |
| nh304                  | c01  | -9.81180e+02 | 0.  |
| nh304                  | c01  | -9.80180e+02 | 0.  |
| nh304                  | c01  | -9.79180e+02 | 0.  |

| rtd temperature dt4 g01 |             |             |             |
|-------------------------|-------------|-------------|-------------|
| time                    | a02         | a03         | a04         |
| -1.99180e+02            | 3.27400e+01 | 3.30000e+01 | 3.34400e+01 |
| -1.98180e+02            | 3.27400e+01 | 3.29800e+01 | 3.34200e+01 |
| -1.97180e+02            | 3.27400e+01 | 3.29800e+01 | 3.34200e+01 |
| -1.96180e+02            | 3.27100e+01 | 3.29500e+01 | 3.34200e+01 |
| -1.95180e+02            | 3.26900e+01 | 3.29500e+01 | 3.34200e+01 |
| -1.94180e+02            | 3.26900e+01 | 3.29300e+01 | 3.34400e+01 |
| -1.93180e+02            | 3.26600e+01 | 3.29300e+01 | 3.34700e+01 |
| -1.92180e+02            | 3.26400e+01 | 3.29300e+01 | 3.34700e+01 |
| -1.91180e+02            | 3.26400e+01 | 3.29300e+01 | 3.34700e+01 |
| -1.90180e+02            | 3.26400e+01 | 3.29300e+01 | 3.34700e+01 |
| -1.89180e+02            | 3.26600e+01 | 3.29300e+01 | 3.34700e+01 |
| -1.88180e+02            | 3.26600e+01 | 3.29300e+01 | 3.34700e+01 |
| -1.87180e+02            | 3.26600e+01 | 3.29300e+01 | 3.34400e+01 |
| -1.86180e+02            | 3.26600e+01 | 3.29300e+01 | 3.34700e+01 |
| -1.85180e+02            | 3.26400e+01 | 3.29300e+01 | 3.34700e+01 |
| -1.84180e+02            | 3.26400e+01 | 3.29300e+01 | 3.34700e+01 |
| -1.83180e+02            | 3.26400e+01 | 3.29500e+01 | 3.34700e+01 |
| -1.82180e+02            | 3.26400e+01 | 3.29500e+01 | 3.34700e+01 |
| -1.81180e+02            | 3.26400e+01 | 3.29500e+01 | 3.34700e+01 |
| -1.80180e+02            | 3.26400e+01 | 3.29500e+01 | 3.34700e+01 |
| -1.79180e+02            | 3.26600e+01 | 3.29800e+01 | 3.34900e+01 |
| -1.78180e+02            | 3.26600e+01 | 3.29800e+01 | 3.34900e+01 |
| -1.77180e+02            | 3.26900e+01 | 3.29800e+01 | 3.34900e+01 |
| -1.76180e+02            | 3.26900e+01 | 3.29800e+01 | 3.35200e+01 |
| -1.75180e+02            | 3.26900e+01 | 3.29800e+01 | 3.35200e+01 |
| -1.74180e+02            | 3.26900e+01 | 3.29800e+01 | 3.34900e+01 |
| -1.73180e+02            | 3.26900e+01 | 3.29800e+01 | 3.34900e+01 |
| -1.72180e+02            | 3.26900e+01 | 3.29800e+01 | 3.34700e+01 |
| -1.71180e+02            | 3.26900e+01 | 3.29500e+01 | 3.34700e+01 |
| -1.70180e+02            | 3.26600e+01 | 3.29500e+01 | 3.34700e+01 |
| -1.69180e+02            | 3.26600e+01 | 3.29500e+01 | 3.34700e+01 |
| -1.68180e+02            | 3.26400e+01 | 3.29500e+01 | 3.34400e+01 |
| -1.67180e+02            | 3.26400e+01 | 3.29300e+01 | 3.34400e+01 |
| -1.66180e+02            | 3.26400e+01 | 3.29300e+01 | 3.34700e+01 |
| -1.65180e+02            | 3.26400e+01 | 3.29300e+01 | 3.34700e+01 |
| -1.64180e+02            | 3.26400e+01 | 3.29300e+01 | 3.34700e+01 |
| -1.63180e+02            | 3.26400e+01 | 3.29500e+01 | 3.34700e+01 |
| -1.62180e+02            | 3.26400e+01 | 3.29500e+01 | 3.34700e+01 |
| -1.61180e+02            | 3.26400e+01 | 3.29500e+01 | 3.34400e+01 |
| -1.60180e+02            | 3.26100e+01 | 3.29800e+01 | 3.34400e+01 |
| -1.59180e+02            | 3.26100e+01 | 3.29800e+01 | 3.34400e+01 |
| -1.58180e+02            | 3.26400e+01 | 3.29800e+01 | 3.34200e+01 |

# Data Sets Usage

- **Most frequently requested data sets**
  - Prairie Grass
  - Dipole Pride 26
  - Over-Land Alongwind Dispersion
  - Kit Fox
  - DOE dense gas experiments (Burro, Coyote, Desert Tortoise, and Goldfish)
  - Thorney Island
  - Urban 2000
  - MUST
  - DSWA Phase 1
- **Have on average received 5-10 requests per year from all over the world, leading to publication of many journal articles, dissertations, and reports**

# Other Data Sources

- **Air Resources Laboratory, National Oceanic and Atmospheric Administration (<http://www.arl.noaa.gov/DATEM.php>)**
- **Dugway Proving Ground**
- **Lawrence Livermore National Laboratory**
- **Environmental Protection Agency**
- **Nuclear Regulatory Commission**
- **Naval Surface Warfare Center, Dahlgren Division**
- **Risø National Laboratory, Denmark (e.g., Model Validation Kit, <http://www.harmo.org/kit/>)**
- **University of Hamburg, Germany**
- **John Irwin's web site ([http://jsirwin.com/Tracer\\_Data.html](http://jsirwin.com/Tracer_Data.html))**

# Conclusions (1/2)

- **Data are perishable; will disappear (e.g., due to lack of funding, PM moving on) if not properly preserved**
- **A grassroots effort to archive and distribute 50+ historical ATD data sets**
- **Varying degrees of data availability, including**
  - **Complete raw data with experiment reports**
  - **Data processed as inputs to other ATD models**
  - **Summary tables**
- **No web site nor database management system, just providing all data files “as is” in bulk; so no common data format except for condensed MDA files created for some experiments**
- **Distribution via cloud storage**

# Conclusions (2/2)

- Recent data sets often still managed by sponsors, so can't be freely distributed
- Answers to questions and advice on analysis provided to the extent feasible
- For future field experiments
  - Consider carefully how to maintain dataset longevity
  - Do not let unessential software features become future obstacles to data availability
  - Have good documentation to increase usefulness
- Welcome
  - Contributions from colleagues of other data sets
  - Suggestions of business models to sustain this effort

# Backup Slide

