Dabberdt & Ching: History of US Meteorological Field Studies (AMS Atlanta 2014)

Year of Study (approx.)	Ref. #	Citation	Study Name (Bold font = formal name)	Study City	Study Year	Meteor. Meas. Systems	Meteor. Science	AQ Science & Meas.
1921	1	Chow, W. T. L., D. Brennan, and A. J. Brazel (2012). Urban heat island research in Phoenix, Arizona: theoretical contributions and policy applications. *Bull. Amer. Meteor. Soc* ., **93** (4), pp 917-930.	*Phoenix UHI Review*	Phoenix, AZ	Reviews many field studies over many years (~1921-present)	MN	UHI	n/a
1960	2	DeMarrais,GA, 1961:Vertical temperature difference observed over an urban area. Bull AMS 8, 548-554	*Cincinnati Temp Profiles*	Louisville, KY	1960?	AC	BL	
1962	3	Pack, D. H. (1962). Air trajectories and turbulence statistics from weather radar using tetroons and radar transponders. Mon. Wea. Rev., 90, 491-506.	*Cincinnati Tetroon ('62)*	Cincinnati	1962	T	TD; TU; LC	n/a
1963	4	Angell, J. K., D. H. Pack, G. C. Holzworth, and C. R. Dickson (1966). Tetroon trajectories in an urban atmosphere. J. Appl. Meteor., 5, 565–572.	*LA Tetroon ('63)*	Los Angeles (see Pack and Angell, 1963)	1963	T	TD; TU; LC	n/a
1963	5	McElroy, J. L. (1969). A comparative study of urban and rural dispersiont. J. Appl. Meteor., 8, 19–31.	*St. Louis Tracer ('63-'65)*	St. Louis	1963-1965	-	TD	TR
1963	6	Pack, D. H. and J. K. Angell (1963). A preliminary study of air trajectories in the Los Angeles basin as derived from tetroon flights. Mon. Wea. Rev., 91, 583–604.	*LA Tetroon ('63)*	Greater Los Angeles Area	1963	T; AC	TD; LC	n/a
1963	7	Pooler, F. Jr. (1966). A tracer study of dispersion over a city. J. Air Pollut. Control Assoc., Vol. 16, 677-681.	*St. Louis Tracer ('63-'65)*	St. Louis	1963-1965	MN; SO; T	TD; LC	TR
1964	8	Bornstein, R. D., 1968: Observations of the urban heat island effect in New York City. J. Appl. Meteor., 7, 575–582. (see Davidson, 1967)	**NY Urban Air Pollution Dynamics**	New York City	1964-66	AC; SO	UHI	n/a
1964	9	Davidson, B. (1967). A summary of the New York urban air pollution dynamics research program. J Air Pollut Control Assoc. Mar; 17(3) :154-158.	**NY Urban Air Pollution Dynamics**	New York City	1964-66	AC; SO	TD; LC; BL; UHI	C; SO2
1965	10	Hass, W. A., Hoecker, W. H., Pack, D. H. and Angell, J. K. (1967). Analysis of low-level, constant volume balloon (tetroon) flights over New York City. Q.J.R. Meteorol. Soc., 93: 483–493.	*NYC Tetroon ('65)*	New York City	1965	T	TD; TU; LC	n/a
1967	11	Clarke, JF, 1969: Nocturnal urban boundary layer over Cincinatti, Mon Wea Rev, 97(8), 582-589	*Cincinnati UBL*	Cincinnati, OH	1967-1968	AC	UHI,BL	
1967	12	Sandberg J. S., W. J. Walker and R. H. Thuillier (1970). Fluorescent tracer studies of pollutant transport in the San Francisco Bay area. J. Air Pollut. Control Assoc., Vol. 20, 593-598.	*San Francisco Tracer ('67-'68)*	San Francisco Bay Area	1967-1968	-	TD	TR
1969	13	Angell, J. K., D. H. Pack, L. Machta, C. R. Dickson, W. H. Hoecker (1972). Three-dimensional air trajectories determined from tetroon flights in the planetary boundary layer of the Los Angeles basin. J. Appl. Meteor., 11, 451–471.	*LA Tetroon ('69)*	Greater Los Angeles Area	1969	T; AC	TD; LC	C; O3
1969	14	Kirschner, B. (1971). Environmental meteorological support units: A new Weather Bureau program supporting urban air quality control. Paper ME 3E, pages 987-993. **Proceedings of the Second International Clean Air Congress**, Harold M. Englund and W. T. Beery, Editors. Academic Press, 1971. 1354 pages.	**EMSU**	Chicago, Philadelphia, NYC, St. Louis, and Washington, DC	1969-1972?	SO	BL	n/a
1970	15	Johnson, W. B., F. L. Ludwig, W. F. Dabberdt, and R. J. Allen (1973). An Urban Diffusion Simulation Model For Carbon Monoxide, J. Air Poll. Contr. Assoc., Vol. 23, No.6, 490-498.	**APRAC-1A**	San Jose, CA	1970	AC; MN	TD; LC; BL	CO
1971	16	Dabberdt, W. F. , F.L. Ludwig and W. B. Johnson, Jr. (1973). Validation and applications of an urban diffusion model for vehicular pollutants, Atmospheric Environment. Vol. 7, pp. 603-618.	**APRAC-1A**	St. Louis, MO	1971	AC; MN	TD; LC; BL	CO
1971	17	Changnon, S. A., Jr. (1981). METROMEX: A Review and Summary. Meteorological Monographs, Vol. 18, No. 40, 181 pages. Published by Amer. Meteor. Soc., Boston, MA.	**METROMEX**	St. Louis	1971-76	MN; SO; R; L; WP; AC	PCP; LC; UHI	PM
1972	18	Dabberdt, W. F. and P. A. Davis: Determination of energetic characteristics of urban-rural surfaces in the greater St. Louis area, Boundary-Layer Meteorology 14 (1978) 105-121.	Urban Climatonomy	St. Louis, MO	1972	AC	SEB; UHI	n/a
1973	19	Drivas, P.J. and F.H. Shair (1967). A tracer study of pollutant transport and dispersion in the Los Angeles area, Atmospheric Environment , Volume 8, Issue 11, November 1974, Pages 1155-1163, ISSN 0004-6981.	*Anaheim Tracer ('73)*	Greater Los Angeles Area	1973	-	TD	TR
1973	20	Pooler,F., 1974: Network requirements for the St Louis Regional Air pollution study, J Air Poll Clontrol Assoc, 24(3) 228-231	**RAPS**	St Louis, Missouri		MN	TD; UHI; BL;	SO2
1973	21	Schiermeier, FA., 1978: RAPS field measurements are in, Environ. Sci. Technol., 1978, 12 (6), pp 644–651, DOI: 10.1021/es60142a608	**RAPS**	St Louis, Missouri	1973-1976	MN; SO; AC; WP; L	TD; UHI; BL;	SO2
1974	22	Evans, R, 1979: The Contribution of Ozone Aloft to Surface Ozone Maxima, PHD dissertation, UNC	**RAPS**	St Louis, Missouri	1974-1976	AC, MN	TD	O3
1974	23	Mage, D, R. Evans, 1979: The RAPS Helicopter Air Pollution Measurement Program: St Louis, Missouri, 1974-1976. EPA-600/4-7-078	**RAPS**	St Louis, Missouri	1974-1976	AC	UHI; BL;	SO2; O3
1975	24	Clarke,J., J. Ching,,J. Godowitch, 1982: An experimental study of turbulence in an urban environment., EPA Technical Report, EPA-600/3-82-062, RTP, NC 150 pp (NTIS PB 82-226-085)	**RAPS**	St Louis, Missouri	1975-1976	ST; SR; AC	BL; TU; AC; SEB	
1975	25	Clarke,J., J. Ching,,J. Godowitch, F.Binkowski, 1987: Surface layer turbulence in an urban area, in "Modeling the Urban Boundary Layer, AMS,isbn 0-933876-68-8"	**RAPS**	St Louis, Missouri	1975-1976	ST	BL; TU; SEB	
1975	26	Doll,D., JKS Ching, J Kaneshiro, 1985: Parameterization of subsurface heating for soil and concrete using net radiation data, Bound Layer Meteor., 32 351-372.	**RAPS**	St Louis, Missouri	1975-1976	ST	SEB	
1975	27	Godowitch, J.M., 1986: Characteristics of vertical turbulence velocies in the urban convective boundary layer, BLM 35, 387-407.	**RAPS**	St Louis, Missouri	1975-1976	ST; AC	BL; TU; UHI	
1975	28	Godowitch, JM., JKS Ching, JF Clarke, 1986: Evolution of the nocturnal inversion layer at an urbanand nonurban location, JCAM 24(8), 791-804.	**RAPS**	St Louis, Missouri	1975-1976	AC; MN	BL	
1975	29	Godowitch, JM., JKS Ching, JF Clarke, 1987: Spatial variation of the evolution and structure of the urban boundary layer, BLM 38, 249-272	**RAPS**	St Louis, Missouri	1975-1976	ST; AC; L; SO	BL; UHI	
1976	30	Ching, JKS, 1985: Urban scale variations of turbulence parameters and fluxes, BLM 33, 335-361	**RAPS**	St Louis, Missouri	1976	ST; AC	BL; TU; SEB	

1976	31	Ching, JKS, JF Clarke, JM Godowitch, BLM 25 171-191: Modulation of heat flux by different scales of advection in an urban environment, BLM 25, 171-191	**RAPS**	St Louis, Missouri	1976	ST; AC	BL; TU; SEB	
1976	32	Ching, JKS, JF Clarke, JS Irwin and JM Godowitch, 1983: Relevance of mixed layer sdaling for daytime dispersion based on RPS and other field studies Atm Env 17(4) 859-871.	**RAPS**	St Louis, Missouri	1976	ST; SO; L; AC; MN	BL; TU; TD	
1976	33	Peterson, JT, TL Stoffel, 1980: Analyses of Urban-Rural Solar Radiation Data from St Louis, Missouri.J Appl Meteo, 19, 275-283	**RAPS**	St Louis, Missouri	1976	SR; MN	UHI; SEB	
1976	34	Shreffler, J , 1979: Heat island convergence in St Louis during calm periods. J Appp Meteor 18, 1512-1519	**RAPS**	St Louis, Missouri	1976	MN	UHI	
1979	35	Greenhut, G., J. K. S. Ching, R. Pearson Jr.T. P. Repoff, 1984:Transport of ozone by turbulence and clouds in an urban boundary layer, Volume 89, Issue D3, pages 4757–4766, 20 June 1984	**NEROS**	Philadelphia,PA	1979	AC	TBL; LC; BL	O3
1982	36	McElroy, J.L. and T. B. Smith (1986). Vertical Pollutant Distributions and Boundary Layer Structure Observed by Airborne Lidar Near the Complex Southern California Coastline, Atmos. Env., Vol. 20, No. 6, pp. 1555-1566.	*So. Calif. Airborne Lidar ('82)*	Los Angeles - San Diego Coastal Zone	1982	L; AC	TD; BL	PM
1984	37	Wakimoto, R. M., and J. L. McElroy (1986). Lidar observation of elevated pollution layers over Los Angeles. Journal of Climate and Applied Meteorology 25 (11).	**BASIN**	Greater Los Angeles Area	1984	L; AC; SO; MN	BL	C; PM
1985	38	Dabberdt, W. F. and W. Viezee, 1987: South central coast cooperative aerometric monitoring program (SCCCAMP). Bull. Amer. Meteor. Soc., 68, 1098–1110	**SCCCAMP**	North LA	1985	SO; MN; AC; R; WP	TD; BL; LC	C; O3; NOX; HC; TR
1985	39	Streutker, D. R. (2003). Satellite-measured growth of the urban heat island of Houston, Texas. *Remote Sensing of Environment* 85 , pp 282–289.	*Houston UHI*	Houston, TX	1985-87 and 1999-2001	SAT	UHI	n/a
1987	40	Lawson, D.R. (1990). The Southern California Air Quality Study. Journal of the Air and Waste Management Association, Vol. 40, pp: 156–165.	**SCAQS**	Greater Los Angeles Area	1987	MN; SO; AC; L	TD; LC	C; O3; NOx; CO; SO2; HC; PM; TR
1992	41	Marsik, F.J., K.W. Fischer, T.D. McDonald, and P.J. Samson. 1995. Comparison of methods for estimating mixing height used during the 1992 Atlanta Field Intensive. J. Appl. Meteorol. 34:1802-1814.	**SOS**	Atlanta,GA	1992	RASS; SO; L	BL;	
1995	42	McNider,RT, WB Norris, AJ Song,RL Clymer, S Gupta, RM Banta, RJ Zamora A White and M Trainer, 1998: Meteorological conditions during the 1995 Southern Oxidants Study Nashville/Middle Tennessee Field Intensive, J GEOPHYS RES, 103(D17), 22,225-22,243	**SOS**	Nashville, TN	1995	AC;	TD; BL; LC	
1995	43	Alvarez II, R.J., C.J. Senff, R.M. Hardesty, D.D. Parrish, W.T. Luke, T.B. Watson, P.H. Daum, and N. Gillani. 1998. Comparisons of airborne lidar measurements of ozone with airborne insitu measurements duringthe 1995 Southern Oxidant Study, j Geophys Res. 103(D23): 31,155-31,171.	**SOS**	Atlanta,GA	1995	AC; L		O3
1995	44	Banta, R.M., C.J. Senff, A.B. White, M. Trainer, R.T. McNider, R.J. Valente, S.D. Mayor, R.J.Alvarez, R.M. Hardesty, D. Parrish, and F.C. Fehsenfeld. 1998. Daytime buildup and nighttime transport of urban ozone in the boundary layer during a stagnation episode. J.Geophys. Res. 103(D17):22,519-22,544.	**SOS**	Atlanta,GA	1995	AC; L; MN	TD; BL;	O3
1995	45	Cowling, E.B, W.L. Chameides, C.S. Kiang, F.C. Fehsenfeld, and J.F. Meagher. 2000a. Introduction to special section: Southern Oxidants Study Nashville/Middle Tennessee Ozone Study, part 2. J. Geophys. Res. 105(D7):9075-9007.	**SOS**	Nashville, TN	1995	WP; RASS; MN; L; SO; AC; ST	TD; BL; LC	C; CO; SO2; O3; NOx; PM; HC; PAN
1995	46	Hubler, G.R., R alverez, P. Daum, R Dennis, N Gillani, L Kleinman, W. Luke, J. Meagher, D. Rider, M. Trainer, and R. Valente, 1998: An overview of the airborne activities during Southern Oxidant Studies (SOS) 1995 Nashville/Middle Tennessee ozone study, J. Geophys REs., 103(D17) 22,245-22,259.	**SOS**	Nashville, TN	1995	AC;	TD; BL; LC	C; CO; SO2; O3; NOx; PM; HC; PAN
1996	47	MacDonald C.P., T.S. Dye, and P.T. Roberts (2001). Spatial and temporal observations of the planetary boundary layer during ozone episodes in Southern California. Presented at SCOS97-NARSTO Data Analysis Conference, Los Angeles, CA, February 13-15 (STI-2057).	**SCOS97-NARSTO**	Greater Los Angeles Area	1996-97	WP; RASS; AC; SO	TD; BL; LC	C; O3; NOx; HC
1997	48	Croes, B.E. and E. M. Fujita (2003). Overview of the 1997 Southern California Ozone Study (SCOS97-NARSTO). Atmospheric Environment, Vol. 37, Supplement 2.Pages 3-26.	**SCOS97-NARSTO**	Greater Los Angeles Area	1997	MN; WP; RASS; SO; AC; L; SR	TD; BL; LC	C; HC; NOx; O3; PM; PAN
1998	49	Streutker, D.R. (2002). A remote sensing study of the urban heat island of Houston, Texas. *International Journal of Remote Sensing.* Vol. 23, Iss. 13, 2002.	*Houston UHI*	Houston, TX	1998-2000	SAT	UHI	n/a
1999	50	Chameides, W.L., P. Solomon, P. McMurry, C.S. Kiang, E. Edgerton, S. Hering, F. Fehsenfeld, J. Meagher, J. Jansen, E. Cowling, T. Bahadori, and D. Mikel. 2000. An overview of the objectives and design of the Atlanta '99 SuperSite Experiment. In A.F. Spilhaus Jr. (ed.) 2000. Fall Meeting. San Francisco, California. December 15-19, 2000. American Geophysical Union, Washington, DC. Eos Transactions Supplement 81(48):F118.	**SOS**	Atlanta,GA	1999	MN	TD	C; CO; SO2; O3; NOx; PM; HC; PAN
2000	51	Allen, D. C. Durrenberger, G. McGaughey, and J. Nielsen-Gammon. 2002. Accelerated ScienceEvaluation of Ozone Formation in the Houston-Galveston Area: Meteorology. 84 pp.http://www.utexas.edu/research/ceer/texaqsarchive/pdfs/Meteorology-version2.0final.PDF	**TEXAQS-2000**	Houston,TX	2000	AC; WP; RASS; MN;SO	TD; UHI; BL; LC	C; CO; SO2; O3; NOx; PM; HC; PAN
2000	52	Allwine, K. J., J. H. Shinn, G. E. Streit, K. L. Clawson, M. Brown, 2002: Overview of URBAN 2000: A Multiscale Field Study of Dispersion through an Urban Environment. Bull. Amer. Meteor. Soc., 83, 521–536	**Urban 2000 and VTMX**	Salt Lake City	2000	MN; L; WP; RASS	TD; TU; LC; SEB	TR
2000	53	Banta, R.M., C.J. Senff,J.Nielsen-Gammon, T.B Ryserson R.J Alvarez, S.P. Sandberg, E.J. Williams and M. Trainer,2005: A bad day in Houston, Bull Am Meteor. Soc, 657-669.	**SOS**	Houston,TX	2000	AC; L MN	TD; BL; LC	O3; PM
2000	54	P. H. Daum, L. I. Kleinman, S. R. Springston, L. J. Nunnermacker, Y.-N. Lee,J. Weinstein-Lloyd,2 J. Zheng,3 and C. M. Berkowitz, 2003: A comparative study of O3 formation in the Houston urban and industrial plumes during the 2000 Texas Air Quality Study,JOURNAL OF GEOPHYSICAL RESEARCH, VOL. 108, NO. D23, 4715, doi:10.1029/2003JD003552, 2003	**TEXAQS-2000**	Houston,TX	2000	AC; WP; RASS; MN;SO	TD; UHI; BL; LC	C; CO; SO2; O3; NOx; PM; HC; PAN
2003	55	Allwine, K. J. and J. E. Flaherty (2006). Joint Urban 2003: Study Overview and Instrument Locations, Pacific Northwest National Laboratory, Report No. PNNL-15967, August	**Joint Urban 2003**	Oklahoma City, OK	2003	MN; SO; AC; L; WP	TD; TU; LC; BL; SEB	TR
2003	56	Grimmond, C.S.B. H.-B. Su, B. Offerle, B. Crawford, S. Scott, S. Zhong, and C. Clements (2004). Variability of Sensible Heat Fluxes in a Suburban Area of Oklahoma City, AMS Symposium on Planning, Nowcasting, and Forecasting in the Urban Zone, Paper J7.2.	**Joint Urban 2003**	Oklahoma City, OK	2003	MN; SO; AC; L; WP	SEB	n/a
2005	57	Steven Hanna · John White · Ying Zhou Observed winds, turbulence, and dispersion in built-up Boundary-Layer Meteorol (2007) 125:441–468, DOI 10.1007/s10546-007-9197-2	**UDP-MSG05**	NYC- Mid Manhattan	2005	TR; WP; ST	TD; TU; BL; LC	

2005	58	Alwine,JA and JE. Flaherty, 2006: Urban Dispersion Program MSG05 Field Study: Summary of Tracer and Meteorological Measurements (PNNL-15969)	**UDP-MSG05**	NYC- Mid Manhattan	2005	TR; WP; ST	TD; TU; BL; LC		
2005	59	Alwine,JA and JE. Flaherty, 2007: Urban Dispersion Program Overview and MID05 Field Study, PNNL- 16696	**UDP-MIDO5**	NYC- Mid Manhattan	2005?	TR; WP; ST	TD; TU; BL; LC		
2005	60	Hanna,S. R.,M. J. Brown, F. E. Camelli, S. T. Chan, W. J. Coirier, O. R. Hansen, A. H. Huber, S. Kim, AND R. M Reynolds, Detailed Simulations of atmospheric flow and and dispersion dispersion in downtown Manhattan,an Application of Five Computational Fluid Dynamics Models. DOI:10.1175/BAMS-87-12-1713	**UDP-MSG05**	NYC- Mid Manhattan	2005	TR; WP; ST	TD; TU; BL; LC		
2006	61	Barry Lefer*, Bernhard Rappenglück, James Flynn, Christine Haman, 2010: Photochemical and meteorological relationships during the Texas-II Radical and Aerosol Measurement Project (TRAMP), Atmospheric Environment 44 (2010) 4005-4013	**TEXAQS2006**	Houston,TX	2006	WP; RASS; R; SO; ST; AC; L; MN	TD; UHI; BL; LC	C; CO; SO2; O3; NOx; PM; HC; PAN	
2006	62	Parrish, D. D., et al. (2009), Overview of the Second Texas Air Quality Study (TexAQS II) and the Gulf of Mexico Atmospheric Composition and Climate Study (GoMACCS), J. Geophys. Res., 114, D00F13, doi:10.1029/2009JD011842.	**TEXAQS2006**	Houston,TX	2006	WP; RASS; R; SO; ST; AC; L; MN	TD; BL; UHI; LC	C; CO; SO2; O3; NOx; PM; HC; PAN	
2006	63	TEXAQS- GoMACC Science and Implementation Plan http://www.esrl.noaa.gov/csd/projects/2006/scienceplan.pdf	**TEXAQS 2006**	Houston,TX	2006	WP; RASS; R; SO; ST; AC; L; MN	TD; BL; UHI; LC	C; CO; SO2; O3; NOx; PM; HC; PAN	
2012	64	Chandrasekar, V. , B. J. Philips, H. Chen, D. J. Seo, E. J. Lyons, F. Junyent, A. Bajaj, J. A. Brotzge, D. Willie, D. Pepyne, K. Brewster, A. Cannon, A. Rafieei Nasab, and D. Westbrook (2013). The Dallas-Fort Worth Urban Weather Radar Network. 36th Conference on Radar Meteorology, Breckenridge, CO (16-20 September, 2013) https://ams.confex.com/ams/36Radar/webprogram/Paper229165.html .	**CASA Urban Testbed**	Dallas-Ft. Worth	2012 - present	R	PCP; BL; LC; HY	n/a	
2012	65	Chandrasekar, V. and B. Philips (2012). Dallas-Fort Worth Urban Demonstration Network. ERAD 2012 - The Seventh European Conference on Radar in Meteorology and Hydrology. http://www.meteo.fr/cic/meetings/2012/ERAD/extended_abs/QPE_060_ext_abs.pdf	**CASA Urban Testbed**	Dallas-Ft. Worth	2012 - present	R	PCP; BL; LC; HY	n/a	

Meteorological Meas. Systems	Meteorological Science	Air Quality Science & Meas.
Radar [R]	Transport/Dispersion [TD]	Chemistry [C]
Wind profilers -- RF and sodar [WP]	Urban Heat Island [UHI]	[CO]
Radio Acoustic Sounding System (RASS)	BL Structure [BL]	[SO2]
Mesonets [MN]	Turbulence [TU]	[O3]
Lightning [TS]	Surface energy balance [SEB]	[NOx]
Tetroons [T]	Precipitation/Cloud Physics [PCP]	Hydrocarbons [HC]
Lidar [L]	Local circulations [LC]	[PM]
RAOBs [SO]	Hydrology [HY]	[PAN]
Satellite AVHRR [SAT]		Synthetic tracers [TR]
Aircraft observations [AC]		
Solar radiation [SR]		