

AQS Conference 2012

Integrating United States And Canadian Air Monitoring Data

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Environment Canada

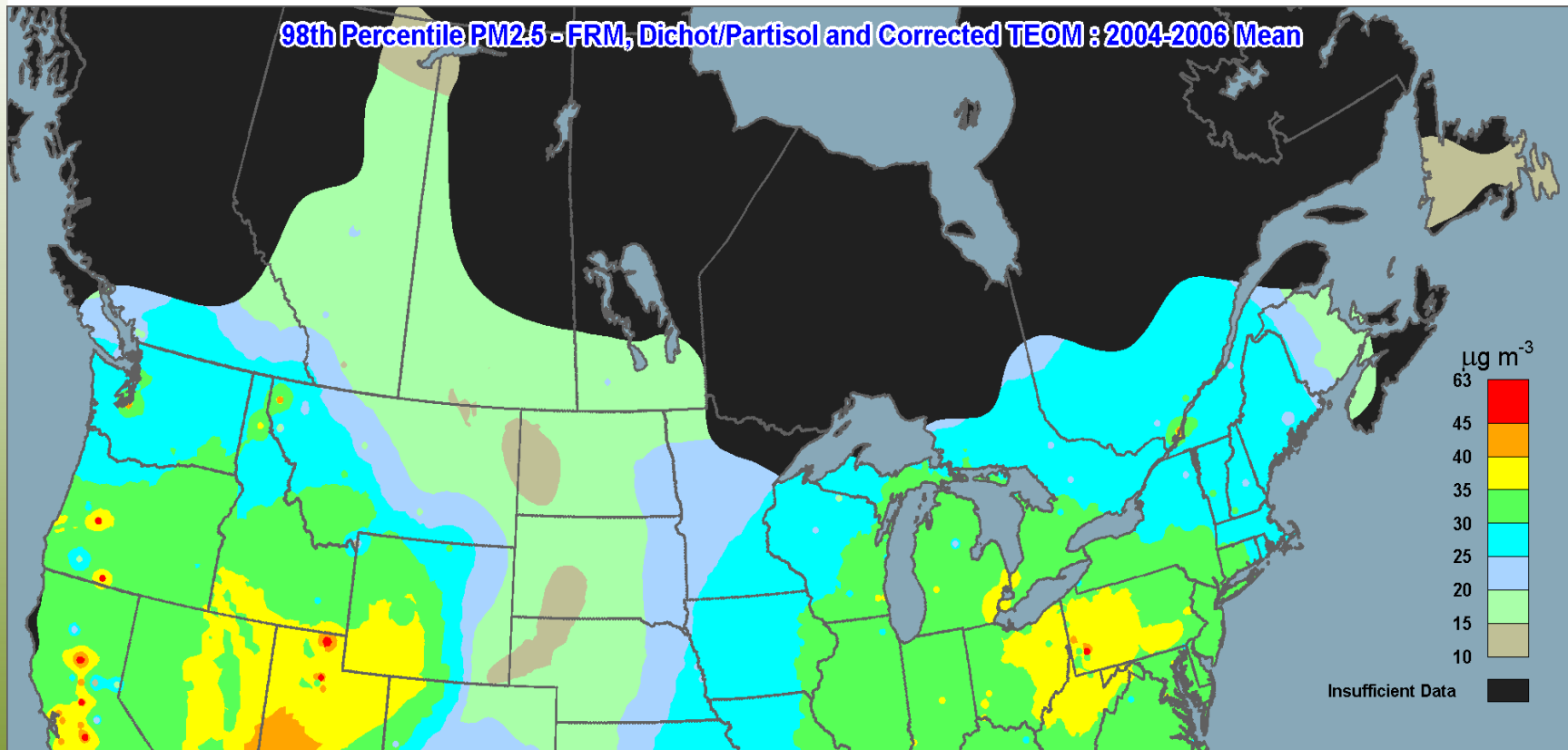


Environment
Canada

Environnement
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Reports and Publications



Source: 2012 Canadian Smog Science Assessment (Environment Canada / Health Canada)



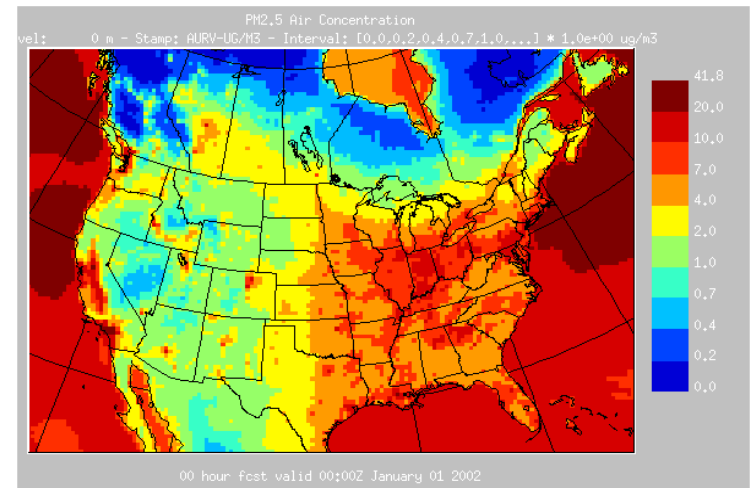
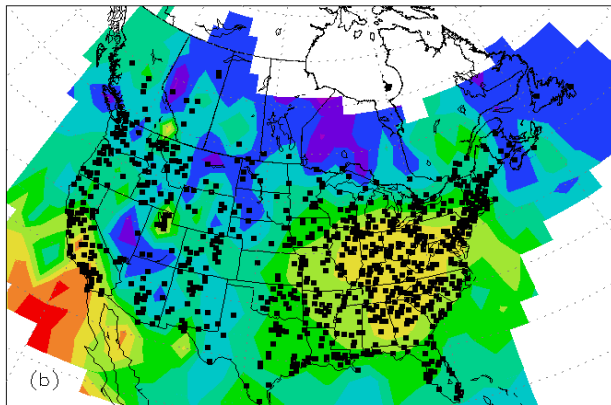
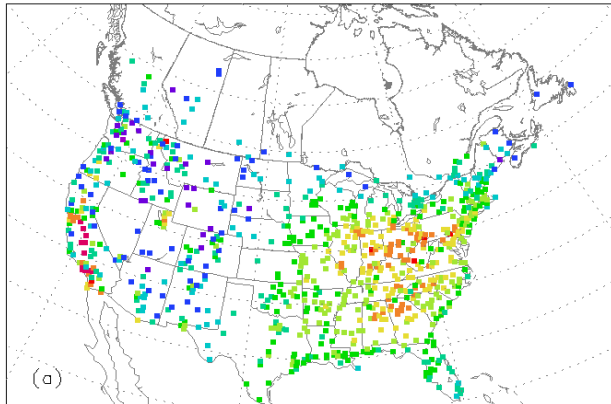
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Model Evaluation

Observed PM_{2.5}, $\mu\text{g}/\text{m}^3$, 2002 annual



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International Agreements

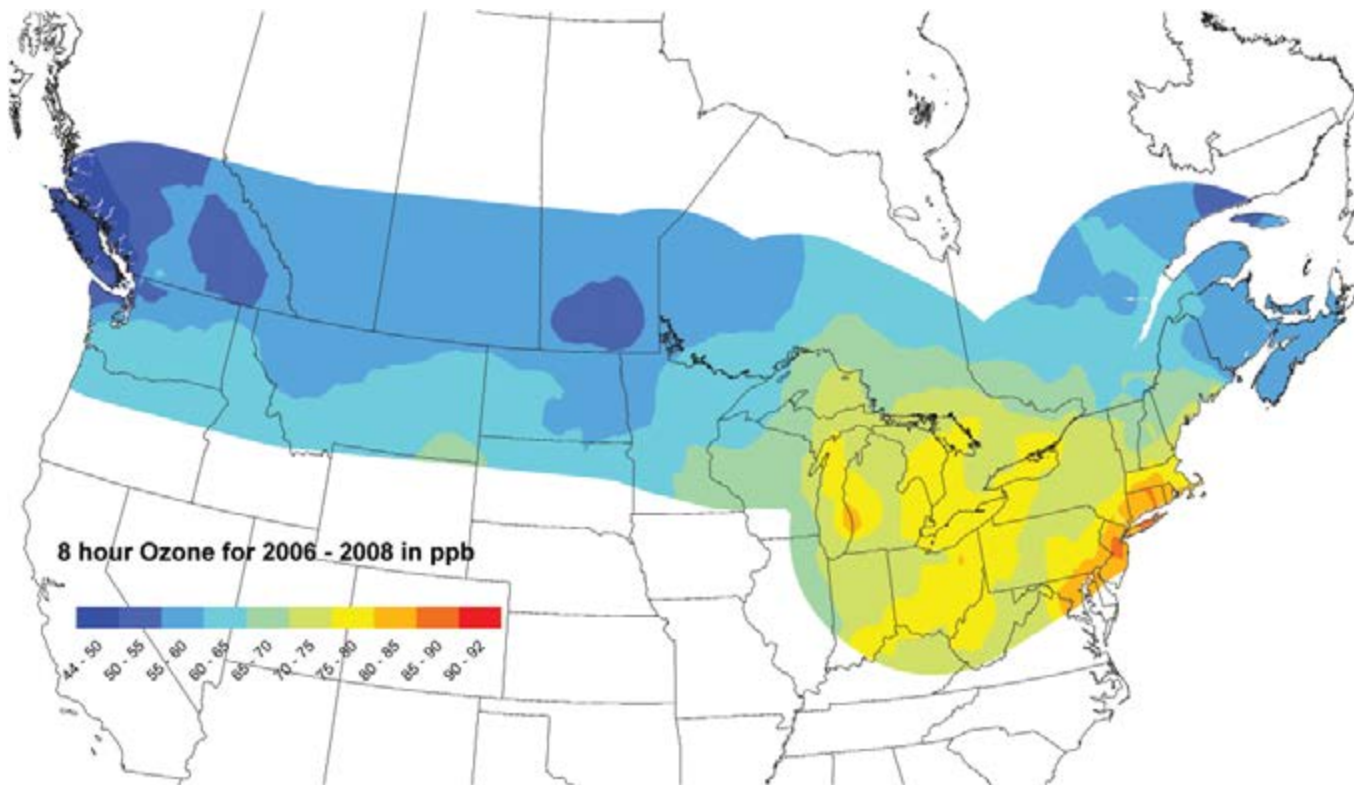


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Publications



Ozone Concentrations along the Canada–U.S. Border
(Three-Year Average of the Fourth-highest Daily Maximum 8-hour
Average), 2006–2008



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Data Sources: Particulate Matter & Toxics Networks

Network	Sampling Period	Start & End Time	STP	Blank Corrected	Flow Rate	Date	Size cut
<i>AIRMoN</i>	7days	0900-0900	STP (21°C)	yes	3l/min	1984	ND
<i>AMODES</i>	24hr	Var.	STP (25°C)	yes	20l/min	1988 - 1990	ND
<i>AQS</i>	24hr	Var.	Var.	yes & no		1995	2.5µm, 10µm
<i>APIOS-C</i>	28days	0800-0800	Amb.	no	2l/min	1981 - 1993	ND
<i>APIOS-D</i>	24hr	0800-0800	Amb.	no	20l/min	1980 - 1993	ND
<i>CAACP</i>	7 days	Var.	STP (0°C)	yes	1m**3/min	1980	ND
<i>CAAMP</i>	24hr	0800-0800	STP (0°C)	no	16.7l/min	1992 - 1996	2.5µm, 10µm
<i>CAMNet</i>	24hr	Var.	Amb.	no	0.75/min	1995	ND

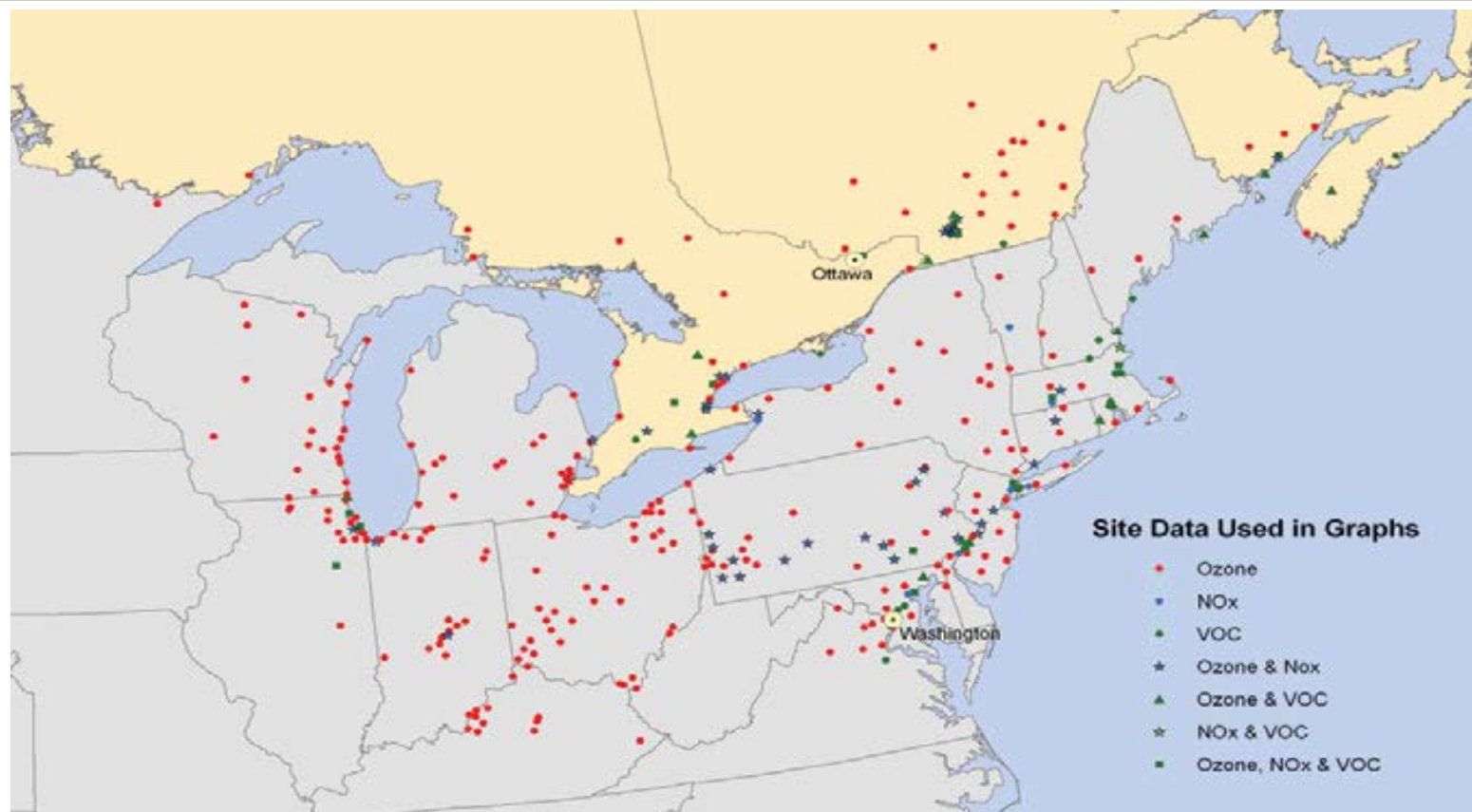


Data Sources: Particulate Matter & Toxics Networks

Network	Sampling Period	Start & End Time	STP	Blank Corrected	Flow Rate	Date	Size cut
<i>CANCP</i>	7 days	1100-1100	STP (25°C)	no	1.1m**3/min	1993	10µm
<i>CAPMoN</i>	24hr	0800-0800	STP (0°C)	yes	25l/min	1979	ND
<i>CASTNet</i>	7 days	0800-0800	STP (25°C)	yes	1.5l/min (E), 3l/min (W)	1987	ND
<i>FPNT</i>	24hr	0800-0800	STP (25°C)	no	8.8l/min	1988 - 1990	2.5µm
<i>GAViM</i>	24hr	0001-2359	Amb.	no	22.9l/min,	1994 - 2001	2.5µm
<i>IADN-A</i>	24hr	0800-0800	STP (0°C)	yes & no		1988	ND, 10µm
<i>IMPROVE</i>	24hr	0000-0000	Amb.	no	22.8l/min, 16.9l/min	1988	2.6µm, 10µm
<i>NAPS</i>	24hr	0000-0000 or 0800-0800	STP (25°C)	no	16.7l/min.	1992	2.5µm



Data Sources: Example

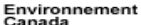


Network of Monitoring Sites Used to Create Graphs
of Ambient Ozone, NOx and VOC Levels



NAtChem

**Environment Canada**

**Environnement Canada**



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> Canadian National Atmospheric Chemistry (NAtChem)

Air

Data

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The Canadian National Atmospheric Chemistry (NAtChem) Database And Analysis System

The National Atmospheric Chemistry Database (NAtChem) is a data archival and analysis facility operated by the Science and Technology Branch of Environment Canada.

- [Download NATChem Data](#)

The purpose of the NATChem database is to enhance atmospheric research through the archival and analysis of North American air and precipitation chemistry data. Such research includes investigations into the chemical nature of the atmosphere, atmospheric processes, spatial and temporal patterns, source-receptor relationships and long range transport of air pollutants.

The NATChem Database contains air and precipitation chemistry data from many major regional-scale networks in North America. To contribute to NATChem, networks must operate for a period of at least two years, must have wide area coverage, and must have regionally-representative sites (rural and background).

The NATChem Database consists of several smaller databases:

- [The National Atmospheric Chemistry/Particulate Matter Database](#) (NAtChem/PM)
Atmospheric particulate matter and related trace gas data and results
- [The National Atmospheric Chemistry/Precipitation Chemistry Database](#) (NAtChem/Precip)
Precipitation chemistry data and results
- [The National Atmospheric Chemistry/Air Toxics Database](#) (NAtChem/Toxics)
Atmospheric toxic substances data and results
- [The National Atmospheric Chemistry/Special Studies Database](#) (NAtChem/Special Studies)
Atmospheric data and results at special studies sites
- [Greenhouse Gases](#)
Greenhouse Gases data and results
- [Canadian Aerosol Baseline Measurements](#) (CABM)
Aerosol Measurements data and results

**Environment Canada**

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US Data Source: AQS

US EPA

http://www.epa.gov/ttn/airs/airsaqs/detaildata/downloadaqsdata.htm

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US EPA

AQS Data for Downloading | TTN AIRS AQS ...

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Tools

Yearly Raw Data Files Retrieved From AQS

Year of data, zipped file size, (unzipped file size), Date of extraction

Pollutant (Parameter Code) File name (substitute year for 'yyyy')	2012	2011	2010	2009	2008	2007	2006	2005	2004	2003	2002	2001	2000	1999	1998	1997	1996	1995
Carbon Monoxide (42101) RD_S01_42101_YYYY.ZIP	42101_2012 1045 KB (18445KB) 05/12/12	42101_2011 11267 KB (199577KB) 05/12/12	42101_2010 10763 KB (206445KB) 05/12/12	42101_2009 10431 KB (206445KB) 05/12/12	42101_2008 10566KB (218168KB) 05/12/12	42101_2007 10649KB (224159KB) 05/12/12	42101_2006 11021KB (232867KB) 05/12/12	42101_2005 11771KB (248359KB) 05/12/12	42101_2004 12176KB (256346KB) 05/12/12	42101_2003 12603KB (262955KB) 05/12/12	42101_2002 13248KB (247597KB) 05/12/12	42101_2001 14703KB (296633KB) 05/12/12	42101_2000 14576KB (298284KB) 05/12/12	42101_1999 16114KB (29428KB) 05/12/12	42101_1998 15125KB (303718KB) 05/12/12	42101_1997 16700KB (305235KB) 05/12/12	42101_1996 15371KB (307367KB) 08/8/11	42101_1995 16889KB (305667KB) 08/8/11
Lead - PB - daily (12128) RD_S01_12128_YYYY.ZIP	12128_2012 1k (3KB) 05/14/12	12128_2011 14k (180KB) 05/14/12	12128_2010 221k (293KB) 05/14/12	12128_2009 35KB (521KB) 05/14/12	12128_2008 64KB (949KB) 05/14/12	12128_2007 66 KB (975KB) 05/14/12	12128_2006 75KB (1138KB) 05/14/12	12128_2005 73KB (1136KB) 05/14/12	12128_2004 70KB (1105KB) 05/14/12	12128_2003 65KB (1032KB) 05/14/12	12128_2002 67KB (1065KB) 05/14/12	12128_2001 65KB (1008KB) 05/14/12	12128_2000 60KB (999KB) 05/14/12	12128_1999 65KB (1070KB) 05/14/12	12128_1998 76KB (1261KB) 05/14/12	12128_1997 92KB (1546KB) 05/14/12	12128_1996 105KB (1752KB) 05/14/12	12128_1995 109KB (1809KB) 05/14/12
Lead from TSP - (PB TSP) daily (14129) RD_S01_14129_YYYY.ZIP	14129_2012 6KB (90KB) 05/14/12	14129_2011 77KB (1115KB) 05/14/12	14129_2010 71KB (1039KB) 05/14/12	14129_2009 43 KB (650KB) 05/14/12	no data reported	no data reported	no data reported	no data reported	no data reported	no data reported	no data reported	no data reported	no data reported	no data reported	no data reported	no data reported	no data reported	no data reported
Nitrogen Dioxide (42602) RD_S01_42602_YYYY.ZIP	42602_2012 1431 KB (24240KB) 05/16/12	42602_2011 13122 KB (231692KB) 05/16/12	42602_2010 13424 KB (240929KB) 05/16/12	42602_2009 12670KB (237792KB) 05/16/12	42602_2008 12507KB (242402KB) 05/16/12	42602_2007 12539KB (245258KB) 05/16/12	42602_2006 12782KB (248502KB) 05/16/12	42602_2005 12881KB (249648KB) 05/16/12	42602_2004 13063KB (253753KB) 05/16/12	42602_2003 12980KB (250133KB) 05/16/12	42602_2002 13175KB (253309KB) 05/16/12	42602_2001 13155KB (252212KB) 05/16/12	42602_2000 13076KB (250374KB) 05/16/12	42602_1999 12811KB (243985KB) 05/16/12	42602_1998 12603KB (240956KB) 05/16/12	42602_1997 13357KB (234150KB) 05/16/12	42602_1996 11822KB (224943KB) 05/16/12	42602_1995 11786KB (223379KB) 05/16/12
Ozone (44201) - hourly RD_S01_44201_YYYY.ZIP	44201_2012 3481 KB (59658KB) 05/16/12	44201_2011 38737KB (654805KB) 05/16/12	44201_2010 11311 KB (193234KB) 05/16/12	44201_2009 34823KB (606589KB) 05/16/12	44201_2008 33408KB (596563KB) 05/16/12	44201_2007 32857KB (593365KB) 05/16/12	44201_2006 32017KB (577963KB) 05/16/12	44201_2005 31673KB (571826KB) 05/16/12	44201_2004 34293KB (576694KB) 03/17/11	44201_2003 31813KB (573405KB) 05/15/12	44201_2002 31380KB (564171KB) 05/15/12	44201_2001 29797KB (553675KB) 05/15/12	44201_2000 28755KB (536082KB) 05/15/12	44201_1999 28755KB (516593KB) 05/15/12	44201_1998 28134KB (506173KB) 05/15/12	44201_1997 29536KB (492660KB) 09/16/10	44201_1996 28350KB (475202KB) 05/03/10	44201_1995 28307KB (473813KB) 05/03/10
Oxides of Nitrogen - NOX (42603) RD_S01_42603_YYYY.ZIP	42603_2012 1221 KB (20325KB) 05/14/12	42603_2011 12310 KB (205979KB) 05/14/12	42603_2010 11578 KB (215677KB) 05/14/12	42603_2009 11262KB (209020KB) 05/14/12	42603_2008 11262KB (210332KB) 05/14/12	42603_2007 11079KB (208599KB) 05/14/12	42603_2006 9794KB (182248KB) 05/14/12	42603_2005 9661KB (178325KB) 05/14/12	42603_2004 9644KB (178711KB) 05/14/12	42603_2003 10413KB (175607KB) 05/05/10	42603_2002 10409KB (174900KB) 05/05/10	42603_2001 9979KB (166840KB) 05/05/10	42603_2000 9901KB (164951KB) 05/05/10	42603_1999 9666KB (163132KB) 09/16/10	42603_1998 9416KB (156798KB) 09/16/10	42603_1997 9129KB (151451KB) 09/16/10	42603_1996 8989KB (14357KB) 09/16/10	42603_1995 8813KB (145045KB) 09/16/10
PAMS VOC ¹ RD_S01_PAMS VOC_YYYY.ZIP	PVOC 2012 2994 KB (49350KB) 05/16/12	PVOC 2011 38826 KB (639619KB) 05/16/12	PVOC 2010 37098 KB (616406KB) 05/16/12	PVOC 2009 36215KB (616406KB) 05/16/12	PVOC 2008 36213KB (613060KB) 05/16/12	PVOC 2007 39874KB (664006KB) 05/16/12	PVOC 2006 37882KB (627441KB) 05/16/12	PVOC 2005 35216KB (577851KB) 05/16/12	PVOC 2004 32004KB (526190KB) 05/16/12	PVOC 2003 31405KB (511644KB) 05/15/12	PVOC 2002 33726KB (565594KB) 05/15/12	PVOC 2001 30967KB (521106KB) 05/15/12	PVOC 2000 30031KB (507904KB) 05/15/12	PVOC 1999 28841KB (492765KB) 05/15/12	PVOC 1998 27994KB (471919KB) 05/15/12	PVOC 1997 25102KB (386472KB) 08/18/11	PVOC 1996 19572KB (300425KB) 08/18/11	PVOC 1995 14472KB (223349KB) 08/18/11
PM _{2.5} - Local Conditions ⁴ (88101) RD_S01_88101_YYYY.ZIP	88101_2012 957 KB (16010KB) 05/16/12	88101_2011 8768 KB (149980KB) 05/16/12	88101_2010 6345 KB (105668KB) 05/16/12	88101_2009 3397KB (56876KB) 05/16/12	88101_2008 1078KB (16396KB) 05/16/12	88101_2007 747KB (11187KB) 05/16/12	88101_2006 791KB (10680KB) 05/16/12	88101_2005 791KB (11257KB) 05/16/12	88101_2004 791KB (11408KB) 05/16/12	88101_2003 803KB (11594KB) 05/16/12	88101_2002 888KB (12913KB) 05/16/12	88101_2001 884KB (12797KB) 05/16/12	88101_2000 835KB (12056KB) 05/16/12	88101_1999 624KB (8392KB) 10/1/10	88101_1998 4KB (48KB) 6/04/09	88101_1997 4KB (9KB) 4/2/10	no data reported	no data reported
PM Fine Speciation ^{2,3,5} RD_S01_SPEC_YYYY.ZIP	SPEC 2012 739 KB (8275KB) 05/16/12	SPEC 2011 5801 KB (70667KB) 05/16/12	SPEC 2010 5475 KB (66692KB) 05/16/12	SPEC 2009 6240KB (68605KB) 08/19/11	SPEC 2008 6915KB (80947KB) 08/19/11	SPEC 2007 7085KB (80666KB) 08/19/11	SPEC 2006 7750KB (86013KB) 08/19/11	SPEC 2005 8999KB (99430KB) 08/19/11	SPEC 2004 8762KB (103442KB) 08/19/11	SPEC 2003 8762KB (97091KB) 08/19/11	SPEC 2002 7568KB (86644KB) 09/17/10	SPEC 2001 3555KB (42552KB) 09/17/10	SPEC 2000 1197KB (14330KB) 09/17/10	no data reported	no data reported	no data reported	no data reported	no data reported
PM Fine Speciation-Blanks ⁶ RD_S01_Blanks_YYYY.ZIP	BLANKS 2012 24KB (471KB) 05/14/12	BLANKS 2011 77KB (5551KB) 05/14/12	BLANKS 2010 754KB (11047KB) 05/14/12	BLANKS 2009 652KB (9262KB) 05/14/12	BLANKS 2008 669KB (9261KB) 05/14/12	BLANKS 2007 908KB (12036KB) 05/14/12	BLANKS 2006 1100KB (14060KB) 05/14/12	BLANKS 2005 1314KB (16784KB) 05/14/12	BLANKS 2004 1498KB (20115KB) 05/14/12	BLANKS 2003 1333KB (17148KB) 05/17/12	BLANKS 2002 952KB (11994KB) 05/17/12	BLANKS 2001 478KB (6262KB) 05/17/12	BLANKS 2000 117KB (1658KB) 05/17/12	no data reported	no data reported	no data reported	no data reported	no data reported
PM Fine Speciation- IMPROVE ⁷ RD_S01_IMPROVE_YYYY.ZIP	No Data Reported	No Data Reported	IMPROVE 2010 4647KB (47378KB) 08/19/11	IMPROVE 2009 7106 KB (72400KB) 08/19/11	IMPROVE 2008 7226KB (72858KB) 08/19/11	IMPROVE 2007 8854KB (8581KB) 08/19/11	IMPROVE 2006 8566KB (81956KB) 08/19/11	IMPROVE 2005 8765KB (104936KB) 05/16/12	IMPROVE 2004 10911KB (94935KB) 08/19/11	IMPROVE 2003 9991KB (94935KB) 08/19/11	IMPROVE 2002 9090KB (85601KB) 08/19/11	IMPROVE 2001 7651KB (71484KB) 08/19/11	IMPROVE 2000 4960KB (47694KB) 08/19/11	IMPROVE 1999 3668KB (37761KB) 08/19/11	IMPROVE 1998 3757KB (38032KB) 08/19/11	IMPROVE 1997 3816KB (38172KB) 08/19/11	IMPROVE 1996 3642KB (36436KB) 08/19/11	IMPROVE 1995 3554KB (35289KB) 08/19/11
	81102 2012	81102 2011	81102 2010	81102 2009	81102 2008	81102 2007	81102 2006	81102 2005	81102 2004	81102 2003	81102 2002	81102 2001	81102 2000	81102 1999	81102 1998	81102 1997	81102 1996	81102 1995

Read AQS Data

```
INFILE "&rawfile.\*.txt" lrecl=300 delimiter="|" missover  
dsd;
```

```
INPUT trantype $  
    actcode $  
    state  
    county $  
    site $ @;
```



Read AQS Data

```
...  
SELECT;  
  WHEN (trantype="RD") DO;  
    INPUT parameter_code :$char5.  
      poc :$char1.  
      sampdur :$char1.  
      unit_code :$char3.  
      method_code :$char3.  
      date :ymmdd10.  
      start :time5.  
      sampval  
      nullcode :$char2.  
      collfreq :$char1.  
      altmpid :$char1.  
      qual1: $char2. qual2: $char2. qual3: $char2. qual4: $char2. qual5: $char2.  
      qual6: $char2. qual7: $char2. qual8: $char2. qual9: $char2. qual10: $char2.  
      methdl  
      uncert ;  
    ...
```



Read AQS Data

```
SELECT;
  WHEN(sampdur EQ '1') DO; * Hourly;
    smdtend = smdtstr + 3600;
  END;
  WHEN(sampdur EQ 'H') DO; * 5 minute ;
    smdtend = smdtstr + 300;
  END;
  WHEN(sampdur EQ '7') DO; * Daily;
    smdtend = smdtstr + 86400;
  END;
  OTHERWISE DO;
    IF sampdur NE _prev_sampdur
    THEN PUT 'WARNING: Excluding non-standard sampling period: '
           sampdur= 'hrs, ' orgstnid= method_code = ;
    DELETE;
  END;
END; * end select;

...
```



Assign Metadata Fields

- Parameter code & description
- Method code & Sample analysis description
- Unit code & description
- Sample duration
- Sample collection description
- Method detectable limit
- Unit and/or STP conversion: description
- Unit and/or STP conversion: equation / constant
- NAtChem variable name / unit



Assign Metadata and Transform Data

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1	parameter code	parameter description	method code	sample analysis description	unit code	unit description	sample duration	sample collection description	method detectable limit	Unit and/or STP conversion formula Description	Unit and/or STP conversion formula	natchem var name	natchem units	Load Data (Y/N)	raw var name
2	11101	SUSPENDED PARTICULATE (TSP)	079	TEOM-Gravimetric	001	UG/CUBIC METER (25 C)	7	Instrumental R&P M1400A TSP HD	1	stp correction to OC	298/273	TSP	ug/m3	Y	TSP_T
3	11101	SUSPENDED PARTICULATE (TSP)	091	Gravimetric	001	UG/CUBIC METER (25 C)	7	HI-VOL	1	stp correction to OC	298/273	TSP	ug/m3	Y	TSP
4	11101	SUSPENDED PARTICULATE (TSP)	092	Gravimetric	001	UG/CUBIC METER (25 C)	7	MEMBRANE-SAMPLER	1	stp correction to OC	298/273	TSP	ug/m3	Y	TSP_M
5	11101	SUSPENDED PARTICULATE (TSP)	002	Gravimetric	001	UG/CUBIC METER (25 C)	7	HI-VOL	1	stp correction to OC	298/273	TSP	ug/m3	N	TSP_H
6	12306	NITRATE (TSP)	092	Reduction-Diazo Coupling	001	UG/CUBIC METER (25 C)	7	HI-VOL	0.05	stp correction to OC	298/273	NO3_	ug/m3	Y	NO3_TR
7	12306	NITRATE (TSP)	096	Ion Chromatograph Conductimetric	001	UG/CUBIC METER (25 C)	7	HI-VOL	0.05	stp correction to OC	298/273	NO3_	ug/m3	Y	NO3_TH
8	12403	SULFATE (TSP)	091	Colorimetric	001	UG/CUBIC METER (25 C)	7	HI-VOL	0.5	stp correction to OC	298/273	SO4_	ug/m3	Y	SO4_TC
9	12403	SULFATE (TSP)	092	Turbidimetric	001	UG/CUBIC METER (25 C)	7	HI-VOL	0.5	stp correction to OC	298/273	SO4_	ug/m3	Y	SO4_TT
10	12403	SULFATE (TSP)	093	Methylthymol Blue	001	UG/CUBIC METER (25 C)	7	HI-VOL	1	stp correction to OC	298/273	SO4_	ug/m3	Y	SO4_TC
11	12403	SULFATE (TSP)	096	Ion Chromatograph Conductimetric	001	UG/CUBIC METER (25 C)	7	HI-VOL	0.5	stp correction to OC	298/273	SO4_	ug/m3	Y	SO4_TH
12	16111	CARBON BLACK	011	Model AE 20 Optical Absorption	001	UG/CUBIC METER (25 C)	7	Instrumental Magee Scien	0.005	stp correction to OC	298/273	LAC	ug/m3	Y	LAC
13	42101	CARBON MONOXIDE	008	NonDispersive Infrared	007	PARTS PER MILLION	7	INSTRUMENTAL	0.5	no conversion		CO	ppm	Y	CO_I
14	42101	CARBON MONOXIDE	008	NonDispersive Infrared	087	Parts per ten million	7	INSTRUMENTAL	0.5	conversion from 10 ppm to ppm	0.1	CO	ppm	Y	CO_I
15	42101	CARBON MONOXIDE	011	NonDispersive Infrared	007	PARTS PER MILLION	7	INSTRUMENTAL	0.5	no conversion		CO	ppm	Y	CO_I
16	42101	CARBON MONOXIDE	012	NonDispersive Infrared	007	PARTS PER MILLION	7	INSTRUMENTAL	0.5	no conversion		CO	ppm	Y	CO_I
17	42101	CARBON MONOXIDE	013	Detection Tube	007	PARTS PER MILLION	7	INSTRUMENTAL	5	no conversion		CO	ppm	Y	CO
18	42101	CARBON MONOXIDE	014	Dual Isotope Florescence	007	PARTS PER MILLION	7	INSTRUMENTAL	0.4	no conversion		CO	ppm	Y	CO_D
19	42101	CARBON MONOXIDE	018	NonDispersive Infrared	007	PARTS PER MILLION	7	INSTRUMENTAL	0.5	no conversion		CO	ppm	Y	CO_I
20	42101	CARBON MONOXIDE	021	Gas Chromatographic	007	PARTS PER MILLION	7	INSTRUMENTAL	0.5	no conversion		CO	ppm	Y	CO_G
21	42101	CARBON MONOXIDE	033	NonDispersive Infrared	007	PARTS PER MILLION	7	INSTRUMENTAL	0.5	no conversion		CO	ppm	Y	CO_I
22	42101	CARBON MONOXIDE	041	NonDispersive Infrared	007	PARTS PER MILLION	7	INSTRUMENTAL	0.5	no conversion		CO	ppm	Y	CO_I
23	42101	CARBON MONOXIDE	048	NonDispersive Infrared	007	PARTS PER MILLION	7	INSTRUMENTAL	0.5	no conversion		CO	ppm	Y	CO_I
24	42101	CARBON MONOXIDE	050	NonDispersive Infrared	007	PARTS PER MILLION	7	INSTRUMENTAL	0.5	no conversion		CO	ppm	Y	CO_I
25	42101	CARBON MONOXIDE	051	NonDispersive Infrared	007	PARTS PER MILLION	7	INSTRUMENTAL	0.5	no conversion		CO	ppm	Y	CO_I
26	42101	CARBON MONOXIDE	054	NonDispersive Infrared	007	PARTS PER MILLION	7	INSTRUMENTAL	0.5	no conversion		CO	ppm	Y	CO_I

Map to NAtChem Metadata Fields

- Station ID
- Sample start date/time (local standard time)
- Sample end date/time
- Variable name
- Instrument type
- Sampling media or principal
- Coating or absorbing solution / media
- Humidity or temperature control

... continued



Map to NAtChem Metadata Fields

- Inlet type
- Size cut
- Sample analysis method
- Solubility type
- Standard temperature and pressure
- Blank correction
- Value
- NAtChem flag

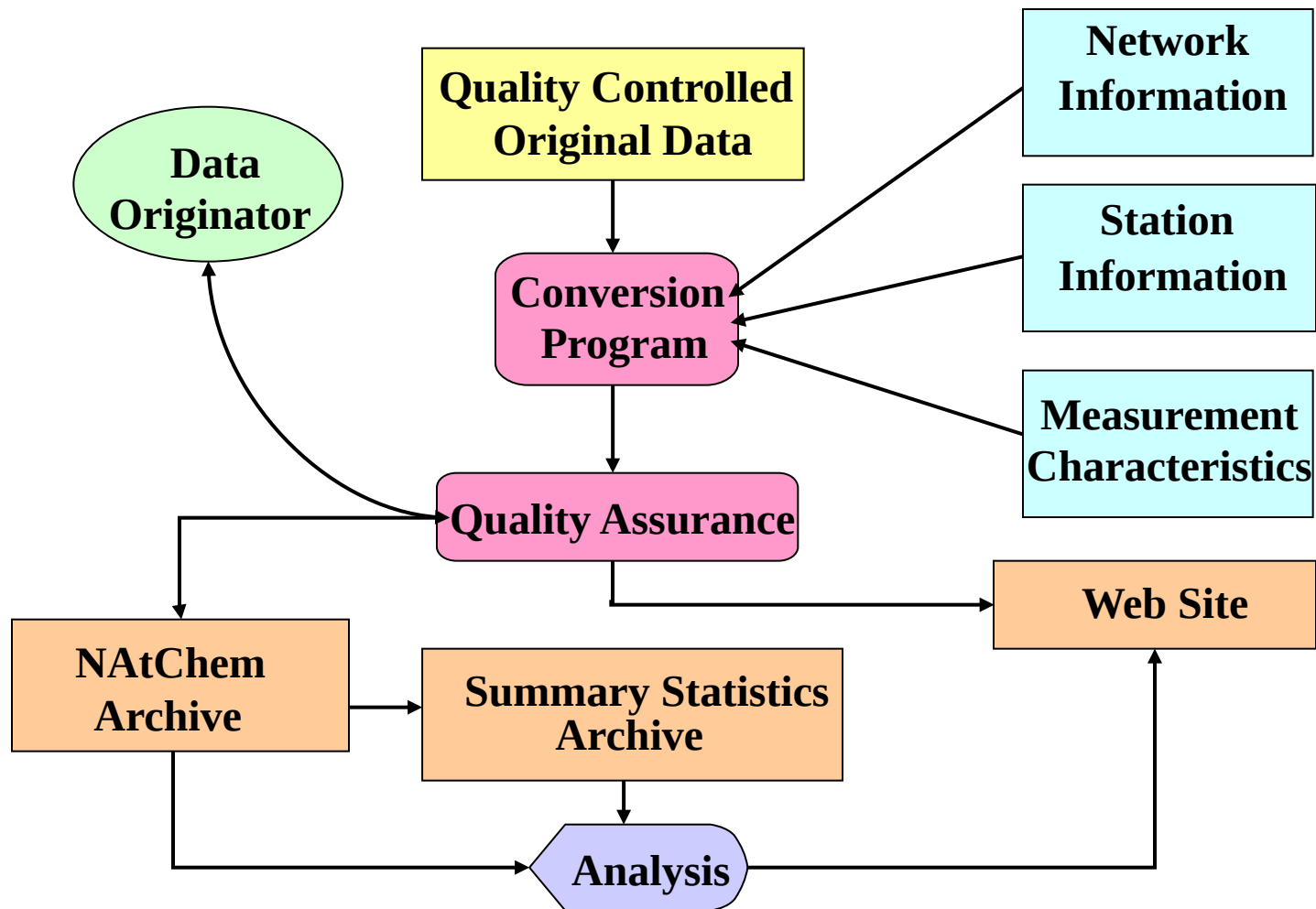


NAtChem Database

	CATEGORY	NAtChem Station ID	Sample Start Date/Time	Variable Name	Instrument Type	Sampling Media or Principals	Coating or Absorbing Solution/Media	Humidity or temperature Control	Inlet Type	Size Cut	Sample Analysis Method	Solubility Type	Standard Pressure & Temperature	Blank-Correction	NAtChem Value	NAtChem Flag	Original Flag	Sample End Date/Time	Date Data Loaded	Re
1	FLT	AIRSUSAK1JNU	02JAN10:00:01	PM2_5	GRV	TF	N_A	NONE	IEL	LE2P5	MBAL	NONE	AMB	BC	18.9 V0			03JAN10:00:01	14MAY2012	LA
2	FLT	AIRSUSAK1JNU	08JAN10:00:01	PM2_5	GRV	TF	N_A	NONE	IEL	LE2P5	MBAL	NONE	AMB	BC	4.7 V0			09JAN10:00:01	14MAY2012	LA
3	FLT	AIRSUSAK1JNU	14JAN10:00:01	PM2_5	GRV	TF	N_A	NONE	IEL	LE2P5	MBAL	NONE	AMB	BC	5.9 V0			15JAN10:00:01	14MAY2012	LA
4	FLT	AIRSUSAK1JNU	20JAN10:00:01	PM2_5	GRV	TF	N_A	NONE	IEL	LE2P5	MBAL	NONE	AMB	BC	16.9 V0			21JAN10:00:01	14MAY2012	LA
5	FLT	AIRSUSAK1JNU	26JAN10:00:01	PM2_5	GRV	TF	N_A	NONE	IEL	LE2P5	MBAL	NONE	AMB	BC	18.7 V0			27JAN10:00:01	14MAY2012	LA
6	FLT	AIRSUSAK1JNU	01FEB10:00:01	PM2_5	GRV	TF	N_A	NONE	IEL	LE2P5	MBAL	NONE	AMB	BC	18.2 V0			02FEB10:00:01	14MAY2012	LA
7	FLT	AIRSUSAK1JNU	07FEB10:00:01	PM2_5	GRV	TF	N_A	NONE	IEL	LE2P5	MBAL	NONE	AMB	BC	1.1 V1			08FEB10:00:01	14MAY2012	LA
8	FLT	AIRSUSAK1JNU	13FEB10:00:01	PM2_5	GRV	TF	N_A	NONE	IEL	LE2P5	MBAL	NONE	AMB	BC	10.5 V0			14FEB10:00:01	14MAY2012	LA
9	FLT	AIRSUSAK1JNU	19FEB10:00:01	PM2_5	GRV	TF	N_A	NONE	IEL	LE2P5	MBAL	NONE	AMB	BC	19.6 V0			20FEB10:00:01	14MAY2012	LA
10	FLT	AIRSUSAK1JNU	25FEB10:00:01	PM2_5	GRV	TF	N_A	NONE	IEL	LE2P5	MBAL	NONE	AMB	BC	6.2 V0			26FEB10:00:01	14MAY2012	LA
11	FLT	AIRSUSAK1JNU	03MAR10:00:01	PM2_5	GRV	TF	N_A	NONE	IEL	LE2P5	MBAL	NONE	AMB	BC	2.9 V0			04MAR10:00:01	14MAY2012	LA
12	FLT	AIRSUSAK1JNU	09MAR10:00:01	PM2_5	GRV	TF	N_A	NONE	IEL	LE2P5	MBAL	NONE	AMB	BC	1.9 V1			10MAR10:00:01	14MAY2012	LA
13	FLT	AIRSUSAK1JNU	18MAR10:00:01	PM2_5	GRV	TF	N_A	NONE	IEL	LE2P5	MBAL	NONE	AMB	BC	7.2 V0			19MAR10:00:01	14MAY2012	LA
14	FLT	AIRSUSAK1JNU	21MAR10:00:01	PM2_5	GRV	TF	N_A	NONE	IEL	LE2P5	MBAL	NONE	AMB	BC	10.3 V0			22MAR10:00:01	14MAY2012	LA
15	FLT	AIRSUSAK1JNU	27MAR10:00:01	PM2_5	GRV	TF	N_A	NONE	IEL	LE2P5	MBAL	NONE	AMB	BC	1.9 V1			28MAR10:00:01	14MAY2012	LA
16	FLT	AIRSUSAK1JNU	02APR10:00:01	PM2_5	GRV	TF	N_A	NONE	IEL	LE2P5	MBAL	NONE	AMB	BC	9.5 V0			03APR10:00:01	14MAY2012	LA
17	FLT	AIRSUSAK1JNU	08APR10:00:01	PM2_5	GRV	TF	N_A	NONE	IEL	LE2P5	MBAL	NONE	AMB	BC	6.2 V0			09APR10:00:01	14MAY2012	LA
18	FLT	AIRSUSAK1JNU	14APR10:00:01	PM2_5	GRV	TF	N_A	NONE	IEL	LE2P5	MBAL	NONE	AMB	BC	7.8 V0			15APR10:00:01	14MAY2012	LA
19	FLT	AIRSUSAK1JNU	20APR10:00:01	PM2_5	GRV	TF	N_A	NONE	IEL	LE2P5	MBAL	NONE	AMB	BC	2.3 V0			21APR10:00:01	14MAY2012	LA
20	FLT	AIRSUSAK1JNU	26APR10:00:01	PM2_5	GRV	TF	N_A	NONE	IEL	LE2P5	MBAL	NONE	AMB	BC	4.8 V0			27APR10:00:01	14MAY2012	LA
21	FLT	AIRSUSAK1JNU	02MAY10:00:01	PM2_5	GRV	TF	N_A	NONE	IEL	LE2P5	MBAL	NONE	AMB	BC	2 V0			03MAY10:00:01	14MAY2012	LA
22	FLT	AIRSUSAK1JNU	08MAY10:00:01	PM2_5	GRV	TF	N_A	NONE	IEL	LE2P5	MBAL	NONE	AMB	BC	7.4 V0			09MAY10:00:01	14MAY2012	LA
23	FLT	AIRSUSAK1JNU	14MAY10:00:01	PM2_5	GRV	TF	N_A	NONE	IEL	LE2P5	MBAL	NONE	AMB	BC	6 V0			15MAY10:00:01	14MAY2012	LA
24	FLT	AIRSUSAK1JNU	20MAY10:00:01	PM2_5	GRV	TF	N_A	NONE	IEL	LE2P5	MBAL	NONE	AMB	BC	5.7 V0			21MAY10:00:01	14MAY2012	LA
25	FLT	AIRSUSAK1JNU	26MAY10:00:01	PM2_5	GRV	TF	N_A	NONE	IEL	LE2P5	MBAL	NONE	AMB	BC	5.7 V0			27MAY10:00:01	14MAY2012	LA
26	FLT	AIRSUSAK1JNU	01JUN10:00:01	PM2_5	GRV	TF	N_A	NONE	IEL	LE2P5	MBAL	NONE	AMB	BC	4.6 V0			02JUN10:00:01	14MAY2012	LA
27	FLT	AIRSUSAK1JNU	07JUN10:00:01	PM2_5	GRV	TF	N_A	NONE	IEL	LE2P5	MBAL	NONE	AMB	BC	4.7 V0			08JUN10:00:01	14MAY2012	LA
28	FLT	AIRSUSAK1JNU	13JUN10:00:01	PM2_5	GRV	TF	N_A	NONE	IEL	LE2P5	MBAL	NONE	AMB	BC	1.6 V1			14JUN10:00:01	14MAY2012	LA
29	FLT	AIRSUSAK1JNU	19JUN10:00:01	PM2_5	GRV	TF	N_A	NONE	IEL	LE2P5	MBAL	NONE	AMB	BC	5 V0			20JUN10:00:01	14MAY2012	LA
30	FLT	AIRSUSAK1JNU	25JUN10:00:01	PM2_5	GRV	TF	N_A	NONE	IEL	LE2P5	MBAL	NONE	AMB	BC	2.4 V0			26JUN10:00:01	14MAY2012	LA
31	FLT	AIRSUSAK1JNU	01JUL10:00:01	PM2_5	GRV	TF	N_A	NONE	IEL	LE2P5	MBAL	NONE	AMB	BC	2 V0			02JUL10:00:01	14MAY2012	LA
32	FLT	AIRSUSAK1JNU	08JUL10:00:01	PM2_5	GRV	TF	N_A	NONE	IEL	LE2P5	MBAL	NONE	AMB	BC	6 V0			09JUL10:00:01	14MAY2012	LA
33	FLT	AIRSUSAK1JNU	13JUL10:00:01	PM2_5	GRV	TF	N_A	NONE	IEL	LE2P5	MBAL	NONE	AMB	BC	3 V0			14JUL10:00:01	14MAY2012	LA
34	FLT	AIRSUSAK1JNU	19JUL10:00:01	PM2_5	GRV	TF	N_A	NONE	IEL	LE2P5	MBAL	NONE	AMB	BC	3.9 V0			20JUL10:00:01	14MAY2012	LA
35	FLT	AIRSUSAK1JNU	25JUL10:00:01	PM2_5	GRV	TF	N_A	NONE	IEL	LE2P5	MBAL	NONE	AMB	BC	6.3 V0			26JUL10:00:01	14MAY2012	LA
36	FLT	AIRSUSAK1JNU	31JUL10:00:01	PM2_5	GRV	TF	N_A	NONE	IEL	LE2P5	MBAL	NONE	AMB	BC	5.5 V0			01AUG10:00:01	14MAY2012	LA
37	FLT	AIRSUSAK1JNU	06AUG10:00:01	PM2_5	GRV	TF	N_A	NONE	IEL	LE2P5	MBAL	NONE	AMB	BC	1.7 V1			07AUG10:00:01	14MAY2012	LA
38	FLT	AIRSUSAK1JNU	12AUG10:00:01	PM2_5	GRV	TF	N_A	NONE	IEL	LE2P5	MBAL	NONE	AMB	BC	4.1 V0			13AUG10:00:01	14MAY2012	LA
39	FLT	AIRSUSAK1JNU	18AUG10:00:01	PM2_5	GRV	TF	N_A	NONE	IEL	LE2P5	MBAL	NONE	AMB	BC	2.5 V0			19AUG10:00:01	14MAY2012	LA
40	FLT	AIRSUSAK1JNU	24AUG10:00:01	PM2_5	GRV	TF	N_A	NONE	IEL	LE2P5	MBAL	NONE	AMB	BC	2.1 V0			25AUG10:00:01	14MAY2012	LA
41	FLT	AIRSUSAK1JNU	30AUG10:00:01	PM2_5	GRV	TF	N_A	NONE	IEL	LE2P5	MBAL	NONE	AMB	BC	4 V0			31AUG10:00:01	14MAY2012	LA
42	FLT	AIRSUSAK1JNU	05SEP10:00:01	PM2_5	GRV	TF	N_A	NONE	IEL	LE2P5	MBAL	NONE	AMB	BC	6 V0	2		06SEP10:00:01	14MAY2012	LA
43	FLT	AIRSUSAK1JNU	11SEP10:00:01	PM2_5	GRV	TF	N_A	NONE	IEL	LE2P5	MBAL	NONE	AMB	BC	9.5 V0			12SEP10:00:01	14MAY2012	LA
44	FLT	AIRSUSAK1JNU	17SEP10:00:01	PM2_5	GRV	TF	N_A	NONE	IEL	LE2P5	MBAL	NONE	AMB	BC	17.3 V0			18SEP10:00:01	14MAY2012	LA
45	FLT	AIRSUSAK1JNU	23SEP10:00:01	PM2_5	GRV	TF	N_A	NONE	IEL	LE2P5	MBAL	NONE	AMB	BC	8.7 V0			24SEP10:00:01	14MAY2012	LA
46	FLT	AIRSUSAK1JNU	29SEP10:00:01	PM2_5	GRV	TF	N_A	NONE	IEL	LE2P5	MBAL	NONE	AMB	BC	3.9 V0			30SEP10:00:01	14MAY2012	LA



NAtChem Database Facility



NAtChem Database

- Read program for each data source
- Standard names, units, date/time, metadata
- Combining of data
 - Select parameters
 - Determine metadata criteria
 - Obtain latest version of data from source
 - Read data into NAtChem
- Perform analysis



Integrating US and Canadian air monitoring data: sources

MAJOR ROUTINE OPERATING AIR MONITORING NETWORKS: State / Local / Tribal / Federal Networks				
Network ¹	Sites	Initiated	Measurement Parameters	Source of Information and/or Data
Urban/Human-Health Monitoring				
NCore – National Core Monitoring Network	~80 planned	2011	O ₃ , NO/NO _x , SO ₂ , CO, PM _{2.5} /PM _{10-2.5} , PM _{2.5} speciation, surface meteorology	http://www.epa.gov/ttn/amtic/ncore/index.html
SLAMS – State and Local Ambient Monitoring Stations	~3000	1978	O ₃ , NO _x /NO ₂ , SO ₂ , PM _{2.5} /PM ₁₀ , CO, Pb	http://www.epa.gov/airexplorer/
CSN – PM _{2.5} Chemical Speciation Network	~200 currently active	1999	PM _{2.5} mass, PM _{2.5} speciation, major ions, Metals	http://www.epa.gov/airexplorer/
PAMS – Photochemical Assessment Monitoring Network	75	1994	O ₃ , NO _x /NO _y , CO, speciated VOCs, carbonyls, surface meteorology, upper air	http://www.epa.gov/ttn/amtic/pamsmain.html
Rural/Regional Monitoring				
IMPROVE – Interagency Monitoring of Protected Visual Environments	110 plus 67 protocol sites	1988	PM _{2.5} /PM ₁₀ , major ions, metals, light extinction, scattering coefficient	http://vista.cira.colostate.edu/IMPROVE/
CASTNET – Clean Air Status and Trends Network	80+	1987	O ₃ , weekly concentrations of SO ₂ , HNO ₃ , SO ₄ ²⁻ , NO ₃ ⁻ , Cl ⁻ , NH ₄ ⁺ , Ca ²⁺ , Mg ²⁺ , Na ⁺ , K ⁺ for dry and total deposition, surface meteorology	www.epa.gov/castnet/
GPMP – Gaseous Pollutant Monitoring Program	33	1987	O ₃ , NO _x /NO/NO ₂ , SO ₂ , CO, surface meteorology, enhanced monitoring of CO, NO, NO _x , NO _y and SO ₂ , canister samples for VOC at three sites	www.nature.nps.gov/air/Monitoring/network.htm#data

Summary

- The key to successfully integrating US and Canadian air monitoring data is in the metadata.
 - Taxonomies
 - Key characteristics
 - Quality assurance
 - Data versioning



References

- The Canadian National Atmospheric Chemistry (NAtChem) Database and Analysis Facility (www.ec.gc.ca/natchem)
- 2012 Canadian Smog Science Assessment Highlights and Key Messages (<http://www.ec.gc.ca/air/default.asp?lang=En&n=72F82C27-1>)
- 2010 Canada—United States Air Quality Agreement: Progress Report ISDM-444 (<http://www.ec.gc.ca/Publications/default.asp?lang=En&xml=4B98B185-7523-4CFF-90F2-5688EBA89E4A>)
- AQS Data: <http://www.epa.gov/ttn/airs/airsaqs/detaildata/downloadaqsdta.htm>

