

Analytical Atmospheric Chemistry Senior Research Projects

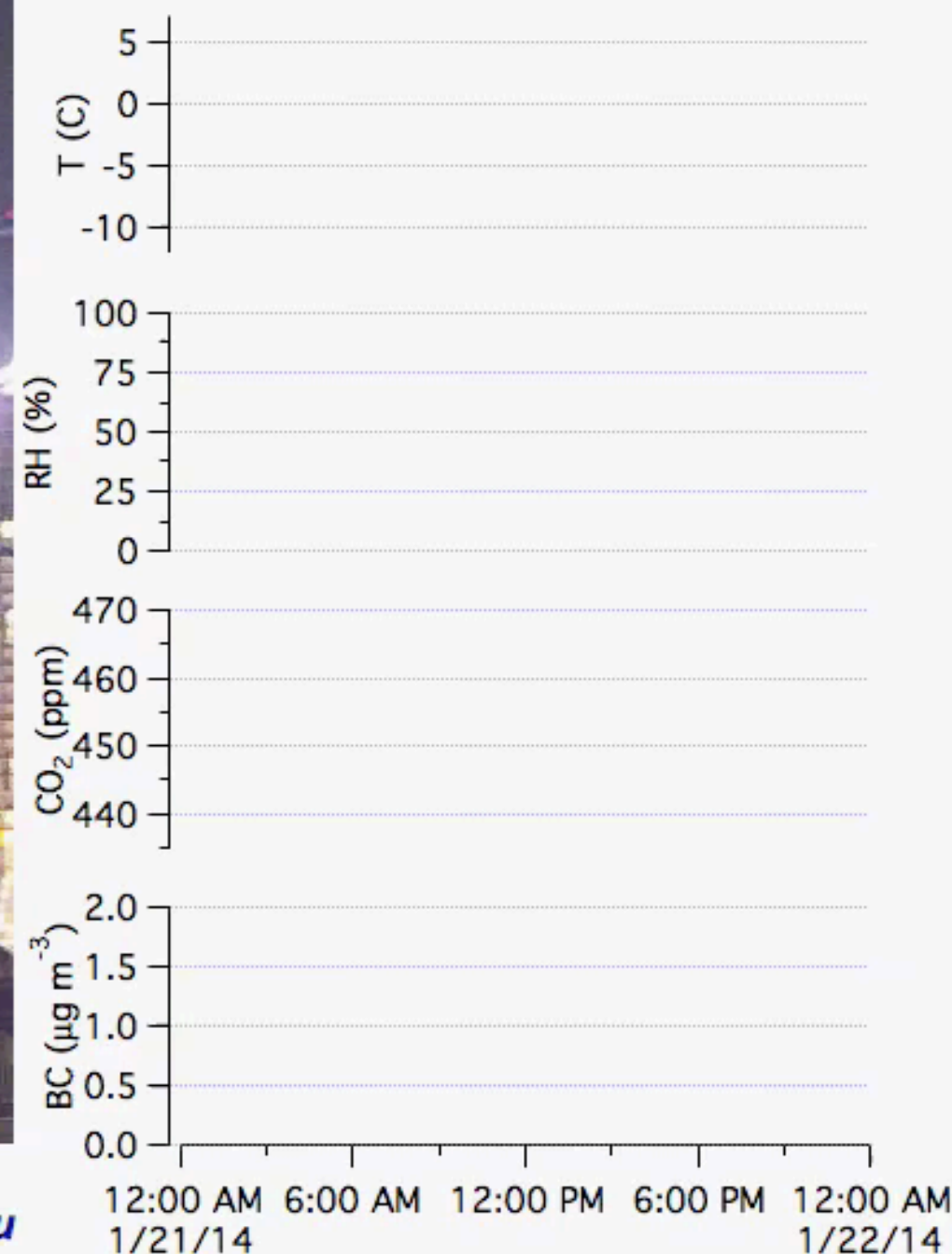
Dr. Peter DeCarlo
pfd33@drexel.edu

Dr. Kevin Owens

What am I talking about?



Drexel University Air Resources Research Laboratory - pfd33@drexel.edu



Weather Station




Weatherproof Camera



Aethalometer (AE-33)

Wolfgang Nadler

Sources...

 **EPA** United States Environmental Protection Agency


[Learn the Issues](#) | [Science & Technology](#) | [Laws & Regulations](#) | [About EPA](#)

Toxics Release Inventory (TRI) Program

[TRI Home](#)
[Learn About TRI](#)
[TRI In...](#)
[TRI D...](#)
[Report...](#)
[TRI Cl...](#)
[Laws &...](#)
[Get In...](#)
[Site M...](#)

You are here: [EPA Home](#) » [Toxics Release Inventory \(TRI\) Program](#) » [2012 TRI National Analysis: Urban Communities](#) » [Camden-Wilmington, PA-NJ-DE-MD](#)

2012 TRI National Analysis: Urban Communities


 **EPA** United States Environmental Protection Agency

[LEARN THE ISSUES](#) | [SCIENCE & TECHNOLOGY](#) | [LAWS & REGULATIONS](#) | [ABOUT EPA](#)

TRI Explorer

You are here: [EPA Home](#) » [TRI](#) » [TRI Explorer](#) » Releases: Facility Report

Releases: Facility Report

Detail columns are collapsed by default. Click the  icon to view additional columns. Use your Browser back feature to collapse.

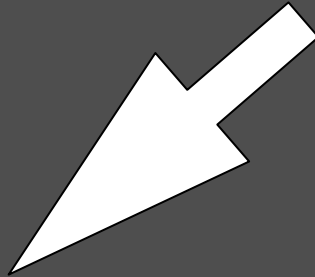
Data Source: 2012 National Analysis dataset (released to the public in November 2013) [See Note](#) [Go To New Report](#) [Instructions for printing wide reports](#)

TRI On-site and Off-site Reported Disposed of or Otherwise Released (in pounds), the facility PHILADELPHIA ENERGY SOLUTIONS REFINING PHILADELPHIA REFINERY, 3144 PASSYUNK AVE, PHILADELPHIA PENNSYLVANIA 19145 (PHILADELPHIA)

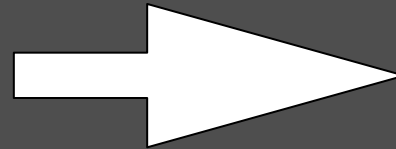
Row #	Facility	Total On-site Disposal or Other Releases	Total Off-site Disposal or Other Releases
1	PHILADELPHIA ENERGY SOLUTIONS REFINING PHILADELPHIA REFINERY. 3144 PASSYUNK AVE, PHILADELPHIA PENNSYLVANIA 19145 (PHILADELPHIA)	762,390	3,662
	1,2,4-TRIMETHYLBENZENE (324 - Petroleum)	3,107	3,107
	AMMONIA (324 - Petroleum)	13,560	13,560
	ANTIMONY COMPOUNDS (324 - Petroleum)	678	
	BENZENE (324 - Petroleum)	69,325	
	BENZO(G,H,I)PERYLENE (324 - Petroleum)	0	
	CUMENE (324 - Petroleum)	28,728	
	CYCLOHEXANE (324 - Petroleum)	12,206	
	ETHYLBENZENE (324 - Petroleum)	6,909	
	ETHYLENE (324 - Petroleum)	2,538	
	ETHYLENE GLYCOL (324 - Petroleum)	0	
	HYDROGEN CYANIDE (324 - Petroleum)	154,520	
	HYDROGEN FLUORIDE (324 - Petroleum)	1	
	HYDROGEN SULFIDE (324 - Petroleum)	9,222	
	LEAD COMPOUNDS (324 - Petroleum)	170	
	MERCURY COMPOUNDS (324 - Petroleum)	5	
	METHANOL (324 - Petroleum)	17	
	MOLYBDENUM TRIOXIDE (324 - Petroleum)	0	
	N-HEXANE (324 - Petroleum)	48,897	
	NAPHTHALENE (324 - Petroleum)	2,174	
	PHENOL (324 - Petroleum)	5,012	
	POLYCYCLIC AROMATIC COMPOUNDS (324 - Petroleum)	0	
	PROPYLENE (324 - Petroleum)	9,719	
	STYRENE (324 - Petroleum)	437	
	SULFURIC ACID (1994 AND AFTER "ACID AEROSOLS" ONLY) (324 - Petroleum)	365,600	
	TETRACHLOROETHYLENE (324 - Petroleum)	13	
	TOLUENE (324 - Petroleum)	14,415	
	XYLENE (MIXED ISOMERS) (324 - Petroleum)	15,137	
	Total	762,390	3,662



A stylized sun with a large yellow circle in the center and a ring of orange triangular rays around it. The sun is positioned in the upper right quadrant of the slide.



Scheme 12



Atkinson, R., & Arey, J. (2003). Chemical Reviews.

Sources + Chemistry = Products

Light Absorption

Molecular Markers

Polar vs non-Polar

**Soup of chemical
components**



Functional Groups

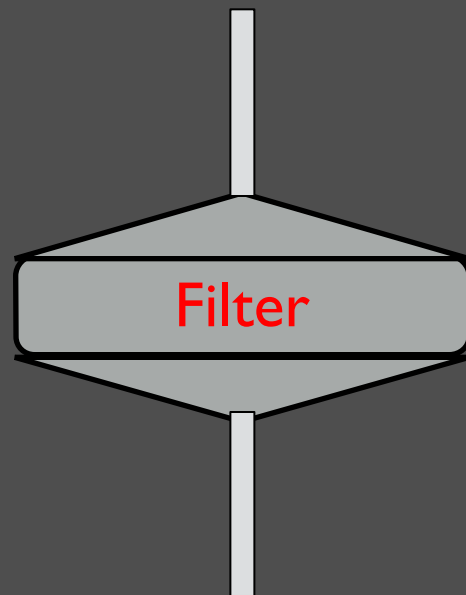
H/C and O/C ratios

Oxidation States

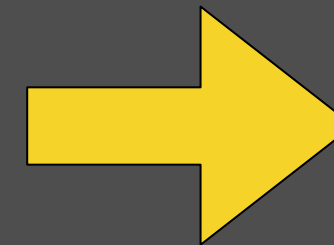
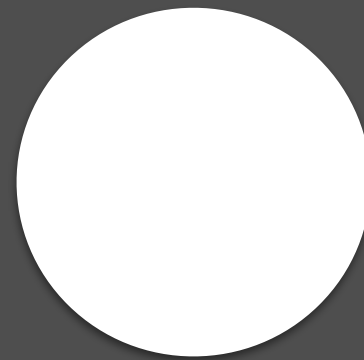
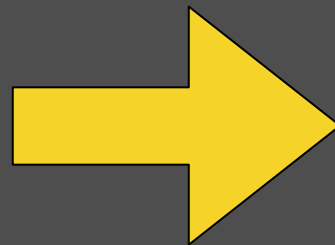
Molecular Weight Range

Collect - Extract - Analyze

Collect



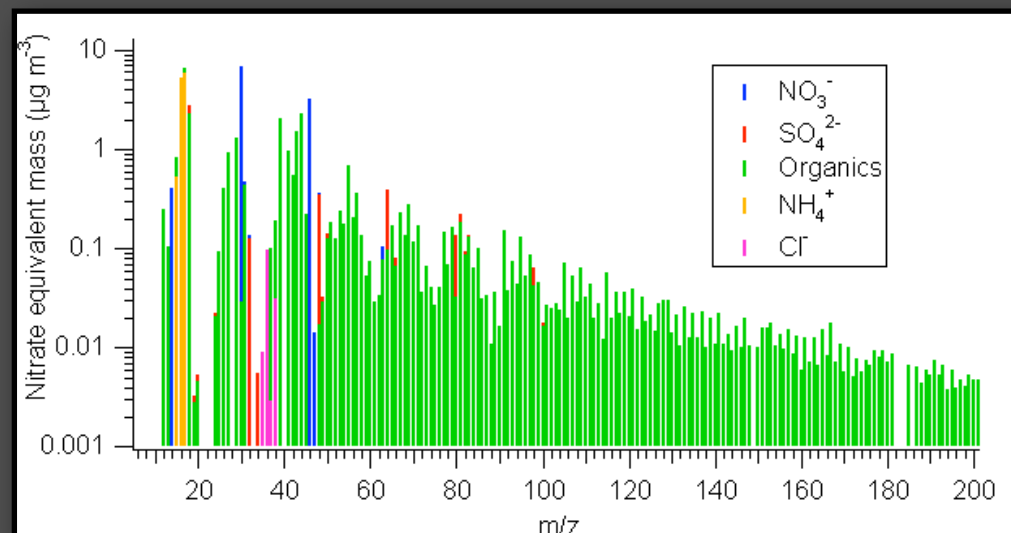
Extract



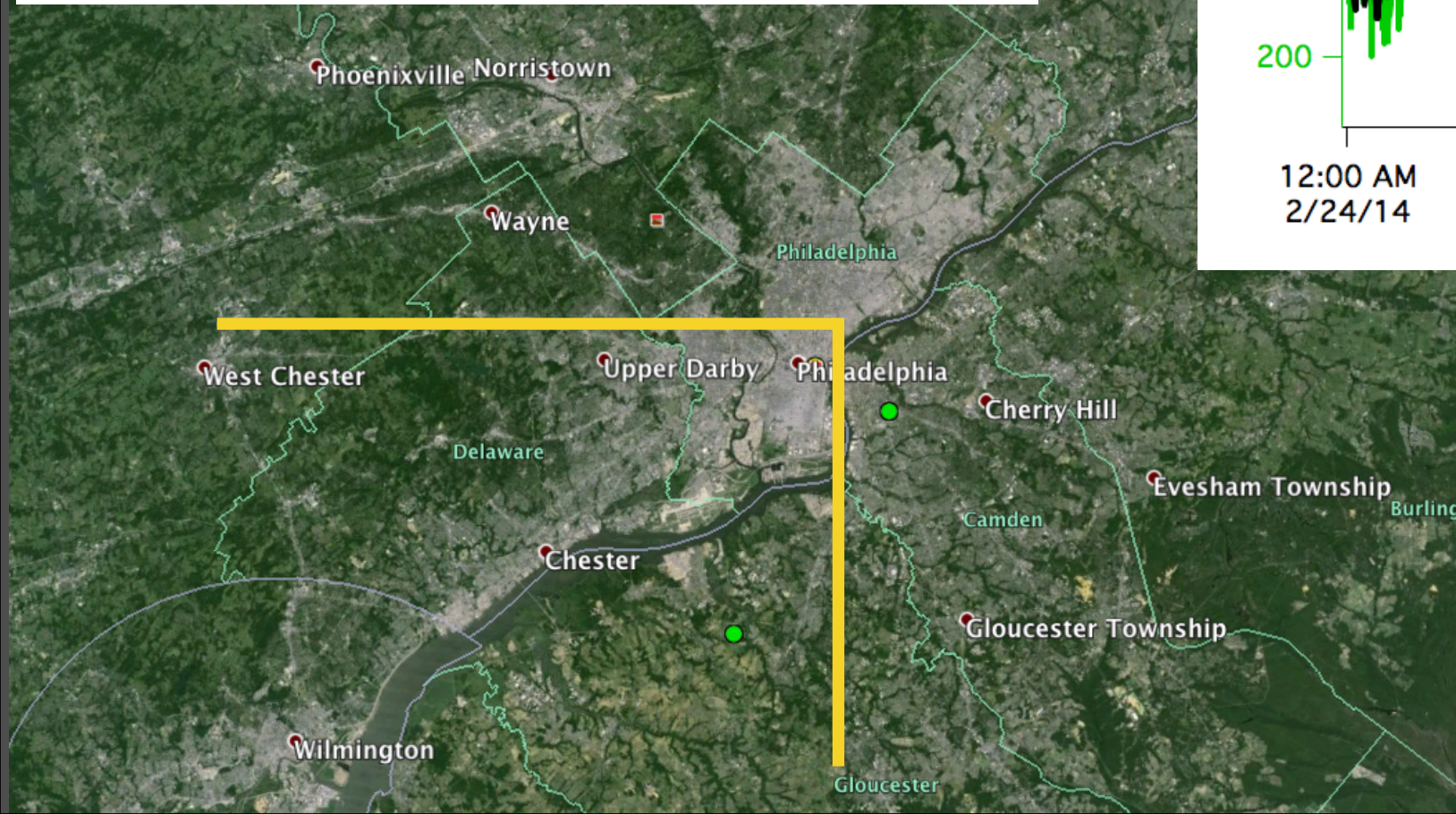
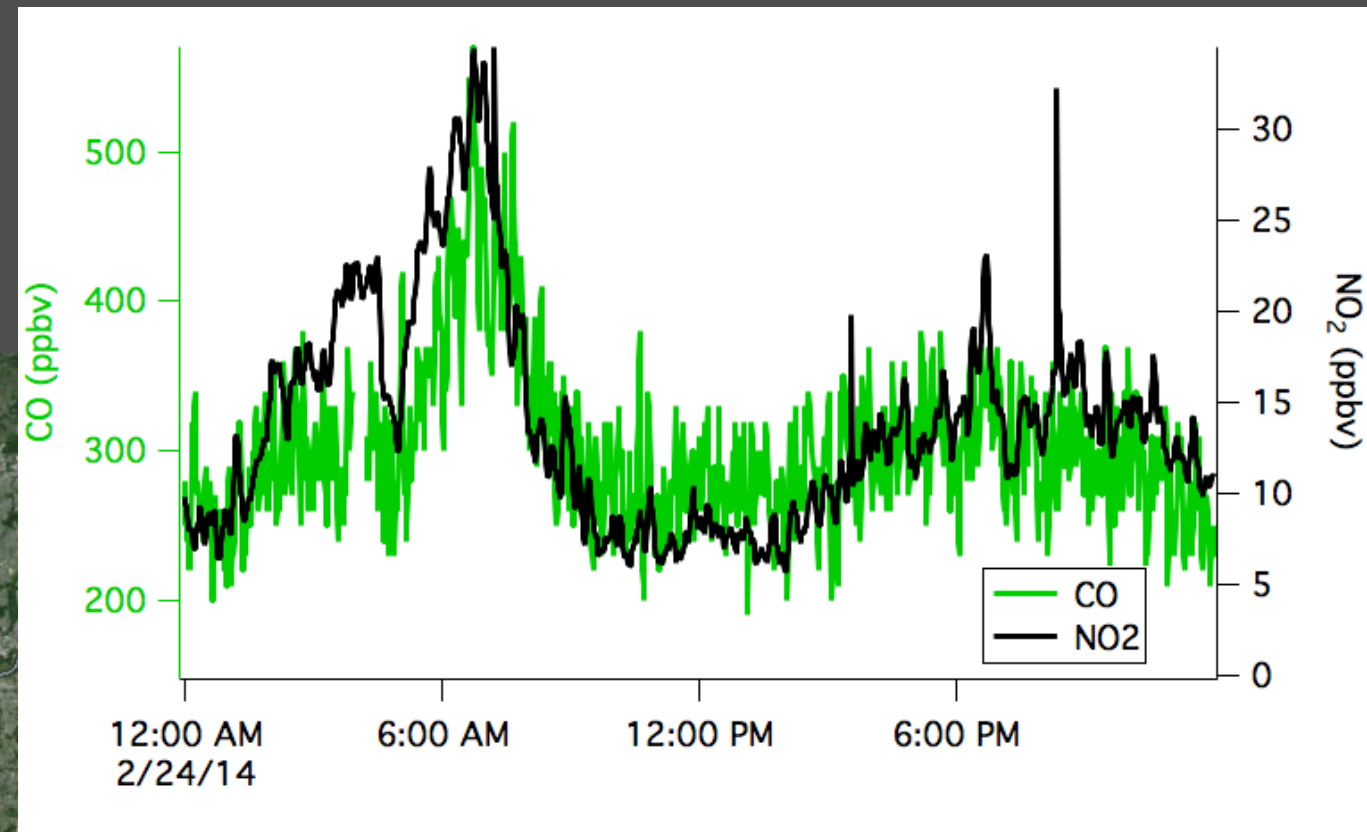
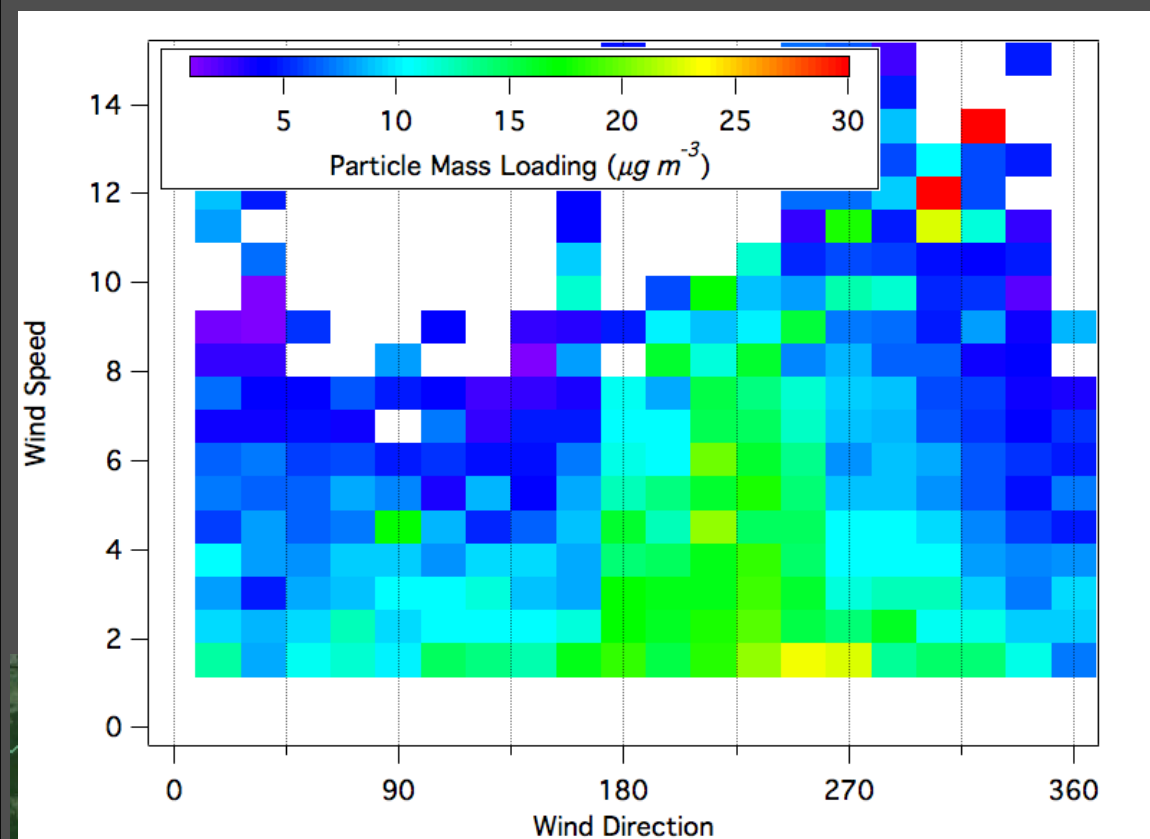
Analyze

Mass Spec
GC-MS
FTICR
LC-MS
HNMR
FTIR
UV-Vis Abs

...



Variables - Meteorology - Time of Day



Logistics - Fall - Winter - Spring

1 - Fall Term

Lit Review, Choice of Analytical Method, Hypothesis Development
Due: Presentation, Written Research Plan

2 - Winter Term

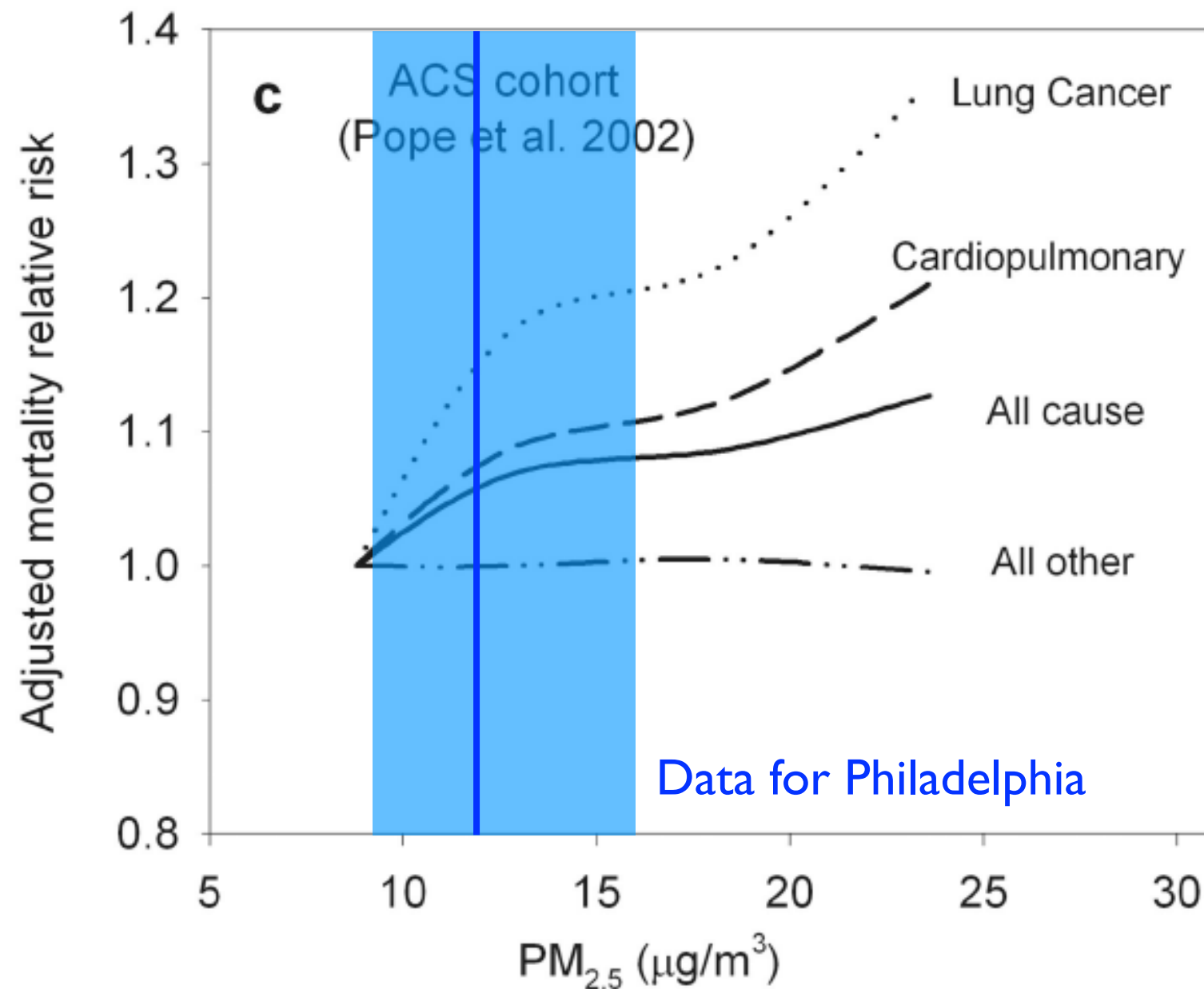
Start Research Project, Begin data collection and analysis
Due: Presentation to group on preliminary data, written report

3 - Spring Term

Continue data collection and analysis, archive data with documentation
Due: Final Presentation, Final Paper

Questions?

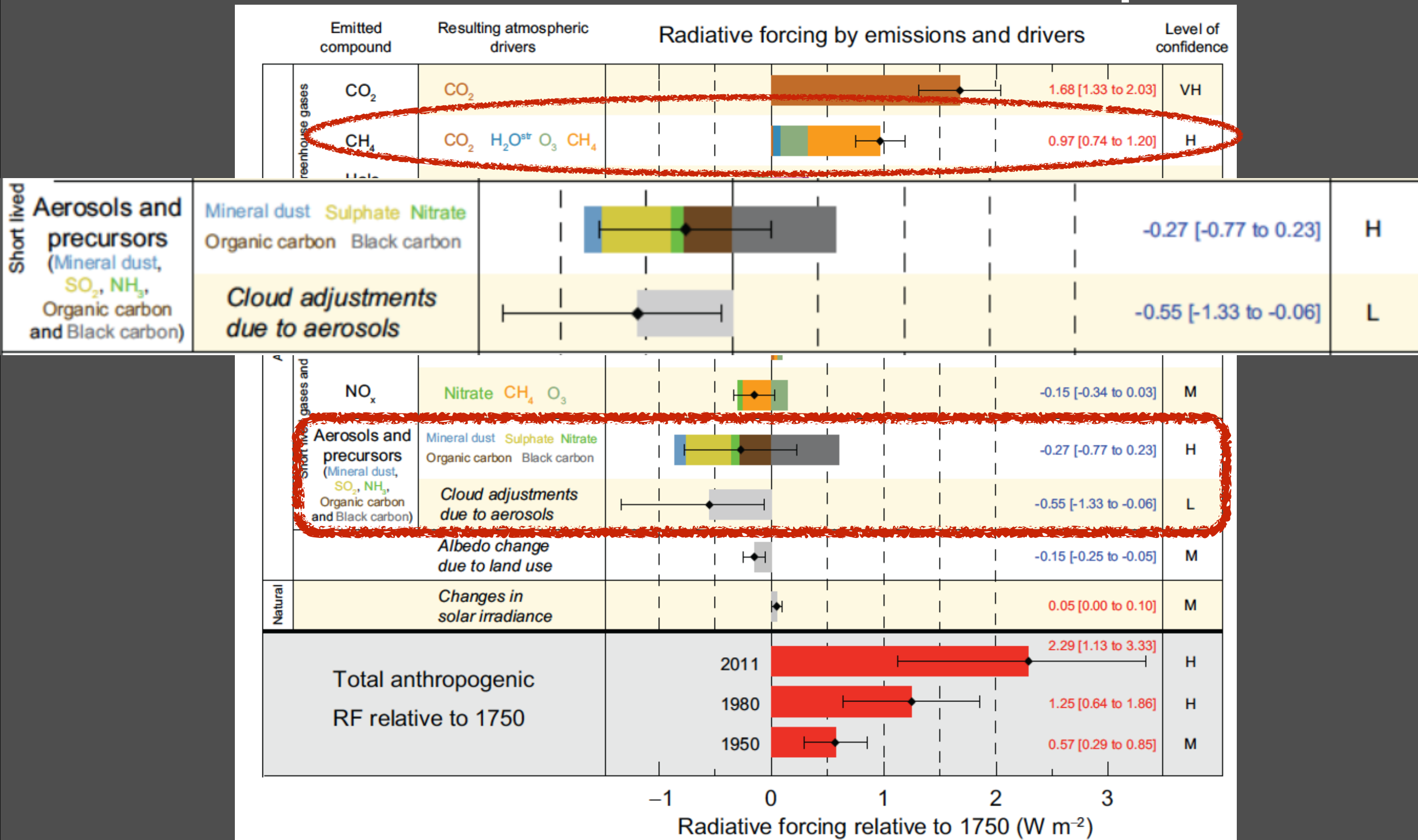
Human Health



- “Six City” study
- Relationship between aerosol mass loading and increased death rate established
- No “safe” threshold concentration
- Developing world Issues: Cooking over open fire kills 1.9 M people / year

Pope and Dockery JAWMA (2006)

Climate - Radiative impacts

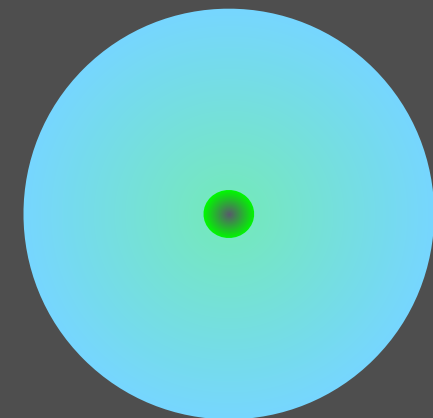
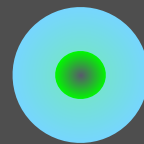


Particle Growth vs RH or SS

Dry RH < 30%

Dry RH ~ 90%

RH > 100%



Haze

Fog or Cloud

Aerosol growth with RH change depends on:

Concentration, SIZE, Composition, Shape