Small Ozone Sensors

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Ozone Sensors: Thought Process

Why use low cost sensors?

- Inexpensive
- So you can use many
- So you can capture spatial variations
- So you can drive them around exploring

Ozone Sensors: Thought Process

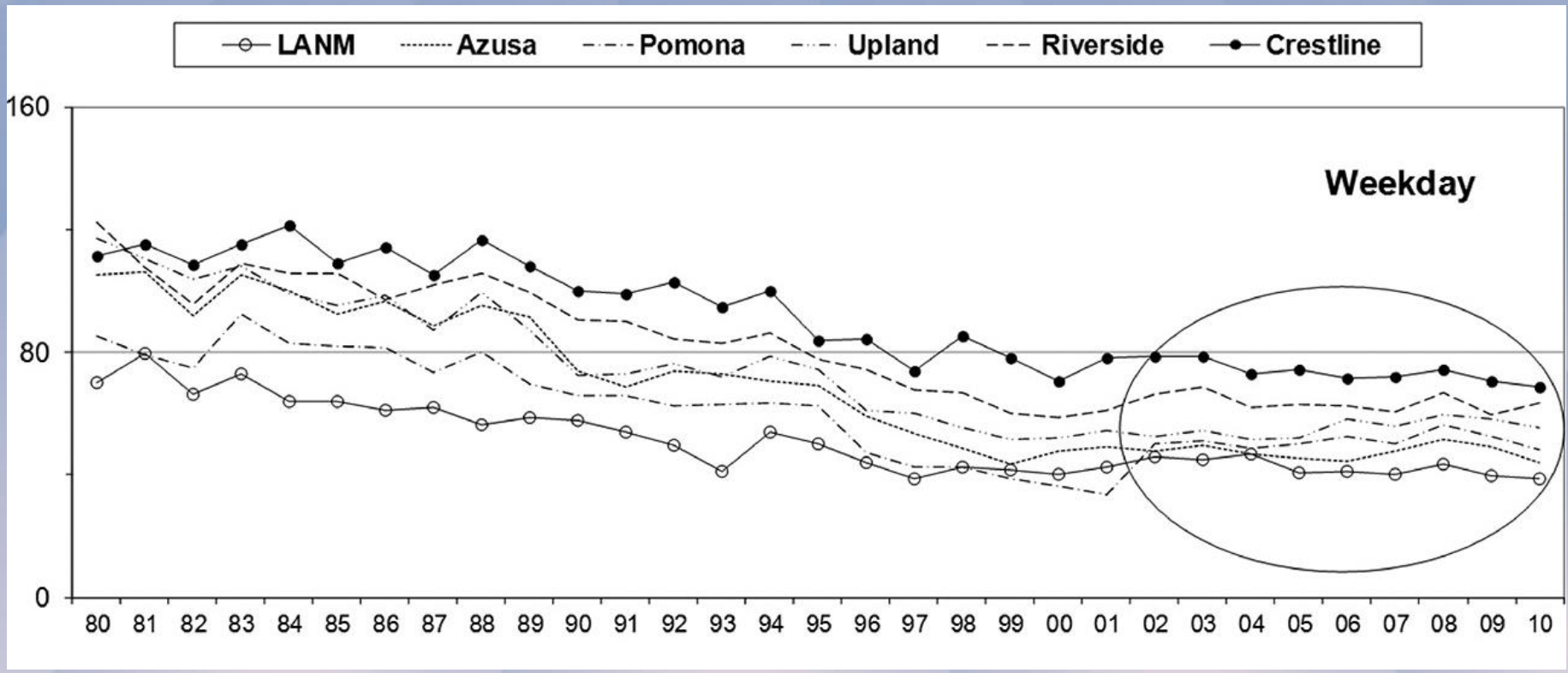
What are the spatial scales?

- Reactions of NOx + VOCs -> O_3 slow because NO -> NO_2 is slow
  - So spatial scales are generally long and slow
- But NO + O_3 -> NO_2 + O_2 is pretty fast
  - So spatial scales near NO sources are short and fast
- Why does this matter now?

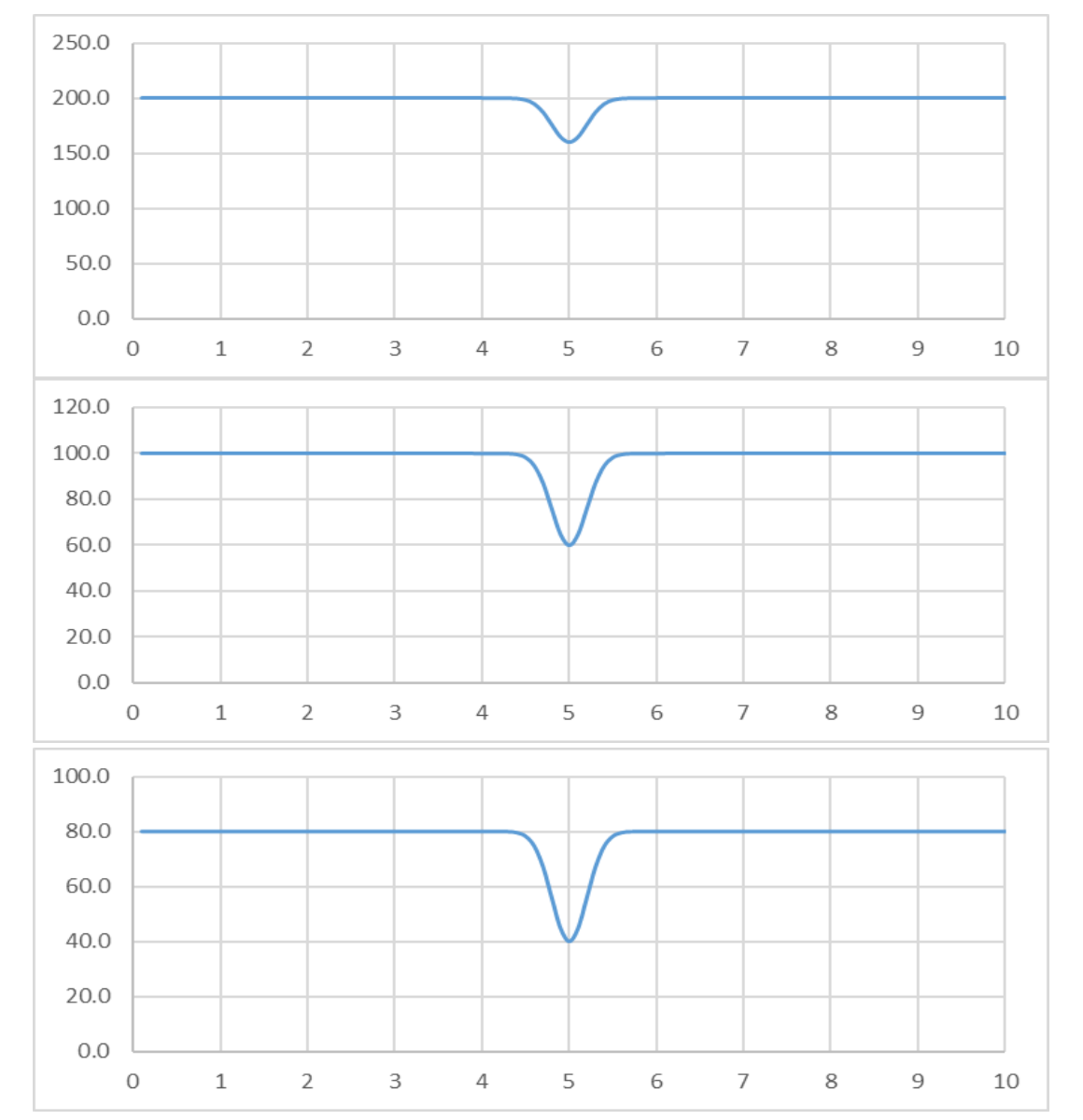
Ozone Sensors: Thought Process

History

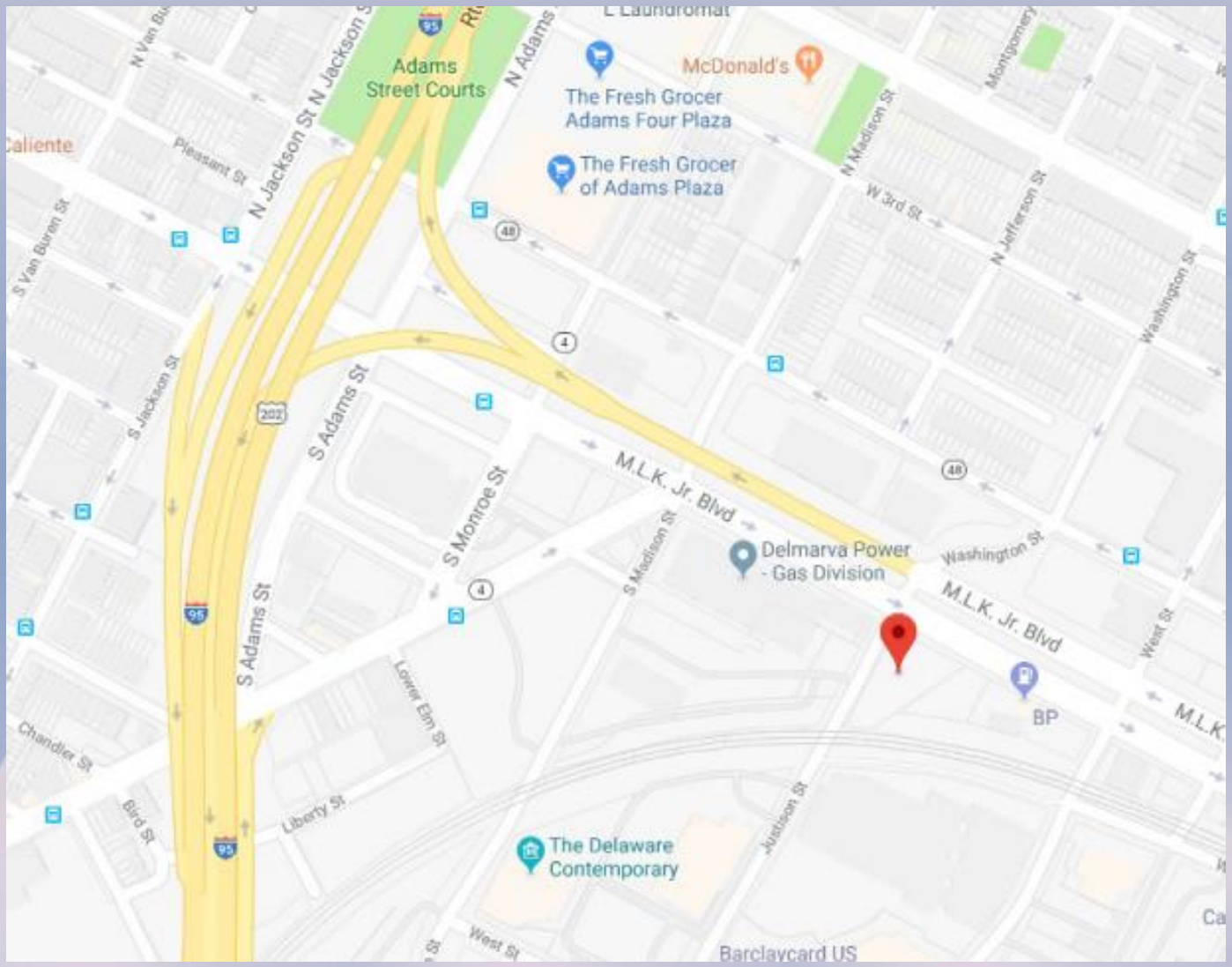
- Used to be, if you lived in a major city, you often breathed ozone at dangerous concentrations
- But we succeeded, well not completely, but still …



Ozone Sensors: Thought Process



Ozone Sensors: Thought Process



Ozone Sensors on AQ-SPEC

Sensor	R2	Slope	Cost
2B Technologies - POM	0.99	1.02	$4,500
Aeroqual	0.85	0.98	$500
Air Quality Egg	0.15	0.1	$200
Perkin Elmer ELM	0.93	1.3	$5,200
Spec Sensors	0.2	0.1	$500
Uhoo	0.6	0.5	$300
Uni-Tec Sens-It	0.8	Nonlinear	$2,200
Vaisala	0.5	-0.2	$3,700

Ozone Sensors on AQ-SPEC

And even the expensive FRM ozone sensors have issues:

- Have you notice how high ozone is in wildfires?

Ozone Sensors: Summary

Some sensors are better than no sensors?

- Not if they give a very wrong answer
- But let's not hold them to standards that maybe our "Gold Standard" sensors cannot meet

So how good do they need to be?

- Ozone concentrations in US: 40 to 120 ppb, mostly
- NAAQS 8 hour ozone is 70 ppb, recently
- A performance standard depends on the question that the sensor is supposed to answer

Small Sensors: Next Steps

Air Sensors International Conference

asic.aqrc.ucdavis.edu

September 10-12

Oakland Convention Center, Oakland, CA

Hosted by the Air Quality Research Center at UC Davis