

The Black Carbon network in Mexico

Current state and challenges

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Comparisons of methods

Some definitios to start with

- All instruments are fitted with 2.5 μm cyclones
- Soot: particles emitted directly from combustion processes
- Black carbon (BC): particulate fraction (soot) containing carbon and absorbing visible light
- Elemental carbon (EC): particulate fraction (soot) containing carbon and thermally stable at $< 900\text{ }^{\circ}\text{C}$

Baumgardner et al, JOURNAL OF GEOPHYSICAL RESEARCH, 107, 10, 2002

Buseck et al, Atmos. Chem. Phys. Discuss., 12, 24821–24846, 2012

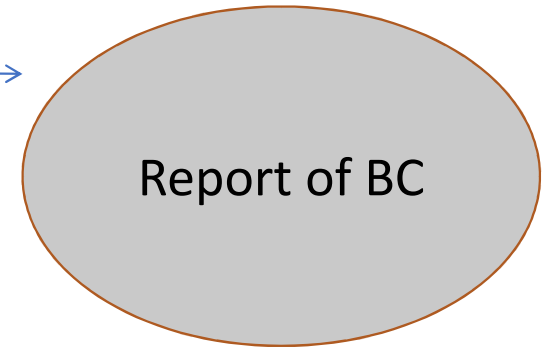
Ramanathan and Carmichael, Nat. Geosci., 1, 221–227, 2008

EPA, Report to Congress on Black Carbon, 2012

Instrumental procedures



Aethalometer
Microaethalometer
PAX



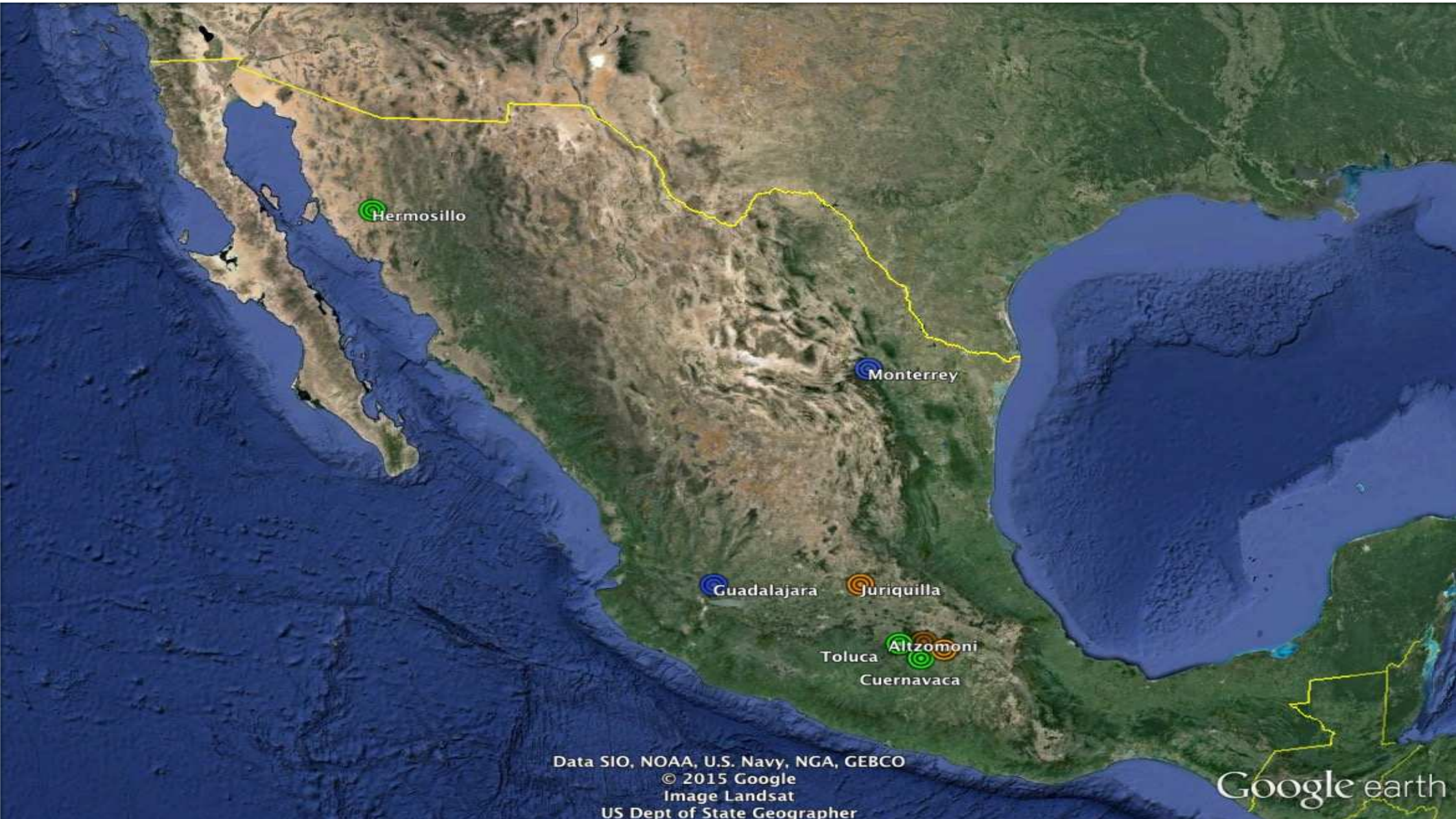
- SRM 1649a (Urban Dust) is used to calibrate the instrument

Current RCN sites

Site	Location	Instrument	Names
1	Ciudad Universitaria, México DF	PAX	Oscar Peralta Rafael Liñán
2	Juriquilla, Querétaro	PAX	Dara Salcedo Oscar Peralta
3	Alzomoni, Estado de México	PAX	Oscar Peralta Rafael Liñán
4	Monterrey, Nuevo León	Et-42	Armandina Valdés
5	Guadalajara, Jalisco	Et-31	Adriana Villavicencio Leonel Hernández

Future sites

Site	Location	Instrument	Names
6	México DF	Et-42	Armando Retama
7	Cuernavaca, Morelos	Et-31	Stephanie Montero Hugo Salarriaga
8	Hermosillo, Sonora	PAX	Oscar Peralta Rafael Liñán
9	Toluca, Estado de México	Et-42	



Data SIO, NOAA, U.S. Navy, NGA, GEBCO
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Image Landsat
US Dept of State Geographer

Google earth

Time series

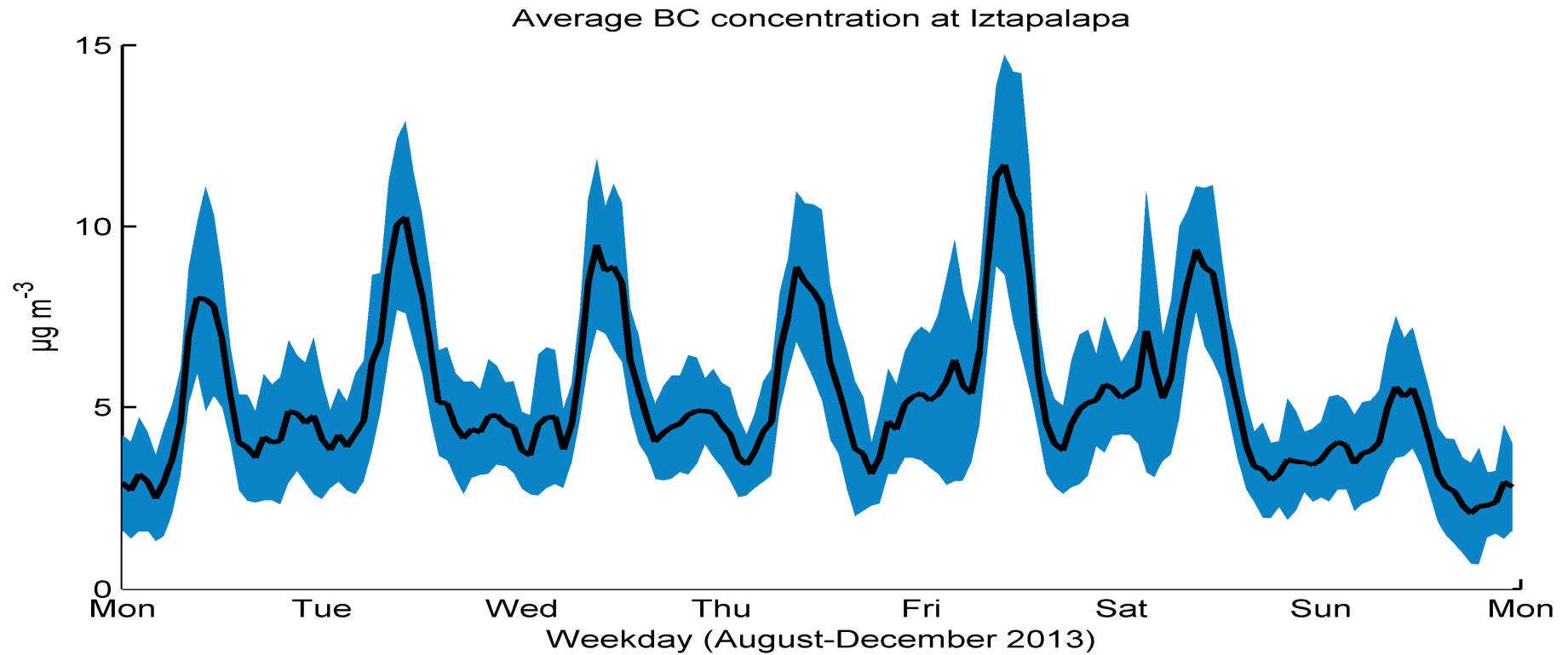


Figure 4. Black carbon time series . Shaded area represents standard deviation

BC only correlates with CO

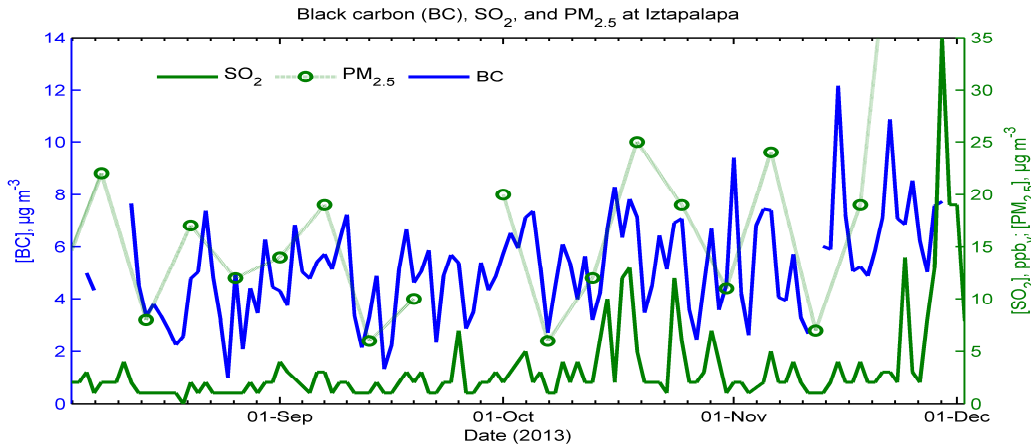


Figure 6. Time series for black carbon, sulfur dioxide, and particulate matter 2.5 μm .

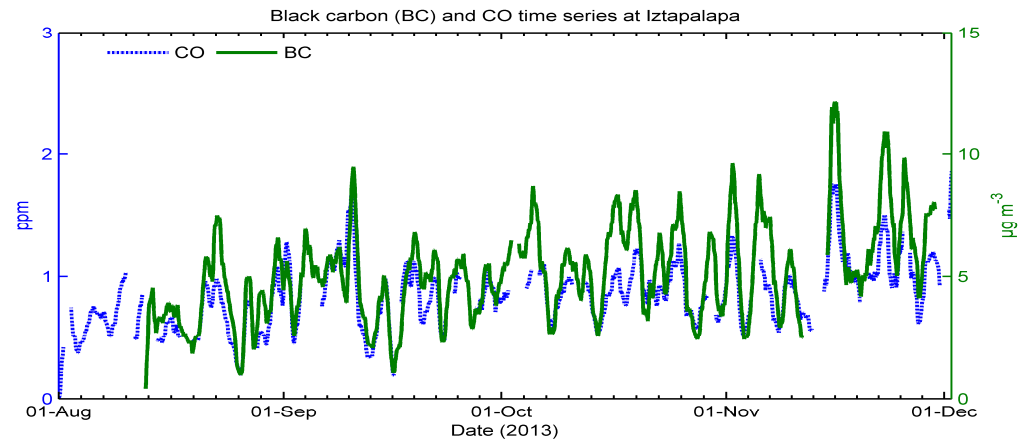


Figure 7. Time series for black carbon and carbon monoxide

It may be possible to reconstruct BC time series from CO for some sites

Results of a comparison BV vs EC

ID	Mass, μg	OC, μg	EC, μg	Error UIC	EC, $\mu\text{g}/\text{m}^3$	AET-21 BC, $\mu\text{g}/\text{m}^3$	MAC-Mod
Q47-001	180	65	42	< 10%	5.80	1.64	3.05
Q47-002	74	53	10	> 15%	1.33	0.8	6.50
Q47-003	91	61	21	< 10%	3.04		
Q47-004	171	78	34	< 10%	5.00		
Q47-005	71	20	18	> 15%	2.46		
Q47-006	18	9	4	> 15%	0.52		
Q47-008	34	14	8	> 15%	1.06	0.8	8.15
Q47-009	122	26	30	> 15%	4.26	3.9	9.89
Q47-010	26	11	6	> 15%	0.81	0.5	6.67
Q47-011	73	24	18	> 15%	2.52	1.6	6.86
Q47-012	168	107	27	< 10%	3.78	1.2	3.43
Q47-013	13	3	3	> 15%	1.79	1	6.03
Q47-014	110	42	26	> 15%	3.47	1.1	3.42

The average Mass Absorption Coefficient modified is $6.7 \text{ m}^2/\text{g}$ (AE-21 default value is $10.8 \text{ m}^2/\text{g}$).

Observed BC as is and corrected BC

