



GISERA

Gas Industry Social and
Environmental Research Alliance

Coal seam gas and air quality in the Surat Basin, Queensland

Results from new 2 year monitoring program

Sarah Lawson | Senior Research Scientist | 16 October 2017



QGC



Santos
We have the energy.



Australian Government
Department of Industry,
Innovation and Science

Acknowledgements

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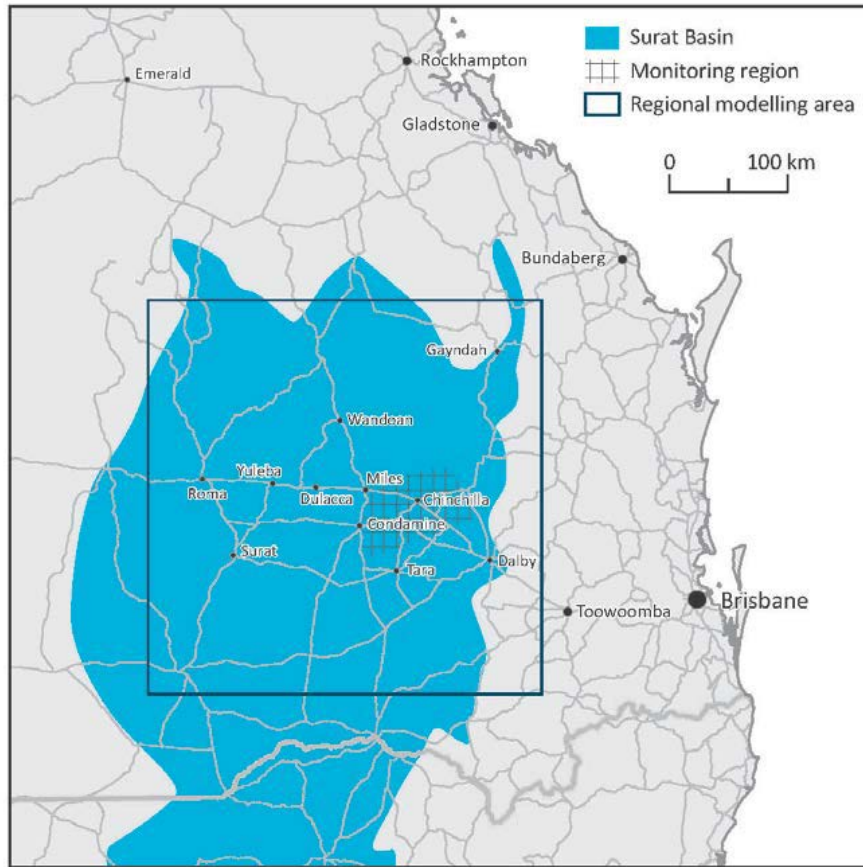
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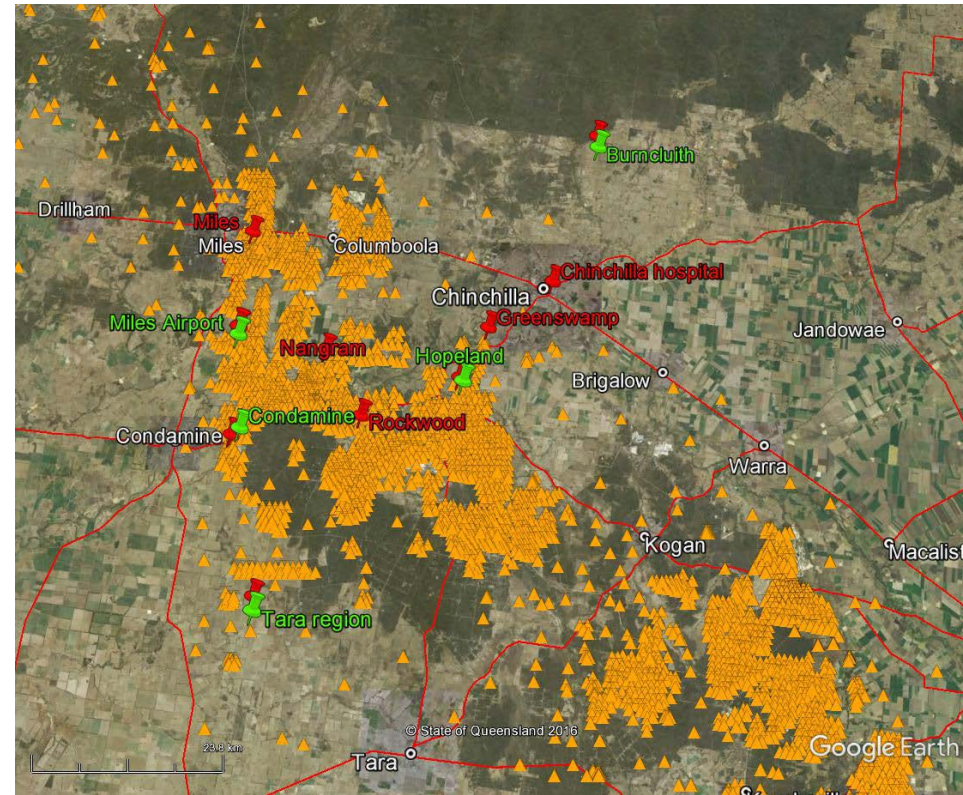
Background:

- CSIRO-led study - first air monitoring program in coal seam gas region of Australia (began Feb 2015)
- Based in the Chinchilla-Miles-Condamine area of Surat Basin, South West Queensland
- Incorporates monitoring and modelling component
- Driven by community concern about airborne pollutants
- Strong focus on transparency of project outputs
 - CSG composition data available to everyone including gas, gas combustion, water composition and radiological surveys (<https://gisera.org.au/project/ambient-air-quality-in-the-surat-basin/>)
 - Air quality data is available to everyone in real time via DEHP website

Study area and monitoring sites



Green – ambient air monitoring stations
Red – passive sampler sites



- 3 Gas field sites
- 2 Regional background sites

Pollutants measured (2+ year monitoring):

Oxides of nitrogen

(NO_x)

Carbon monoxide (CO)

Ozone (O₃)

PM2.5, PM10, TSP

Methane (CH₄)

Total VOCs

Carbon dioxide(CO₂)

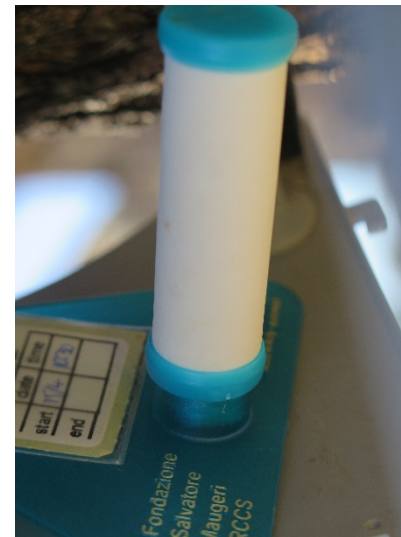
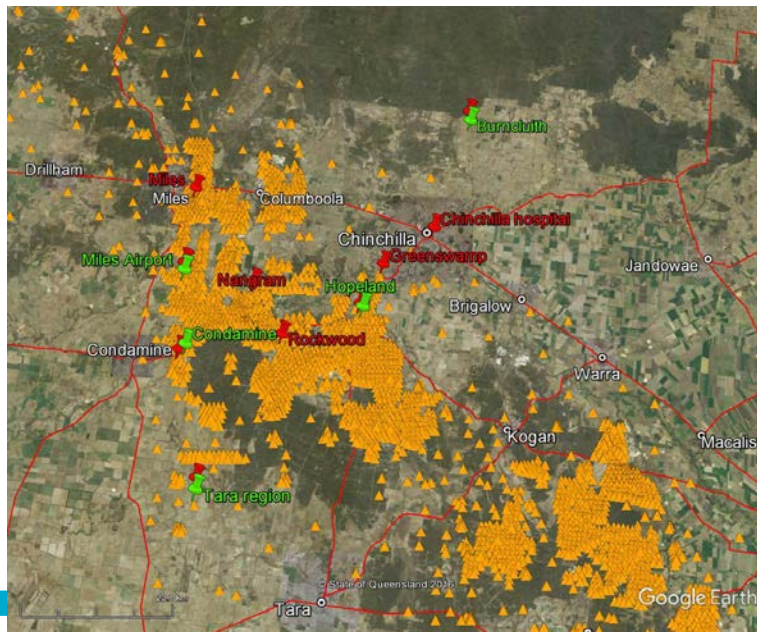
Meteorology

- 4 out of 6 NEPM criteria pollutants
 - Ecotech/CSIRO



Radiello passive gas measurements

- 54 speciated gases incl VOCs (BTEX), oxygenated VOCs, hydrogen sulfide
- Gas field, Regional and Chinchilla
- 10 sites for 16 months
- SGS Leeder / CSIRO measurements



4 out of 5 NEPM
Air Toxics
measured using
this method

Live data streaming to DEHP website

- Data can be compared to air quality standards and other regions at a glance
- Maximum transparency for concerned community

Hourly Air Quality data

Latest measurement: 24 July 2017, 11:00am - 12:00pm

Search

Day: 24 Month: 07 Year: 2017 Hour: 11:00AM - 12:00PM

Display: ☒ Air Quality ☐ Meteorological ☐ DOAS ☐ Metals ☐ Historical

Show: ☒ data readings ☐ index values

Search Previous hour Next hour Latest hour

Region	Station	Carbon Monoxide (8hr Av) (ppm)	Nitrogen Dioxide (1hr Av) (ppm)	Ozone (1hr Av) (ppm)	Sulfur Dioxide (1hr Av) (ppm)	Particulates TSP (24hr Av) (ug/m ³)	Particle PM10 (24hr Av) (ug/m ³)	Particle PM2.5 (24hr Av) (ug/m ³)	Visibility (1hr Av) (Mm ⁻¹)
South East Queensland	Mountain Creek		0.002	0.026			16.6		2
	Deception Bay		0.006	0.027					
	Wynnum		0.011		0.007		13.7	5.2	
	Wynnum West				0.005		11.9	5.2	
	Lytton				0.001		27.3	6.2	
	Cannon Hill			[offline]		[offline]	[offline]	[offline]	
	Brisbane CBD						16.7		2
	Woolloongabba	0.1	0.009				18.5	10.7	
	South Brisbane	2.1	0.02				18.1	12.1	
	Rocklea		0.002	0.027			16.3	10.7	3
South West Queensland	Springwood		0.01	0.018	0.001		11.5	8	
	North Maclean		0.003	0.026					
	Flinders View		0.002	0.024	0.001		15.8		10
	Mulgoolly		0.001	0.03					
	Burnduluth	0.1	0.002	0.035					
	Miles Airport	0	0.001	0.033		13.2	8.2	2.6	
	Hopeland	0.2	0.001			6.7	6.4	3.7	
	Tara	0.1	0.002	0.029					
	Gladesville		0.003		0		9.7	4.7	2
	Fisherman's Landing		0.001		0		36.1	6.5	10
South West Queensland	Boat Creek		0.005		0		12	4.9	10
	Clinton		0.005		0		14.8	8.6	8

Number of exceedances of EPP (Air) objectives or Air NEPM standards in first 2 years of monitoring

Air pollutant	Averaging period	Exceedances Gas field sites (3 sites)	Exceedances Regional sites (2 sites)
PM10	Annual 24 hour	0 2	n/a
PM2.5	Annual 24 hour	0 6	n/a
TSP	Annual 24 hour	0 8	n/a
Carbon monoxide	8 hour	0	0
Ozone	4 hour 1 hour	0 0	0 0
Nitrogen dioxide	1 hour Annual	0 0	0 0
benzene	Annual	0	0
Toluene	Annual	0	0
Xylenes	Annual	0	0

- Particle exceedances at Gas field sites
- Particles not measured at Regional sites
- No other exceedances observed

Methane concentrations at Gas field sites

Miles Airport

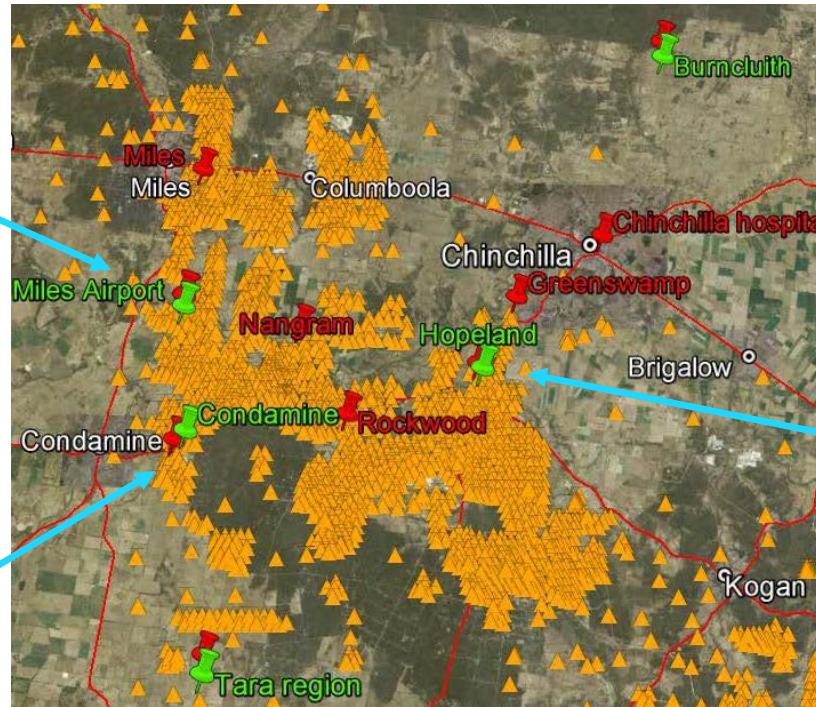
Mean 1.8 ppm

Hourly Max 15.4 ppm

Condamine

Mean 1.8 ppm

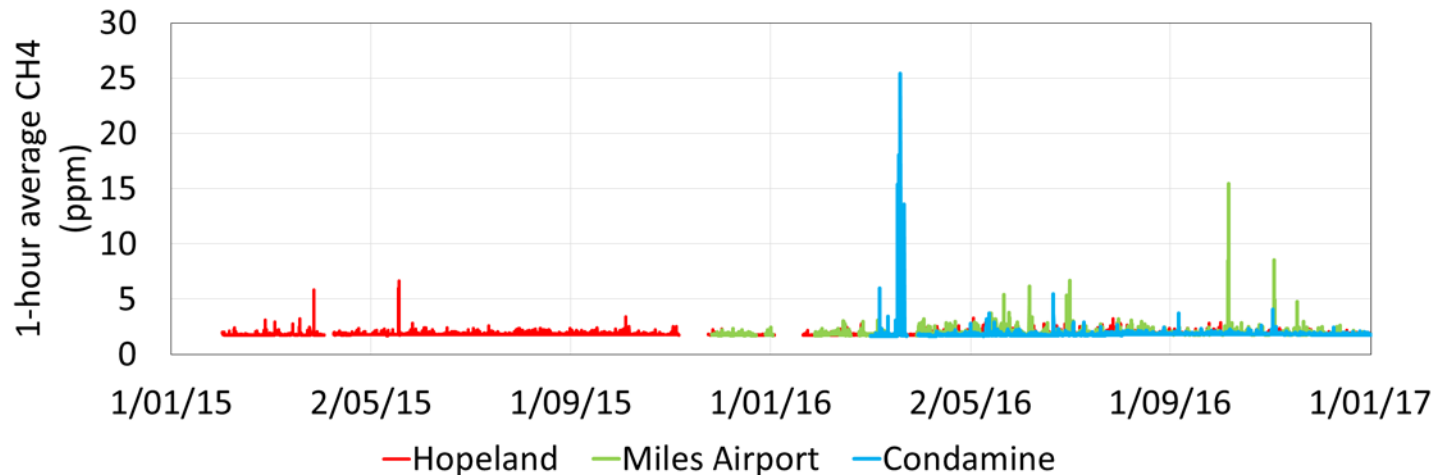
Hourly Max 25.4 ppm



Hopeland

Mean 1.8 ppm

Hourly Max 6.6 ppm

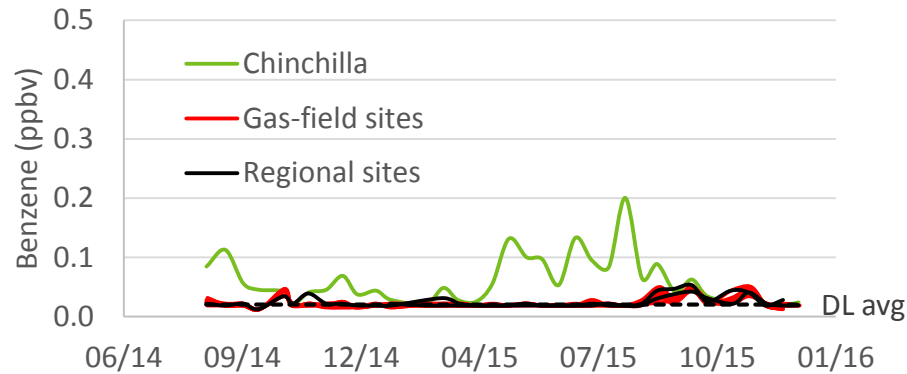


Passive sampler results –commonly detected gases

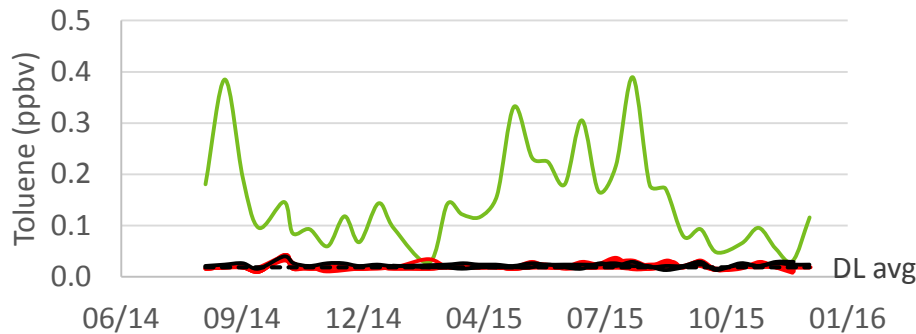
- Of 54 gases targeted, 32 gases measured above detection limit in one or more sample
- Highest number of detects at Chinchilla township site
- Most commonly detected gases
 - Benzene, toluene, xylenes (BTX) (~90% of Chinchilla samples, ~30% of Gas field and Regional samples)
 - Formaldehyde, acetaldehyde (90-100% of all samples)
 - Carbon tetrachloride (100% of samples)



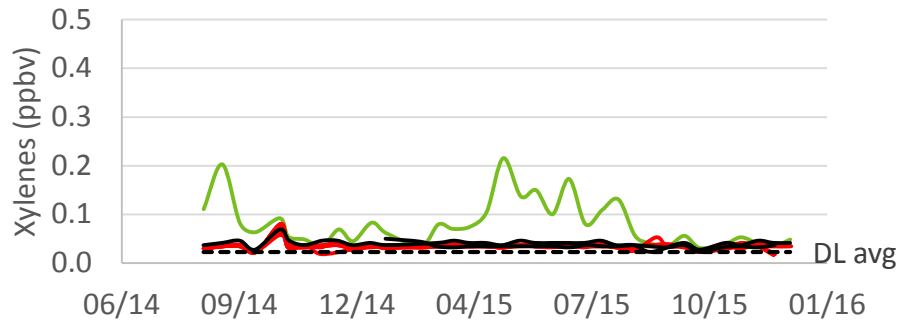
BTX at Chinchilla, Gas field and Regional sites



The EPP (air) objective for **benzene** is 3 ppbv

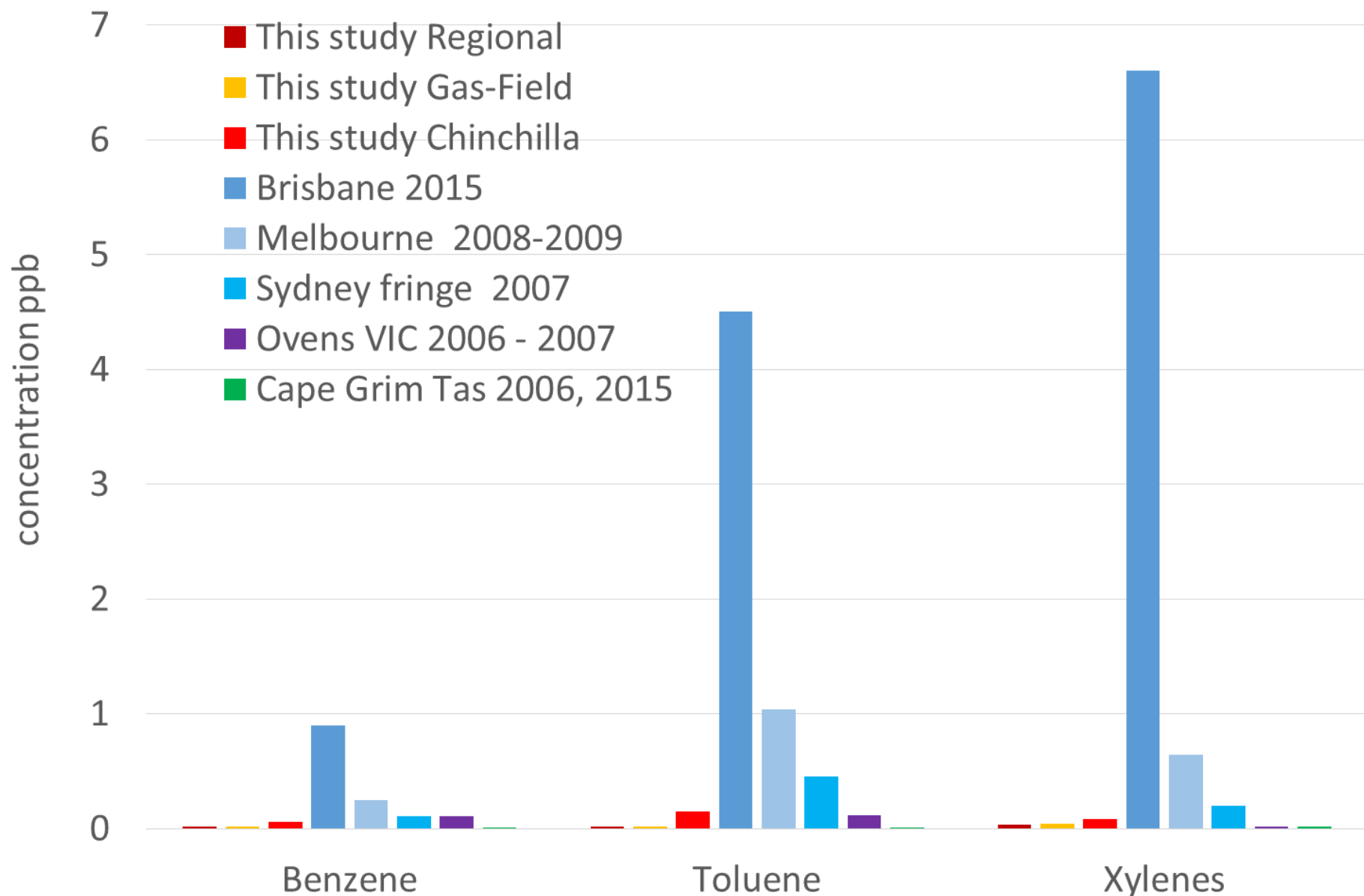


The EPP (air) objective for **toluene** is 100 ppbv

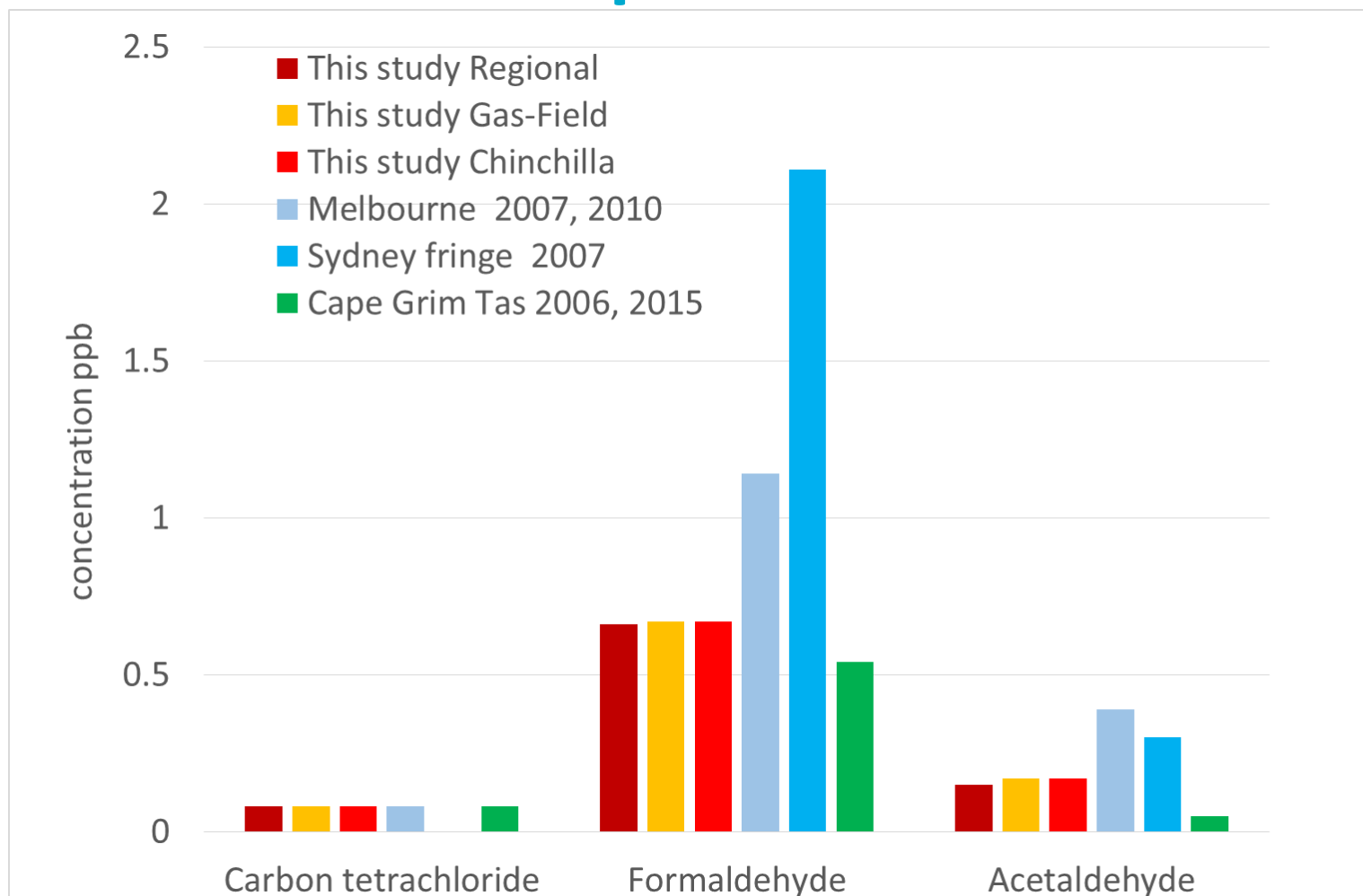


The EPP (air) objective for **xylenes** is 200 ppbv

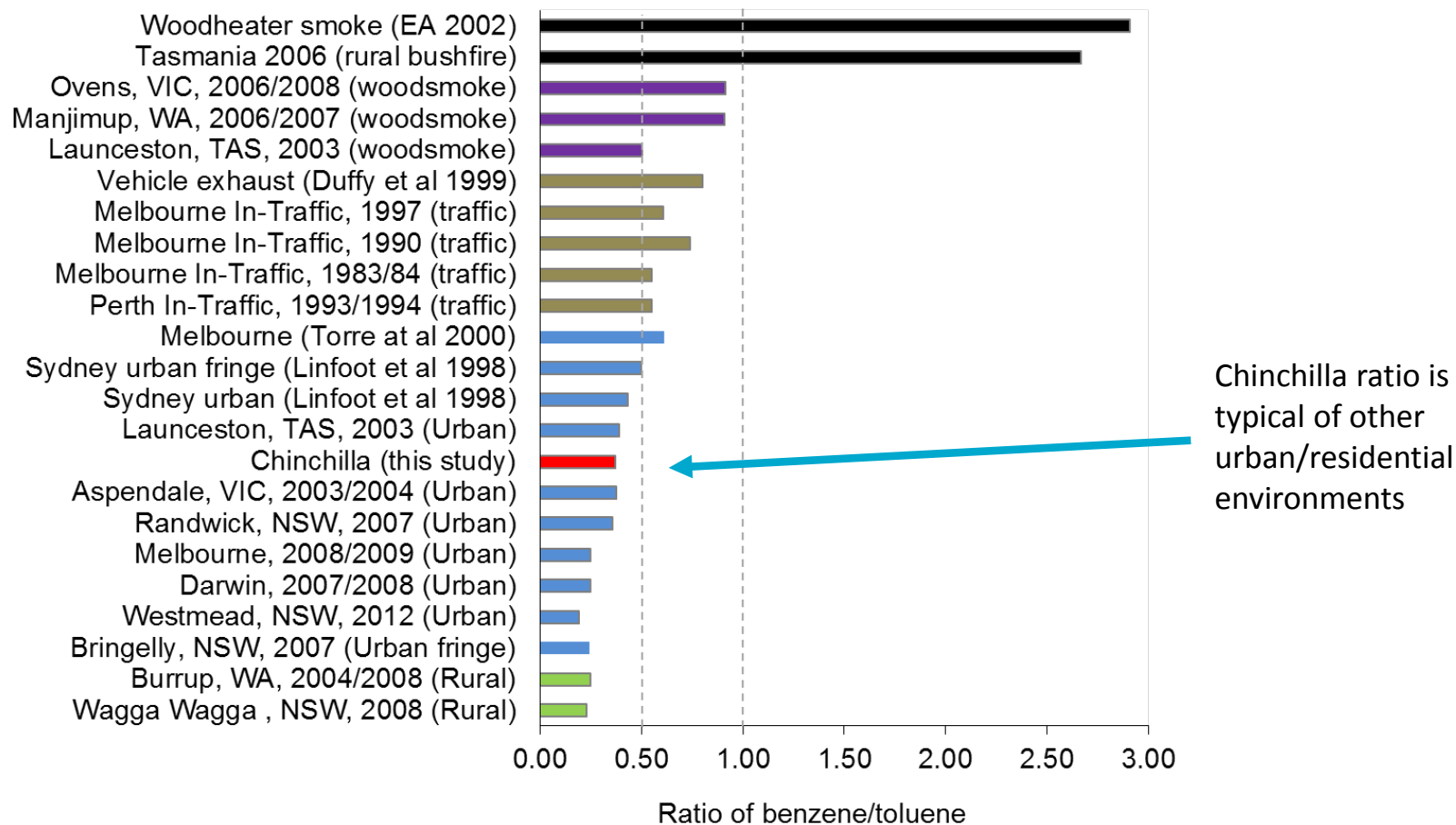
BTX : this study compared to other sites



Other commonly detected gas concentrations compared to other sites



Ratios of benzene/toluene from woodsmoke/fire, vehicle exhaust, urban and rural areas



Project outputs and next steps

- Live data streaming continues from air quality sites (CO, NO₂, O₃, PM2.5, PM10, TSP), relocation of Condamine station to new Wieambilla site
- Data summary reports will be available via GISERA website
 - Compare concentrations from AQ stations and passive samplers with relevant air quality guidelines
 - Investigate exceedances
 - Investigate frequently detected gases
 - Concentrations compared with elsewhere in Australia
- Community engagement
- Air quality data will provide benefits to local community, government and industry

Thank you

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