



# Black Carbon Measurements at the Cape Grim Baseline Air Pollution Station, Tasmania

Fabienne Reisen<sup>\*</sup>, John Gras, Jason Ward, Melita Keywood

Global Monitoring Annual Conference, Boulder CO

23 May 2017

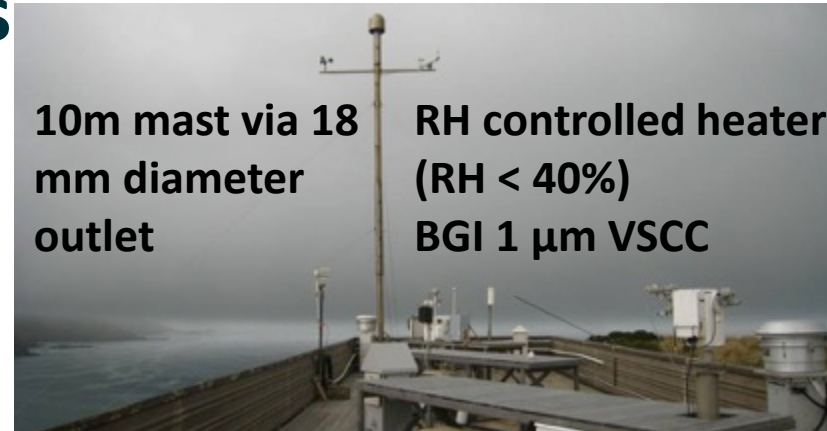
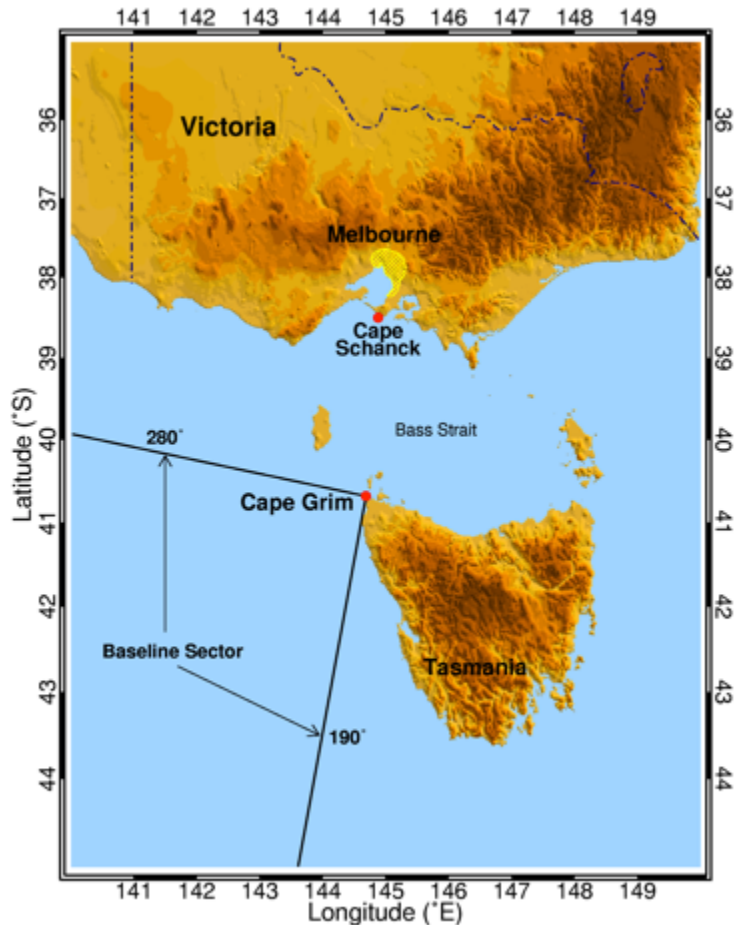
OCEANS & ATMOSPHERE

[www.csiro.au](http://www.csiro.au)



# Cape Grim Baseline Air Pollution Station

## Black carbon measurements



Year	Instrument
1990-2007	Aethalometer- Magee Scientific AE10
2007	Thermo MAAP 5012 (670nm)
Sep 2015	Photoacoustic Extinctionmeter DMT PAX – 870nm
June 2016	Tricolor Absorption Photometer (TAP-NOAA/Brechtel)

# Initial climatology of BC (1990-1997)

BASELINE ATMOSPHERIC PROGRAM (AUSTRALIA) 1997-98, PAGES 20-26, APRIL 2001

## AEROSOL BLACK CARBON AT CAPE GRIM, BY LIGHT ABSORPTION

*J L Gras*

CSIRO Atmospheric Research, Aspendale, Victoria 3195, Australia

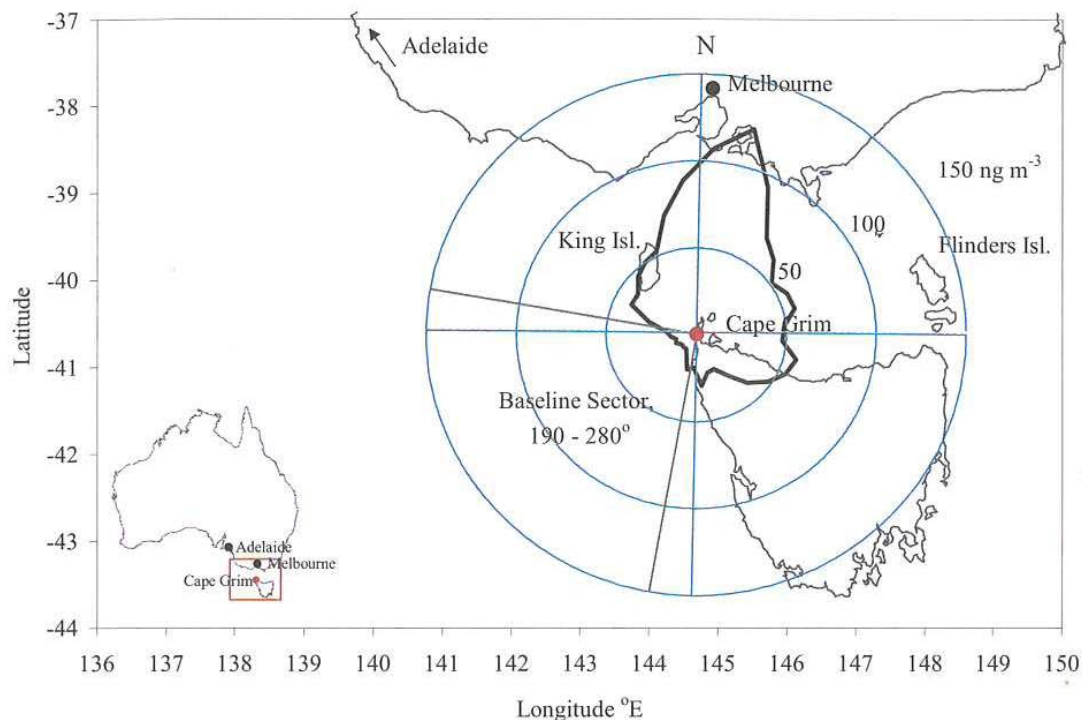
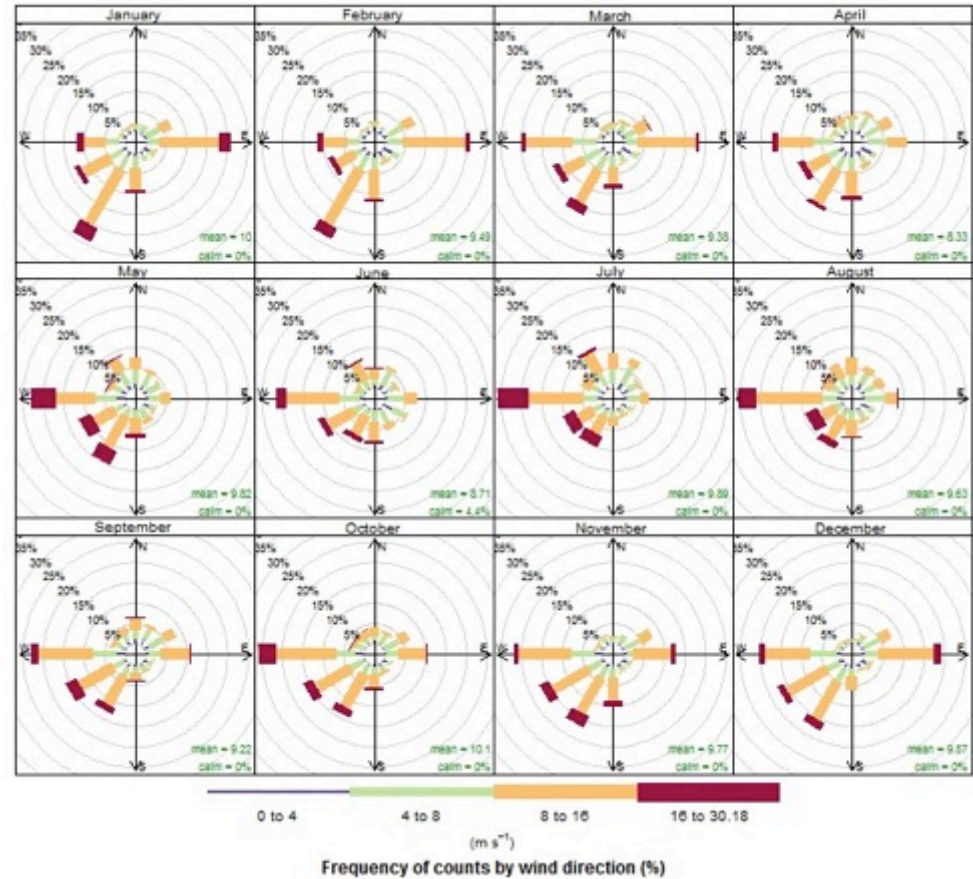
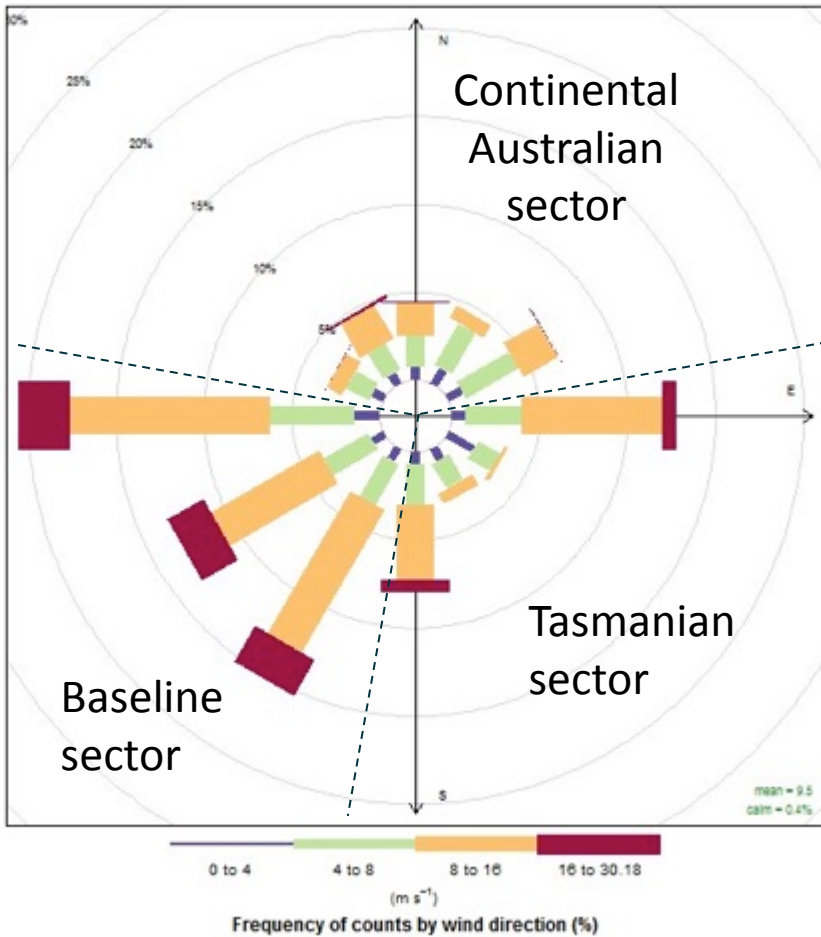


Figure 1. Mean BCa concentration by local wind direction at Cape Grim for 1990-1997.

- **Main contributors to BC:** Northern TAS and Melbourne/eastern VIC (peak BC autumn/winter)
- **Baseline conditions:** peak BC in spring attributed to long-range transport of smoke
- **Baseline sector:** potentially wind-related artefacts due to scattering or re-suspended soil

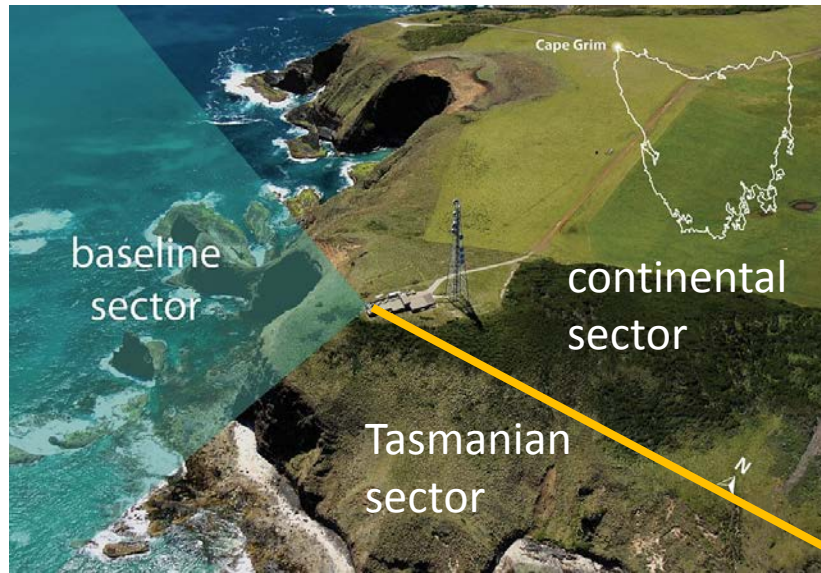


# Origins of air masses at Cape Grim

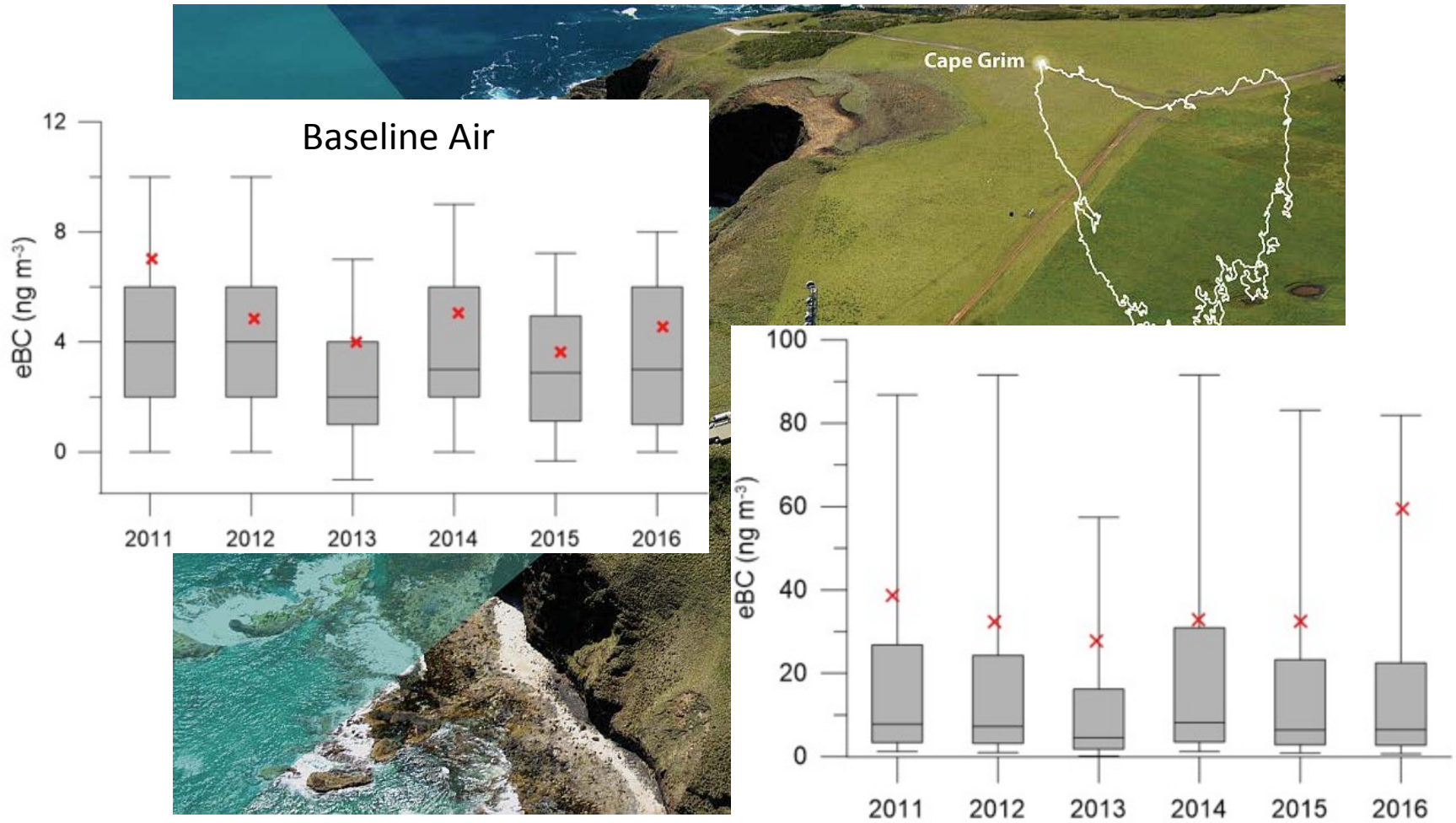


# What are the sources of BC at Cape Grim?

Long-range transport of smoke

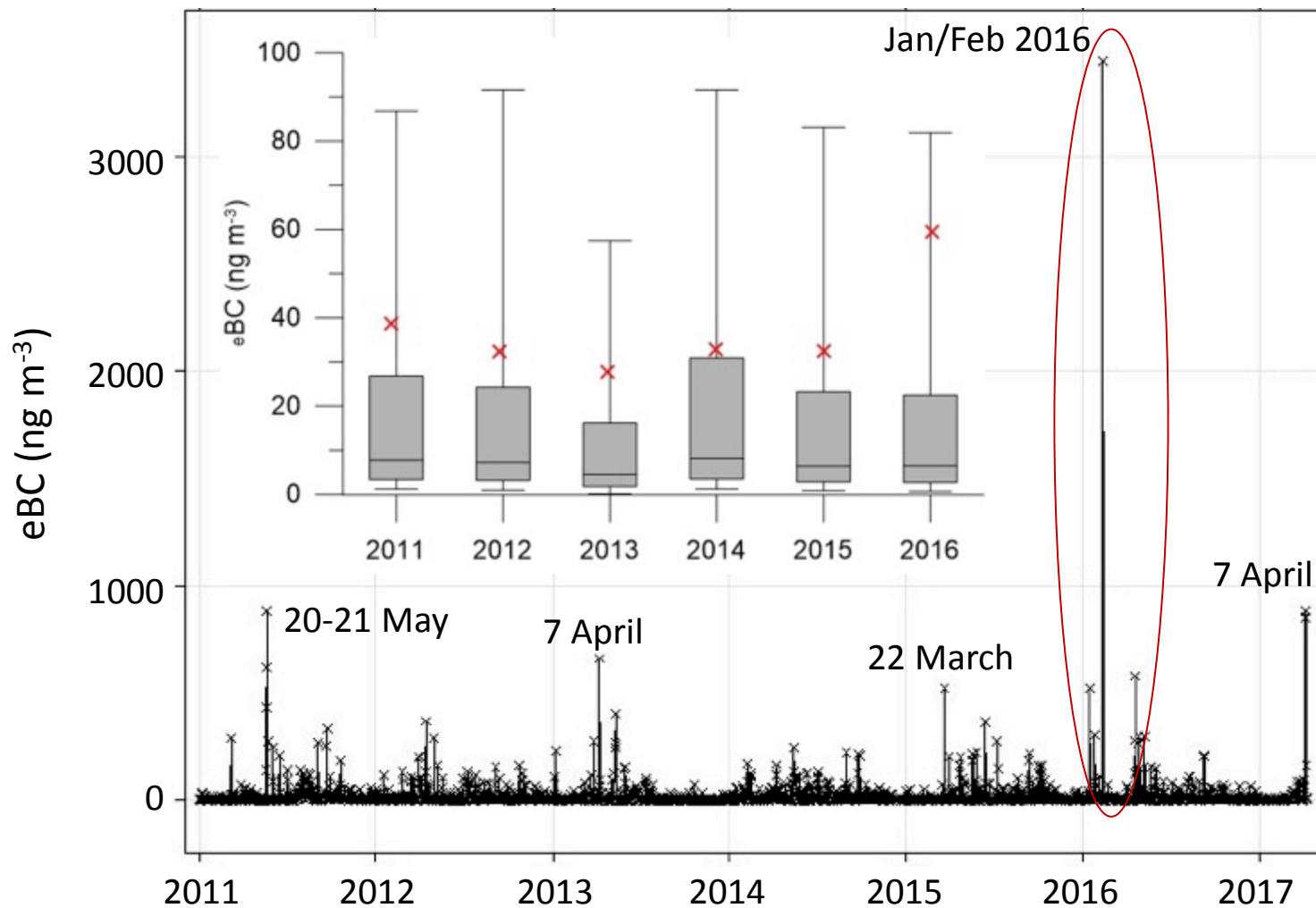


# Black carbon concentrations 2011-2017

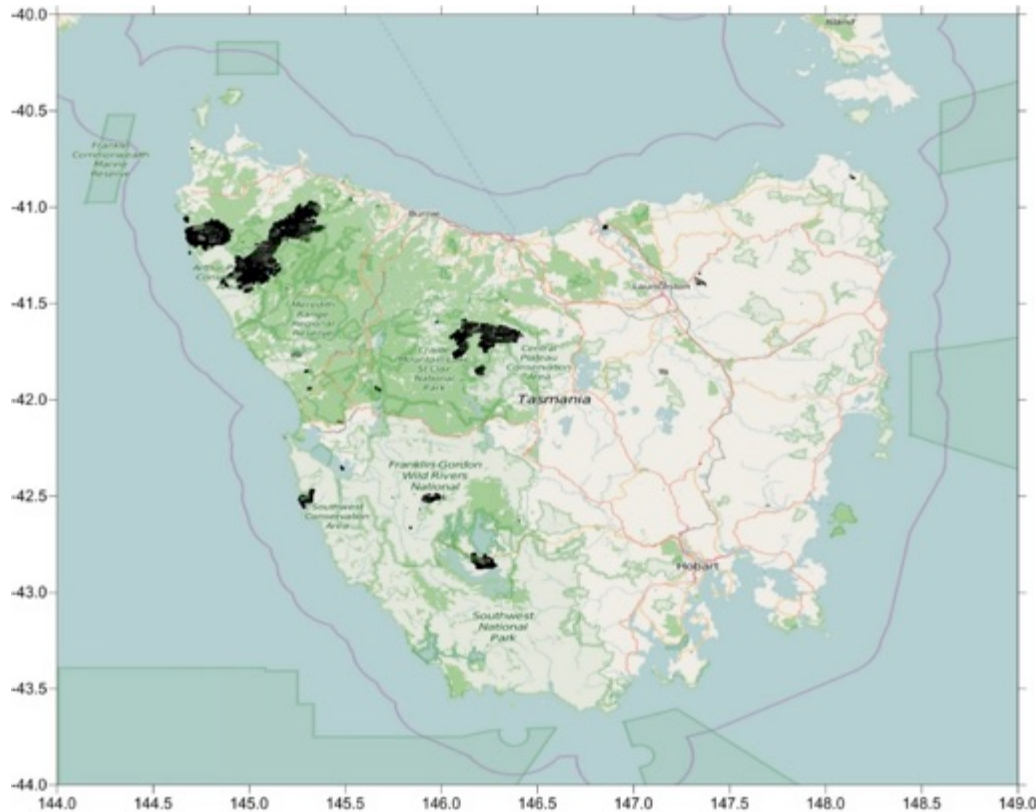




# Daily median BC – highlighting few large events



# Tasmanian Fires 2016

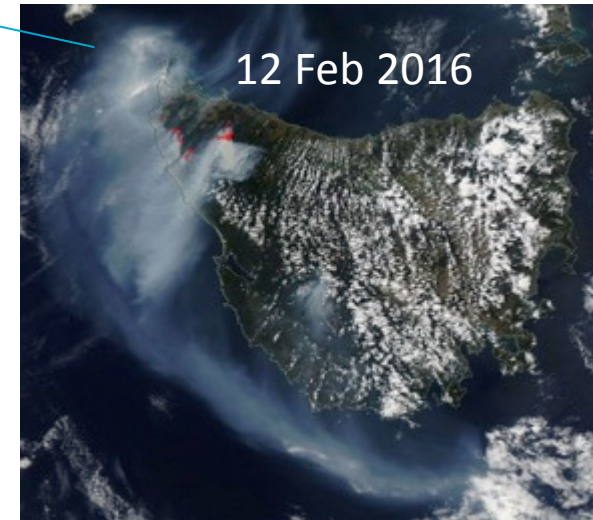
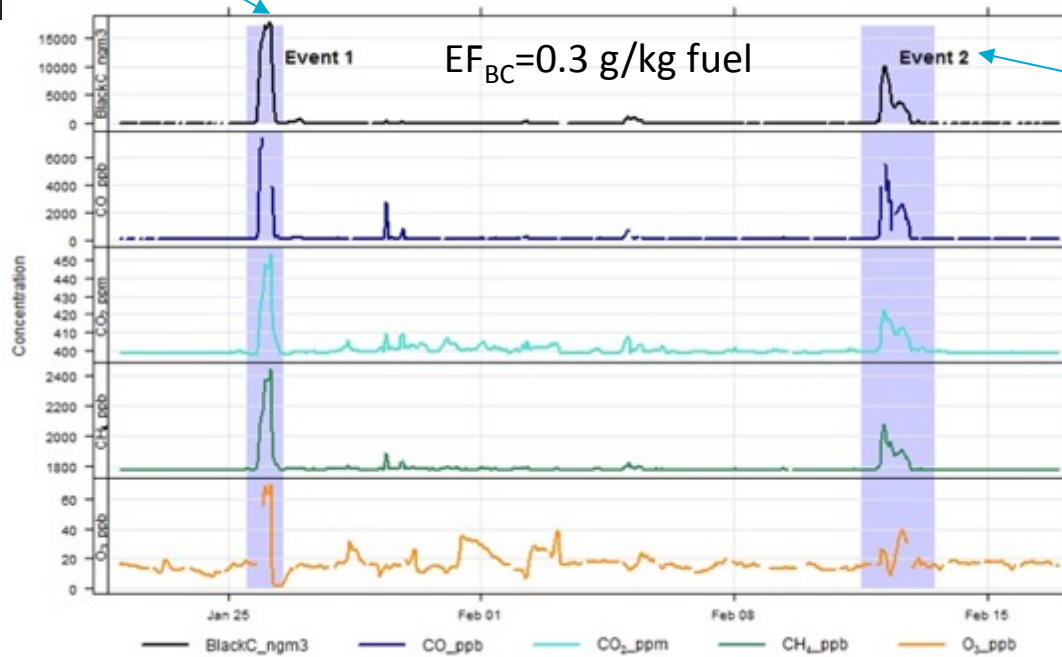
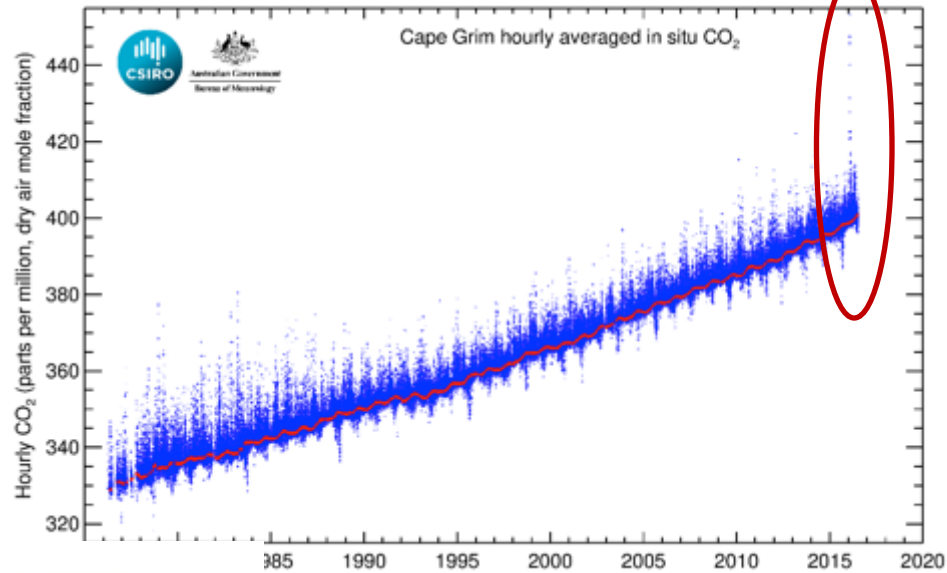
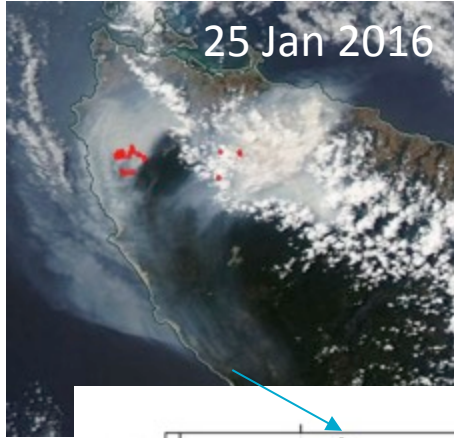


At least 70 separate fires that spread quickly burning an area of  $\sim 100,000$  ha over a 6-week period.

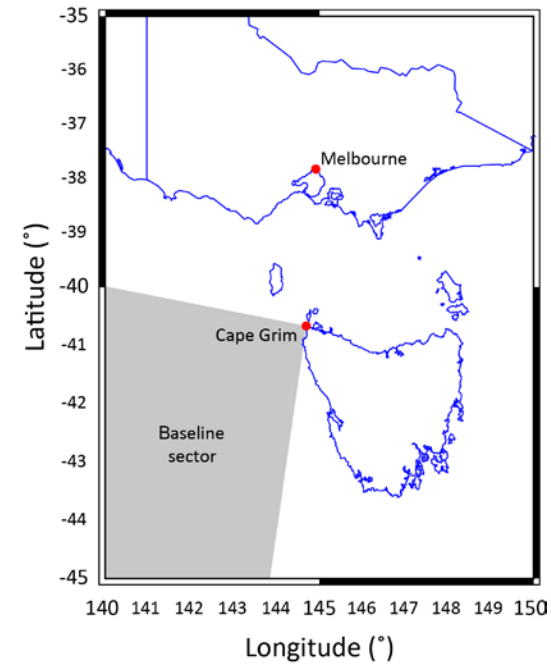
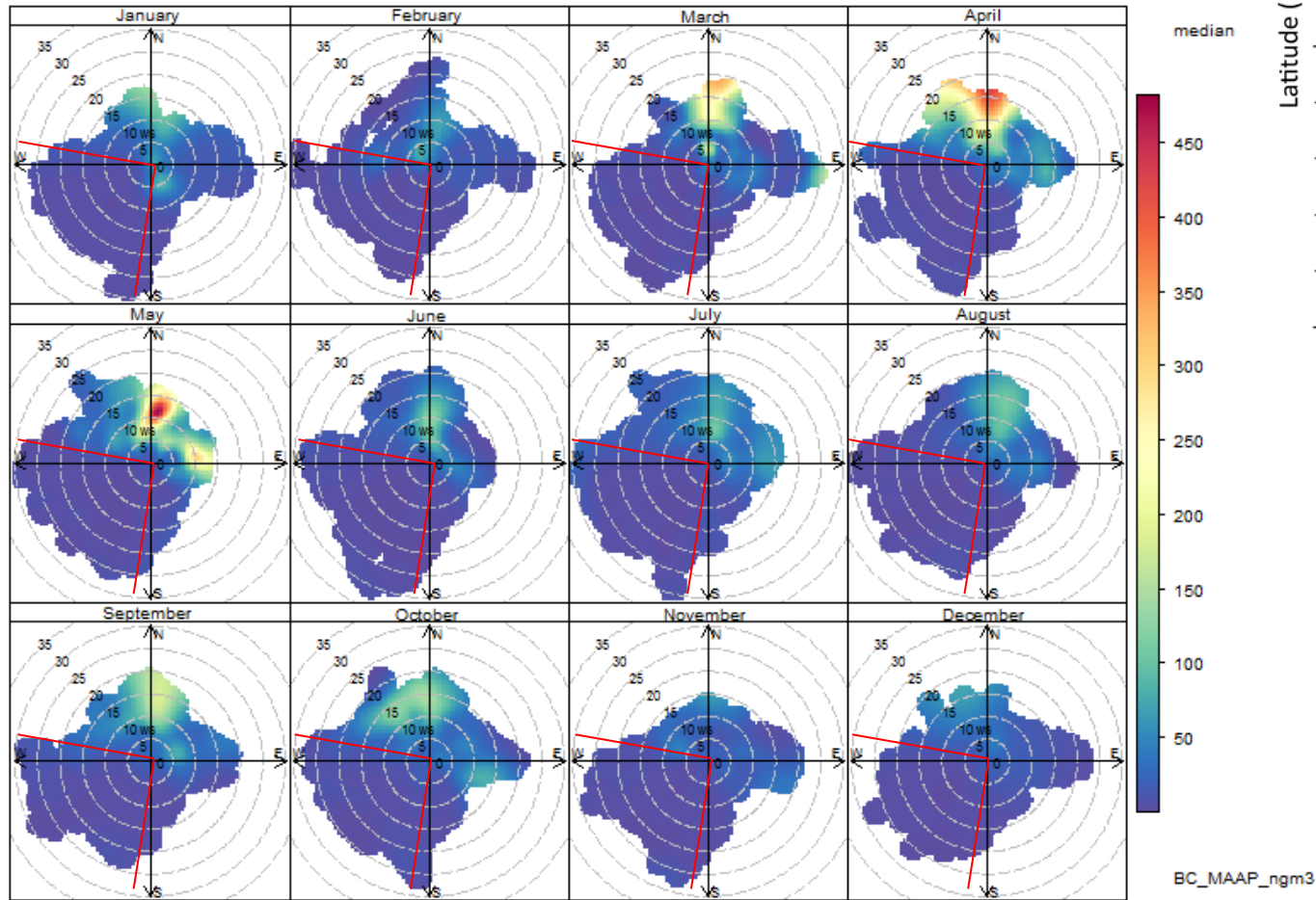
This was one of the largest and most ecologically damaging fires to occur in Tasmania in recent history.



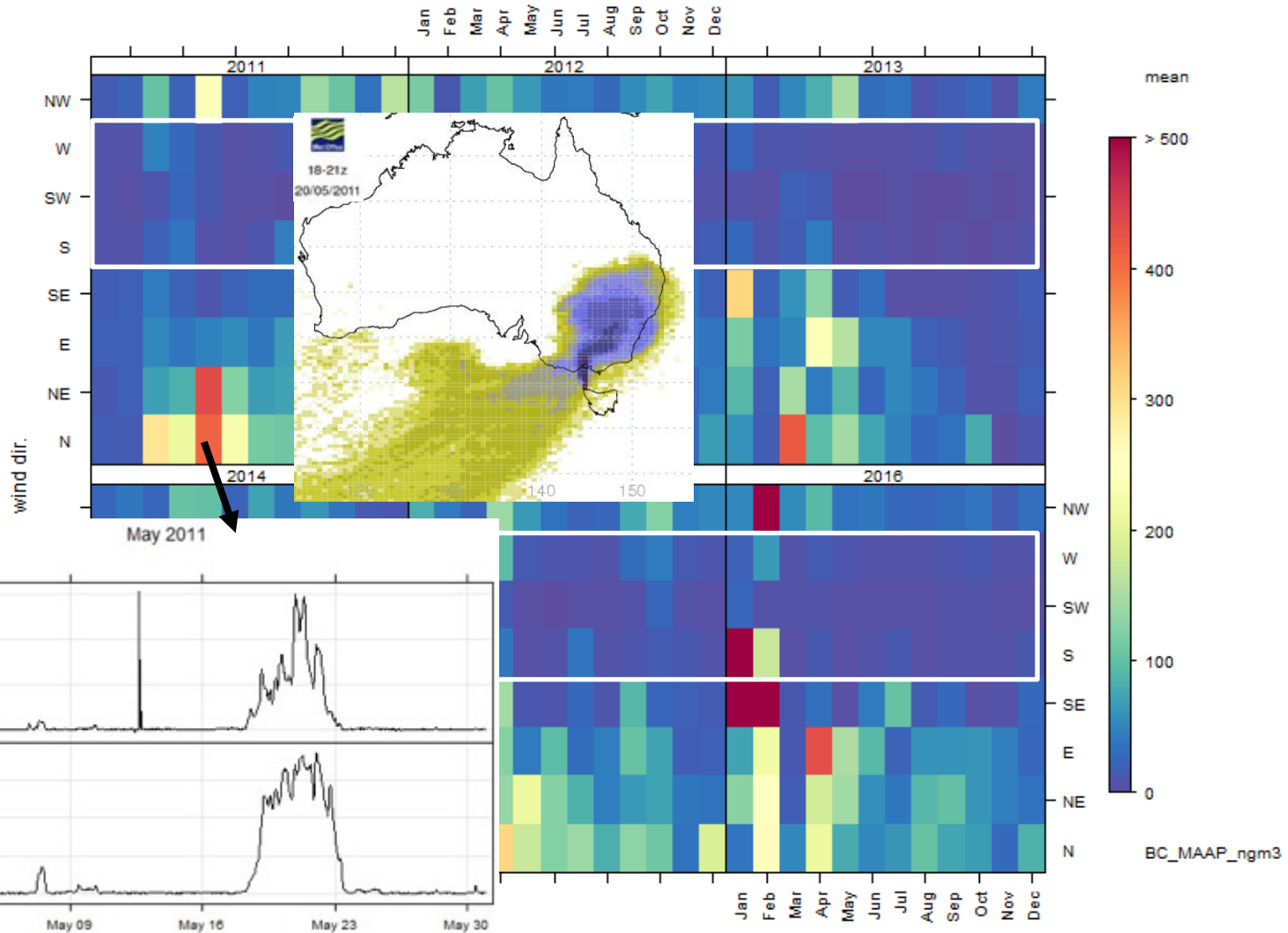
# Tasmanian Fires 2016



# Potential sources of high BC

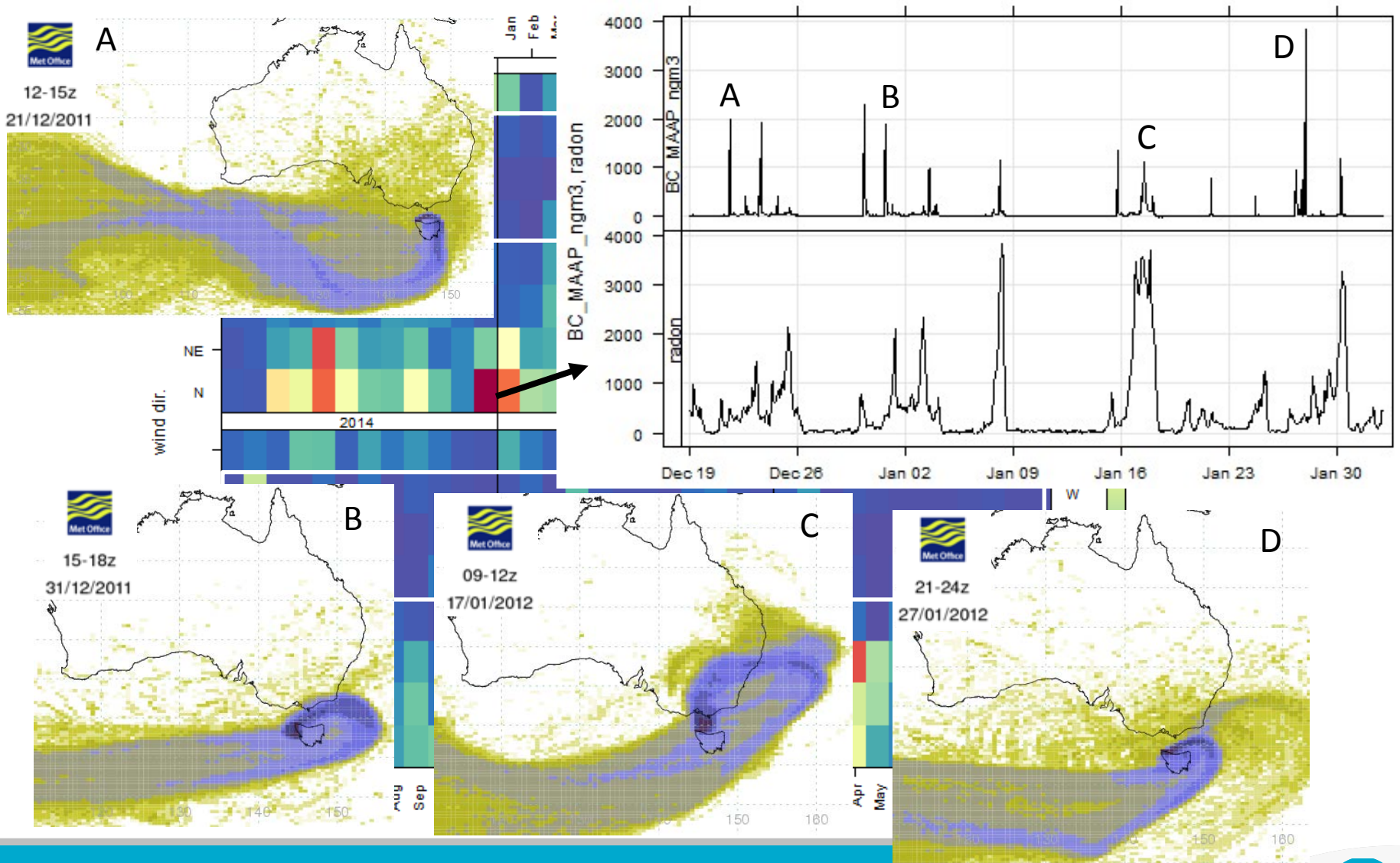


# High BC pollution events from continental sector

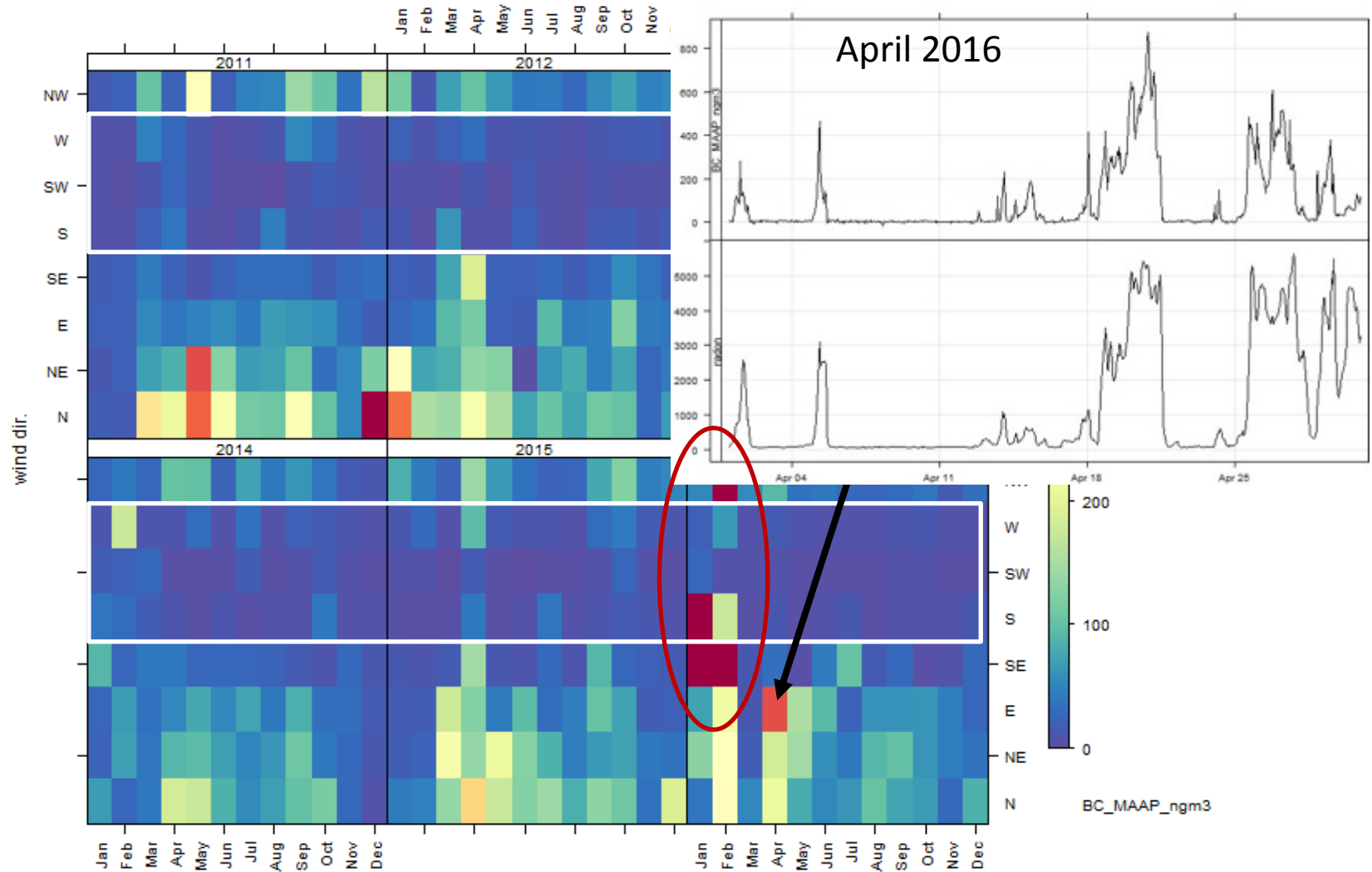




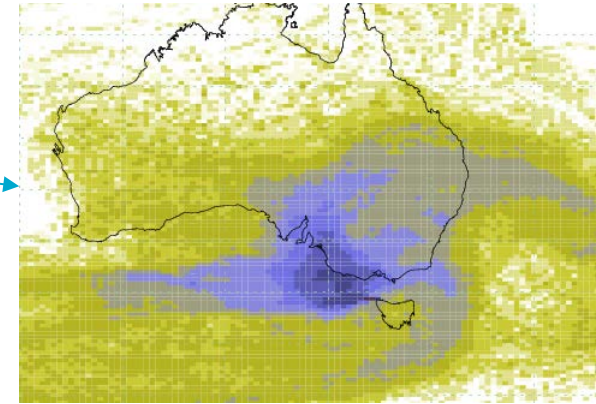
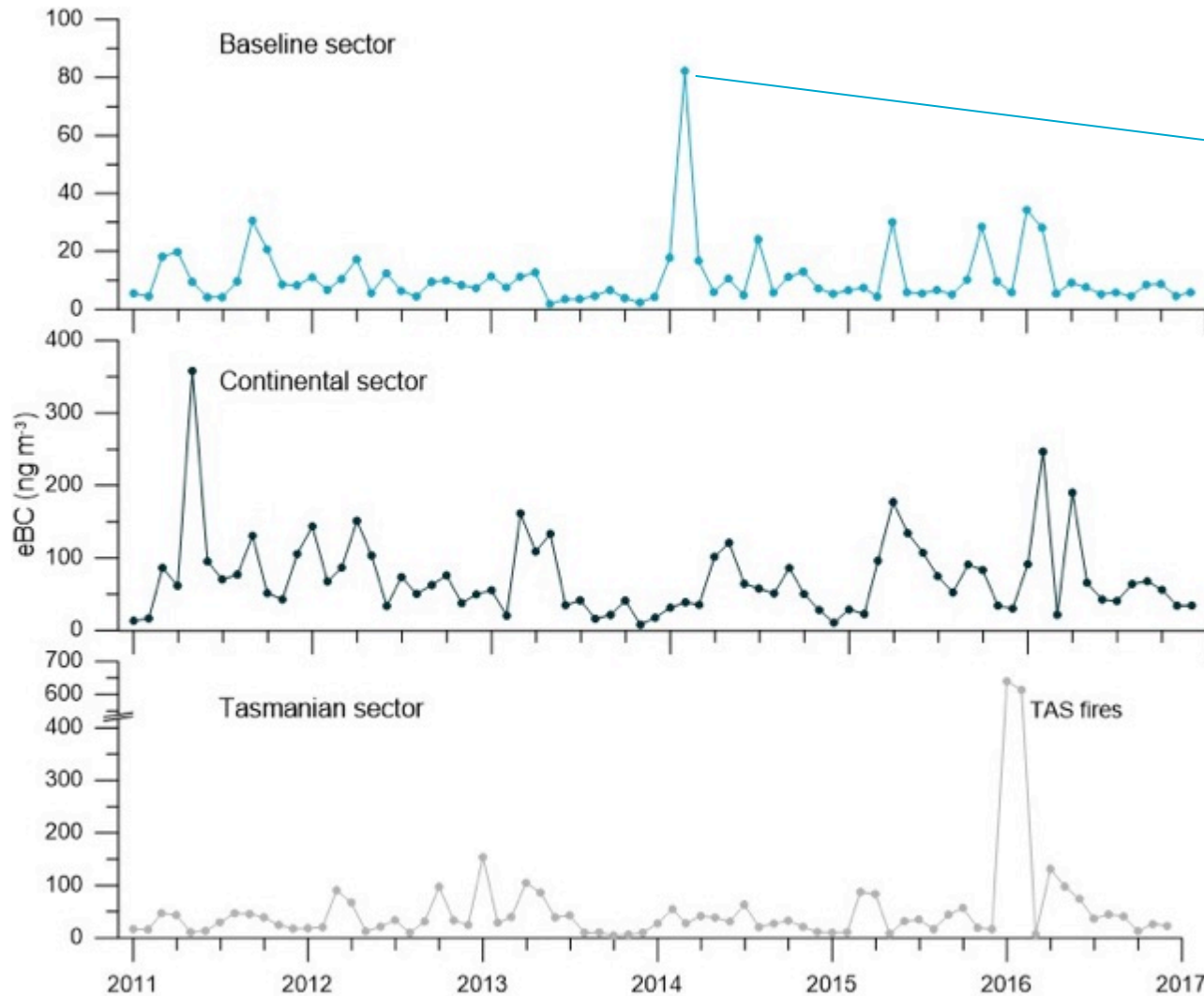
# High BC pollution events from continental sector



# High BC levels from Tasmanian sector

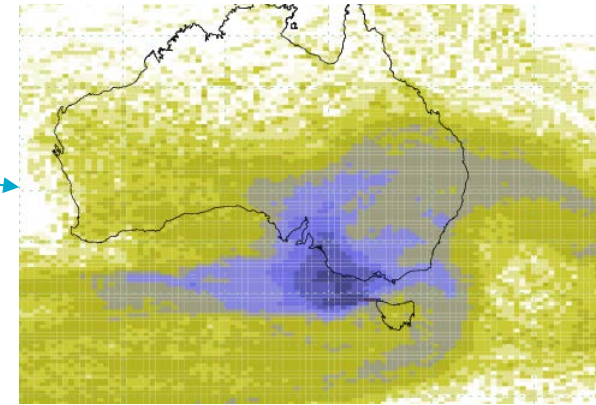
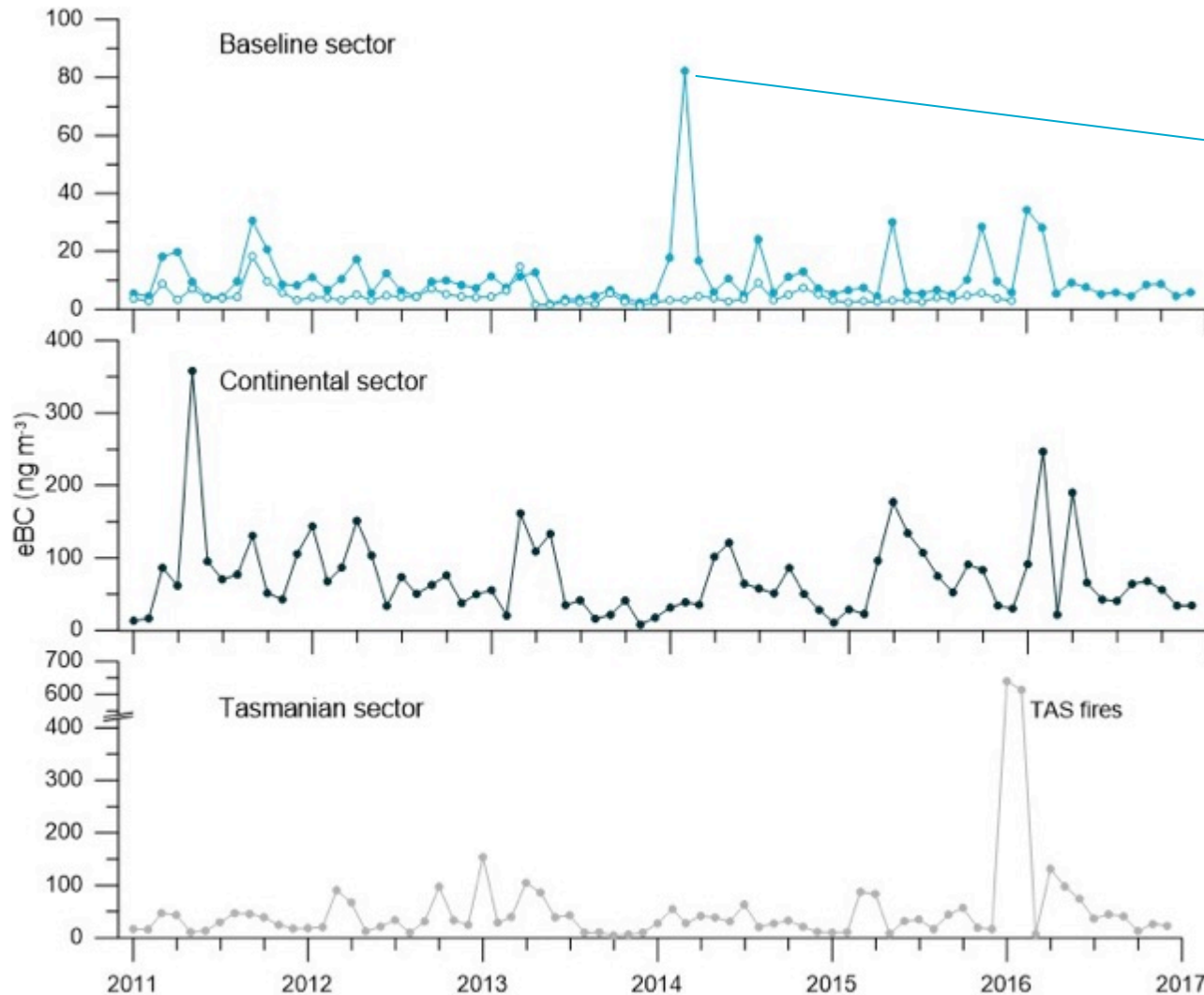


# Seasonal cycles for baseline sector



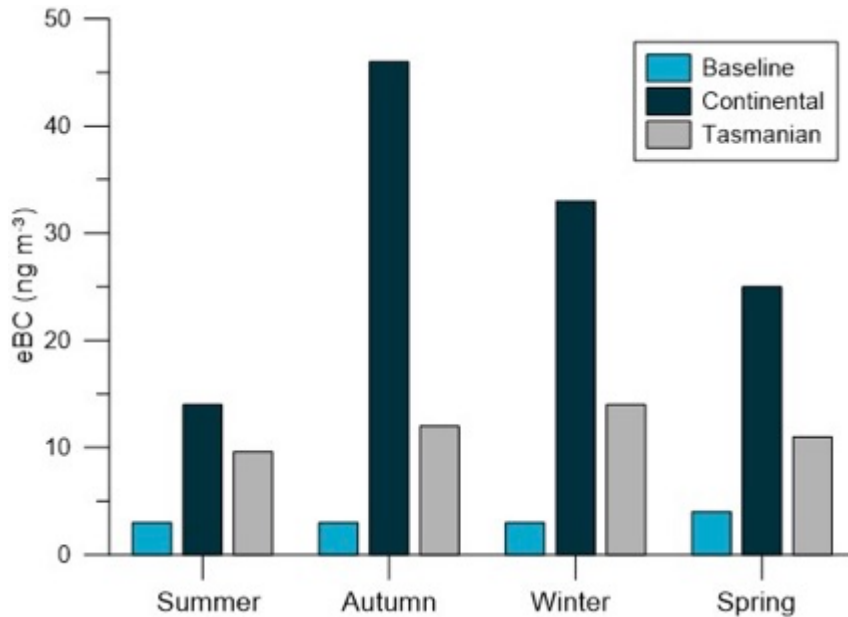


# Seasonal cycles for baseline sector



Additional criteria for baseline conditions:  
Radon < 100  $\text{mBq m}^{-3}$

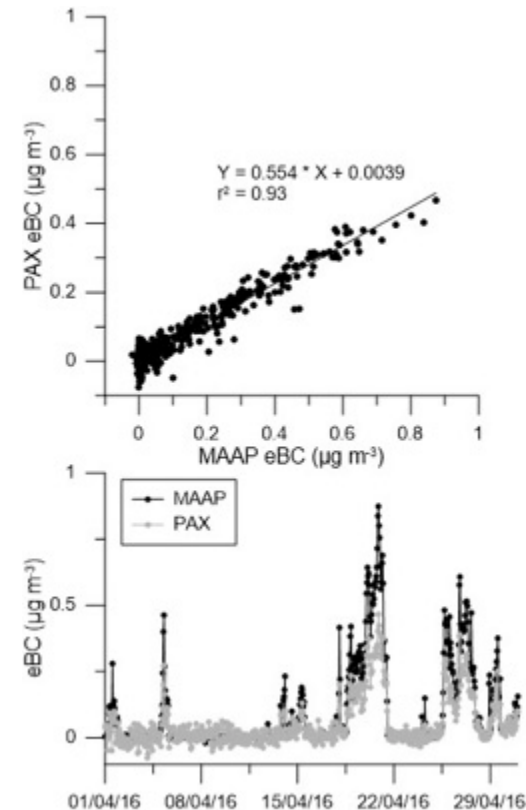
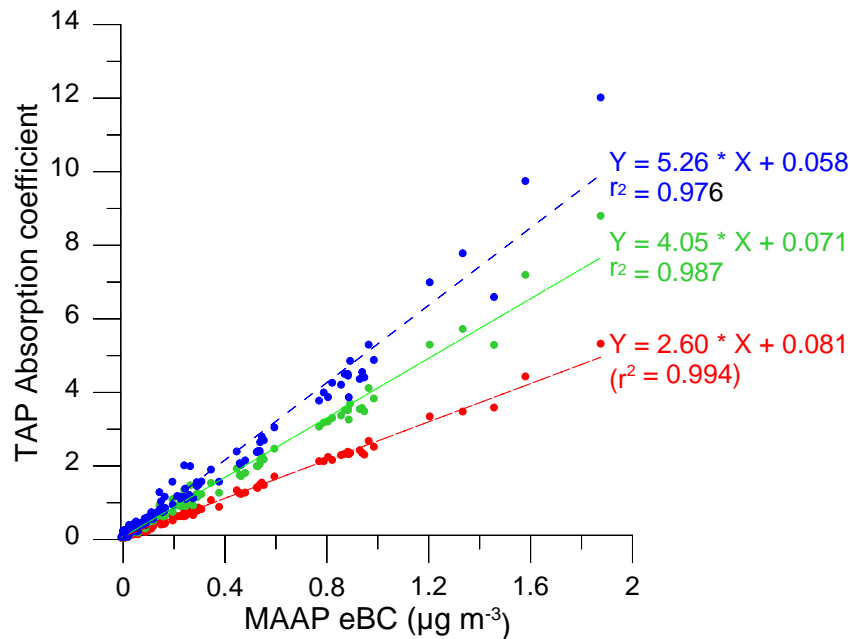
# Seasonal BC concentrations



- Autumn peak for continental sector – increased biomass burning from prescribed burns & woodheaters
- Winter peak for Tasmanian sector – domestic woodsmoke
- Slight spring peak for baseline sector

# Future work

- Extend analysis of BC measurements to years prior 2011
- Investigate long-term trend in BC concentrations at Cape Grim
- Evaluate the TAP and PAX





# Thank you

**Oceans and Atmosphere**

Fabienne Reisen

Senior Research Scientist

**t** +61 3 9239 4435

**e** [fabienne.reisen@csiro.au](mailto:fabienne.reisen@csiro.au)

**OCEANS AND ATMOSPHERE**

[www.csiro.au](http://www.csiro.au)

