

# THERE'S NO FIRE WITHOUT SMOKE: MODELLING SMOKE EMISSIONS AND TRANSPORT FROM THE 2006 VICTORIAN ALPINE FIRES.

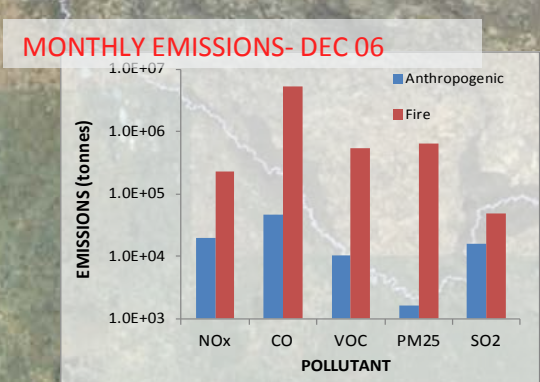
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The Victorian Alpine fires burned from December 3<sup>rd</sup> 2006 until February 1<sup>st</sup> 2007, consuming 1 Mha, mostly forest. The smoke was transported across Victoria and southern NSW, with large impacts on regional and urban air quality.

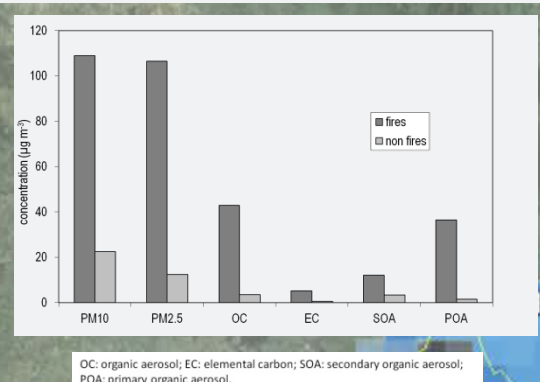
At that time, the regional air pollution exposure could only be guessed; then as now, the surface monitoring network is sparse and satellite observing platforms are insensitive. If you want to know the air quality at a location then the best option is to measure it. But if you want to know the air quantity impacts of a region, then your only real options are to combine modelling and observations.

## Observed

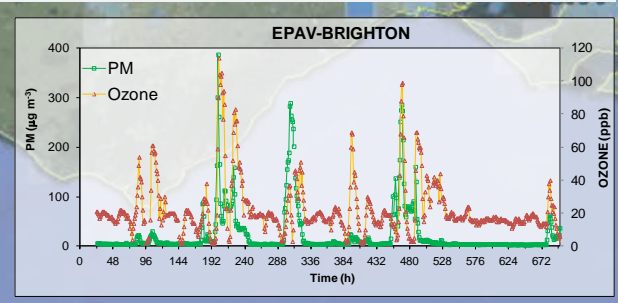
**Emissions:** 1 – 3 orders of magnitude higher than Victorian anthropogenic sources



- **Plumes impacted Melbourne for 17% of Dec/Jan**
  - Ozone, NO<sub>2</sub>: 100% higher
  - CO: 7 times higher
  - Aerosol 10 fold higher



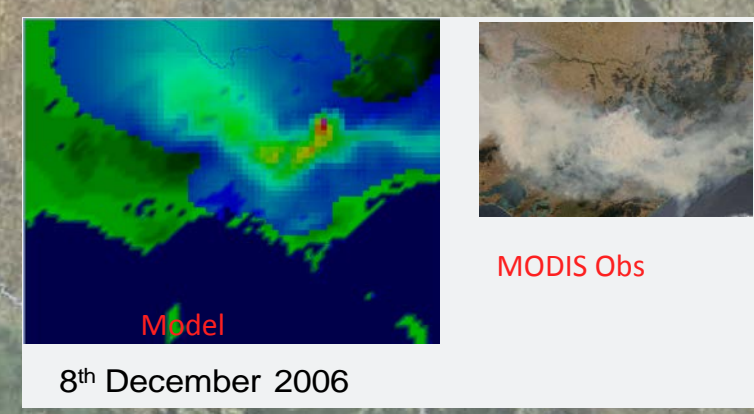
- **Plume strike duration 12 ->24h**



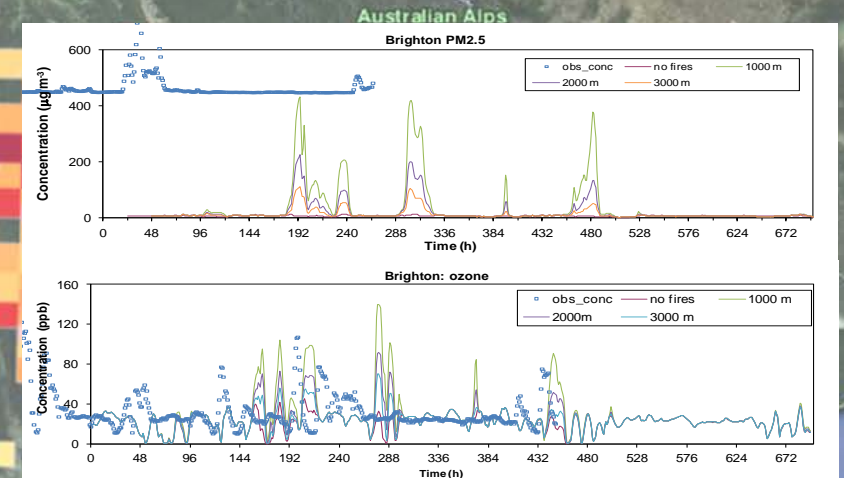
- **Impact:** 4.5% increase in of-out-of-hospital cardiac arrest/ 6 µg m<sup>-3</sup> increase in PM2.5 (Dennekamp, 2010)

## Modelled (TAPM + CTM)

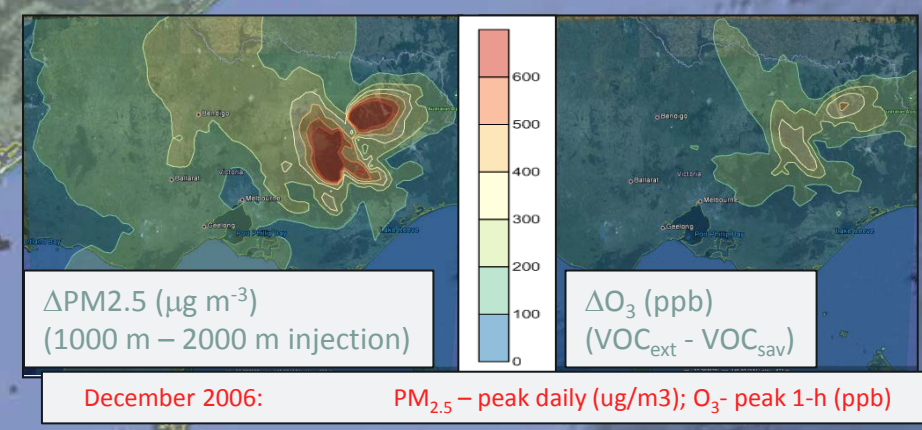
- **Dispersion is OK spatially**



- **Dispersion is OK temporally**



- **Regionally very widespread with high surface concentrations.**



This is Case Study 1 for Fire-DST. The model predicts most of the observations with reasonable accuracy. Remaining issues include parameterising plume rise, determining emission factors for the highly reactive C2- C8 organics, rate and duration of smouldering emissions. These are require to improve model smoke chemical transformation predictions.