



Monitoring Background and/or Natural Concentrations of PM

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Improving PM10 Monitoring in NZ

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CSIRO Marine and Atmospheric Research

www.csiro.au



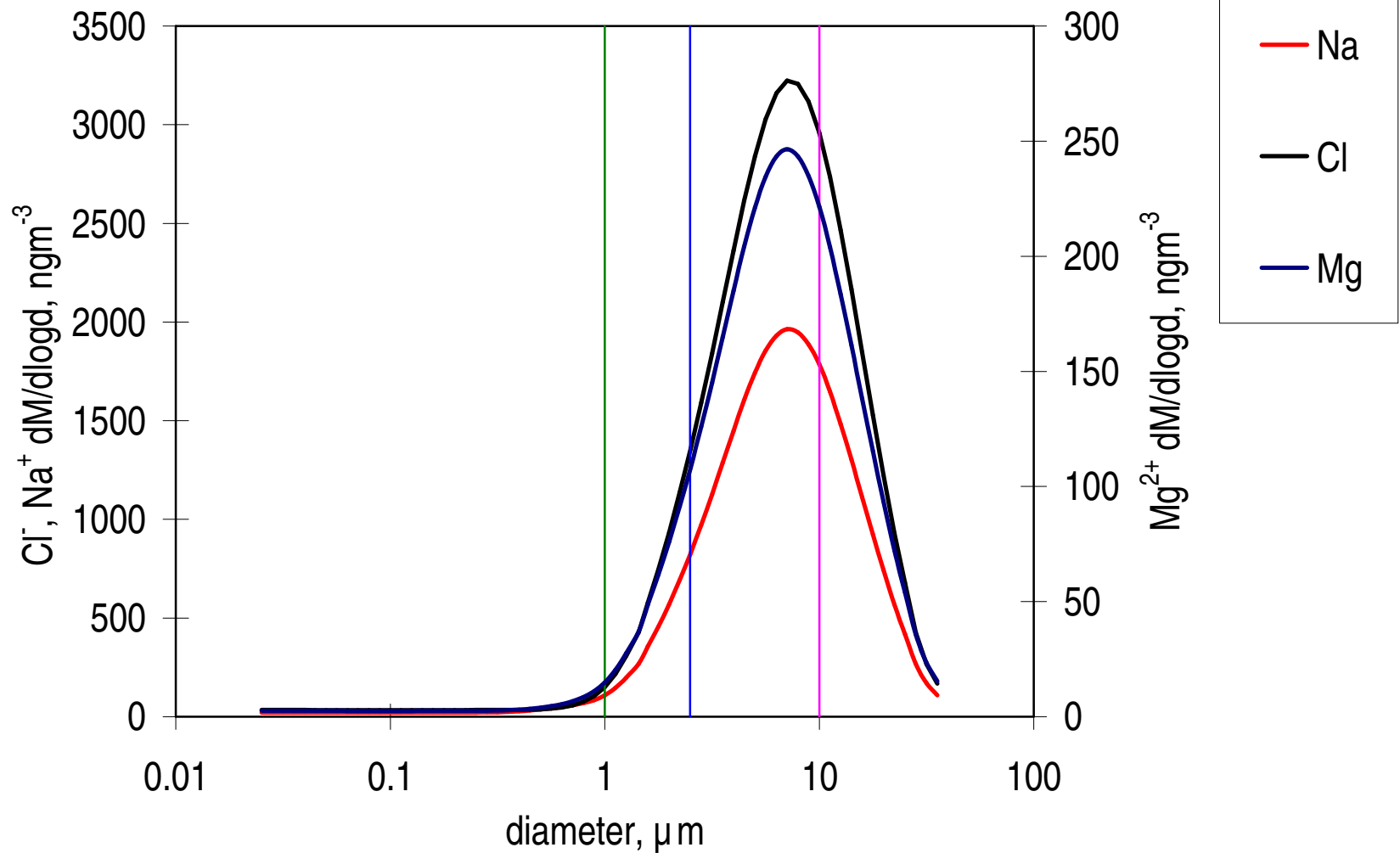
Background/natural aerosol

- **How is background/natural aerosol defined?**
 - Not generated by human actions?
- **Sea-salt**
- **Wind blown dust**
 - Road dust?
- **Secondary particles?**
- **Smoke?**



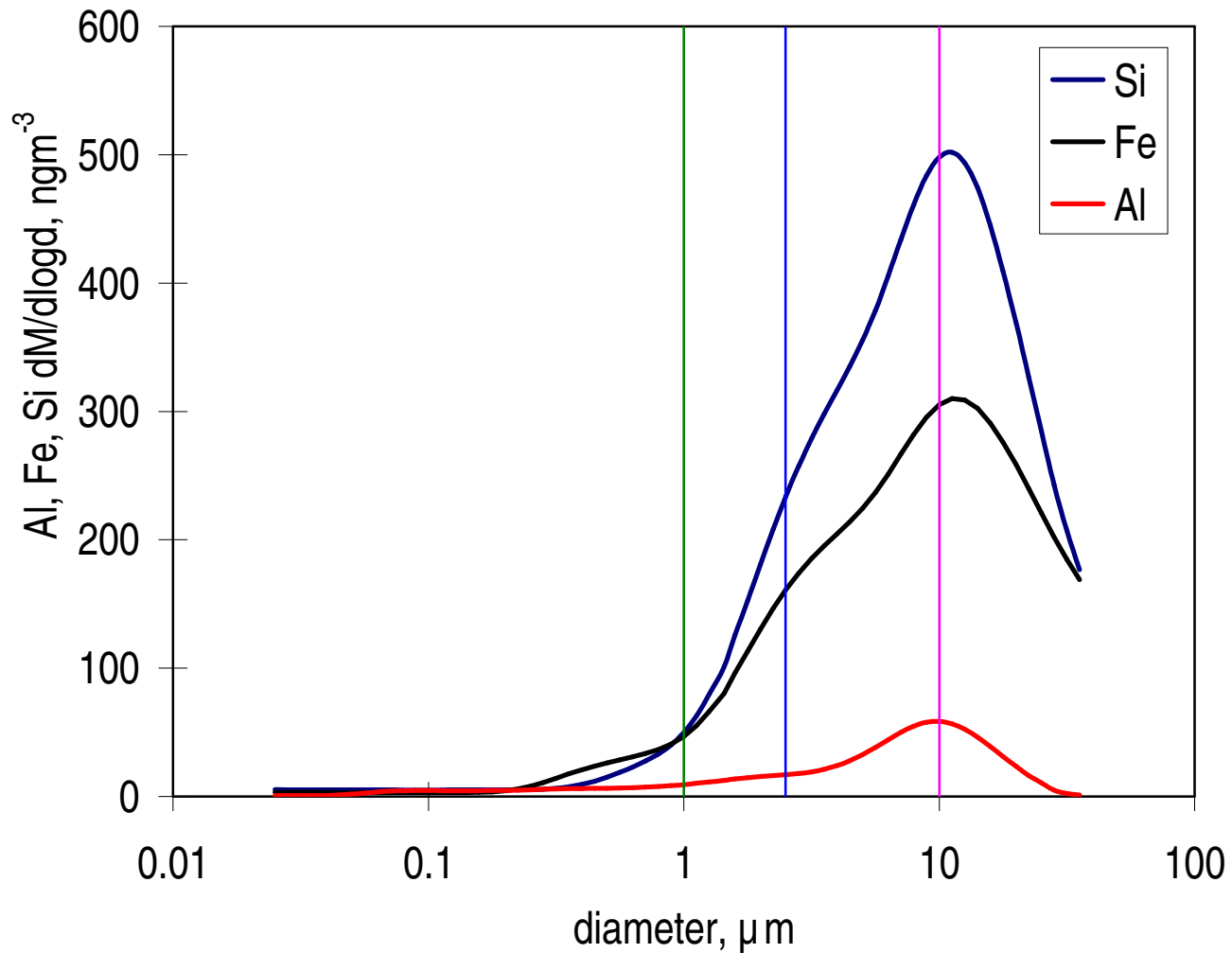
Sources of background PM

•Sea-salt



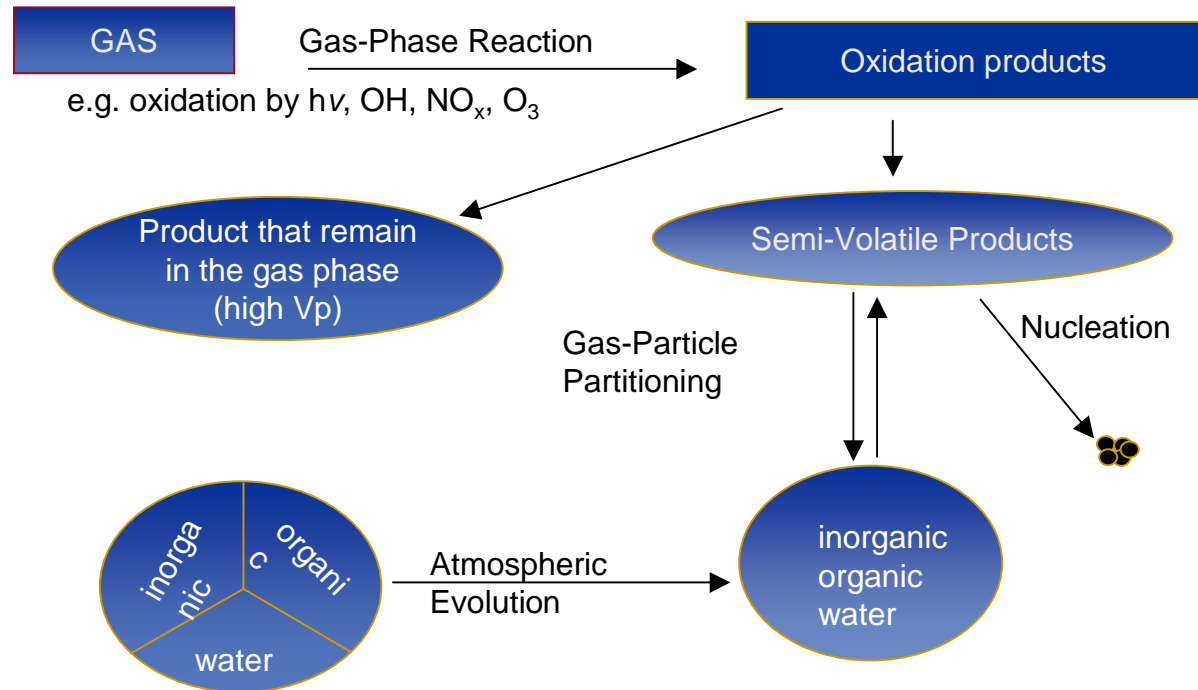
Sources of background PM

•Soil dust (and road-side dust)?



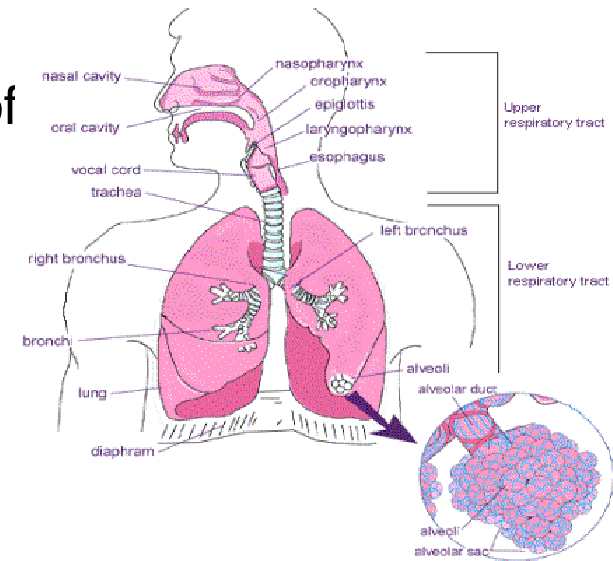
Sources of background PM

•Secondary aerosol from biogenic VOCs producing fine particles (?)



Importance

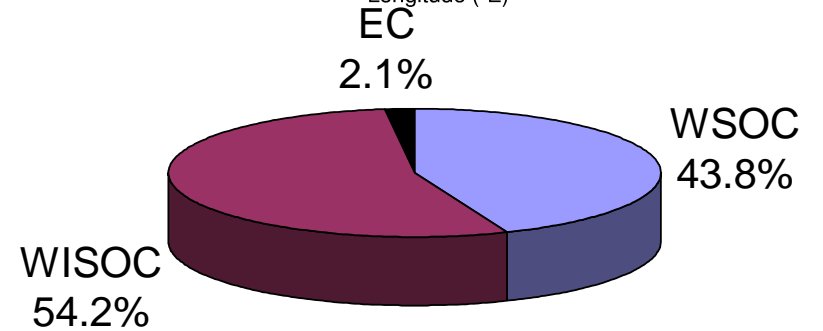
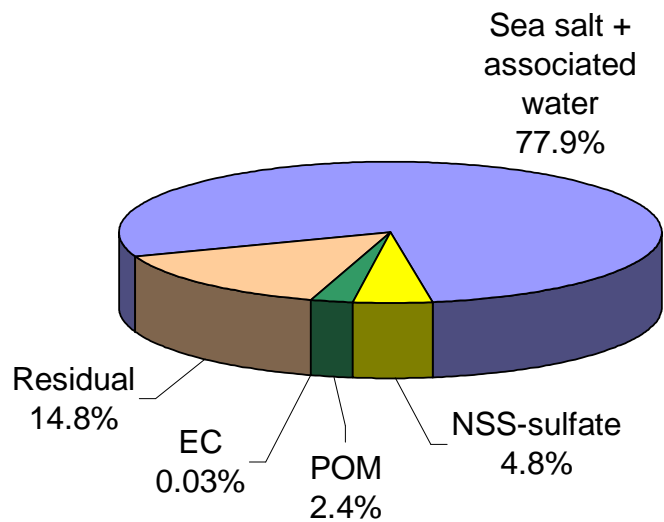
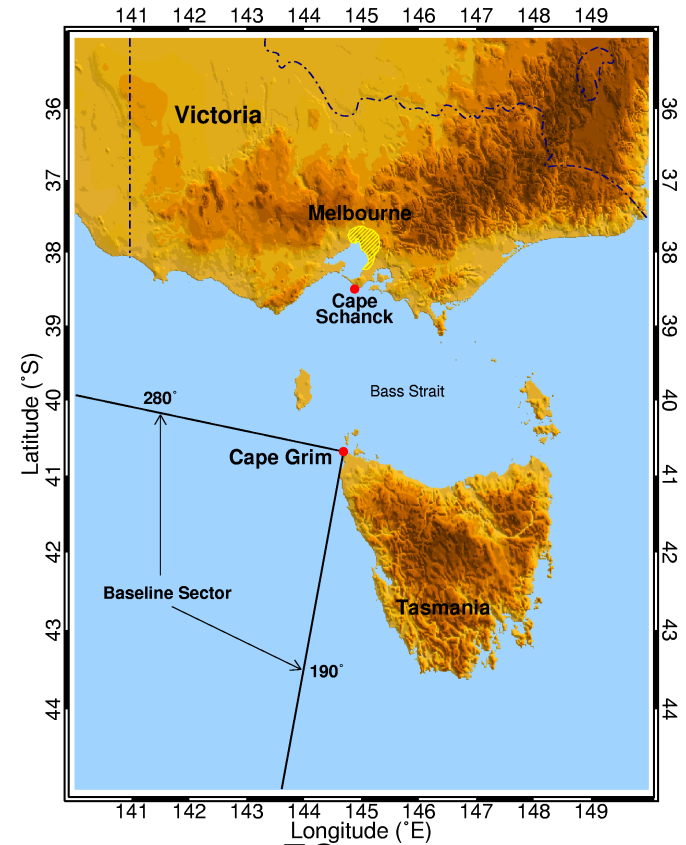
- Benign effect of background aerosol on human health? Coarse particles made up of inert compounds (except SOA and smoke aerosol?)
- Difficult to control/regulate background aerosol sources
- Background aerosol adding to anthropogenic could push PM to an exceedence
 - Eg. Sydney PM_{2.5} Advisory of $8 \mu\text{g m}^{-3}$
 - Surrounded by the “Blue Mountains”, Biogenic VOC’s





What's being done ?

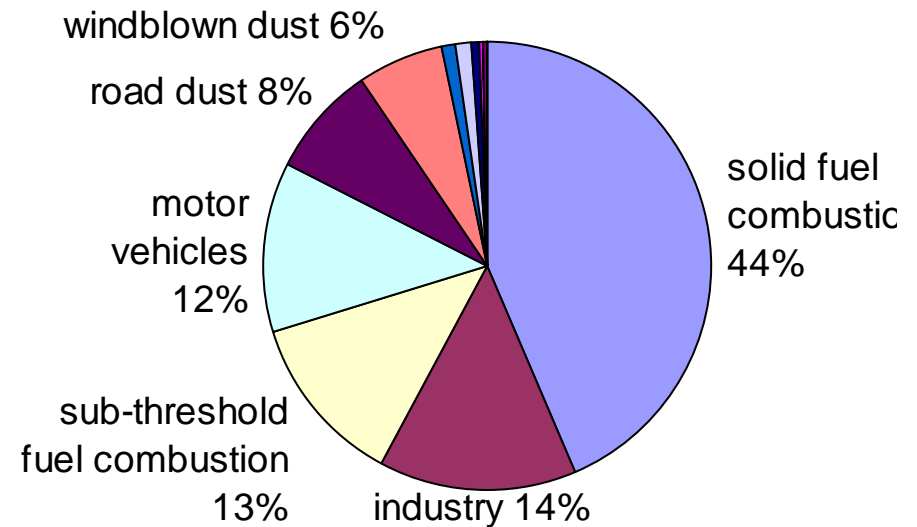
•Cape Grim Baseline station



What's being done?

•Emissions Inventories

- Victoria: inclusion of biogenic emissions from cut grass and windblown dust
- Estimation of windblown dust emissions from agricultural lands and unpaved roads is based on a wind erosion equation adapted by Ng (2004).
- No sea-salt



Ng et al., 2005

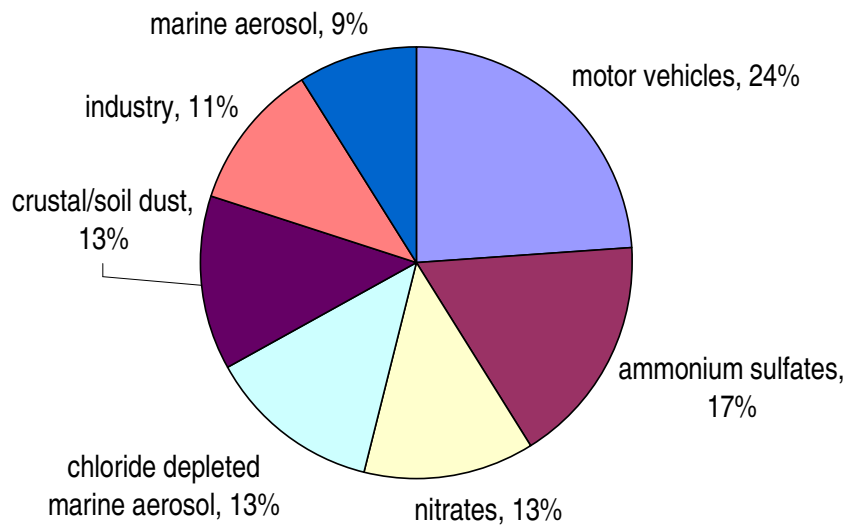


What's being done?

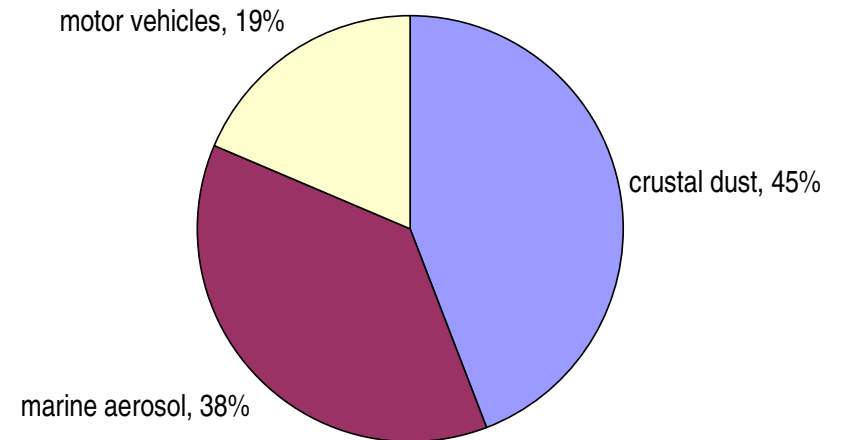
•Four Cities Study (DEH)

- Sydney, Melbourne, Brisbane and Adelaide
- 2003-2004
- Averaged over all cities

Fine particles



Coarse particles



Chan et al., 2005



What's being done in NZ?

- **Baring Head Baseline Station, Lauder?**
- **Combine meta data with PM10 and PM2.5 (eg CO, wind direction, wind speed) Kaikoura**
- **Source apportionment**
 - Auckland 5-6 $\mu\text{g m}^{-3}$ (annual)
 - Masterton > 50 $\mu\text{g m}^{-3}$, 4 $\mu\text{g m}^{-3}$
 - Christchurch 52% summer, 8% winter



What else can be done?

- **More chemistry**
- **Size resolved chemistry**
- **Source profiles for natural/background chemistry**
 - Specific sources
 - Regionally specific sources
- **Non-urban air quality stations**
 - Transformations of “fresh” sources

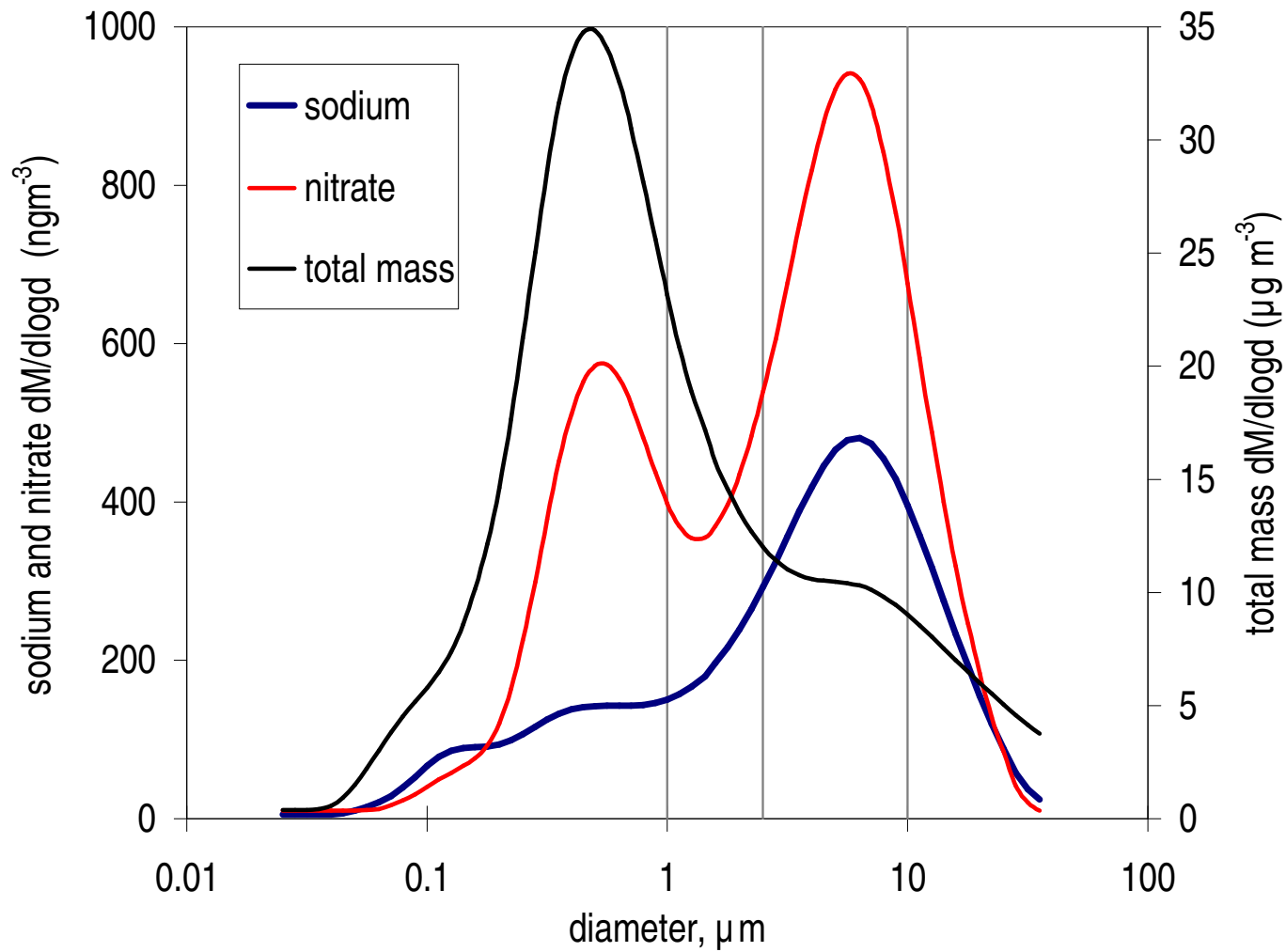


Challenges and Questions

- **Characterise SOA, how much is from biogenic VOCs?**
- **Emissions inventory?**
- **Is road dust a natural aerosol?**
- **Bushfires that are not deliberately lit?**
- **Mixtures of background and anthropogenic sources**
 - Aged marine aerosol



Aged marine aerosol



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Thank You

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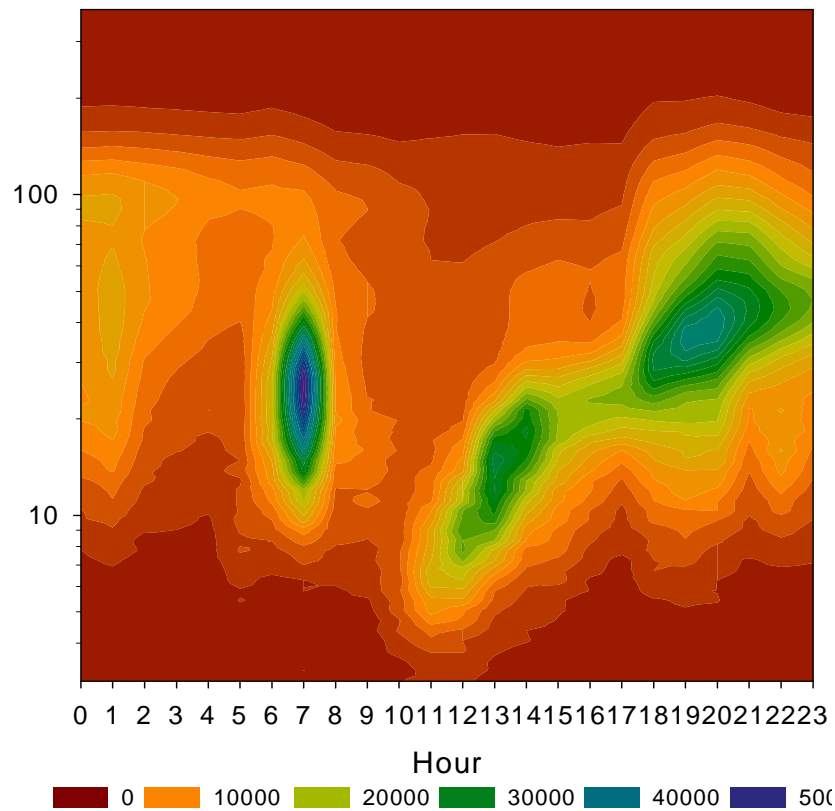
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Urban sties

New particle formation at the Fresno Supersite



Watson and Chow 2005