EMISSIONS INVENTORY AND MODELLING UPDATE

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EPA VICTORIA
Environment Protection Authority Victoria

VICTORIA State Government

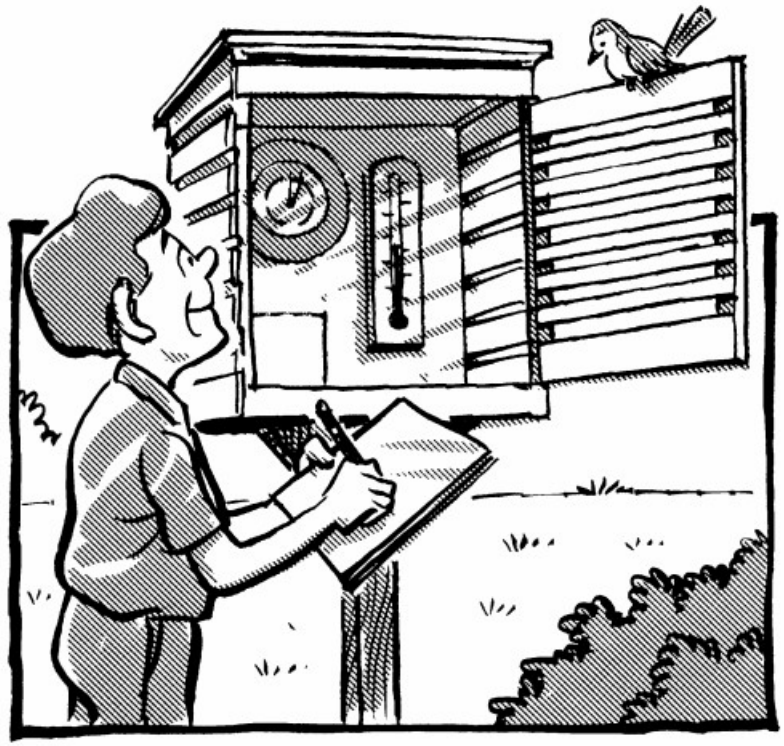
Inventories and modelling as part of an air quality assessment program

- What can modelled data be used for?
- Where does an emissions inventory and modelling fit into the jigsaw puzzle
- It can fill in the gaps between monitoring
- What do you need for an emissions inventory
- Future air report in 2013

https://www.epa.vic.gov.au/our-work/publications/publication/2008/december/1261

Inventories need lots of information and data

- Last inventory was based on 2006 census
- Update to align with 2016 census
- Need lots of data for an inventory
- What sort of data do we need



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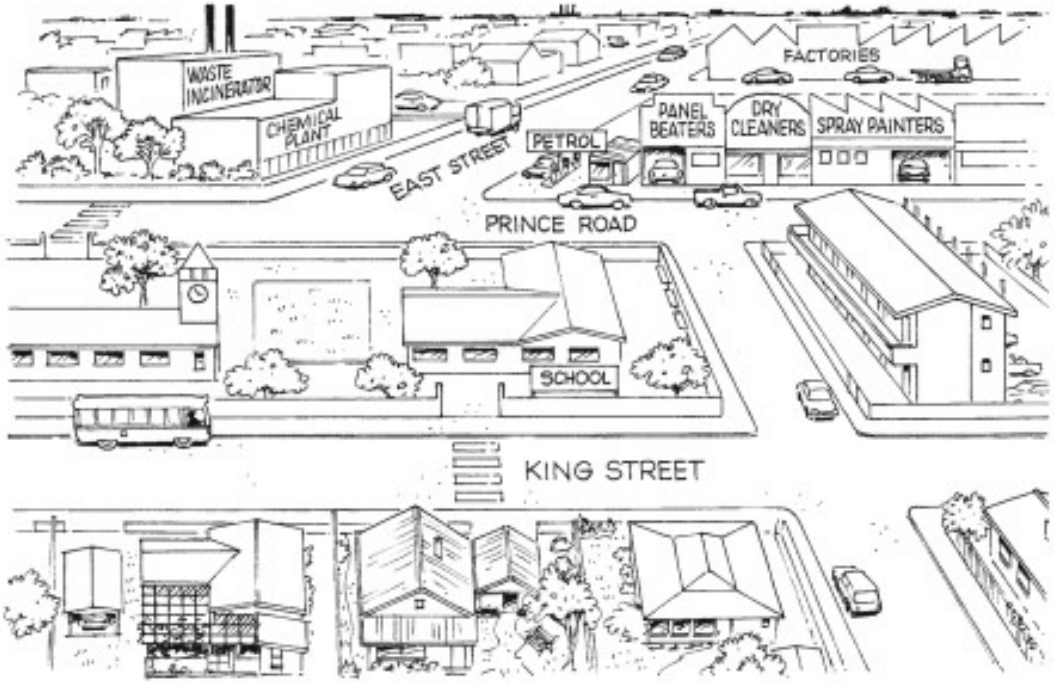
Activity data and emission factors

- Emission inventories are an abstraction of the real world
- We use an activity term and an emission factor to calculate a total emission
- We also apply a time variation to the emission
- This allows us to include seasonal variation (i.e. domestic wood heater smoke in summer
- Take a bottom up approach



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Motor vehicles

- Working with Vic Roads to get traffic data
- Changes to the fleet
- Changes to engine efficiency
- Exhaust vs non-exhaust emissions
- Electric and autonomous vehicles

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Shipping and other transport

- Port of Melbourne, Geelong, Hastings and Portland
- About a third of Australia's container trade at PoM
- Different fleet composition, fuels and cargo
- How many ship journeys, and ship activities
- Also includes rail transport

Source: amsa

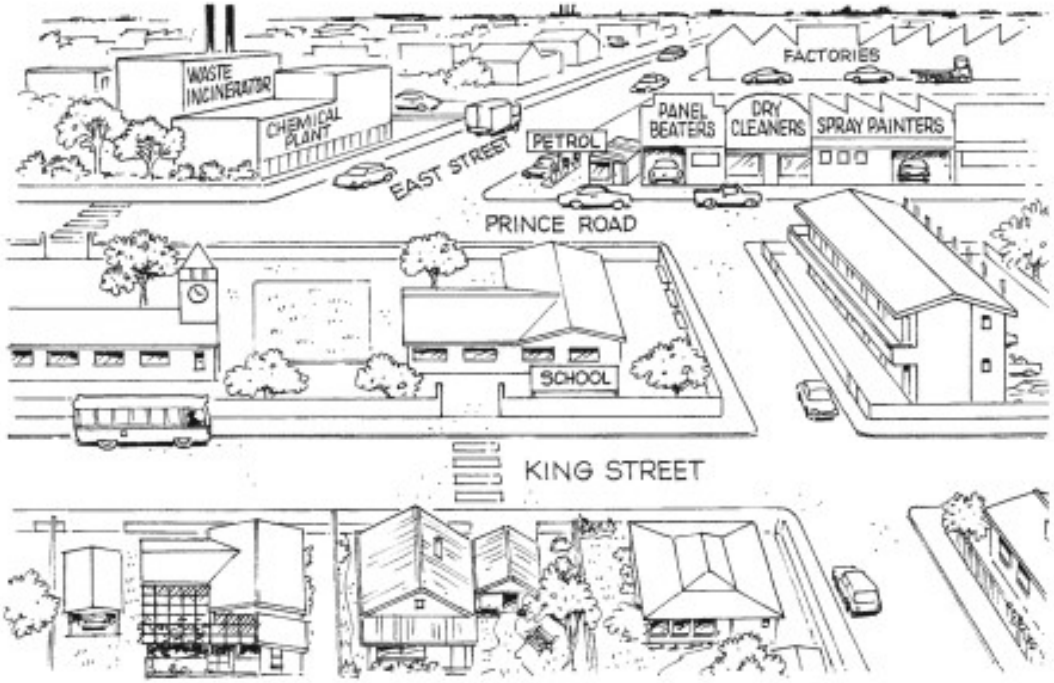
Industrial emissions

- Each year, industry report to a National Pollutant Inventory
- In 2016/2017 there were 824 facilities that reported
- NPI also provides emission factors and tools
- There are differences between the NPI the Victorian emissions inventory, built for different purposes
- Important input, but extra work needs to be done to work out how emissions vary over time

https://www.epa.vic.gov.au/our-work/publications/publication/2008/december/1261

Commercial sources of emissions

- NPI covers bigger industries that meet reporting thresholds
- Many small to medium enterprises aren't captured but still have an impact on local environment
- These are important to include since they are close to where we live, study and work
- Challenges with collecting data on where these are occurring and activity levels



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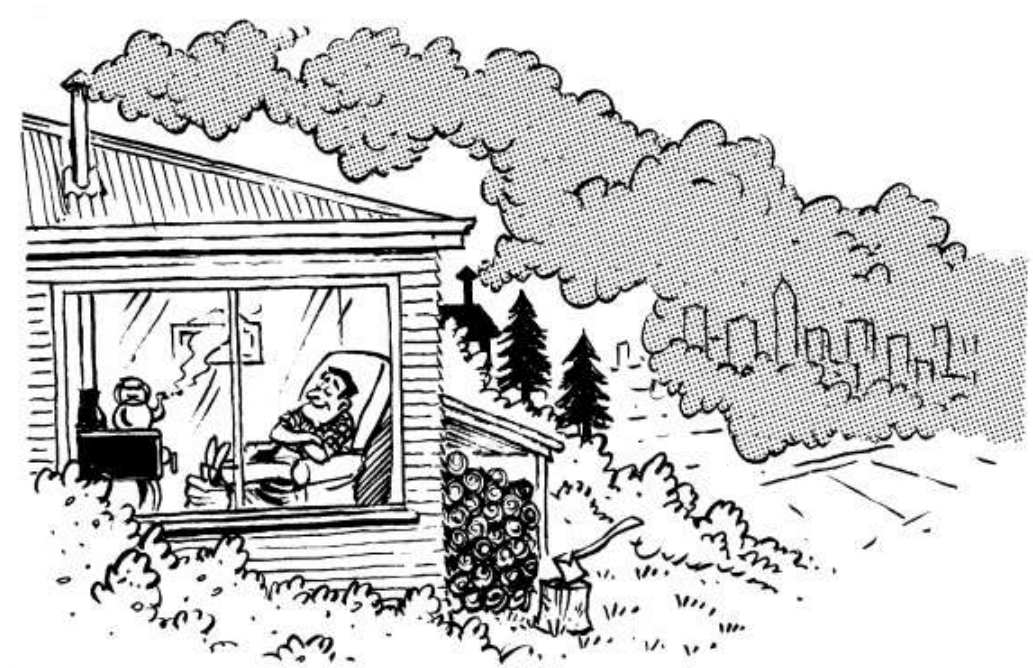
Urban sources including domestic wood heaters

- There are also many urban sources
- Wood heaters are a major source of particles and other air pollutants in winter
- Can be used to inform compliance of new heaters and guides to use existing heaters efficiently
- Challenges include how to quantify the amount of fuel used and patterns of use



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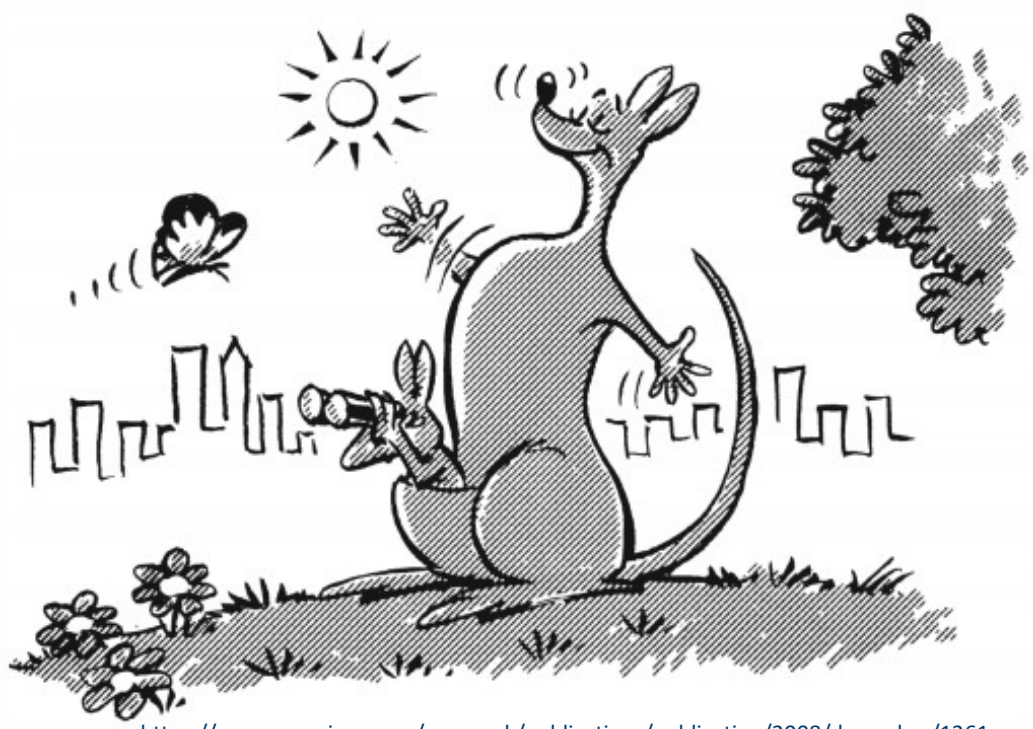
Biogenic sources

- Many biogenic and natural sources
- PM_{10} from windblown dust, can be much larger than other sources
- $PM_{2.5}$ from bushfires
- Volatile Organic Compounds from vegetation



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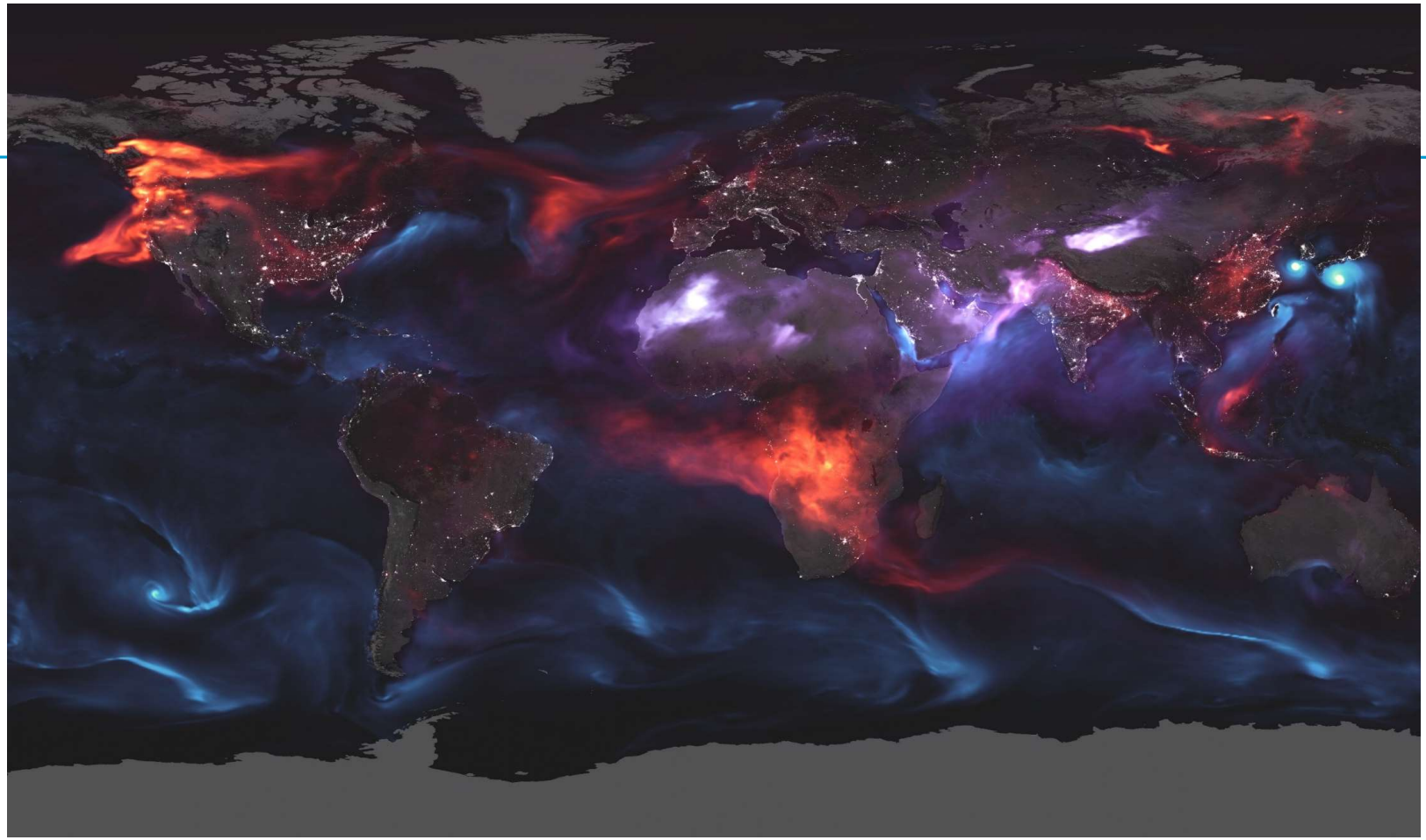
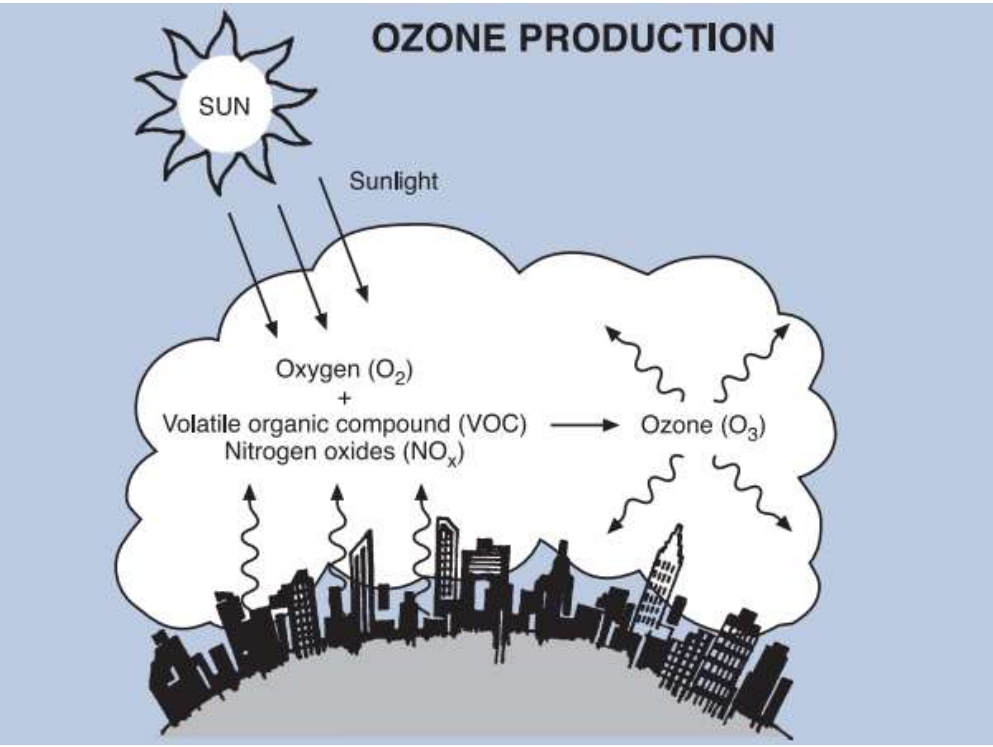


Source: NASA

Visualising the inventory data and population exposure

- Big matrix of data on different sources and emissions
- We can start modelling where the air pollutants go and how they react
- Requires detailed upper air and ground level meteorological data
- Need to have ways to visualise data, this includes models which look at how pollutants are transported and react in the atmosphere
- Can we forecast air quality like weather?



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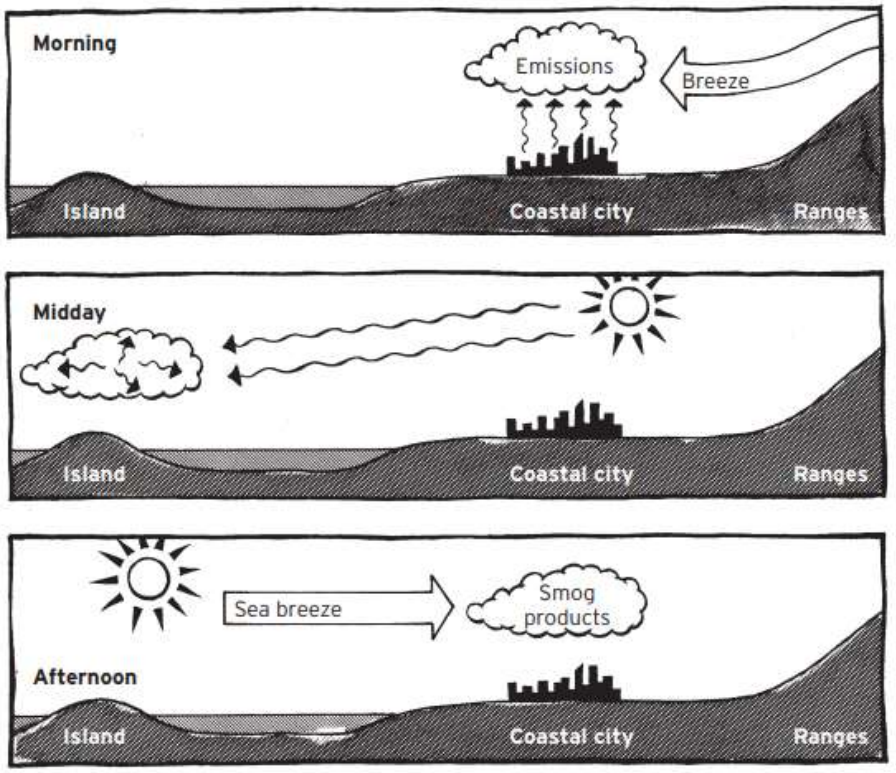
Modelling ozone

https://www.epa.vic.gov.au/our-work/publications/publication/2008/december/1261

- Look at the generation of precursors
- Transport and formation of ozone
- Transport back over the city
- We can also model other types of pollutants as well



Population exposure and quality control

- Can overlay population density to look at exposure
- Modelled outputs from emissions inventories are based on a range of inputs
- Quality control is critical
- Need to determine if results make sense
- Can use monitored data to see if emissions are right

Conclusions and future steps

EPA is looking at different ways to model air quality,

Assessment of air quality, not just modelling so need to consider monitored data for calibration

Emissions Inventory can tell us about air quality where we don't monitor

Need lots of data, only as good as the data we put in

Built as layers

Can be used to determine population exposure

Report on 2016 emissions inventory on its way