3.038 Biogenic modelling activities in eucalypt-rich southeast Australia.

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Abstract:

With over 800 species of eucalypt trees, the south east coast of Australia is a global hotspot for isoprene emissions. Eucalypts are amongst the world's largest flowering plants. The first in-depth study of how the Model of Emissions of Gases and Aerosols from Nature (MEGANv2.1) performed in Australia, showed large discrepancies when compared with measurements in the Sydney region. The discrepancies were due to the use of incorrect emission factors, some of which were derived from measurements of emission factors from Northern Hemisphere sapling specimens in laboratory experiments. These discrepancies highlight the need for new measurements on in-situ eucalypt forests around the world.

Whilst trying to reduce the modelled uncertainties, our work began to uncover a series of unique behaviours not seen in other regions of the world. The isoprene to monoterpene carbon ratio is approximately one and suggests that neither isoprene nor the monoterpenes dominate. This is unusual, and could impact the rate of formation of biogenic secondary organic aerosol and its composition.

We also discovered that the values chosen for the light dependence of monoterpene

species in MEGANv2.1 may not be appropriate for Australian eucalypts. Switching off the light dependence entirely has improved the agreement between the predictions and the observations, particularly at night.

We are also quantifying the suppression of isoprene emissions by Australian drought conditions, by coupling soil moisture from the land-surface model CABLE.

There are still numerous unanswered questions. However, we are working towards constructing a more accurate emission inventory of biogenic hydrocarbons for Australia, and ultimately their incorporation into global atmospheric models.