

Smogchamber investigations of primary and secondary organic aerosol from combustion sources

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Primary organic aerosols from combustion sources have long been recognized as important contributors to ambient organic aerosol. More recently the secondary formation of organic aerosol from combustion sources is a subject of investigation (e.g. [1]). To investigate the secondary formation and processing of combustion aerosol, primary emissions from a Euro 3 diesel passenger car and a logwood burner were introduced into the Paul Scherrer Institut smogchamber. Photooxidation experiments of these emissions were monitored with a suite of instrumentation including a High Resolution Time-of-Flight Aerosol Mass Spectrometer (AMS), and a VHTDMA. Results from the AMS show significant increases in organic aerosol mass corrected for wall losses. In addition properties of the organic aerosol, such as the oxygen to carbon (O/C) atomic ratio [2] increase during the course of these experiments for both diesel exhaust and wood burning. The increase in the O/C is also reflected by an increase in the hygroscopic growth factor as measured by the VHTDMA. These and other results will be shown during this presentation.

[1] Robinson & Donahue (2007) *Science* **315** (5816), 1259-1262. [2] Aiken & DeCarlo *et al.* (2008) *Environ. Sci. Technol.* **42** (12), 4478–4485, 10.1021/es703009q.

Denudation rates for dolerites across southern Africa determined with cosmogenic noble gas nuclides

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Southern Africa displays a landscape characterised by a distinct escarpment zone between low-lying coastal plains and elevated interior plateaux more than 1000 m above sea level. The region is not associated with convergent plate boundaries or active rifting, and its anomalously high mode of elevation might rather be a result of thermally induced epeirogenic uplift, as suggested by a low seismic velocity anomaly in the asthenospheric mantle beneath southern Africa [1, 2]. However, understanding the origin and evolution of this topography, and in turn, mantle dynamics, requires a determination of the changing rates of denudation across this region on various timescales. Here we present cosmogenic noble gas nuclide inventories (³He, ²¹Ne) for dolerite exposures of the Karoo Igneous Province from across southern Africa. Our data addresses the rates of surface processes on intermediate timescales (10³-10⁶ yr) and our results imply generally very low maximum denudation rates of 1-3 m/Myr for horizontal surfaces across gradients in present day rainfall and elevation. Our minimum exposure ages for scarp faces vary by an order of magnitude (~20-200 ka). These results may be contrasted with fission track thermochronology results that indicate enhanced vertical denudation seaward of the southern escarpment in the mid-late Cretaceous (100-80 Ma) at a rate of 125-175 m/Myr and an average vertical denudation rate of 10-15 m/Myr since 80 Ma [3]. Our results may thus be interpreted to reflect significant shifts in weathering and erosion rates over time under a changing tectonic and/or climatic regime.

[1] Nyblade & Robinson (1994) *Geophys. Res. Lett.* **21**, 765-768. [2] de Wit (2007) *S Afr J Geol.* **110**, 367-392. [3] Tinker *et al.* (2008) *Tectonophysics* **455**, 77-93.