

## A radon-only technique for characterising baseline constituent concentrations at Cape Grim

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### Abstract

Nine years (2004-2013) of hourly Radon-222, carbon dioxide and ozone concentration observations at Cape Grim are used to assess the residual terrestrial influence on air masses with radon concentrations below the 100 mBq m<sup>-3</sup> threshold traditionally used for 'baseline' delineation (Figure 1a). Subsequently, a two-step radon-only approach for estimating 'baseline' constituent concentrations on monthly timescales is proposed. Based on a stringent 40 mBq m<sup>-3</sup> radon threshold followed by a simple 10<sup>th</sup>/90<sup>th</sup> percentile constituent outlier removal, the technique is completely independent of meteorological or aerosol observations. An initial evaluation of the technique using hourly carbon dioxide and ozone records yielded monthly 'baseline' concentration estimates more consistent with expectations of minimally perturbed Southern Ocean air masses than existing baseline selection techniques (Figure 1c). This work builds upon prior studies that have identified radon as a valuable baseline criteria [e.g. Gras and Whittlestone, 1992; Molloy and Galbally, 2014].

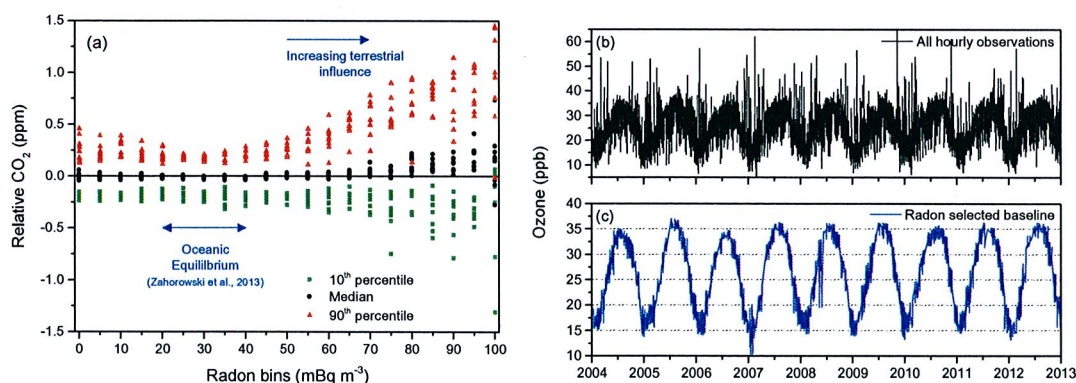


Figure 3. (a) Distributions of hourly CO<sub>2</sub> concentrations (monthly means have been removed) arranged into 5 mBq m<sup>-3</sup> radon bins, for air masses containing less than 100 mBq m<sup>-3</sup> of radon (each symbol represents one year of data); (b) all hourly ozone observations for 2004-2013; and (c) 'baseline' ozone concentrations as selected by the radon-based method.

### References

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