

Southern Ocean Atmospheric Chemistry and Aerosols - from Cape Grim to the RV Investigator

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During 2016 the Cape Grim Observatory, located on the northwest tip of Tasmania, Australia, will celebrate 40 years of measurements of the composition and chemistry of the atmosphere (including aerosols). Under baseline conditions, defined as wind direction in the 190° and 280° sector and concentrations of select parameters below threshold levels depending on the application (e.g. for the collection of integrated baseline samples for aerosol chemical composition the condensation nucleus (CN) concentrations are within the 90 percentile of CN hourly medians for the previous five years for the particular month) the Cape Grim Observatory samples long trajectories over the Southern Ocean.

In March 2015, the new Australian marine research vessel, the RV Investigator, undertook its maiden voyage, travelling from Hobart (147° E, 42° S) to the Southern Ocean Times Series Mooring located near 140° E, 47° S. The vessel spent 7 days in this region, and measurements of long-lived greenhouse gases, reactive gases and aerosols were carried out during this time, utilising purpose-built aerosol and atmospheric chemistry laboratories. During much of this time the RV Investigator was within the Cape Grim baseline fetch (Figure 1) approximately 350 nautical miles southwest of Cape Grim.

Preliminary analysis of the data suggests that concentrations of many species measured at 140°E, 47°S were lower than climatologically averaged concentrations measured at Cape Grim. The Cape Grim Observatory experienced baseline conditions on several of the days and further analysis of the data will link observations between the two platforms using chemical transport and back trajectory analysis. The measurements on board the RV Investigator represent some of the first *in situ* observations of atmospheric composition and aerosols in the Southern Ocean since the 1990s.

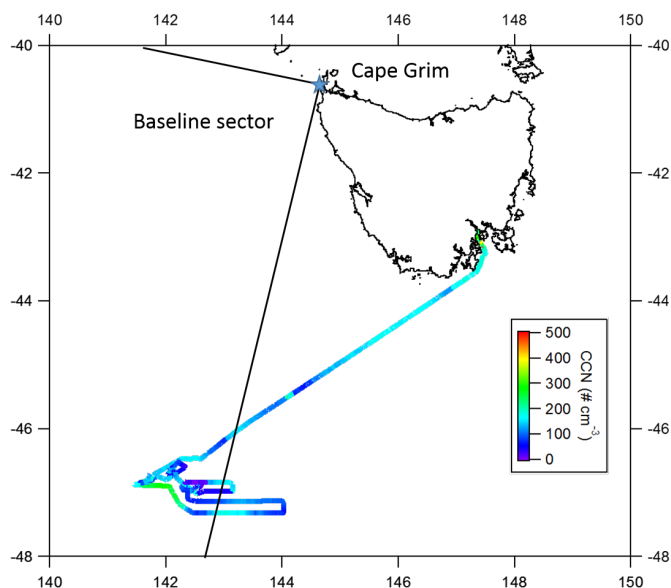


Figure 1. Baseline sector of the Cape Grim observatory and concentrations of cloud condensation nuclei (CCN) measured on board the RV Investigator as a function of location between 21 and 28 March 2015.