A COMPARISON OF THE BARING HEAD AND MAUNA LOA ATMOSPHERIC CO_2 RECORDS

A.J. Gomez, G.W. Brailsford, K. Riedel, and D.C. Lowe

[1]*National Institute of Water & Atmospheric Research, Wellington, New Zealand; a.gomez@niwa.co.nz*

The New Zealand atmospheric CO_2 record is the longest continuous measurement series in the Southern Hemisphere with its inception first at Makara (1970) followed by Baring Head (1972). The Baring Head background air monitoring station (41.4°S, 174.9°E), situated on a southern coastal cliff 85 m above sea-level, is a remote site located 12 km southeast of Wellington, New Zealand. Air masses arriving at the site from the South (onshore) are representative of a large part of the South West Pacific whereas northerlies are influenced mainly by local terrestrial biotic processes of photosynthesis and respiration. The Southern Hemisphere, due to its large extent of ocean, plays an important role in processes relating to global climate and climate change.

A comparison of the CO_2 records from Baring Head with Mauna Loa, the longest continuous record for a Northern Hemisphere site (19.5°N, 155.6°W), is presented. Both show similar increasing trends and growth rates though the difference between the two trends is widening. In 2007, the Baring Head trend is about 3.0 parts per million (ppm) lower than Mauna Loa compared to 1.5 ppm in the 1970s. (Note this does not include the altitude effect at Mauna Loa). Changes in seasonality at Mauna Loa are of the order of 5 ppm whereas seasonal changes at Baring Head are closer to 1 ppm. The difference between the two trends and the smaller seasonal cycle at Baring Head reflects the extent of the differences in emissions and biogeochemical processes between the two hemispheres, the Northern Hemisphere governed by the greater land mass and the Southern Hemisphere by the greater extent of oceans influenced by a large polar region. Surprisingly, a comparison of the growth rates and the inter-annual variability (around 1-2 ppm), exhibits strong correlations on a monthly time scale despite the interhemispheric atmospheric transport exchange time for CO_2 of about 18 months.