

Revision of the Historical Atmospheric CO₂ Record at Cape Grim and Expansion of the Atmospheric Observation Network in the Australian Region

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The Cape Grim Baseline Air Pollution Station (CGBAPS) is an important Southern Hemisphere, atmospheric observation site in the global network. It is also the central reference observation site for the expanding Australian Greenhouse Gas Observation Network. A key addition to this network is a new (2010) pilot tropical atmospheric observation site established at Gunn Point in Australia's Northern Territory (12.249S, 131.045E, elevation 25 metres). This site incorporates high precision *in situ* measurement and flask air sample collection programs for a range of GreenHouse Gases (GHGs) and related trace gas species. The Gunn Point site is an existing Australian Bureau of Meteorology research radar station (since 1997) and part of the U.S. Atmospheric Radiation Measurement network program. The site has been involved in numerous tropical meteorology field campaigns and experiments including: "Mctex", "TRMM", "Dawex", and "TWPICE". This combination of research capabilities with both chemical composition and physical dynamical aspects of the tropical atmosphere provides a unique opportunity to develop a one-of-a-kind tropical atmosphere research capability. It is anticipated high precision atmospheric observations from this region should significantly improve the understanding of the tropical sources and sinks of the major anthropogenic GHG and lead to a greater understanding of the globally important tropical climate processes.

The integration and calibration of large and expanding network *in situ* datasets can be a technically and logistically demanding process. Recently the historical CO₂ record at Cape Grim has begun to be reviewed and reprocessed (onto the WMOX2007 CO₂ mole fraction scale). The first phase has been completed to reprocess the LoFlo MkII data (2005 onward). This data is shown in Figures 1 and 2 as comparisons between the LoFlo MkII *in situ* CO₂ data and the CSIRO Global Atmospheric Sampling Lab flask CO₂ data at CGBAPS. This comparison shows a very high level of agreement and gives us confidence in our ability to integrate datasets from independent measurement programs using both different sampling and analytical technologies, as well as being independently calibrated (from internally propagated calibration scales).

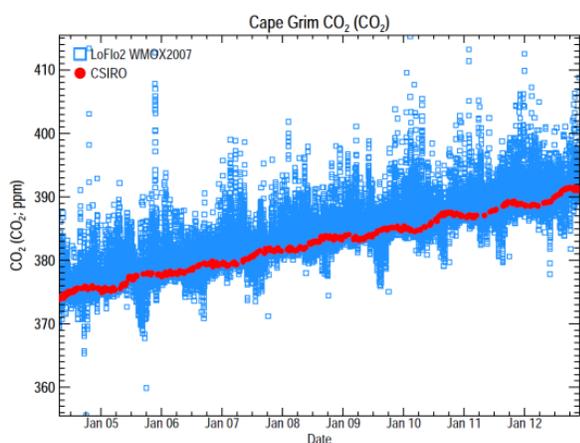


Figure 1. Revised CO₂ record (LoFlo *in situ* and flasks) at Cape Grim since 2005 (all data).

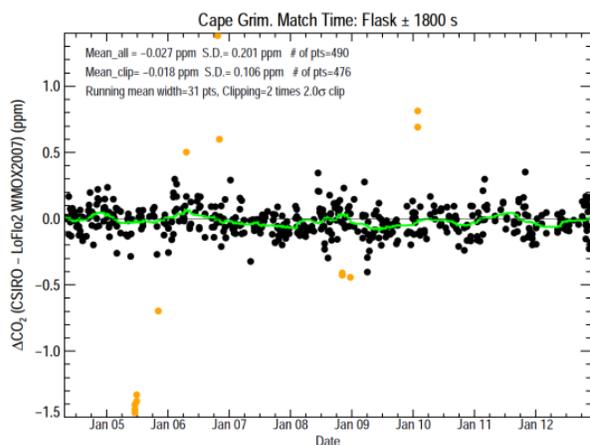


Figure 2. Comparison between *in situ* (LoFlo MKII) and flask revised CO₂ records at Cape Grim since 2005 (time matched data).