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Atmospheric trends of CF_4 and C_2F_6 inferred from air recovered from polar firn and ice.

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Tetrafluoromethane (CF_4) and hexafluroethane (C_2F_6) are two potent greenhouse gases in the atmosphere which have very long lifetimes ($>$10000 years) and large global warming potentials. CF_4 and C_2F_6 have known anthropogenic sources, mainly from the aluminium and semiconductor industries. CF_4 has previously [Harnisch et al. 1996] been shown to have a significant natural background of approximately 50% of contemporary concentrations. Through the analysis of polar firn air from 3 sites (North GRIP, Greenland; Berkner Island and Law Dome, Antarctica) and air recovered from ice at Law Dome, Antarctica our results confirm a natural background of 35 ± 1.5 pptv for CF_4 whilst showing that C_2F_6 is entirely anthropogenic in origin with zero concentrations observed prior to $\sim$1930. Both CF_4 and C_2F_6 show rapid growth in the atmosphere post 1950 and the relationship between them is observed to change as a result of the different reductions in emissions from the aluminium industry coupled with growing emissions of C_2F_6 resulting from its increased use in the semiconductor industry. These results have implications for both the 20^{th} Century and pre-industrial radiative forcing calculations.

Reference

Harnish, J., R. Borchers, P. Fabian, H. W. Gaggeler and U. Schotterer. Effect of natural tetrafluromethane, *Nature, 384* (6604), 32-32, 1996**.**