## "New" fluorocarbon gases in the atmosphere

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We have detected a number of fluorocarbons in the atmosphere that have not hitherto been considered in assessments of future radiative forcing from halocarbon gases, nor in terms of stratospheric halogen loading. These include minor chlorofluorocarbons (CFCs such as CFC-113a - CCI3CF3), hydrochlorofluorocarbons (HCFCs such as HCFC-133a - CH2CICF3), perfluorocarbons (PFCs such as C4F10), and a hydrofluorocarbon (HFC-227ea - CHF2CF2CF3). From measurements in polar firn air, and at a remote southern hemispheric mid-latitude location (Cape Grim, Tasmania), it is evident that the majority of these gases are increasing in atmospheric abundance. These add to recent reports by other authors of further 'new' fluorinated gases such nitrogen trifluoride (NF3) and sulfuryl fluoride (SO2F2). Although present abundances of all such 'new' gases are low, unconstrained growth of such species could collectively add significantly to future radiative forcing. We examine here recent growth rates of these gases, and their GWP-weighted emissions expressed as equivalent carbon dioxide emissions. Aircraft measurements, along latitudinal transects and as stratospheric profiles, are indicative of their atmospheric lifetimes, which in many cases are evidently very long.