

CHF₃ (HFC-23) Emission Trend Response to CHClF₂ (HCFC-22) Production and Recent Emission Abatement Measures

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CHF₃ (HFC-23) is an inevitable by-product of CHClF₂ (HCFC-22) production for use in air conditioning/refrigeration and as feedstock in fluoropolymer manufacture. CHF₃ has limited use in small emissive and non-emissive markets and thus historically this 'waste' gas was simply vented to the atmosphere following production at CHClF₂ plants. Concern over its high Global Warming Potential of 14,800 (100-year horizon) has led to international efforts to curb its emissions. We present emission and production estimates for both gases based on observations of lower-tropospheric CHF₃ and CHClF₂ mole fractions at the Advanced Global Atmospheric Gases Experiment (AGAGE) network of five remote *in situ* Gas Chromatography/Mass Selective Detector instruments and in archived air samples. We quantitatively attribute recent changes in CHF₃ production to various sources.

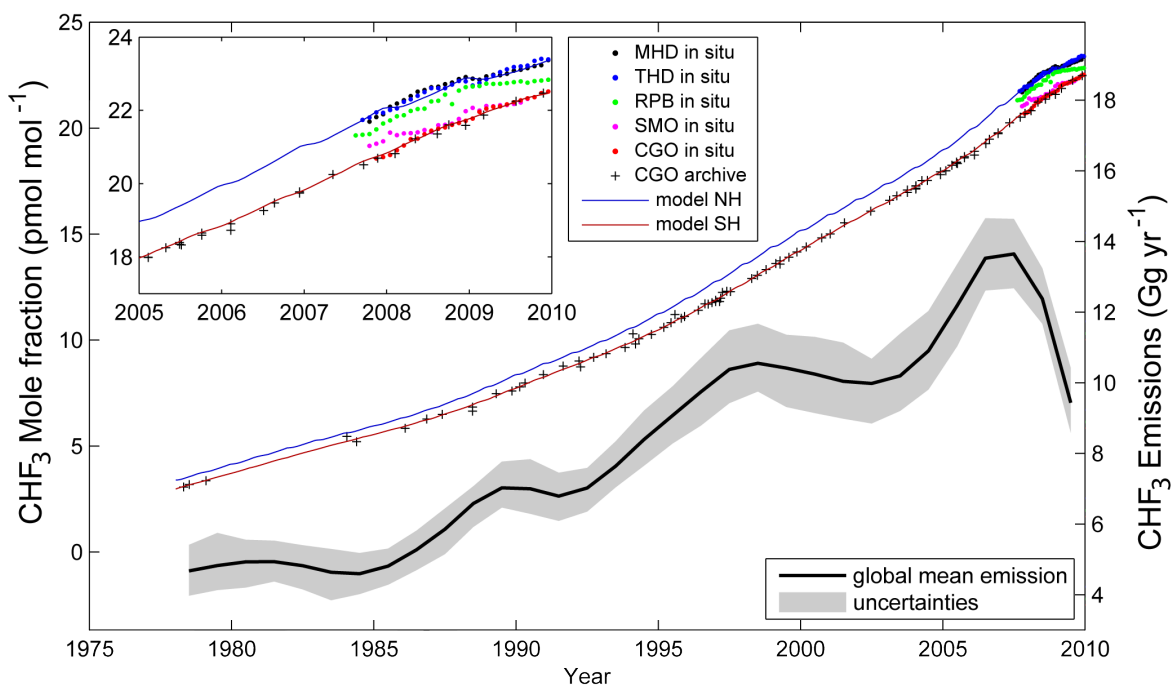


Figure 1. AGAGE *in situ* atmospheric observations (2007-2009) of CHF₃ at global monitoring sites and in the Cape Grim air archive (1978-2009) show a historically accelerating growth with a marked deceleration since 2006 (left axis). Inversion using the AGAGE 2D 12-box model yields CHF₃ emission estimates (right axis). The sharp increase in CHF₃ emissions during 2004-2006 results from a dramatic increase in CHClF₂ production in Article 5 countries (predominantly China and India). The sharp decrease in CHF₃ emissions since 2006 reflects a decrease in global CHClF₂ production, destruction (incineration) of >6 Gg CHF₃ yr⁻¹ by Article 5 countries (China, India, South Korea, Argentina and Mexico) participation in the United Nations Framework Convention on Climate Change's Clean Development Mechanism and emission reduction efforts by non-Article 5 countries.