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A systematic search for unknown halocarbons in the troposphere and stratosphere - Overview and first results of the CLEARFOGG project

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In their latest report the IPCC named a large number of halocarbons that are presumed to be present in the atmosphere but have not been detected or quantified yet (IPCC, 2007). Observational evidence for the presence of such unknown halogenated organic trace gases in the atmosphere has been reported recently. These substances could contribute to stratospheric ozone depletion and global warming. The three chlorofluorocarbons trifluorochloroethene, 3-chloropentafluoropropene and 4,4-dichlorohexafluoro-1-butene were detected in tropospheric air samples in 2007 by means of Gas Chromatography with Electron Capture and Mass Spectrometric detection (GC-ECD-MS, Laube and Engel, 2008). Indications for the presence of additional unidentified chlorofluoroalkenes were found and it is uncertain up to now, whether any of these substances are able to reach the stratosphere. Moreover, results from balloon-borne observations performed in 2005 in the tropical tropopause layer (TTL) and above revealed indications for additional organic brominated substances to reach the stratosphere (Laube et al., 2008). To bring these issues forward the project ĆLEARFOGG - Checking Layers of the Earths Atmosphere For halogenated Ozone-depleting and Greenhouse Gasesśtarted in November 2008. It aims at a systematic identification and quantification of unknown halocarbons in the troposphere and stratosphere using various GC-MS techniques on a global set of air samples. In addition, the risks arising from these substances regarding ozone depletion and global warming will be estimated via the corresponding historical time trends, radiative forcings, lifetimes and fractional release factors. The outline of the project and first results are presented.