6.108 European emissions of hydrofluorocarbons: top down estimates and comparison with bottom up inventories.

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Abstract:

The increase of greenhouse gases (GHGs) concentrations in the atmosphere has been recognised as a major driver of climate change (IPCC, 2013). In response to this, the International community agreed in cutting anthropogenic emissions of GHG through the Kyoto Protocol, an international treaty linked to the United Nations Framework Convention on Climate Change (UNFCCC), which commits its Parties by setting internationally binding emission reduction targets. The reliability of the emissions data reported by the Parties to UNFCCC, is crucial in assessing the Parties compliance to the Kyoto Protocol and therefore in determining the Protocol's effectiveness. Following the IPCC guidelines, the UNFCCC requires only bottom-up reporting, which relies on declared activities from industrial processes and product use and on emission factors for the release into the atmosphere. The availability of independent data, such as measurements of GHG atmospheric concentrations to be used for emission modelling, the so-called top-down approach, has been recognised as an important verification tool. Among the Kyoto gases, HFCs are considered particularly suitable for inverse modelling verification, being solely anthropogenic, long-lived and characterised by a well-known removal mechanism and such verification would be particularly important being their inventories affected by considerable uncertainties.
In this work we estimate, using atmospheric data from four European sites combined with a Bayesian inversion method, the emissions of nine individual HFCs from Europe and from twelve group of countries, comparing our results with the annual reports that the European countries submit to the UNFCCC and with the Emissions Database for Global Atmospheric Research. The observed discrepancies are then discussed. The reference period is from 2002 to 2014. The estimates provided by this analysis are relevant for constraining the atmospheric budget of these gases on a regional scale, also improving the accuracy of their emissions quantification on a global scale.