



## **Global emission inventories of gases and particles from fossil fuel and biofuel consumption for the period 1860-2030 with tentative validations with carbonaceous aerosol TM4 global modeling**

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Emission inventories of gases (CO<sub>2</sub>, CO, NO<sub>x</sub>, SO<sub>2</sub> and VOC) and particles (Black BC and organic OC particles) have been developed from fossil fuel and biofuel consumption for the period 1860-2030 using the flexible method of Junker and Lioussé, 2006.

The inventory for the period 1950 to 2003 is based on the United Nations Energy Statistics Database (UNSTAT database). Two simplifications at its core : a) fuels are categorized into three principal usage classes with associated EF (industrial, domestic and traffic). b) the different EF occurring in similar fuel/usage combinations as a consequence of the different technologies used are categorized into three classes (industrialised, semi-developed and developing countries).

Fossil fuel and biofuel consumptions for the period 1860-1949 have issued from Etemad et al., 1991 and Mitchell et al., 1995. The method used for 1950-2003 was further simplified for the earlier period. Instead, fuel usage in terms of the three classes (industrial, domestic and combined) was estimated globally. Moreover, only two classes of development are considered before 1939 (semi-developed and developing).

The prospective inventory is based on energy consumption forecasts by the Prospec-

tive Outlook on Long-term Energy Systems (POLES) model (Criqui, 2001) for a reference scenario, where no emission controls beyond those achieved in 2003 are taken into account, and for a "clean" scenario where possible and planned political measures for emission control are assumed to be effective.

In the initial results, the inventories use EF variable in time for BC and OC whereas EF for gases are kept constant. Spatial distributions of emissions are obtained in proportion to the population density.

Emission budgets are presented and compared with previous existing inventories of gas and particles. Trends of emissions are analysed for both gas and particle inventories.

Also, BC and OC inventories are included in the global TM4/ORISAM model (Guillaume et al., 2006) for typical years in the period 1860-2030. Carbonaceous aerosols issued from biomass burning emissions given by Granier et al. are also added. Global BC distributions obtained with TM4 are presented for 1900, 1950, 2000 and 2030 with tentative validations with ground measurements.