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Greenhouse gas measurements in the upper Spanish plateau

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Since May 2009, the continuous CO_2 measurements performed from 2000 in a rural area in the Spanish plateau (CIBA station) have been extended to other greenhouse gases in the framework of the CCGG NOAA/ESRL cooperative network. Current measurements are performed using a Picarro cavity ring down spectroscopy analyzer together with those provided from NOAA, through the flasks weekly air sampling data. Available data include CO_2, CH_4, N_2O, CO, H_2, SF_6 and the $\delta^{13}C$ and $\delta^{18}O$ isotopic fractions. The inter-comparison results of CO_2 and CH_4 recorded by the Picarro analyser and those concurrently obtained in the flasks weekly data, showed very satisfactory results revealing the low drift of the continuous analyser, especially for the CO_2 concentrations.

This paper presents the most salient results obtained, namely, background concentrations, seasonal cycle and preliminary annual trends. The main results obtained can be summarized as follows: a) A high annual increasing CO_2trend from 2000, 2.82 ppm/y, a value consistent with the increase in CO_2emissions in Spain during the last decade. The slight decline observed over the last two years, in agreement with the decline in Spanish emissions, supports the interpretation given. b) The expected "anticorrelation" between CO_2 and $\delta^{13}C$ and CO_2 ambient concentrations as well as the annual trends. c) Relatively high CH_4 mean concentrations, 1888.6 ppb, featured by a significant impact in the SE-SSE sectors, proving the local influence of a non-verified emitting source yet. d) N_2O and SF_6 mean concentrations consistent with those reported in other continental sites across the Northern Hemisphere, 324.1 ppb and 7.3 ppt, respectively. Both exhibited evident linear increasing trends of 1.00 ppb/y and 0.26 ppt/y, respectively. Due to the still limited available temporal series, additional measurements are necessary in order to confirm the future evolution of the trends currently reported during the coming years.