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High resolution methane inventory for Argentina. Comparison with GOSAT and SCHIAMACHY satellites measurements

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Methane in the atmosphere is a potent greenhouse gas, however, since it absorbs more energy per unit mass than carbon dioxide produces an important effect on the global radiative forcing. We present a methane high resolution (lat. 0.025˚ x long. 0.025˚) emissions inventory for Argentina for all relevant sectors, including biomass burning, forest fires, production and generation of energy, residential consumption, transport, livestock and agricultural production. Precisely, Argentina is an important livestock producer emitting an average of 2700 Gg / year of CH4 out of a total of 3500 Gg / year, representing 75% of the national methane emissions and 39% of national GHG emissions. Other methane emissions include domestic waste 15% (580 Gg/year) and 5% (185 Gg/year) from fugitive emissions vented at energy production facilities and natural gas wells; 0.9% biomass burning (31 Gg/year); 0.9 % agriculture mainly from rice-paddy (30 Gg/year); 0.5% transportation (19 Gg/year) and the rest from other sources. The emissions inventory calculation are compared with the GOSAT and SCHIAMACHY satellite data of height profiles and surface concentrations, obtained for years 2009-2016. Two analyzes were carried out: a) an evaluation of latitudinal / longitudinal averages of 0.5˚ bins and b) a study of the oceanic / continental concentrations for the same measurements to uncouple global temporal and latitudinal variations . From these analysis it is observed that the latitudinal averages of the continental sector increases at a higher rate from south to north than the maritime sector, which is merely constant. The continental slope increase is 10 ppb per degree up to latitude 28 S were remains approximately constant at 1870 ppb level. These latitudinal increase from south to north is consistent with the emissions inventory from 45S to 28S, where most of the anthropogenic national activities are reported. From a temporal perspective, monthly average concentration values has a stational amplitude of 40-50 ppb, (with minimum values in March and maximum values in September). Absolute concentration values has been increasing since 2007, showing an average rate of 0.4% per month for the Ushuaia GAW station (54.8S, 68.3W) and an average rate of 0.26% per month for the GOSAT surfaces data (at 925 $\pm$ 14 mb atmospheric pressure).