

Amazon Basin and Brazilian Coast SF₆ Study in a 15 Years Time Series

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The sulphur hexafluoride (SF₆) is known as a potent Long Lived Greenhouse Gases and it is a synthetic gas with a millennia lifetime, about 3200 years, and has a Global Warm Potential 23000 time higher than the Carbon Dioxide (CO₂). Levin et al. (2010)¹ showed that SF₆ emissions decreased after 1995, most likely because of emissions reductions in developed countries, but then increased after 1998. It is produced by the chemical industry, mainly as an electrical insulator in power distribution equipment². Due its very long lifetime, SF₆ emissions are accumulating in the atmosphere. Its global mole fraction increased nearly linearly in recent decades and in 2014 is about twice the level observed in the mid-1990s³. Its concentration was 4.2 parts per trillion (ppt) in 1998 (TAR) and has continued to increase linearly over the past decade, implying that emissions are approximately constant. Because of these characteristics, the SF₆ has been as an essentially inert tracer to study atmospheric and oceanic transport processes³.

The Amazon Basin is an ecosystem that has a growing interest by researchers around the world because of its role at the Climate Change. The emissions of SF₆ in the Amazon Basin are considered non existents and, a time series of 15 years has the potential to show the behaviour of this gas in a large area.

Until now, our mainly interest in SF₆ concentrations is to use this gas as a transport tracer to calculate the BKG to Amazon and determinate the CO₂, CH₄ and N₂O fluxes over the Amazon Basin. SF₆ atmospheric measurements were started with vertical profiles using small aircrafts, since 2000 in Santarém (SAN; 2.86°S; 54.95°W), 2009 in Rio Branco (RBA; 9.38°S, 67.62°W), 2010 in Alta Floresta (ALF; 8.80°S, 56.75°W) and Tabatinga (TAB; 5.96°S, 70.06°W), all these sites located in Brazilian Amazon Basin. Since 2010, we started flask measurements at two sites located at the Brazilian Atlantic coast: in Salinópolis (SAL; 0.60°S, 47.37°W) and in Natal (NAT; 5.48°S, 35.26°W) and later in 2014 at Camocim (CAM; 2.86°S, 40.08°W) and in 2016 at Itarema in a 100m tower (ITA; 2.93°S, 39.84°W).

This work will present analyse of 15 years SF₆ measurements at the Amazon Basin and Brazilian coast show the trends, comparing the years and the behaviour among the sites regions which is expect to change mainly by the differences of the air masses origin.

References

¹Levin, I., et al., 2010: The global SF₆ source inferred from long-term high precision atmospheric measurements and its comparison with emission inventories. *Atmos. Chem. Phys.*, 10, 2655–2662.

²WMO – World Meteorological Organization. Greenhouse Gas Bulletin - The state of Greenhouse gases in the atmosphere using global observation throught 2014. n. 11, 2015.

³IPCC - Intergovernmental Panel on Climate Change. Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of Intergovernmental Panel on Climate Change. S. Solomon et al, Cambridge University Press. Cambridge University Press, Cambridge, 2007.