In-situ Greenhouse Gases Monitoring in India

M. Ramonet [1], N.K. Indira [2], Y. Tiwari [3], B.C. Bhatt [4], M. Delmotte [1], P. Bousquet [1], and V.K.Gaur [2]

[1]*Laboratoire des Sciences du Climat et de l'Environnement (LSCE) - CEA/CNRS/UVSQ - F91191 Gif sur Yvette, France*

[2]*Centre for Mathematical Modelling and Computer Simulation (C-MMACS/CSIR), Bangalore 560037, India*

[3]*Indian Institute of Tropical Meteorology, Pune, India*

[4]*Indian Institute of Astrophysics, Bangalore, India*

The rapidly expanding economies of East Asia are showing a swift increase in greenhouse gases emissions. From 1993 to 2003 CO_2 emissions from India have increased by 57 percent, and such trend will likely continue since per capita emissions still lag far behind those of Europe and the United States. The development of the Indian sub-continent with a population of ~1.2 billion, may lead to significant changes in the regional distribution of GHGs in the atmosphere. Such development emphasizes the urgent need of initiating a long term measurement of the concentrations of greenhouse gases over the Indian subcontinent. In the framework of an Indo-French collaboration research program we have initiated in August 2005 the first CO2 measurement station at Hanle at the Indian Astronomical observatory, in Ladakh as per WMO standards (0.01 ppm precision). We are now running regular air sampling at three stations: Hanle, Pondicherry and Port Blair, and our objective is to equip all those three stations with in-situ CO2/CH4 analyzers. This project is involving several institutes in India (*Indian Institute of Astrophysics, Pondicherry University, National Institute of Ocean Technology*) which are in charge of maintaining the instruments and sampling the air.

The scientific goal of this effort is to improve our knowledge of the regional distribution of greenhouse gases sources and sinks, as well as their long term and interannual variability. The top-down approaches convert the spatial and temporal gradients of atmospheric concentrations of greenhouse gases into space and time varying sources and sinks, by using an atmospheric transport model. The poor density of stations over the Indian subcontinent is the main reason for the large uncertainties in the regional flux estimates based on atmospheric inversions. We will present the greenhouse gases time series obtained from the three stations, and some preliminary results obtained from inversions, and network design. This emergent Indian network of stations will be presented in the context of the infrastructures which are under development in Europe and North America for assessing the greenhouse gases budget in those continents.