

## **HIGH PRECISION ATMOSPHERIC CO<sub>2</sub> CONCENTRATION MEASUREMENT OVER INDIA: PLANS FOR FUTURE RESEARCH**

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### **OBJECTIVE**

Greenhouse gases play an important role in the energy balance of the atmosphere. An increase in atmospheric CO<sub>2</sub> leads to a new stationary state with increased earth surface temperature. Such a change in atmospheric greenhouse composition is due to human activity such as fossil fuel burning, cement manufacture and deforestation. Among the greenhouse gases of anthropogenic origin, the increase of atmospheric carbon is of concern because carbon is not removed from the atmosphere by chemical reactions in the atmosphere unlike other greenhouse gases. In order to monitor the emission of CO<sub>2</sub> fluxes, NOAA, CMDL has established a network of measurement stations all over the globe. The data from this campaign has been used in an inverse sense to estimates of sources and sinks by de-convolving the atmosphere transport. The paucity of monitoring sites in Asia, especially India, however leads to poor resolvability of their estimates. To infer estimates of CO<sub>2</sub> sources and sinks we need good coverage of stations and high quality of measurements. This project is especially designed to augment the data density of atmospheric CO<sub>2</sub> concentration over the Indian continent by adding a new site at Sinhagad (high altitude, mountain top in the Western Ghat of India, lat=18.35 N, lon=73.75 E, asl=1400 meter) and Cape Rama, Goa (west coast of India, sea coast, lat=15.08 N, lon=73.83 E, asl = 50meter) to improve estimates of carbon sources and sinks. Sinhagad is a hill station on a mountain top in the Western Ghat. It is located about 18 km southwest of Pune city. Its top is flat with an area about 0.5 km<sup>2</sup>. Sinhagad is a clean site. It receives maritime as well as continental air masses during the year. During SW monsoon it is mostly dominated by maritime air masses and during rest of the months it receives continental air masses. Another proposed site is Cape Rama, Goa. Cape Rama is a maritime site. It is located at the west coast of India. It is a unique site which experiences a seasonal reversal wind pattern. During SW monsoon it receives air masses having marine signatures while during remaining period it receives typical west coast region (continental India) characteristics (as an example, Cape Rama back trajectories during Jan-Dec05 is shown below in fig.1).

### **METHODOLOGY**

Air samples in 2 separate glass flasks will be collected once every week at the selected sites. These flasks will be sent to central analysis laboratory at the Indian Institute of Tropical Meteorology, Pune, India for arranging the analysis of CO<sub>2</sub> and other greenhouse gases using high precision analyzers (Gas Chromatograph) with their precisions for different gases. Once the analysis is completed, data will be included in the existing dataset of CO<sub>2</sub> network, for computer inversion to obtain better constrained inverse solutions (estimates) of carbon fluxes over India and Central Asia.

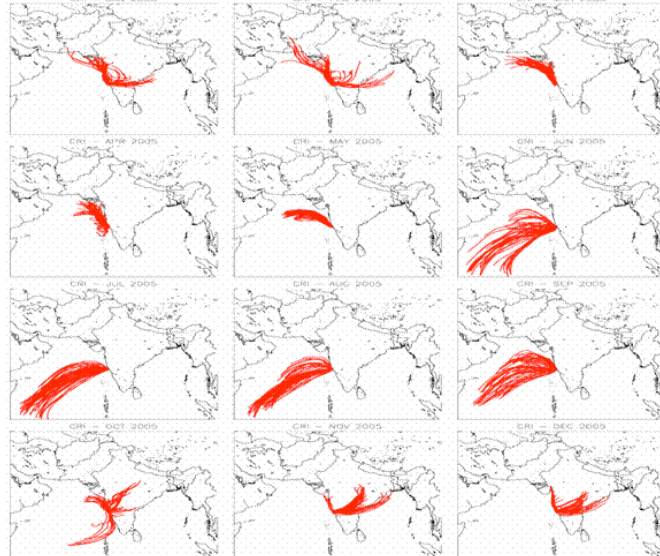


Fig.1: Back trajectories by Hysplit model at Cape Rama, Goa, India, during Jan-Dec05 (top left to right)