



## **Seasonal and long-term variabilities in trace species over south Asia**

**M. Naja** (1) and **S. Lal** (2)

(1) Aryabhata Research Institute of Observational Sciences, Nainital, India, (2) Physical Research Laboratory, Ahmedabad, India

Increasing levels of radiative and chemically active species are of major concern for global warming, climate change, and ecosystem hazard. Increasing anthropogenic sources together with the natural factors, like higher solar radiation and large amount of water vapor make tropical Asian regions photochemically most active and important to study tropospheric processes.

South Asian region is surrounded by pristine marine region from nearly three sides and convective lifting of pollution from this region would influence radiation budget, chemical composition and air-quality over wide region. Ground based long-term observations of trace species are very limited in Asia. There are some long-term observations of ozone only. Considering these aspects, different measurement programs have been initiated in India, e.g. observations of trace gases (ISRO-Environmental Observatories), aerosols & radiation (ARFI) and vertical distribution of aerosols (I-Link).

Available observations in India show a positive trend in surface ozone. Vertical ozone distribution shows a positive trend in northern and western India, while no significant trend in southern India. Space-borne observations have also shown higher levels of total tropospheric ozone in northern India. Seasonal variations in ozone show higher values in spring in northern India, while ozone levels are higher in late autumn/winter in western India. Interestingly, lower ozone in summer/monsoon is a common feature in most part of India, which is driven by cloudy conditions and arrival of pristine marine air. Generally, surface ozone levels are not significantly higher in India, when compared with other parts of the world. It seems that ozone production potential is

lower in India and probably this region is dominated by incomplete photochemical processes.