# Climate Forcing of South Asian Aerosols: Facts and the Unknowns

K KRISHNA MOORTHY

*Space Physics Laboratory, Vikram Sarabhai Space Centre, Thiruvananthapuram, India*

Reducing the current uncertainties in the climate forcing of atmospheric aerosols calls for a synergy between observations and modeling. Observations, aiming at accurate regional characterization of aerosols, pertinent to climate forcing, in turn calls for long-term measurements through carefully constructed ground based network supplemented with space borne measurements of aerosol parameters, and integrated, multi-instrumented field campaigns involving network observatories, shipboard, balloon-borne and aircraft based, concurrent measurements. Realising this for the complex aerosol environment of Asia-Oceania region, several field campaigns were carried out under the Geosphere Biosphere Program of the Indian Space Research Organization, over the Indian landmass and adjoining oceans to better characterise the highly heterogeneous properties of Asian aerosols, their seasonal transformation, long-range transport and the resulting changes in the optical and physical properties with consequence on short and long-wave radiative forcing.

The ICARB (Integrated Campaigns for Aerosols, gases and Radiation Budget), carried out during March – May 2006 and W_ICARB of December 2008 – January 2009 have been amongst the biggest such field experiments ever conducted for investigating atmospheric aerosols of south Asia. Designed on a novel 'integrated-segmented' concept, these campaigns brought-in a synergy of continuous time-series measurements of aerosols from a network of about 20 aerosol observatories, extensive measurements from a special aerosol laboratory onboard a research vessel over > 4 million $km^2$ oceanic regions of the Bay of Bengal, northern Indian Ocean and the Arabian Sea, balloon borne measurements of aerosols and thermodynamic features of the atmosphere over land and ocean (from the ORV) and concurrent measurements of the altitude distribution of aerosols using an instrumented aircraft in the troposphere during about 40 sorties from different locations[1]. A synthesis of the voluminous data collected in these campaigns revealed several new findings, specific to this region, including large spatial distinctiveness between the optical and physical properties. It also provided the first experimental evidence of the prevalence of elevated aerosol layers, within which the aerosol absorption and extinction were higher than those at the surface. The details and its implications of the to regional climate would be presented and the new issues would be highlighted

## References

[1] K K Moorthy, *J Earth Syst. Sci*., **117 S1,** 243-262**,** (2008).