Spatial Variation of Ozone, Carbon Monoxide and Nitrogen Dioxide Over Bay of Bengal During Winter

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The role of ozone, nitrogen oxides, carbon monoxide in tropospheric chemistry is well established. However, in-situ measurements of these gases are scarce over the tropics, especially over the oceanic environment. The Integrated Campaign for Aerosols, gases and Radiation Budget (ICARB) conducted under the Geosphere Biosphere Programme of Indian Space Research Organisation (ISRO-GBP) focused on the mapping of aerosols and trace gases over the Indian region. As part of ICARB, cruise-based measurements of near-surface ozone (O₃), carbon monoxide (CO) and nitrogen dioxide (NO₂) have been carried out over Bay of Bengal (BoB) during winter months of December 2008 to January 2009. These measurements covering latitude-longitude sector 3.5°N to 21.0°N and 76.0°E to 98.0°E brought out the winter pattern of these trace gases over BoB. Certain hot-spots have been identified for these trace gases over this oceanic region. While in the distribution of O₃, highest mixing ratios have been observed over the north/head-BoB, NO₂ mixing ratios are comparable over head-BoB and southeast-BoB regions. The highest CO concentration is found to be over the southeast region of BoB. This feature has been examined in the light of changing wind pattern and airmass back trajectories and found that transport from nearby landmass plays important role in establishing the spatial patterns. Using Hybrid Single particle Lagrangian Integrated Trajectory (HYSPLIT) back-trajectory analysis and satellite based map of CO the pathways for CO transport were identified. In addition, the comparison of observed trace gases for common region covered during Indian Ocean Experiment (INDOEX) 1999, Bay of Bengal Processes Studies (BOBPS) and Bay of Bengal Experiment (BOBEX) has been made. This comparison shows that the winter-time mixing ratios are higher as compared to other seasons.