Simultaneous Observations of Convective Systems and Emerged Gravity Waves and Thermal Structure in the Troposphere and Lower Stratosphere Using Satellite, EAR, and Radiosonde Over Indonesia During CPEA-II Campaign

R. Bhatnagar[1, 2], S. K. Dhaka[1], V. Panwar[1, 2], Y. Shibagaki[3], H. Hashiguchi[4], T. Kozu[5], and M. Takahashi[6]

1. Radio and Atmospheric Physics Lab, Department of Physics, Rajdhani College, University of Delhi, Delhi, India
2. Department of Physics and Astrophysics, University of Delhi, India
3. Osaka Electro-communication University, Japan
4. RISH, Kyoto University, Japan
5. Shimane University, Japan
6. CCSR, Tokyo University, Japan

Fine scale perturbations are observed in humidity, temperature and vertical wind component in the upper troposphere and lower stratosphere using hourly radiosonde launchings and high resolution Equatorial Atmosphere Radar (EAR) observations over Indonesia during convective events. Observations suggest that convective storm enhances humidity significantly in the middle and upper troposphere during its active period. Quasi-periodic wave perturbations in humidity induced gravity wave oscillations in temperature and vertical wind with ~2 hours wave period in tropopause region (~17-19 km). Amplitude of short scale wave perturbations enhanced during penetration of convective storm into upper troposphere, which dissipated within 6-8 hours. High resolution satellite (MTSAT-1R) observations confirm the presence of deep clouds over observation site. Hourly temperature at a height resolution of 100 m interval in the upper troposphere showed a significant decrease in temperature (~6-7 K) during convection occurrence at ~16-17 km height, which occurred partly due to adiabatic cooling of air-mass and partly by active evaporation of moisture in the presence of strong wind shear.