Session: B6 Oral presentation

Impact of dust storms and anthropogenic emissions on the Indo-Gangetic Basin and melting of Himalayan Glaciers

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Recent studies point towards the increasing influence of anthropogenic emissions such as soot (black carbon), COx, NOx, SOX and various gases and natural (desert dust) pollutants on the snow cover, albedo, energy budget (shortwave and long wave radiation), sunshine duration (solar dimming), and long term decadal changes in precipitation and tropospheric temperatures (using MSU and models, 1979-2010). The area of interest in the present study is Africa-Asia (source to sink region for desert dust): from Sahara-Middle East region to Himalaya (Glaciers), Tibean Plateau and the Indo-Gangetic plains. The model (DREAM), AERONET, MODIS and CALIPSO data have been used to study the vertical profiles as well as column properties of aerosols in the atmosphere. The MODIS (Terra and Aqua, 2000-2010) derived maximum snow cover extent has been used to track the snow cover over various major Himalayan and Tibet Glaciers at 500m grid resolution. The level 2 (10 km grid) aerosol optical depth (AOD) derived using dark-target and deep-blue algorithm have been used show the transport of desert dust over high altitude (over 4000m) Himalayas and Tibet region during the summer season. The results are supported by visible images (enhanced for dust detection) at 250m grid resolution from MODIS Terra and Aqua. MODIS data clearly show that the dust is reaching up to major Himalayan glaciers feeding major rivers of Asia (Indus, Ganges, Yamuna, and Brahmaputra). Currently, we are also mapping the melting (extent of receding) of major Himalayan and Tibet glaciers (using Landsat series and ASTER) for last 4 decades (early 1970-2010). Assessment of the direct and indirect influence of the aerosols on the radiation budget, MSU derived tropospheric temperature (lower 0-3 km, middle 3-7 km) and precipitation pattern over the region will be discussed in detail. Continuous wavelet transforms (CWT) analysis of the long term changes in parameters such as ozone that signify tremendous increase in the anthropogenic pollution over the region (1960-2010) will be discussed.