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GREENHOUSE GASES MEASUREMENT OVER INDIAN RESEARCH STATION MAITRI, ANTARCTICA

S.L. Jain, S.D. Ghude, P.S. Kulkarni, B.C. Arya

National Physical Laboratory, New Delhi, India

During Indian Antarctica Scientific expedition during 2002-2004 in-situ measurements of CO_2 and CH_4 by Gas Chromatograph, CO by IR CO-analyzer and remote measurement of columnar water vapour using MICROTOPS has been made at Maitri (Antarctica). The continuous hourly averaged CO_2 observations during February 2002–January 2004 period showed mean yearly value of 368.43 ppm in the year 2002 and 369.72 ppm in the year 2003, indicating an increase by 1.3 ppm. This corresponds to a growth rate of 0.35% per year. Mean CH_4 concentration for a 16-month period has been observed to be 1.699 ppm, with standard error of ± 0.0025. Unlike CO_2, CH_4 does not show any evidence for an increase during the observation period. The variability in CO_2 and CH_4 calculated from frequency distributaries analysis illustrates that the air at Maitri is well mixed and far removed from the source strength characteristics of land area. Diurnal changes in CO concentration were systematically observed in Antarctica during clear sky condition, with higher CO concentrations in daytime sunlight period, indicating that the solar induced CO production processes are active in surface snow layers. During the hours of CO production, there was a very strong positive relationship between CO and UV radiation at 305 nm and 320 nm. The diurnal variability in CO concentration has been observed with hourly mixing ratios ranging from 30 ppb to 65 ppb during summer period. The mean CO production rate (007h-14h) during observational period is 3.4 ppb/h. CO was found to be maximum in the afternoon. During nighttime, CO concentration declined to a minimum, which found to be correlated with the diurnal cycle of solar radiation. We consider HCHO photolysis to be responsible for diurnal variation of CO during summer time. The annual mean columnar water vapour was found out to be 0.24 cm in 1997, while it was 0.42 cm in 2002 and 0.45 cm in 2003. Monthly mean water vapour was maximum during January and increased by 48.8% in 2002, 57.7% in 2003 and 66.6% in 2004, compared to 1997. The observation showed signature of increasing total column water vapour with increase in surface temperature at Maitri.