

Temporal and Spatial Distribution of Tropospheric Carbon Dioxide over China based on Satellite Observations.

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Mid-troposphere CO₂ data retrieved by the AIRS (atmospheric infrared sounder) were validated with five ground-based stations and aircraft measurements in the Northern Hemisphere. AIRS CO₂ products show good agreement with ground and aircraft observations. The data had a monthly average accuracy better than 3 ppmv. In this study, the spatial and temporal distribution of mid-troposphere CO₂ from January 2003 to December 2008 was analyzed based on this satellite product. The average concentration of atmospheric CO₂ was higher in the Northern Hemisphere than in the Southern Hemisphere. The yearly average results show a gradual increase from 2003 to 2008. In China, the annual growth rate was about 2 ppmv/a, similar to the United States, Europe, Australia and India, but was slightly lower than Canada and Russia. Mid-troposphere CO₂ concentrations were higher over northern China than over southern areas, due to differences in natural conditions and industrial layout. There were four centers of high CO₂ concentration between 35°N and 45°N over China, with low concentrations over Yunnan Province. There was a significant seasonal CO₂ variation with peak concentration in spring and the lowest concentration in autumn.