



Satellite Remote Sounding of AIRS MidTropospheric CO₂

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With Atmospheric Infrared Sounder (AIRS), we monitor the distribution and transport of global CO₂ on a weekly basis for the first time. There is significant spatio-temporal variability in the middle tropospheric CO₂, which is corroborated by independent *in situ* aircraft observations. The distribution of the middle tropospheric CO₂ appears to be strongly influenced by large-scale circulation such as middle-latitude jet streams and by synoptic weather systems, particularly in summer. Contributions from large stationary surface sources, especially in the Southern Hemisphere, are evident in the AIRS CO₂ data. The stratosphere-troposphere exchange associated with a Northern Hemispheric Stratospheric Sudden Warming (SSW) event in April 2003 resulted in an increase of \sim 2 ppmv in AIRS CO₂ concentrations and a decrease of \sim 20 ppbv in AIRS O₃ at 300 hPa within five days. It is still a challenge for the chemistry and transport models to simulate the CO₂ weather and the sudden warming correctly.