Geophysical Research Abstracts, Vol. 7, 07921, 2005
SRef-ID: 1607-7962/gra/EGU05-A-07921

Estimation of atmospheric CO_2 through the data assimilation of AIRS infrared satellite radiances

Richard J. Engelen

European Centre for Medium-Range Weather Forecasts, Reading, United Kingdom
(richard.engelen@ecmwf.int)

Atmospheric CO_2 concentrations have been obtained from the Atmospheric Infrared Sounder (AIRS) radiance data within the European Centre for Medium-Range Weather Forecasts (ECMWF) data assimilation system. A subset of channels from the AIRS instrument has been assimilated providing estimates of tropospheric column-averaged CO_2 mixing ratios. Results for 2003 show considerable geographical and temporal variability with values ranging between 370 and 382 ppmv. These CO_2 values are representative for a layer between the tropopause and 700 hPa. The 5-day mean estimated random error is about 1%, which is confirmed by comparisons with flask observations on board flights of Japanese airliners in the west-Pacific region. Systematic errors have been addressed as well and are removed where possible. This study demonstrates the feasibility of global CO_2 estimation using high spectral resolution infrared satellite data in a numerical weather prediction data assimilation system. In the near-future the system will be improved to treat CO_2 as a full three-dimensional atmospheric variable, including transport.