Midtropospheric CO2 Concentration derived from infrared and microwave sounders. Application to the TOVS, AIRS/AMSU, and IASI/AMSU instruments

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Combined use of infrared measurements, sensitive to both temperature and carbon dioxide (CO2) variations, and of microwave measurements, only sensitive to temperature, allows deriving information on CO2 concentration in the mid-to-upper troposphere. Using a non linear inference scheme based on neural networks, four years (1987-1991) of TOVS observations, as well as five years (2003-2007) from the AIRS/AMSU instruments have been interpreted in terms of midtropospheric CO2 integrated content. Following the launch of the hyper-spectral infrared sounder IASI, together with AMSU, on board ESA/MetOp on October 2006, a set of IASI channels presenting optimum characteristics for CO2 estimation has been selected, based on a systematic sensitivity study of the observations to CO2, temperature, and other absorbers. Due to a better spectral coverage and a lower instrumental noise, the CO2 fields retrieved from IASI show a lower variability than those from AIRS. The first ten months of CO2 retrieved from IASI will be presented and compared with corresponding retrievals from AIRS, as well as with simulations from atmospheric transport and in situ data.