Geophysical Research Abstracts
Vol. 17, EGU2015-4159, 2015
EGU General Assembly 2015

Lidar Approach for Global Atmospheric Column CO_2 Measurements

Bing Lin
NASA langley Research Center, Science Directorate, Hampton, United States (bing.lin@nasa.gov)

Advanced knowledge in atmospheric CO_2 distributions is critical in predicting the Earth's future climate. Large uncertainties in the prediction persist due to limited observations. This study focuses on the development and demonstration of the Intensity-Modulated Continuous-Wave (IM-CW) lidar for atmospheric CO_2 measurements. Simulations show that IM-CW lidar systems operating at 1.57 um will provide precise atmospheric column CO_2 measurements from space. Airborne systems have demonstrated the feasibility of the technology and instrumentation for space active atmospheric CO_2 missions.
In this presentation, the atmospheric CO_2 column measurements from airborne flight campaigns and lidar system simulations for space missions will be discussed. Data analysis shows that airborne lidar CO_2 column measurements over desert and vegetated surfaces agree well with in-situ measurements. A measurement precision of 0.08% or $\sim$0.3 ppmv for a 10-s average over these surfaces has also been achieved. Generally, airborne flight campaigns have demonstrated that the column CO_2 measurements of the current IM-CW lidar systems meet the accuracy and precision requirements of atmospheric CO_2 measurements. Furthermore, analyses of space CO_2 measurements shows that the current IM-CW lidar technology and approach will enable space missions to achieve their science goals.