World Academy of Science, Engineering and Technology
International Journal of Environmental and Ecological Engineering
Vol:12, No:08, 2018

Airborne CO_2 Lidar Measurements for Atmospheric Carbon and Transport: America (ACT-America) Project and Active Sensing of CO_2 Emissions over Nights, Days, and Seasons 2017-2018 Field Campaigns

Authors : Joel F. Campbell, Bing Lin, Michael Obland, Susan Kooi, Tai-Fang Fan, Byron Meadows, Edward Browell, Wayne Erxleben, Doug McGregor, Jeremy Dobler, Sandip Pal, Christopher O'Dell, Ken Davis

Abstract : The Active Sensing of CO_2 Emissions over Nights, Days, and Seasons (ASCENDS) CarbonHawk Experiment Simulator (ACES) is a NASA Langley Research Center instrument funded by NASA's Science Mission Directorate that seeks to advance technologies critical to measuring atmospheric column carbon dioxide (CO_2) mixing ratios in support of the NASA ASCENDS mission. The ACES instrument, an Intensity-Modulated Continuous-Wave (IM-CW) lidar, was designed for high-altitude aircraft operations and can be directly applied to space instrumentation to meet the ASCENDS mission requirements. The ACES design demonstrates advanced technologies critical for developing an airborne simulator and spaceborne instrument with lower platform consumption of size, mass, and power, and with improved performance. The Atmospheric Carbon and Transport – America (ACT-America) is an Earth Venture Suborbital -2 (EVS-2) mission sponsored by the Earth Science Division of NASA's Science Mission Directorate. A major objective is to enhance knowledge of the sources/sinks and transport of atmospheric CO_2 through the application of remote and in situ airborne measurements of CO_2 and other atmospheric properties on spatial and temporal scales. ACT-America consists of five campaigns to measure regional carbon and evaluate transport under various meteorological conditions in three regional areas of the Continental United States. Regional CO_2 distributions of the lower atmosphere were observed from the C-130 aircraft by the Harris Corp. Multi-Frequency Fiber Laser Lidar (MFLL) and the ACES lidar. The airborne lidars provide unique data that complement the more traditional in situ sensors. This presentation shows the applications of CO_2 lidars in support of these science needs.

Keywords : CO_2 measurement, IMCW, CW lidar, laser spectroscopy
Conference Title : ICARSWM 2018 : International Conference on Atmospheric Remote Sensing and Weather Mapping
Conference Location : New York, United States
Conference Dates : August 27-28, 2018