

Carbon Dioxide-measuring Lidar Instrument Tests Completed

ITT Exelis and the NASA Langley Research Center completed a flight campaign in March 2013 that measured carbon dioxide over various surfaces and conditions as a step towards taking active global measurements from space. Using a NASA DC-8 aircraft and an instrument built by Exelis called the Multifunctional Fiber Laser Lidar, the team took carbon dioxide measurements from various challenging environments.

The information was gathered from high altitudes over fresh and aged snow surfaces, ocean surfaces in high winds, tall coastal and forest conditions, and in the presence of thin cirrus clouds.

The science community has stated clearly that its ability to improve climate models depends directly on its ability to obtain more accurate CO2 measurements, said Eric Webster, vice president of Exelis weather systems. Using the active Lidar system from space would enable significant improvements in global mapping of carbon sources and sinks and thus improve climate models. Results over several years and dozens of flights, including this campaign, prove the solution works and would provide decision-makers with more accurate information, he added.

In 2007, the National Research Council released its decadal survey recommending the use of an active Lidar system to provide new information on carbon dioxide processes over all regions of the Earth, during night and day. NASA Langley Research Center is evaluating the Exelis instrument to determine its effectiveness for the mission. The Exelis instrument is based on commercially viable fibre communications technology, which makes it lower cost and risk than other approaches.

Using active Lidar is important for researchers because current passive instruments for measuring CO2 from space cannot take measurements at night, at high latitudes where major cities are located, or through clouds, which limits effectiveness. Active instruments also take more accurate measurements in the lower atmosphere where increases and decreases in carbon dioxide take place more often.

Exelis has won three related technology development grants from the NASA Earth Science Technology Office, and is on its ninth task under an indefinite-delivery, indefinite-quantity contract with the NASA Langley Research Center for evaluation of Lidar technology. The most recent flight campaign also included instruments from the NASA Goddard Space Flight Center and from NASA's Jet Propulsion Laboratory to quantify various approaches. The NASA Langley Research Center and Exelis are working on the next step in the evaluation process, which is to move the measurement concept to a high-altitude unmanned aerial vehicle.

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