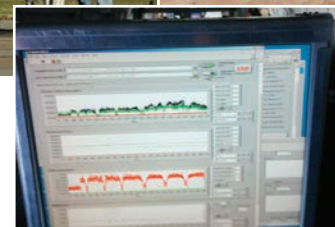




- July - Aug 2012 NASA DC-8 Flights demonstrated range resolved measurements for CO<sub>2</sub> and first measurements of O<sub>2</sub> at 1.26 μm



- First Harris prototype being prepped for airborne campaign



# LIDAR SYSTEMS

## PROVEN LIDAR SYSTEMS FOR TODAY'S CHALLENGES

Harris Corporation has developed a breakthrough Lidar system – the Multi-Functional Fiber Laser Lidar (MFLL). The new system offers the community a revolutionary capability in Lidar for weather, climate, land/ocean and exploration from satellites, airplanes and UAVs.

Through the use of fiber lasers and sophisticated signal processing, the MFLL offers enhanced longevity and increased power efficiency compared to conventional systems. Furthermore, the MFLL system and components have been matured to Technology Readiness Level 6.

Harris has developed and deployed several implementations of the MFLL Engineering Development Unit, under real world field and airborne conditions. These results have validated our physics-based performance models and confirmed the end-end performance in an operational setting.

## THE MFLL IS APPLICABLE TO MANY ACTIVE REMOTE SENSING APPLICATIONS:

### LASER ABSORPTION SPECTROSCOPY

- > TRL 6 solution can be applied to many NASA and NOAA needs in climate, atmosphere composition, pollution, weather.
- > All-fiber based solution adaptable to UAV platform.
- > New low cost solution enables networks of sensors.
- > Recently demonstrated absolute accuracies of 0.6 ppmv with standard deviations of 1.7 ppmv from the NASA DC-8 Platform, which meets the requirements for the ASCENDS mission called out in the NRC Decadal Survey.
- > Compared to conventional Diode Pumped Solid State Lasers, fiber lasers are 10X less expensive, 2 to 4X smaller (8x10x1 inch for 5 watts), 2X more efficient (10 to 20% wall plug efficiency), and 10X longer lifetime (Mean Time to Failure >100,000 hours).





# LIDAR SYSTEMS

## TOPOGRAPHIC MAPPING OF GLACIERS, FAULT ZONES

Demonstrated digitally modulated multi-pixel mapping Lidar using TRL 6 components @ 1 $\mu$ m and 1.6 $\mu$ m.

- > Pseudo-Random-Noise encoding enables use of TRL6 fiber lasers.
- > Diffractive Optics enable custom imaging formats and cross track imaging without moving parts.
- > Validated innovative design which uses corner pixels to reduce errors from attitude uncertainty.

## RENDEZVOUS AND DOCKING

The Agile Laser Imaging Sensor offers 100% operability solution for rendezvous, docking and inspection of space vehicles.

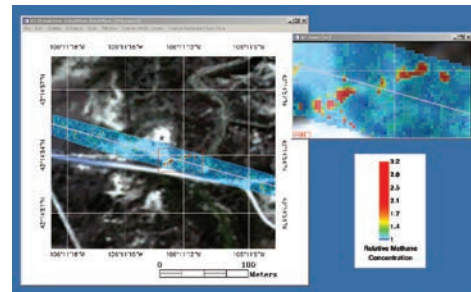


- Measured CO<sub>2</sub> plumes and background enhancements downwind of San Juan power plant
- Measured CO<sub>2</sub> drawdown over Iowa corn fields and WBTT tower

## HARRIS ALSO OFFERS CONVENTIONAL LIDAR

Mid IR pulsed DIAL Lidar for detection of trace gases:

- > Harris offers an airborne natural gas emission lidar technology that detects, quantifies, images and maps locations of natural gas leaks.
- > Another sensor system developed by Harris can passively detect propane and ethylene using an imaging hyperspectral instrument.



- Display of pipeline leaks detected by Harris pulsed mid IR DIAL Lidar system



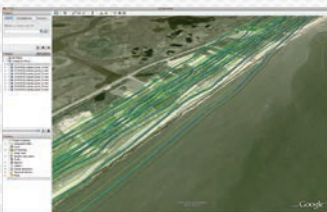
■ ICE mapping system



■ CO<sub>2</sub>, O<sub>2</sub> and Range to ice and snow surfaces over B.C



■ Flight demonstration of the multi pixel implementation of MFL



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