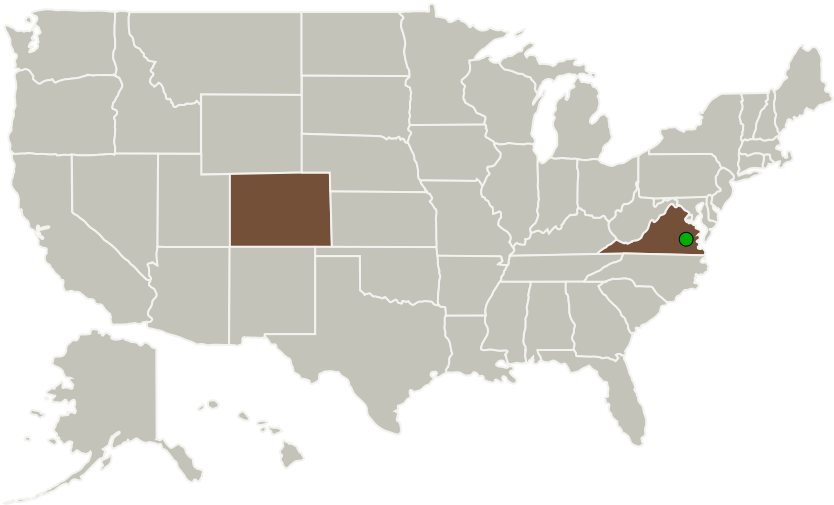
Precision Locking and Control of CW Lasers in Support of ASCENDS, Phase I

Completed Technology Project (2010 - 2010)

Project Introduction

Vescent Photonics proposes to design and build significantly improved laser frequency locking and control systems that will be suitable for ASCENDS and other NASA sensing needs. Precision laser frequency control (absolute frequency to better than 1 MHz with rapid tuning over 10's to 100's of GHz) for lasers in both the 1.57 CO2 overtone region for direct CO2 detection and around 1.53 □m, which may be doubled to reach the O2 A-band spectral-trough feature at 764.7 nm, will be developed and provided. The laser locking and control will employ either calibrated sweep techniques or high-speed frequency offset phase locking. Absolute wavelength references will be maintained to better than 2 MHz via either direct locking to a CO2 line or locking to the HCN R(22) line at 1529.38 nm, which when doubled is directly at the 764.7 nm O2 spectral trough feature. Prototype locking and control systems will be delivered at the end of phase I (TRL will transition from 4 to 5 during phase I) and a complete, ready to use laser system will be delivered at the end of phase II (TRL 6 or 7 at end of phase II).

Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
Vescent Photonics, Inc.	Lead Organization	Industry	Arvada, Colorado
Langley Research Center(LaRC)	Supporting Organization	NASA Center	Hampton, Virginia

Primary U.S. Work Locations	
Colorado	Virginia

Project Transitions

January 2010: Project Start

July 2010: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/139346)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Vescent Photonics, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

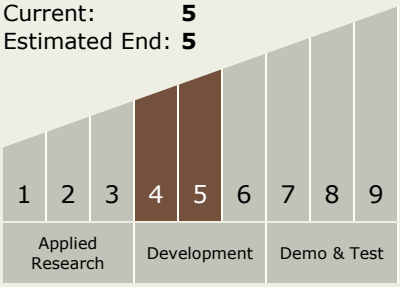
Carlos Torrez

Principal Investigator:

Mike Anderson

Technology Maturity (TRL)

Start: **4**
Current: **5**
Estimated End: **5**



Technology Areas

Primary:

- TX08 Sensors and Instruments
  └ TX08.1 Remote Sensing Instruments/Sensors
    └ TX08.1.5 Lasers

Target Destinations

The Moon, Mars, Outside the Solar System, The Sun, Earth, Others Inside the Solar System