NASAfacts

Space Optical Communications Using Laser Beam Amplification

Amplify and Return a Laser Beam Received by a Satellite

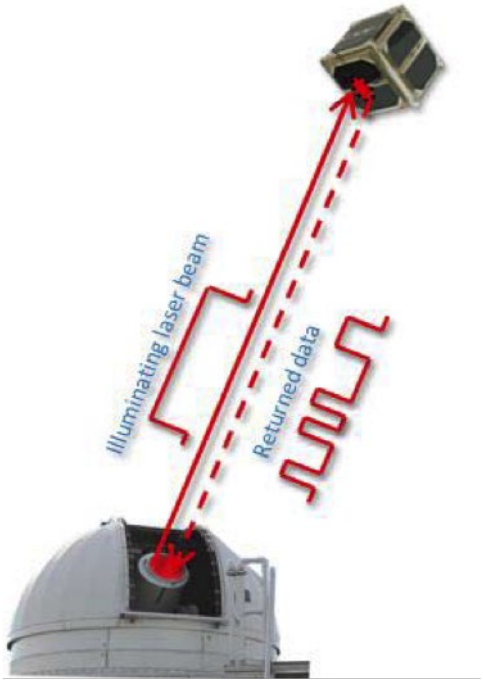
The Space Optical Communications Using Laser Beam Amplification (SOCLBA) project will provide a capability to amplify a laser beam that is received in a modulating retro-reflector (MRR) located in a satellite in low Earth orbit. It will also improve the pointing procedure between Earth and spacecraft terminals. The technology uses laser arrays to strengthen the reflected laser beam from the spacecraft. The results of first year's work (2014) show amplification factors of 60 times the power of the signal beam.

MMRs are mirrors that reflect light beams back to the source. In space optical communications, a high-powered laser interrogator beam is directed from the ground to a satellite. Within the satellite, the beam is redirected back to ground using the MMR. In the MMR, the beam passes through modulators, which encode a data signal onto the returning beam. MMRs can be used in small spacecraft for optical communications.

The SOCLBA project is significant to NASA and small spacecraft due to its application to CubeSats for optical data transmission to ground stations, as well as possible application to spacecraft for optical data transmission.

The SOCLBA project is led by investigators at the University of Rochester, in partnership with NASA Ames Research Center.

The SOCLBA project is funded through the SmallSat Technology Partnerships, a program within the Small Spacecraft Technology Program (SSTP). The SSTP is chartered to develop and mature technologies to enhance andexpand the capabilities of small spacecraft with a particular focus on communications, propulsion, pointing, power, and autonomous operations. The SSTP is one of nine programs within NASA's Space Technology Mission Directorate (STMD).



Schematic of Downlink from a Satellite using MRR Technology

For more information about the SSTP, visit:

http://www.nasa.gov/smallsats

For more information on SOCLBA's patent application, contact:

Ames Technology Partnerships Office at 1-855-627-2249 or ARC-TechTransfer@mail.nasa.gov

Reference the U.S. Patent Application Reference No. ARC-17122-1B, Space Optical Communications Using Laser Beams

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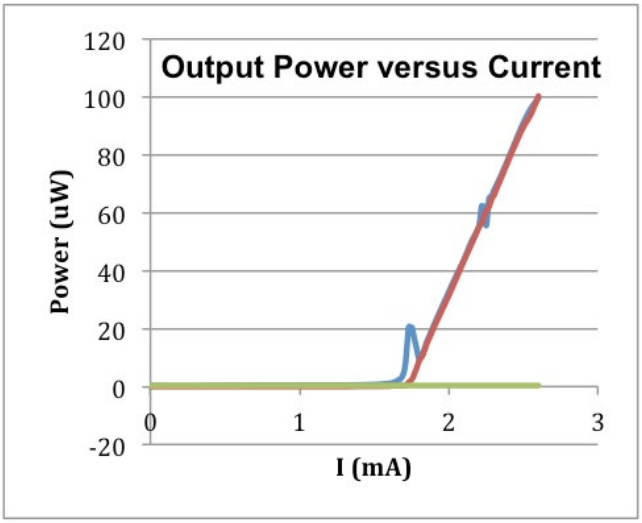
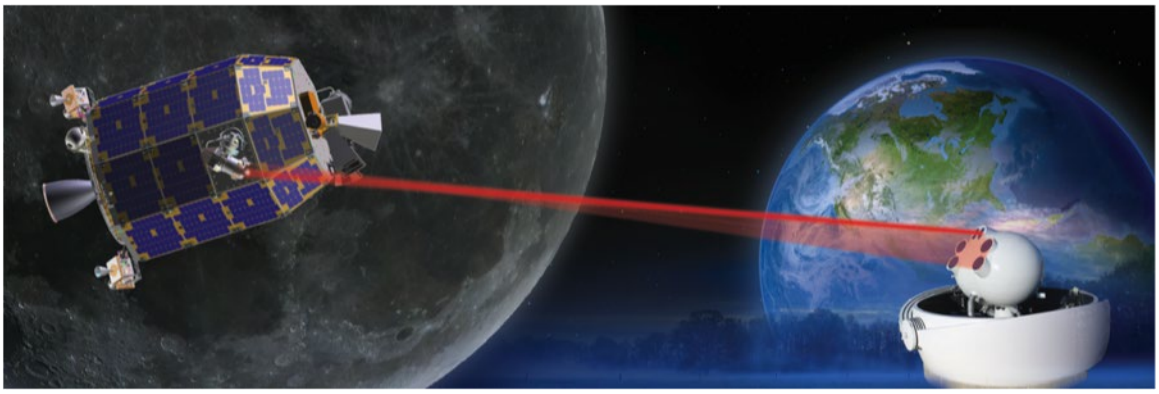


Output power (blue curve) measured as a function of bias current when 0.355-μW power (green curve) was injected into a vertical-cavity surface-emitting laser (VCSEL) from a tunable laser at a wavelength close to the VCSEL's wavelength of 1550-nm. The peak of the blue curve shows amplification factors of 60 times the power of the input signal beam, (green curve). (The red curve shows the output power measured in the absence of the injected signal.)



Schematic of Downlink from Lasercom Terminal on Host Spacecraft

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