Efficient Swath Mapping Laser Altimetry Demonstration

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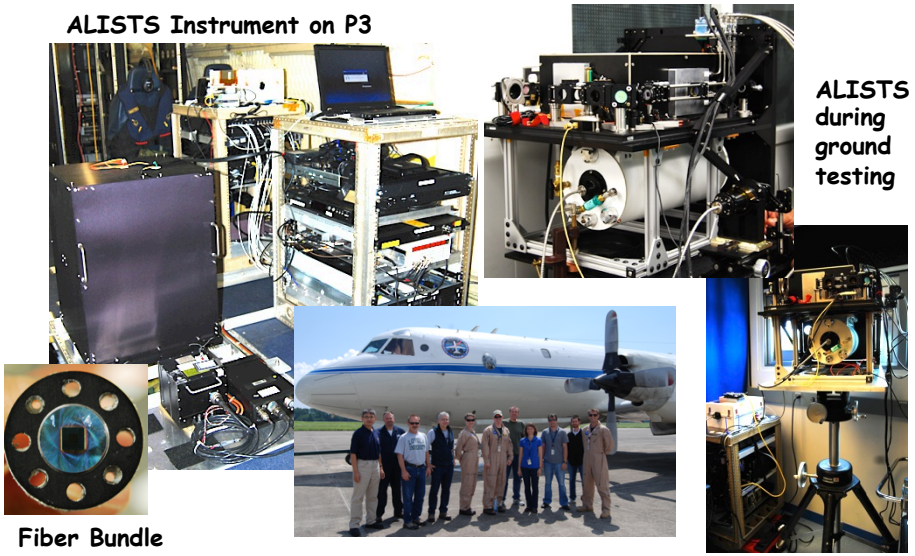
Objective

- Reduce technology risks of a swath mapping, space altimeter to enable 5-m spatial resolution topography and vegetation vertical structure, with decimeter vertical precision for the LIST mission
- Develop and demonstrate a >15% wall plug efficient laser system coupled with a highly sensitive detector array to realize global elevation mapping goals of the LIST mission
- Demonstrate accurate measurements on the ground and from an aircraft as a pathfinder and as a simulator for LIST
- Prototype a 16 channel, non-scanning, waveform capture swath mapping laser altimeter instrument.



Accomplishments

- Developed and demonstrated a highly efficient measurement approach that can meet the LIST mission requirements
- Advanced laser and detector technologies needed to achieve the performance requirements
- Designed, assembled, flight tested, and evaluated the Airborne LIST Simulator (ALISTS), a prototype swath mapping instrument
  - 4x4 laser array and 4x4 receiver array for a 16-channel LIST prototype;
  - Same spatial resolution (5-m spot diameter) as LIST;
- Demonstrated and validated measurements over a variety of surface types, including those of vegetation canopy and underlying topography using the master oscillator (MO) **(TRL_{out} =5)** of the laser transmitter with the ALISTS instrument.
- Integrated the master oscillator power amplifier (MOPA) **(TRL_{out}= 4)** laser with the ALISTS instrument and demonstrated higher power laser output with >15% wall plug efficiency in ground tests

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TRL_{in} = 3 **TRL_{out} = 5**