JPL Laser Remote Sensing Group

A Presentation to the Working Group on Space Based Lidar Winds,
Key West, FL Jan 2002
by Gary D. Spiers, David M. Tratt
Group Changes

- Group has moved from the Microwave and Lidar Technology Section to the Interferometry and Large Optics Section as part of a lab-wide reorganisation.
  - Leverage technology and knowledge of the section and apply it to lidar
- Ground Breaking for doubling of available lidar lab space is scheduled for this spring.
  - Will include two new domes for additional atmospheric access
Section 383 Major Projects

Space Interferometry Mission, Keck Observatory, Starlight, GALEX, LISA, TPF, NGST, Palomar Testbed Interferometer
MAM chamber located in SAF High-Bay.
8-ft inner diameter, 40 ft length.
Vibration isolated, thermally insulated.
Lidar Group Activities

- **Lidars under development**
  - Laser Absorption Spectrometer – IIP
  - LAMP Mars Landing and Rendezvous & Docking Lidar – Mars Program
  - Micro-Doppler Lidar – PIDDP

- **Technology/Knowledge Development**
  - 2 Micron diode laser sources - ATIP
  - ‘Intelligent Lidar’ - AIST
  - Hybrid Technology Evaluation – NPOESS
  - Line of Sight Velocity Bias – UCAR
  - CDDF
Laser Absorption Spectrometer

- PI is Bob Menzies.
- Co-Is Gary Spiers, David Tratt, Chris Webster (JPL)
- Mark Phillips (CTI), Graeme Stephens (Univ. Colorado),
- Develop and build a 2 micron coherent lidar capable of measuring atmospheric CO$_2$ concentrations at the ppm level. Fly a demonstration mission on the DC-8 in the final year. Assess scaling to space.
- 3 yr. program started Jan 1$^{st}$ 2002. Partners are CTI, University of Colorado, Caltech
Laser Absorption Spectrometer
LAMP

- A direct detection lidar for Mars landing/ hazard avoidance and sample rendezvous/ capture return.
- Project Manager is Bob Bunker, Project Engineer is Randy Bartman.
- Develop two breadboards and two engineering models for multiple mission use. First breadboard is undergoing testing.
- Lidar group involvement is with the optical design and performance analysis.

LAMP scan mirror assembly (courtesy of Alex Abramovici)
LAMP Optics

- Lidar group involvement is with the optical design and performance analysis.

Diamond turned primary and secondary mirrors with integral mounting structure

Analysis
Hybrid Doppler Lidar

- Funded by NPOESS
- A hybrid lidar design provided by GSFC/LaRC will be put through Team I sometime in February
- Goal is to assess:
  - Technology readiness level
  - Cost estimate to prepare technology for space
“Intelligent Lidar”

- AIST program, technology PI is Brad Hines, (software development) science PI is Gary Spiers.
- Goal of the program is to demonstrate infusion of interferometry real time software techniques into earth remote sensing –(Keck example has over 400 degrees of freedom)
- Lidar is one of two remote sensing technologies selected
  - demonstrate real time bandwidth limitation – application to LAS and Winds
  - demonstrate effective cloud hole identification
UCAR

- Databuy activity
- line of sight velocity errors
  - Provide independent validation of the ETL instrument model results
  - Specifically validate
- Close out Jan 03
DRDF
(Director’s Research Discretionary Fund)

- A number of small research and development tasks are under development.

Opportunities

- The group and the section has employment opportunities for lidar researchers, lidar engineers, optical designers and opto-electronic engineers.
- JPL actively encourages collaboration with other parties on both scientific and technology development activities.