Lidar Atmospheric Sensing Experiment (LASE) Langley DAAC Project/Campaign Document

Summary:

Vaporized water is an invisible gas that is present everywhere in the atmosphere. The distribution of atmospheric water vapor is of fundamental importance to weather and climate, atmospheric radiation studies, global hydrological cycle and atmospheric chemistry. The LASE program was initiated as an effort to produce an autonomous system for measuring water vapor levels from airborne and spaceborne platforms using LIDAR technology.

LASE is currently being reconfigured to fly on NASA DC-8 and P-3 aircraft, in addition to the ER-2. Proposals are underway for the instrument to participate in a number of major field programs managed by NASA's Office of Mission to Planet Earth. Information gathered by this instrument will become an integral part of many other atmospheric studies. As the first step towards the long range goal of developing a spaceborne LIDAR instrument, LASE is already doing important work for atmospheric research.

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1. Project/Campaign Overview:

Name of Project/Campaign:

Lidar Atmospheric Sensing Experiment (LASE)

Project/Campaign Introduction:

See Project/Campaign Overview.

Project/Campaign Mission Objectives:

The ability of a Differential Absorption Lidar (DIAL) system to measure vertical profiles of water vapor in the lower atmosphere has been demonstrated both in ground-based and airborne experiments. In these experiments, tunable lasers are used that require real-time experimenter control to locate and lock onto the atmospheric water vapor absorption line for the DIAL measurements. The Lidar Atmospheric Sensing Experiment (LASE) is the first step in a long-range effort to develop and demonstrate autonomous DIAL systems from airborne and spaceborne platforms. The LASE instrument was developed to measure water vapor, aerosol, and cloud profiles from a high altitude extended range U-2 (ER-2) aircraft.

The measurement of tropospheric water vapor profiles and column content with the LASE system can be used in various atmospheric investigations, including studies of air mass modification, latent heat flux, the water vapor component of the hydrological cycle, and atmospheric transport using water vapor as a tracer of atmospheric motions. The simultaneous measurement of aerosol and cloud distributions can provide important information on atmospheric structure and transport, and many meteorological parameters can also be inferred from these data. In addition, the impact of subvisible and visible aerosol/cloud layers on passive satellite measurements and radiation budgets can be assessed. The atmospheric science investigations that can be conducted with LASE are greatly enhanced because measurements of water vapor profiles and column content are made simultaneously with aerosol and cloud distributions.

Discipline(s):

Earth Science
Atmosphere

Geographic Region(s):

The project is involved in field campaigns whose locations vary.

Detailed Project/Campaign Description:

For more information on the LASE campaigns, see LASE Home Page.

2. Data Availability:

Data Type(s):

The data are produced in ASCII format.

Input/Output Media:

Data are available by FTP or on media.

Proprietary Status:

There is no proprietary status for the data sets currently on-line at the Langley DAAC.

3. Data Access:

Data Center Location:

Langley DAAC User and Data Services Office
NASA Langley Research Center
Mail Stop 157D
Hampton, Virginia 23681-2199
USA
Telephone: (757) 864-8656
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FAX: (757) 864-8807
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Associated Costs:

There is no cost associated with this data.

4. Principal Investigator Information:

Investigator(s) Name and Title:

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6. References:

1. Browell, E. V., and et al., First Lidar Measurements of Water Vapor and Aerosols from a High-Altitude Aircraft, OSA Optical Remote Sensing of the Atmosphere Technical Digest, Vol. 2, pp 212-214, (1995).

2. LASE Validation Experiment and Atmospheric Case Studies, Browell, E.V., S. Ismail, et al., 18th Int. Laser Radar Conf., pp32, Berlin, Germany, July 1966.

3. Browell, E.V., LASE Measurements of Tropospheric Water Vapor, Aerosols, and Cloud Distributions, OSA Optical Remote Sensing of the Atmosphere Technical Digest, Vol. 5, pp 2, (1997).

4. Moore, A. S., and et al., Development of the Lidar Atmospheric Sensing Experiment (LASE), an Advanced Airborne DIAL Instrument, Advances in Atmospheric Remote Sensing with Lidar, A. Ansmann and et al., Eds., Springer-Verlag, Berlin, pp 281-288, (1997).

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7. Ismail, S., and et al., LASE Measurements of Convective Boundary Layer Development during SGP97, Proceedings from the 19th International Laser Radar Conference (ILRC19), Annapolis, MD. (1998).

8. Ferrare, R. A., and et al., LASE Measurements of Aerosols and Water Vapor during TARFOX, Proceedings from the 19th International Laser Radar Conference (ILRC19), Annapolis, MD. (1998).

7. Glossary of Terms:

EOSDIS Glossary.

8. List of Acronyms:

EOSDIS Acronyms.

9. Document Information:

Document Creation Date:
August 1998
Document Revision Date:
December 1998
Document Review Date:
...
Document Project Reference:
...
Document ID:
...
Document Curator:
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Document URL:
http://eosweb.larc.nasa.gov/GUIDE/campaign_documents/lase_project.html

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Last Updated: Tue Jun 9 12:27:10 PDT 2009