

International Workshop on Spaceborne Lidar 1996
- Technology and Applications -



Organized by

National Space Development Agency of Japan

Earth Science & Technology Forum / Earth Science and Technology Organization

December 16 - 18, 1996

Hakone Hotel Kagetsuen

Hakone, Japan

Preface

The Second International Workshop on Spaceborne Lidar was convened during the period from December 16 to 18, 1996 at Kagetsuen Hotel in a scenic area of Hakone, Japan. The First Workshop was held at Nara in 1995 on the recommendations adopted at the NASDA-sponsored special session on Space Lidar at the occasion of the 17th International Laser Radar Conference in Sendai, 1994.

The primary purpose of the Hakone workshop was to encourage lively and useful discussions in this challenging area of spaceborne lidars, especially in their technologies and applications, for resolving the climate change problems by studying interaction between cloud, aerosols and radiation budgets and also to discuss the following issues in order to accelerate realization of future space borne lidar programs and to make them fruitful. The topics discussed include (1) possible sciences from space lidar (cloud/aerosol) mission, (2) synergism between active and passive remote sensors, (3) significance of scanning capability, (4) measures to treat multiple scattering effects, (5) technological issues in space lidar development, (6) eye safety consideration for space lidar missions, and (7) future international cooperation.

The total number of participants to the workshop was 44 including five eminent scientists who were invited from abroad. There were 29 oral presentations and 14 poster presentations, which discussed a variety of aspects in spaceborne lidar programs ranging from the achievements of actual spaceborne lidar experiments such as LITE, SLA and ALISSA, future programs of spaceborne lidar such as GLAS, MDS-lidar, ATMOS-B1, and ATLID, to scientific issues related to clouds, aerosol and radiation budgets. Special sessions were also organized on laser eye safety and multiple scattering problems, where participants from space agencies (NASDA, NASA, ESA) reported their consideration on these issues.

NASDA reported their current status and a long-term plan for earth observations using satellites. They also presented the MDS-lidar program (given a name of ELISE, Experimental Lidar In-Space Equipment, at this occasion), which caught everyone's eye because this will be the first satellite-borne lidar in space.

As was the case at the First Workshop in Nara, lidar researchers and engineers were able to sit together with the meteorologists in the fields of cloud/aerosol/radiation studies and to have common understanding with them as future data users, which was a big outcome of the workshop.

This proceedings was edited by putting together the contributions from the presenters at the workshop. We hope that this will be of great help to all scientists, engineers and program managers that are interested in spaceborne lidars.

As a final note, continuation of this workshop was recommended by all the participants to the wrap-up session on the third day and it was decided that possibilities to hold the next workshop in the US or in Europe would be investigated.

Great thanks should be extended to Mr. Natsuhiko Motomura, Mr. Yoshiyuki Otake, Ms. Keiko Kikuchi and Ms. Ayako Gotoh of Earth Science and Technology Organization (ESTO) for all their assistance in arranging the workshop and also editing this proceedings.

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Chairperson, Workshop Program Committee

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Program

December 16 (Mon.)

Chairman H. Koshiishi (NAL)

13:00 - 13:10 Opening Remarks
(Y. Sasano, NIES)

13:10 - 13:35 Project for Earth Environment Observation in NASDA
(T. Igarashi, NASDA/EOPD)

13:35 - 14:10 Contribution of a Space-borne Backscatter Lidar
to Earth Radiation Budget and Surface Flux Climatology
(J. Pelon, Service d'Aeronomie /CNRS)

14:10 - 14:45 LITE
(C. M. R. Platt, CSIRO)

14:45 - 15:05 Coffee Break

Chairman N. Tanioka (NASDA/TKSC)

15:05 - 15:40 SLA
(J. Spinhirne, NASA/GSFC)

15:40 - 16:15 NASA's Geoscience Laser Altimeter System Mission
(J. Spinhirne, NASA/GSFC)

16:15 - 16:40 Global Tropospheric Aerosols
(Y. Iwasaka, Nagoya University)

Chairman T. Kobayashi (FUKUI University)

16:40 - 16:55 Laser Safety and Accidental Laser Injuries to the Eye
(T. Nishisaka, JAIST)

16:55 - 17:10 Eye Safety for Space Borne Lidar
(J. Spinhirne, NASA/GSFC)

17:10 - 17:25 Eye-safety
(A. E. Marini, ESA/ESTEC)

17:25 - 17:40 Eye Safe
(N. Tanioka, NASDA/TKSC)

17:40 - 18:35 Free time

18:35 - 20:35 Welcome Party

December 17 (Tue.)

Chairman J. Spinhirne (NASA/GSFC)

8:30 - 9:05 Overview of NASDA MDS-LIDAR Program
(N. Tanioka, NASDA/TKSC)

9:05 - 9:45 Development of NASDA MDS-LIDAR
(T. Imai, NASDA/TKSC)

9:45 - 14:15 Lunch & Outdoor activities

Chairman O. Uchino (JMA)

14:15 - 14:30 ALISSA
(J. Pelon, Service d'Aeronomie /CNRS)

14:30 - 14:55 Roles of Clouds and Aerosols in Climate Change Processes
(T. Nakajima, University of Tokyo)

14:55 - 15:20 MDS-lidar scientific mission
(Y. Sasano, NIES)

15:20 - 15:35 Observation Strategy
(K. Shimizu, Science University of Tokyo)

15:35 - 16:00 Coffee Break

Chairman C. Nagasawa (Tokyo Metropolitan University)

16:00 - 16:15 Overview of Atmos-B1
(T. Takamura, Chiba University)

16:15 - 16:30 ATMOS B1 Lidar
(T. Itabe, CRL)

16:30 - 16:45 Cloud Profiling Radar for Cloud Radiation Study
(H. Kumagai, CRL)

16:45 - 17:10 Some Issues on Microwave Remote Sensing of Clouds
(H. Hayasaka, Tohoku University)

17:10 - 17:30 Spaceborne lidar technology developments
at the European Space Agency
(A. E. Marini, ESA/ESTEC)

17:30 - 19:00 Free time

Chairman N. Sugimoto (NIES)

19:00 - 20:30 Poster Party

December 18 (Wed.)

Chairman N. Takeuchi (Chiba University)

8:30 - 9:05 Space-borne Backscatter Lidar an operational tool
for weather forecast and climate Reserach
(W. Renger, DLR)

9:05 - 9:40 The Interactions of Clouds and Radiation
: Retrieval of optimum parameters from space lidar and radiometry
(C. M. R. Platt, CSIRO)

9:40 - 10:05 Cloud-Radiation Study in the JACCS/MRI Program
(S. Asano, MRI)

10:05 - 10:30 Coffee Break

Chairman J. Pelon (Service d'Aeronomie/CNRS)

- 10:30 - 10:40 Multiple Scattering from Cirrus Clouds
: A Fast Approach to Retrieve Optical Characteristics
of the Atmosphere from LIDAR Returns
(W. Renger, DLR)
- 10:40 - 10:50 Multiple Scattering Effects in Space LIDAR
(C. M. R. Platt, CSIRO)
- 10:50 - 11:00 Multiple Scattering Effects on Space Borne Lidar
(J. Spinhirne, NASA/GSFC)
- 11:00 - 11:10 On the Multiple Scattering Contribution
in Backscattered LIDAR Signals for Spaceborne Observations
(J. Pelon, Service d'Aeronomie /CNRS)
- 11:10 - 11:20 Monte Carlo Simulations for Spaceborne Lidar
(T. Kobayashi, Meteorological Research Institute)
- 11:20 - 11:30 Observation of Multiple Scattering effect in Clouds by a Dual FOV
Polarization and Raman Lidar from Ground
(T. Murayama, Tokyo University of Mercantile Marine)

Chairman K. Asai (Tohoku Institute of Technology)

- 11:30 - 12:15 Summary discussion
- 12:15 - 12:20 Concluding Remarks