
4th IAA International Conference on Low-Cost Planetary Missions

May 2-5, 2000
The Johns Hopkins University
Applied Physics Laboratory
Laurel, Maryland, USA



Discovery-3
Lunar Prospector

Session I: Program Summaries

- IAA-L-0101 ESA Approach to Low-Cost Planetary Missions**
G. Whitcomb -- ESA/ESTEC
- IAA-L-0102 Japanese Space Program**
K. T. Uesugi -- ISAS
- IAA-L-0103 NASA Programs**
C. Pilcher -- NASA

Session II: Current & Future Discovery Missions

- IAA-L-0201 The NEAR Mission**
R. Farquhar -- JHU APL
- IAA-L-0202 STARDUST: Implementing a New Manage-to-Budget Paradigm**
K. Atkins -- Jet Propulsion Laboratory;
B. Martin -- Martin Consulting Group, LLC;
J. Vellinga, R. Price -- Lockheed Martin Astronautics.
- IAA-L-0203 The NASA Discovery 5, Genesis Mission**
C. Sasaki -- Jet Propulsion Laboratory
- IAA-L-0204 The CONTOUR Mission -- Status of its Implementation**

M. Chiu—JHU APL

IAA-L-0205 Deep Impact -- The Scientific Requirements

M. A'Hearn -- University of Maryland;
 M. Belton -- National Optical Astronomy Observatory;
 A. Delamere -- Ball Aerospace and Technology Corp.;
 J. Graf, K. Klassen, B. Muirhead, D. Yeomans -- Jet Propulsion Laboratory;
 J. Kissel -- Max-Planck-Institut fuer Extraterrestrische Physik;
 L. McFadden -- University of Maryland; K. Meech -- University of Hawaii;
 H. Melosh -- University of Arizona; P. Schultz -- Brown University;
 J. Sunshine -- Science Applications International Corp.;
 J. Veverka -- Cornell University.

IAA-L-0206 MESSENGER: A Discovery Mission to Mercury

S. Solomon -- Carnegie Institute of Washington;
 R. McNutt -- JHU APL; and the MESSENGER Team

Session III: Missions to Small Bodies

IAA-L-0301 Small Body Mission Targets: 13 Objects in 12 Years

D. Yeomans -- Jet Propulsion Laboratory

IAA-L-0302 Deep Impact: Mission Design Approach for a New Discovery Mission

W. Blume -- Jet Propulsion Laboratory

IAA-L-0303 The Discovery Deep Impact Mission Flight Hardware

A. Delamere, D. Hampton, R. Reinert -- Ball Aerospace (others: Randy Rose)

IAA-L-0304 The CONTOUR Mission

E. Reynolds -- JHU APL

IAA-L-0305 Configuration and Tradeoffs of CONTOUR Optical Instruments

J. Warren, K. Strobehn, G. Heyler, S. Murchie, K. Peacock, D. Fort, J. Boldt, E. Darlington, J. I. D. Haley, R. Henshaw, C. Kardain, H. Krietz, D. Lohr, J. Maynard, D. Mehoke,
 B. Ogorzalek, T. Sholar, T. Spisz, C. Willey -- JHU APL

IAA-L-0306 The MUSES-C Mission for the Sample and Return -- Its Technology Development Status and Readiness

J. Kawaguchi, K. Uesugi, A. Fujiwara -- Institute of Space and Astronautical Science

IAA-L-0307 An Autonomous Navigation and Guidance System for MUSES-C Asteroid Landing

T. Kubota, T. Hashimoto, S. Sawai, J. Kawaguchi, K. Ninomiya -- Institute of Space and Astronautical Science;
 M. Uo, K. Baba -- NEC Aerospace System Ltd.

IAA-L-0308 NASA Participation in the ISAS MUSES C Asteroid Sample Return Mission

R. Jones, B. Wilcox -- Jet Propulsion Laboratory

IAA-L-0309 Main Belt Asteroid Reconnaissance and Sample Return Using Solar Electric Propulsion

A. Wolf -- Jet Propulsion Laboratory, California Institution of Technology

Posters -- Session III:

IAA-L-0301P On the Comet Rendezvous Exploration and its Potential Extension via Solar Electric Propulsion
 J. Kawaguchi -- Institute of Space and Astronautical Science

IAA-L-0302P Update on SpaceDev's Commercial Near-Earth Asteroid Prospector (NEAP) Mission
 J. King, T. Yee, R. Ridenoure -- SpaceDev, Inc.

IAA-L-0303P Comet Nucleus Sample Return -- A Status Report on JPL's New Advanced Study

0303P J. Green, D. Sabahi, G. Davis, J. Goguen, and the CNSR Team -- Jet Propulsion Laboratory

Session IV: Lunar and Inner Planets Missions - Part 1

IAA-L-0401 Progress of LUNAR-A

T. Nakajma, H. Mizutani, A. Fujimura, H. Saitoh, K. Higuchi -- Institute of Space and Astronautical Science;

S. Morita -- Nissan Motor Co.;

J. Takahashi -- NEC Corporation;

D. Keese, R. Lundgren -- Sandia National Laboratories;

K. Harvey -- EMRTC, New Mexico Tech.

IAA-L-0402 A Conceptual Design for MESSENGER, a Mission to Orbit Mercury

A. Santo, R. McNutt, R. Gold, C. Ercol, J. Jenkins -- JHU APL;

S. Solomon -- Carnegie Institution of Washington

IAA-L-0403 The Moon and Inner Planets -- Getting There for Low Cost

A. Phipps, A. de Silva Curiel, L. Gomes, J. Ward -- Surrey Space Centre, University of Surrey

IAA-L-0404 VEVA Discovery Mission to Venus: Exploration of Volcanoes and Atmosphere

K. Klaasen -- Jet Propulsion Laboratory;

R. Greeley -- Arizona State University

Session IV: Lunar and Inner Planets Missions - Part 2

IAA-L- 0405 Venus Stratospheric Sounder: First In Situ Measurements in Upper Cloud Region

V. Kerzhanovich, D. Crisp, R. Preston -- Jet Propulsion Laboratory;

L. Esposito -- University of Colorado;

A. Ingersoll -- California Institute of Technology;

R. Young -- NASA Ames Research Center;

J. Blamont -- Centre National d'Etudes Spatiales;

V. Linkin -- Space Research Institute

IAA-L- 0406 Venus Sample Return Missions -- a Range of Science, a Range of Costs

T. Sweetser, C. Peterson, E. Nilsen, R. Gershman -- Jet Propulsion Laboratory

IAA-L- 0407 Return to the Moon: The Great Basin Lunar Sample Return Mission

C. Peterson -- Jet Propulsion Laboratory

IAA-L- 0408 Transfers to Earth Centered Orbits via Lunar Gravity Assist

C. Ocampo -- Hughes Space and Communications Company

Posters -- Session IV:

IAA-L- 0401P Lugh/Mercury Express: A Proposed ESA Multiplatform Flexi-Mission to Mercury

S. Curtis -- NASA Goddard Space Flight Center

(others: S. McKenna-Lawlor, P. Clark, B. Giles, D. Winterhalter, G. Marr)

Session V: Mars Missions - Part 1

IAA-L- Mars Exploration Roadmap**0501** D. McCleese -- Jet Propulsion Laboratory**IAA-L- Synthesis of an Alternative Flight Trajectory for Mars Explorer NOZOMI****0502** J. Kawaguchi, I. Nakatani, K. Uesugi, K. Tsuruda -- Institute of Space and Astronautical Science**IAA-L- Mars Express Overview****0503** R. Schmidt -- European Space Agency**IAA-L- Mars Express: ESA and European Industry on the Way to Top Class Affordable Science****0504 Missions**

F. Faye, V. Poinignon, M. Pendaries, P. Moulinier -- Matra Marconi Space

Session V: Mars Missions - Part 2**IAA-L- Aladdin Mission Concept****0506** J. Mueller, Y. Guo, P. Sharer, U. von Mehlem, A. Cheng -- JHU APL**IAA-L- Scientific Objectives of the Beagle 2 Lander****0507** I. Wright, M. Sims, C. Pillinger -- Planetary Sciences Research Institute, Open University**IAA-L- The Mars Microprobes: Did They Achieve Mission Success?****0508** K. Lewis -- Jet Propulsion Laboratory**IAA-L- Mars Network for Enabling Low-Cost Missions****0509** R. Hastrup, D. Bell, R. Cesarone, C. Edwards, T. Ely, J. Guinn, S. Rosell, J. Srinivasan, S. Townes -- Jet Propulsion Laboratory**IAA-L- Mars GCMS/Drill Montgolfiere Micromission Payload Configuration****0510** J. Rivera, J. Jones -- Jet Propulsion Laboratory;
P. Mahaffy -- NASA Goddard Space Flight Center;
S. Gorevan -- Honeybee Robotics, Ltd.**Posters -- Session IV:****IAA-L- An Efficient Rotocraft for Mars Surface Exploration****0501P** G. Savu -- National Institute of Turbomachinery -- COMOTI**IAA-L- Mars Magnetometer Balloon Mission****0503P** C. Raymond, V. Kerzhanovich, K. Leschly, J. Cutts -- Jet Propulsion Laboratory;
C. Russell -- University of California, Los Angeles;
J. Blamont -- Centre National d'Etudes Spatiales**IAA-L- Direct Mars Sample Return Mission: MiniMAV Approach****0504P** V. Kerzhanovich and B. Wilcox -- Jet Propulsion Laboratory**IAA-L- Beagle 2 Martian Lander: The Integrated Lander****0505P** J. Clemmet -- Matra Marconi Space**IAA-L- Beagle 2: Overview of the Entry, Descent & Landing System****0506P** J. Underwood -- Martin-Baker Aircraft**IAA-L- Beagle 2 Thermal Architecture****0507P** S. Peskett -- Rutherford Appleton Laboratory**IAA-L- Beagle 2: Lander Combined Electronics****0508P** C. Berry -- Matra Marconi Space

Session VI: Outer Planets Missions - Part 1

IAA-L- A Solar Powered Spacecraft for the Inside Jupiter Mission

0601 J. Jonaitis, J. Kubitschek, J. Howard, H. Reitsema -- Ball Aerospace & Technologies Corp.;
E. Smith, D. Lisman, T. Spiker, G. Garner -- Jet Propulsion Laboratory

IAA-L- VOLCAN: A Mission to Explore Jupiter's Volcanic Moon Io

0602 J. Esper, T. Martinez -- Swales Aerospace;
P. Panetta, P. Coronado, M. Concha, S. Scott -- NASA Goddard Space Flight Center;
J. Soldner -- SAIC

IAA-L- Europa Lander Concepts

0603 R. Gershman -- Jet Propulsion Laboratory

IAA-L- Saturn Ring Observer

0604 T. Spilker -- Jet Propulsion Laboratory

Session VI: Outer Planets Missions - Part 2

IAA-L-0606 Titan Aerobot Mission Concepts

A. Bachelder, J. Hall, J. Jones, V. Kerzhanovich, A. Yavrouian -- Jet Propulsion Laboratory

IAA-L-0607 Neptune Orbiter Concepts

R. Wallace and R. Gershman -- Jet Propulsion Laboratory

IAA-L-0608 Low-Cost Interstellar Probe

R. McNutt -- JHU APL

Posters -- Session VI:

IAA-L-0601P Concepts for a Titan Organics Explorer

R. Gershman -- Jet Propulsion Laboratory

IAA-L-0602P Post-Game at Europa: Possible Low Cost Modification to the Proposed Europa Orbiter Mission

B.J. Mitchell -- PhD candidate, The Johns Hopkins University

IAA-L-0603P Overcoming Genesis Mission Design Challenges

K. Williams -- Jet Propulsion Laboratory

Session VII: Delivery Systems

IAA-L-0701 Launch Vehicles for Low-Cost Planetary Missions

J. Palsulich, B. Schinnerer -- The Boeing Company

IAA-L-0702 Starsem: the Launch Provider for the Mars Express Mission

J-Y. Le Gall -- Starsem

IAA-L-0703 The ROCKOT Launch System – the Commercial Solution for Low-Cost Planetary Missions

P. Freeborn, M. Kinnersley, Y. Viertel -- EUROCKOT Launch Services GmbH

IAA-L-0704 Piggybacking to Planets with Planetary Balloons

J. Blamont -- Centre National d'Etudes Spatiales

IAA-L-0705 Advanced Ion Propulsion Systems for Affordable Deep-Space Missions

J. Brophy, J. Weiss, J. Polk, C. Garner -- Jet Propulsion Laboratory

IAA-L-0706 Low-Cost Mission Opportunities Using a Solar Sail in Addition to ARIANE V

J-Y. Prado -- Centre National d'Etudes Spatiales

IAA-L-0707 Solar Sail Technology Development and Demonstration

M. Leipold, M. Benda, L. Herbeck, G. Pagel, W. Seboldt, C. Sickinger -- German Aerospace Center; M. Eiden, D. Kassing, H. Rozemeijer -- European Space Agency; C. Garner -- Jet Propulsion Laboratory; T. Kruger, C. Schoppinger, W. Unckenbold -- INVENT GmbH

IAA-L-0708 Perspective Transport Systems Based on "Proton-M" Launch Vehicle

A. Nedaivoda -- Krunichev SRPSC

Posters -- Session VII:**IAA-L-0701P Launch Strategy for Mars Network Spacecraft Carried on the Ariane ASAP**

P. Penzo -- Jet Propulsion Laboratory

IAA-L-0702P Low-Cost Deployment of Planetary Spacecraft

K. Epstein -- Ball Aerospace & Technologies Corporation; S. Wiens, Space Operations International LLC

IAA-L-0703P LK-1/LK-2 Launchers for Low Cost Planetary Mission

C. Oiknine -- LEOLINK JVC

IAA-L-0704P Lunar and Planetary Missions Using ROCKOT Launch Vehicle

A. Medvedev, V. Khatulev, V. Yuriev, V. Petukhov -- Khrunichev Space Center; A. Zakharov -- Space Research Institute

IAA-L-0705P The Launch Configurations Based on Former Soviet ICBM as Delivery Systems for Low-Cost Mission Beyond Low Earth Orbits

K. Karavasilis, L. Mukhin, R. Sagdeev -- University of Maryland; A. Medvedev, V. Khatulev, V. Yuriev -- Khurnichev Space Center; V. Dolgopopov, K. Pichkhadze -- Lavochkin Association; G. Avanesov, V. Balebanov, A. Zakharov -- Space Research Institute

Session VIII: Missions Operations**IAA-L-0801 Trends in Cost-Effective Mission Operations**

J. van der Ha -- Consultant

IAA-L-0802 Applying Successful Operations Approaches Developed for NEAR and Refining for CONTOUR Mission Implementation

M. Holdridge -- JHU APL

IAA-L-0803 Utilizing Rosetta Commonality to Reduce Mission Operations Cost for Mars Express

P. Ferri, M. Denis -- European Space Agency

IAA-L-0804 Mission Operations Strategies

C. Culver -- NASA Ames Research Center

IAA-L-0806 DataLynx: A Commercial TT&C and Mission Operations Service for Low-Cost Planetary Missions

T. Sorenson -- Honeywell Technology Solutions, Inc.

Session IX: Management and Cost

- IAA-L-0901 Predicting Mission Success in Small Satellite Missions**
M. Saunders -- NASA Langley Research Center
- IAA-L-0902 Assessing the Effectiveness of Low Cost Planetary Missions**
T. Mosher, R. Bitten, N. Lao -- The Aerospace Corporation
(others: E. Mahr, R. Musani)
- IAA-L-0903 The Effectiveness of Low-Cost Approaches to Satellite Design, Manufacture, and Operations: A Scorecard**, L. Sarsfield -- The RAND Corporation
- IAA-L-0904 A Complexity-Based Risk Assessment of Low-Cost Planetary Missions: When is Mission Too Fast and Too Cheap?**
D. Bearden -- The Aerospace Corporation
-

Posters -- Session IX:

- IAA-L-0901P Commercial Deep-Space Missions: Here to Stay**
J. Benson, R. Ridenoure -- SpaceDev, Inc.
- IAA-L-0902P A Global Survey of Commercial and Non-Governmental Deep-Space Missions**
R. Ridenoure -- SpaceDev, Inc.
-

Session X: Sensors & Instrumentation

- IAA-L-1001 Light Weight Sensors for the Autonomous Asteroid Landing of MUSES-C Mission**
T. Hashimoto, T. Kubota, T. Mizuno -- Institute of Space and Astronautical Science
- IAA-L-1002 Miniaturized Optics for the Imaging System of Europa Orbiter**
H. Hirsch, I. Walter, G. Arnold -- German Aerospace Center
- IAA-L-1003 A Low Power Compact Mass Spectrometer for Planetary and Comet Missions**
B. Kent, N. Waltham -- Rutherford Appleton Laboratory;
A. Morse -- The Open University;
E. Huq -- Central Microstructures Facility, Rutherford Appleton Laboratory;
H. Lauche -- Max Planck Institut fur Aeronomie
- IAA-L-1004 AIMS: Acousto-Optic Imaging Spectrometer for Spectral Mapping of Solid Surfaces**
D. Glenar, J. Hillman -- NASA Goddard Space Flight Center;
D. Blaney -- Jet Propulsion Laboratory
- IAA-L-1006 Faraday Ring Ammeter for Measurements of Ambient Ionospheric Currents**
K. Brown, R. Bartman, L. Dorsky, R. Goldstein -- Jet Propulsion Laboratory;
K. Lynch, R. Torbert -- University of New Hampshire
- IAA-L-1008 Miniature Time-of-Flight Mass Spectrometers for In Situ Composition Studies**
W. Brinckerhoff, T. Cornish, R. McEntire, A. Cheng, R. Benson -- JHU APL
- IAA-L-1009 Mars Neutron Energy Spectrometer (MANES): An Instrument for the Mars 2003 Lander**
R. Maurer, J. Kinnison, D. Roth, J. Goldsten, R. Fainchtein -- JHU APL
- IAA-L-1010 Advanced System on a Chip Microelectronics for Spacecraft and Science Instruments**
N. Paschalidis -- JHU APL
- IAA-L-1011 Micromachined Polysilicon Resonating Xylophone Bar Magnetometer**
D. Wickenden, J. Champion, R. Osiander, R. Givens, J. Lamb, J. Miragliotta,

D. Oursler, T. Kistenmacher -- JHU APL

IAA-L-1012 The CONTOUR Remote Imager and Spectrograph

D. Fort -- JHU APL

(others: J. Boldt, H. Darlington, J. Hayes, D. Lohr, K. Peacock, K. Strohbahn, J. Warren)

IAA-L-1013 Post-flight Characterization of the NEAR Laser Rangefinder

T. Cole and A. Cheng -- JHU APL

IAA-L-1014 Neutron Activation Instrument for Rovers and Landers (NAIRAL), a new Planetary Composition Instrument

R. Fainchtein, R. Gold, J. Goldstein, G. Holland -- JHU APL

IAA-L-1015 Compact Energetic Particle Detector for Low Cost Planetary Missions

B. Andrews, R. Gold, E. Keath, D. Mitchell, R. McEntire, R. McNutt,

N. Paschalidis -- JHU APL

Posters -- Session X:

IAA-L-1001P Ultra Lightweight Optical Technology for Small Space Missions

P. Chen, R. Romeo -- Composite Mirror Applications, Inc.

IAA-L-1002P Using a Resonating Xylophone Bar Magnetometer for the Heterodyne Detection of AC Magnetic Fields

R. Givens, D. Wickenden, D. Oursler, R. Osiander, J. Champion,

T. Kistenmacher -- JHU APL

IAA-L-1003P The TRIO Smart Sensor Chip Project for NASA's X2000 Program

N. Paschalidis, C. Schlemm, B. Tossman, S. Jaskulek, K. Strohbahn, K. Cooper,

J. Kinnison, J. Lehtonen, H. Feldmesser -- JHU APL;

H. Horiuchi, D. Boyd, E. Holmberg, C. Steiner, A. Dorna, N. Palmer,

C. Timoc -- Jet Propulsion Laboratory;

G. Kottaras, B. Paschalidis, N. Stamatopoulos, C. Karadamoglou.

E. Sarris -- Demokritos University of Thrace -- JHU APL

IAA-L-1004P The APL Time-of-Flight System-on-a-Chip Project for Space

N. Paschalidis, R. McNutt, D. McEntire, E. Keath, B. Andrews, S. Jaskulek -- JHU APL;

N. Stamatopoulos, C. Karadamoglou, G. Kottaras, B. Paschalidis, E. Sarris -- Demokritos University of Thrace -- JHU APL

Session XI: Space Technology - Part 1

IAA-L-1101 Autonomous Action Selection for Single and Clustered Micro-spacecraft

G. Radice, E. Gillies, C. McInnes -- University of Glasgow

IAA-L-1102 Digital Reaction Wheel Assembly RSI 01-5 for Small and Low-cost Spacecraft

A. Landes, S. Boettcher-Arff -- Teldix GmbH

IAA-L-1103 Telescience by Micro Manipulator in Rover Exploration Mission

Y. Kunii -- Chuo University;

Y. Kuroda -- Meiji University;

T. Kubota -- Institute of Space and Astronautical Science

IAA-L-1104 Micro Hopping Robot for Asteroid Exploration

T. Yoshimitsu, T. Kubota, I. Nakatani -- Institute of Space and Astronautical Science;

T. Adachi, H. Saito -- Nissan Corporation

IAA-L-1105

Small, Light-weight Rover "Micro5" for Lunar Exploration

T. Kubota, I. Nakatani -- Institute of Space and Astronautical Science;

Y. Kuroda -- Meiji University;

Y. Kunii -- Chuo University

IAA-L-1106 A Serpentine Robot for Planetary and Asteroid Surface Exploration

G. Haith -- NASA Ames Research Center

IAA-L-1107 Space Technology Three: Mission Overview and Spacecraft Concept Description

W. Deininger, C. Noecker, J. Eterno -- Ball Aerospace & Technologies Corp.;

C. Cleven, G. Blackwood, L. Livesay -- Jet Propulsion Laboratory

Session XI: Space Technology - Part 2

IAA-L-1108 Advances in Deep Space Telecommunications Technology at the Applied Physics Laboratory

R. Bokulic, M. Reinhart, C. Willey, R. Stilwell, J. Penn, J. Norton, S. Cheng,

D. DeCicco, R. Schulze -- JHU APL

IAA-L-1109 Withdrawn

IAA-L-1110 Multimission Space and Solar Physics Microspacecraft

D. Collins -- Jet Propulsion Laboratory

IAA-L-1111 Using Autonomous Navigation for Interplanetary Missions: The Validation of Deep Space 1 A

J. Riedel, S. Bhaskaran, D. Han, B. Kennedy, S. Synnott, T-C. Wang,

R. Werner -- Jet Propulsion Laboratory

IAA-L-1112 A Review of Ballute Technology for Planetary Aerocapture

J. Hall -- Jet Propulsion Laboratory

IAA-L-1113 Scarlet Concentrating Solar Array

C. Minning -- Jet Propulsion Laboratory

Posters -- Session XI:

IAA-L-1101P Rover Simulation in Virtual Reality

A. Sweet -- NASA Ames Research Center

IAA-L-1102P Technology Needs of the Next Generation of Planetary Missions

R. Gershman -- Jet Propulsion Laboratory

IAA-L-1103P Biomorphic Explorers & Biomorphic Missions

S. Thakoor -- Jet Propulsion Laboratory

IAA-L-1104P Micro-DSAD for Micro-Satellites

K. Strohheln, S. Jaskulek, M. Martin -- JHU APL

IAA-L-1105P Autonomous Science Driven Missions for Planetary Aerobots

J. Cameron -- Jet Propulsion Laboratory

IAA-L-1106P Inspiration for Future Autonomous Space Systems

R. Doyle -- Jet Propulsion Laboratory

IAA-L-1107P Field Programmable Mixed Signal Arrays for Space Applications

K. Strohheln, R. Edwards, S. Jaskulek, R. Katz -- JHU APL

IAA-L-1109P Strategies for Reducing the Cost of Custom ICs in Space Missions

S. Jaskulek, K. Strohheln, R. Edwards, H. Voss -- JHU APL

IAA-L-1114P Gas Analysis Package on the Beagle 2 Lander

I. Wright, G. Morgan, A. Morse, I. Praine, D. Leigh, C. Pillinger -- Open University

Posters -- Session XII:

- IAA-L-1203P Web-Based Software Simulations: Training Tools with a Diagnostic Flavor**
C. Scott -- Jet Propulsion Laboratory
- IAA-L-1204P Remote Access Multi-mission Processing and Analysis Ground Environment (RAMPAGE)**
Y. Lee, T. Specht, G. Chin -- Jet Propulsion Laboratory
- IAA-L-1205P A New Compression Algorithm for Spectral and Time-Series Data**
S. Hawkins, E. Darlington, A. Cheng, J. Hayes -- JHU APL
- IAA-L-1206P Attitude Determination and Control System Design of the ITU-UUBF LEO1 Satellite**
Ch. Hajiyev, M. Bahar, Y. Tulunay, R. Aslan -- Istanbul Technical University
- IAA-L-1207P SHIELD -- A Comprehensive Earth Protection System**
R. Gold, K. Heffernan, G. Rogers, O. Barnouin-Jha, N. Izenberg,
D. Dunham, D. Haggerty, R. McNutt, A. Santo -- JHU APL
- IAA-L-1208P Escape and Insertion Trajectories Optimization for SMART-1 Low-thrust Earth Moon Rendezvous**
S. Geffroy, J. Fourcade -- Centre National d'Etudes Spatiales;
R. Jehn -- European Space Agency
- IAA-L-1209P Leveraging the Educational Outreach Efforts of Low-cost Missions**
D. Fisher, N. Leon -- Jet Propulsion Laboratory
- IAA-L-1210P Conceptual Model of Nano-Satellite Design & Manufacturing for Cost Reduction at Large-Quantity Production**
G. Chen -- Morgan State University;
J. Oberright -- NASA Goddard Space Flight Center
- IAA-L-1211P Planetary Balloon Related R&D in the NASA Balloon Program**
S. Raqué, D. Fairbrother, I.S. Smith -- NASA Wallops Flight Facility
- IAA-L-1212P Low Cost Access to Mars -- Mars Micromissions Spacecraft**
W. Deininger, K. Epstein, J. Eterno, L. Andreozzi -- Ball Aerospace & Technologies Corp.;
S. Sieger -- Aerojet;
K. Leschly -- Jet Propulsion Laboratory
- IAA-L-1213P JPL's Extraterrestrial Materials Simulation Laboratory**
J. Green, L. Bruesch, T. Arakelian, B. Nazari -- Jet Propulsion Laboratory
-