

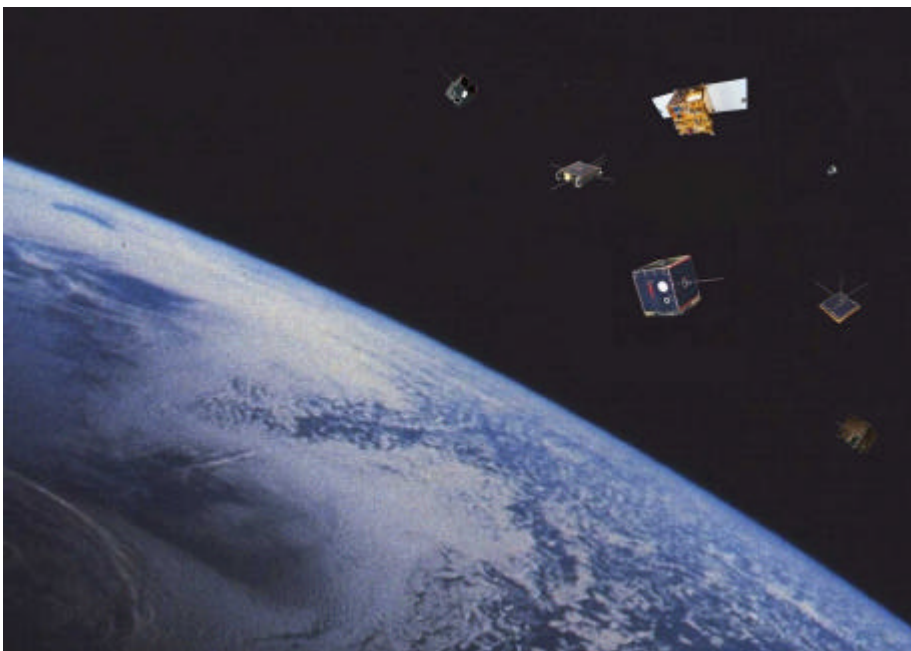
4th IAA SYMPOSIUM

ON SMALL SATELLITES

FOR EARTH OBSERVATION

Final Program

APRIL 7 - 11, 2003



Composition photo: DLR



DLR

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AEROSPACE
CENTER**

**INSTITUTE OF
SPACE SENSOR
TECHNOLOGY
AND PLANETARY
EXPLORATION**

BERLIN, GERMANY

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International Academy of Astronautics (IAA)



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This Symposium was made possible by the support and cooperation of our co-sponsors and our host organization

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Sincere appreciation is extended to the following corporate contributors for their generous support:

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Message of Greeting

from the Governing Mayor of Berlin, Klaus Wowereit, for the
4th Symposium on Small Satellites for Earth Observation of the
International Academy of Astronautics (IAA)
in Berlin, April 7 – 11, 2003



Klaus Wowereit

Berlin would like to extend a very warm welcome to the delegates attending this 4th Symposium. Having outstanding scientists and engineers from all over the world meet here for this forum on aerospace issues underscores our reputation as a city of knowledge. I would like to thank the International Academy of Astronautics for choosing Berlin as the venue for this conference for the fourth time.

Berlin can point to a wide variety of experience in the area of aeronautics and earth observation. This includes not only the previous conferences, which were attended by 800 delegates from more than 30 countries, but also the superb results achieved by scientists from Berlin working in the area of small satellites, which are also to be presented at this symposium. The German Aerospace Center (DLR) will be presenting the small satellite BIRD, among other things, which has been observing large fires and volcano eruptions all over the world since October 2001.

I hope that the delegates will also take the opportunity to explore Berlin, which, in addition to being a city of knowledge, has much more to offer. Here you will find not only some of the most famous museums in the world, great theaters, and opera houses, but a multitude of other attractions as well. Right now Berlin is one of the world's most exciting cities, a capital city in the heart of Europe, and a metropolis on the move.

I wish you a very pleasant stay in Berlin and a productive and stimulating symposium.

A handwritten signature in black ink, which appears to read "Klaus Wowereit". The signature is written in a cursive style with a large initial 'K'.

AGENDA

Sunday, April 6, 2003

- 16.00-20.00 Registration, Hilton Hotel
19.00-20.00 Get-Together

Monday, April 7, 2003

- 08.00-09.30 Registration, Hilton Hotel
09.30-09.50 **Welcome:** R. Sandau, Symposium
Chairman
P. Pasternack, Senate
of Berlin
J.-M. Contant, IAA
Secretary General
A. Bachem, DLR
09.50-10.45 **Keynote Address:** G. Haerendel,
Intern. Univ. Bremen,
Germany
10.45-11.15 BREAK, PRESS CONFERENCE
11.15-12.30 **Session 01:**
PROGRAMMATICS
Chair: J.-M. Contant, IAA
Rapporteur: H.-P. Röser, Univ.
of Stuttgart, Germany
12.30-13.30 LUNCH
13.30-15.00 **Session 02:**
EARTH OBSERVATION MISSIONS
Chair: A. Ginati, ESA
Rapporteur: K. Thyagarajan, ISRO,
India
15.00-15.20 BREAK
15.20-16.40 **Session 03:**
RESULTS AND LESSONS LEARNED
Chair: R. Sandau, IAA
Rapporteur: L. Paxton
JHU/APL, USA
16.40-17.40 **Panel 1:**
**LAUNCH OPPORTUNITIES FOR
SMALL SATELLITES**
Chair: J.-M. Contant, IAA

Tuesday, April 8, 2003

- 09.00-10.30 **Session 04:**
EARTH EXPLORER MISSIONS
Chair: E.-A. Herland, ESA/ESTEC
Rapporteur: L. Alkalai,
NASA/JPL, USA

Tuesday, April 8, 2003 (cont'd.)

- 10.30-10.50 BREAK
10.50-12.10 **Session 05:**
EDUCATIONAL PROGRAMS
Chair: T. Hayashi, CHIBA, Japan
Rapporteur: J. Esper,
NASA/GSFC, USA
12.10-13.30 LUNCH
13.30-15.00 **Session 06: (Special)**
STUDENT CONFERENCE
Chair: L. Paxton,
JHU/APL, USA
Rapporteur: H. Jahn, DLR,
Germany
15.00-15.20 BREAK
15.20-16.40 **Session: 07**
**TECHNOLOGIES AND
INSTRUMENTS**
Chair: L. Alkalai,
NASA/JPL, USA
Rapporteur: E.-A. Herland,
ESA/ESTEC
16.40-17.40 **Panel 2:**
**FUTURE NASA SPACE
TECHNOLOGIES FOR SMALL
SATELLITE MISSIONS**
Chair: L. Alkalai,
NASA/JPL, USA

Wednesday, April 9, 2003

- 09.00-10.30 **Session 08:**
TECHNOLOGY DEMONSTRATION
Chair: H. Jahn, DLR, Germany
Rapporteur: St. Neeck,
NASA/GSFC, USA
10.30-10.50 BREAK
10.50-12.10 **Session 09:**
SPACECRAFT SUBSYSTEMS
Chair: U. Renner, TU Berlin,
Germany
Rapporteur: M. Ovchinnikov,
RAS, Russia

- 12.10-13.30 LUNCH

AGENDA (cont'd.)

Wednesday, April 9, 2003 (cont'd.)

- 13.30-15.00 **Session 10: (Special)**
NASA EARTH SCIENCE SMALL
SATELLITE MISSIONS AND
TECHNOLOGIES
Chair: St. Neeck,
NASA/GSFC, USA
Rapporteur: R. Sandau, IAA
- 15.00-15.20 BREAK
- 15.20-16.40 **Session 11:**
CONSTELLATIONS AND
PLATFORMS
Chair: K. Thyagarajan, ISRO
India
Rapporteur: K. Briess, DLR,
Germany
- 16.40-17.40 **Session:**
POSTER

Thursday, April 10, 2003

- 09.00-10.30 **Session 12:**
ATTITUDE CONTROL
SYSTEMS
Chair: M. Ovchinnikov,
RAS, Russia
Rapporteur: K. Lundal, SSC,
Sweden
- 10.30-10.50 BREAK
- 10.50-12.10 **Session 13:**
SPECIAL ASPECTS OF SMALL
SATELLITE MISSIONS
Chair: H.-P. Röser, Univ. of
Stuttgart, Germany
Rapporteur: J. L. Joergensen,
DTU, Denmark
- 12.10-13.30 LUNCH
- 13.30-15.00 **Session 14: (Special)**
COST EFFECTIVE EARTH
OBSERVATION MISSIONS
Chairs: J. Esper,
NASA/GSFC, USA
R. Sandau, IAA
Rapporteur: U. Renner,
TU Berlin, Germany
- 15.00-15.20 BREAK

Thursday, April 10, 2003 (cont'd.)

- 15.20-16.40 **Session 15:**
LAUNCH SYSTEMS AND GROUND
SEGMENT
Chair: K. Briess, DLR, Germany
Rapporteur: M. Ovchinnikov,
RAS, Russia
- 16.40-17.40 **SYMPOSIUM SUMMARY**
Chair: H.-P. Röser, Univ. of
Stuttgart, Germany
Chief Rapporteur: G. Fountain,
JHU/APL, USA

AWARDS

Friday, April 11, 2003

09.00-12.00 **Visit to:**

WISTA, Science and Technology Center

Berlin-Adlershof

Bus Shuttle Departure from the Berlin Hilton
Hotel at 09.00,
Approximate Return at 13.00

Monday, April 7, 2003, 11.15-12.30

SESSION 01 - PROGRAMMATICS

Chair: J.-M. Contant – IAA

Rapporteur: H.-P. Röser – Univ. of Stuttgart, Germany

The ESA Living Planet, Future Programme

Ginati, A.; Tobias, A. – ESA/ESTEC

IAA-B4-0101

From Observations to Decision Support: The New Paradigm for Satellite Data

McCuistion, J.D.; Birk, R. – NASA/HQ, USA

IAA-B4-0102

Possible Scenario for Future Mission in Earth Observation

Hernandez, D. – CNES, France

IAA-B4-0103

Monday, April 7, 2003, 13.30-15.00

SESSION 02 - EARTH OBSERVATION MISSIONS

Chair: A. Ginati – ESA

Rapporteur: K. Thyagarajan – ISRO, India

The Earth Observation Program at OHB-System

Penne, B.; Tobehn, C.; Kassebohm, M.; Lübberstedt, H. – OHB, Germany

IAA-B4-0201

Low/Medium Density Biomass, Coastal and Ocean Carbon:

A Carbon Cycle Mission

Esper, J.; Gervin, J.; Kirchmann, F.; Middleton, B.; Knox, R.; Gregg, W.; Mannino, A.; McClain, Ch.; Herman, J.; Hall, F. – NASA/GSFC, USA

IAA-B4-0202

MAPSAR: A Small L-band SAR Mission for Land Observation

Schröder, R.; Puls, J.; Hajnsek, I.; Jochim, F.; Neff, Th. – DLR, Germany, Kono, J.; Paradella, W. R.; Quintino da Silva, M. M.; de Morisson Valeriano, D.; Farias Costa, M. P. – INPE, Brazil

IAA-B4-0203

New Small Satellite Mission for Carlo Gavazzi Space

Morea, G.D.; Sabatini, P. – CARLO GAVAZZI SPACE, Italy

IAA-B4-0204

Monday, April 7, 2003, 15.20-16.40

SESSION 03 - RESULTS AND LESSONS LEARNED

Chair: R. Sandau – IAA

Rapporteur: L. Paxton – JHU/APJ, USA

JASON 1: Lessons Learned from the Development and 1 Year in Orbit

Lafon, Th. – CNES, France

IAA-B4-0301

Noncoherent Doppler Tracking: First Flight Test Results

DeBoy, C.C.; Jensen, J.R.; Asher, M.S. – JHU/APL, USA

IAA-B4-0302

PROBA: An ESA Technology Demonstration Mission with Earth Imaging Payload. First Year of In Orbit Results

Teston, F. – ESA-ESTEC; Barnsley, M. – UNIV. of WALES SWANSEA, UK; Settle, J. – ESSC, UK; Vuilleumier, P.; Santandrea, S. – ESA-ESTEC

IAA-B4-0303

Technology Demonstration by the BIRD Mission

Brieß, K.; Bärwald, W.; Gill, E.; Halle, W.; Kayal, H.; Montenbruck, O.
– DLR, Germany; Montenegro, S. – FhG FIRST, Germany; Skrbek, W.;
Studemund, H.; Terzibaschian, T.; Venus, H. – DLR, Germany

IAA-B4-0304

Monday, April 7, 2003, 16.40-17.40

PANEL 1 - LAUNCH OPPORTUNITIES FOR SMALL SATELLITES

Chairman: J. M. Contant – IAA

Members: S.S. Balakrishnan – Antrix, India
Cl. Berna – Arianespace, France
P. Freeborn – Eurockot, Germany

Tuesday, April 8, 2003, 09.00-10.30

SESSION 04 - EARTH EXPLORER MISSIONS

Chair: E.-A. Herland – ESA/ESTEC

Rapporteur: L. Alkalai – NASA/JPL, USA

**SPECTRA – ESA Candidate Earth Explorer Core Mission –
Feasibility Results and Outlook**

Tobehn, C.; Kassebohm, M.; Schmälter, E. – OHB, Germany

IAA-B4-0401

Detection and Analysis of High Temperature Events in the BIRD Mission

Zhukov, B.; Brieß, K.; Lorenz, E.; Oertel, D.; Skrbek, W. – DLR, Germany

IAA-B4-0402

Atmosphere Climate Experiment Plus ACE+

Veldman, S.; Lundahl, K. – SSC, Sweden

IAA-B4-0403

EKOSAT-IR – Ecology Related Earth Observation and Hot Spot Detection

Lübberstedt, H.; Penné, B. – OHB, Germany;

Sandau, R.; Oertel, D. – DLR, Germany

IAA-B4-0404

Tuesday, April 8, 2003, 10.50-12.10

SESSION 05 - EDUCATIONAL PROGRAMS

Chair: T. Hayashi – CHIBA, Japan

Rapporteur: J. Esper – NASA/GSFC, USA

University Small Satellite Program - ANUSAT

Thyagarajan, K.; Gupta, J.P.; Goel, P.S.; Jayaraman, K. – ISRO, India

IAA-B4-0501

**Results of In Flight Operation of Scientific Payload on
Micro-Satellite “Kolibri-2000”**

Klimov, S.I.; Afanasyev, Yu.V.; Eismont, N.A.; Grachev, E.A.;
Grigoryan, O.R.; Grushin, V.A.; Lysakov, D.S.; Nozdrachev, M.N. –
Interregional public organization "Microsputnik", Russia

IAA-B4-0502

Need of High Resolution Low Cost Small Satellite Mission Based Educational Programme and its Application to State Level Planning in India

Rajendran, S. – Annamalai University, India

IAA-B4-0503

Program of Educational and Research Center of Ecological Monitoring Based on the Usage of a New Small Satellite Imaging System

Boyarchuk, K.A. – RAS, Russia; Khutorskoy, M.D. – RPFU, Russia;
Zaitzev, A.N. – RAS, Russia

IAA-B4-0504

Tuesday, April 8, 2003, 13.30-15.00

SESSION 06 (Special) – STUDENT CONFERENCE

Chair: L. Paxton – JHU/APL, USA

Rapporteur: H. Jahn – DLR, Germany

The Icarus Student Satellite Project

Goldberg, H.R.; Gilchrist, B.E. – University of Michigan, USA

IAA-B4-0601

Attitude Estimation from Magnetometer and Earth-Albedo-Corrected Coarse Sun Sensor Measurements

Appel, P. – University of Bremen, Germany

IAA-B4-0602

Exploration of Influence of a Solar Flares on Operation of the Star Trackers

Voronkov, S. – RAS, Russia

IAA-B4-0603

Citizen Explorer-I: An Earth Observer with New Small Satellite Technology

Allen, D.Z.; Dunn, C.E – University of Colorado, USA

IAA-B4-0604

**The DOBSON SPACE TELESCOPE –
A Time Shared Telescope for NEO and Earth Observation**

Segert, T.; Danziger, B.; Geitner, M. – TU Berlin, Germany

IAA-B4-0605

Large Angle Manoeuvre of an Underactuated Small Satellite Using Two Wheels

Horri, N.M. – University of Surrey, UK

IAA-B4-0606

Tuesday, April 8, 2003, 15.20-16.40

SESSION 07 - TECHNOLOGIES AND INSTRUMENTS

Chair: L. Alkalai – NASA/JPL, USA

Rapporteur: E.-A. Herland – ESA/ESTEC

Development of Engineering Model of Medium-sized Aperture Camera System

Kim, E.-E.; Choi, Y.-W.; Yang, H.S.; Kang, M.-S.; Jeong, S.-K.; Yang, S.-U.;
Kim, J.-U. – SaTReC, Korea;

Rasheed, Ad. A. Ad.; Nasir, H. Md. Md.; Rosdi, R. Md.;

Hai, A. H. Ad.; Ismail, I.; Arshad, A. S. – ATSB, Malaysia

IAA-B4-0701

**Mono-Photon Technology Based Hyperspectral Systems
for Remote Sensing in Russia**

Makridenko, L.A. – ROSAVIAKOSMOS, Russia; Salikhov, R.S. – NIEM, Russia; Ovchinnikov, M.Y.; Khrenov, N.N. – RAS, Russia; Montenegro, S.; Behr, P.; Pletner, S. – FhG FIRS, Germany; Rodionov, I.D. – REAGENT, Russia

IAA-B4-0702

ASP-based Miniature Sun Sensor for Earth Observation Nanosatellites

Buonocore, M.; Grassi, M.; Rufino, G. – University of Naples, Italy

IAA-B4-0703

**Tethered System for Sensitive Scientific Experiments
Onboard the Microsatellite**

Korepanov, V.; Dudkin, F. – ISR, Ukraine

IAA-B3-0704

Tuesday, April 8, 2003, 16.40-17.40

**PANEL 2 - FUTURE NASA SPACE TECHNOLOGIES FOR SMALL SATELLITE
MISSIONS**

Chair: L. Alkalai – NASA/JPL, USA

Members: N.N.

Wednesday, April 9, 2003, 09.00-10.30

SESSION 08 - TECHNOLOGY DEMONSTRATION

Chair: H. Jahn – DLR, Germany

Rapporteur: St. Neeck – NASA/GSFC, USA

TopSat: Low Cost High Resolution Imagery from Space

Cawley, St. – QinetiQ Ltd, England

IAA-B4-0801

On Orbit Technology Validation for a University Microsatellite

Bernelli-Zazzera, F.; Ercoli-Finci, A.; Molina, M.; Cattaneo, M.; Dioli, M.; Bertolini, I.; Bianchi, R. – Politecnico di Milano, Italy; Sabatini, P.; Crocco, L.; Schiavi, F.; Zucconi, A. – Carlo Gavazzi Space, Italy

IAA-B4-0802

The PROBA Satellite Star Tracker Performance

Jørgensen; J.L.; Denver, T.; Betto, M. – Technical University of Denmark, Denmark; Van den Braembussche, P. – VERHAERT, Belgium

IAA-B4-0803

SAC-C Orbit Acquisition Maneuver Sequence

Filici, C.; Suarez, M. – CONAE, Argentina

IAA-B4-0804

Wednesday, April 9, 2003, 10.50-12.10

SESSION 09 - SPACECRAFT SUBSYSTEMS

Chair: U. Renner – TU BERLIN, Germany

Rapporteur: M. Ovchinnikov – RAS, Russia

- Micro-Satellites Thermal Control-Concept and Components**
Baturkin, V. – National Technical University of Ukraine, Ukraine IAA-B4-0901
- Implementing an Image Processing System for the Next Generation Earth Observation Sensors for the Sunsat 2 Micro-Satellite Program**
Mostert, S.; Kriegler, E. – University of Stellenbosch, South Africa IAA-B4-0902
- IRECIN Nanosatellite Communication System and Ground Segment**
Ferrante, M.; Povia, M.; Di Ciolo, L. – VITROCISSET, Italy IAA-B4-0903
- In-Flight Quality and Accuracy of Attitude Measurements from the CHAMP Advanced Stellar Compass**
Jørgensen, P.S.; Jørgensen, J.L.; Denver, T.; Betto, M. – Technical University of Denmark IAA-B4-0904
- Wednesday, April 9, 2003, 13.30-15.00*
- SESSION 10 (Special) - NASA EARTH SCIENCE SMALL SATELLITE MISSIONS AND TECHNOLOGIES**
- Chair:* St. Neeck – NASA/GSFC, USA
Rapporteur: R. Sandau – IAA
- NASA's Small Satellite Missions for Earth Observation**
Neeck, S.; Magner, T.; Paules, G.– NASA/HQ, USA IAA-B4-1001
- NN IAA-B4-1002
- The Orbiting Carbon Observatory (OCO) Mission**
Johnson, C.; Crisp, D. – NASA/HQ, USA IAA-B4-1003
- Advanced Platform Technologies Enabling Efficient Distributed Sensing System for Earth Science**
Lemmerman, L.; Raymond, C.; Shotwell, R.; Chase, J. – NASA/JPL, USA;
Bhasin, K. – NASA/GRC, USA; Connerton, R. – NASA/GSFC, USA IAA-B4-1004
- Wednesday, April 9, 2003, 15.20-16.40*
- SESSION 11 - CONSTELLATIONS AND PLATFORMS**
- Chair:* K. Thyagarajan – ISRO, India
Rapporteur: K. Briess – DLR, Germany
- MAGNAS - Magnetic Nanoprobe Swarm**
Lübberstedt, H.; Koebel, D. – OHB, Germany; Hansen, F. – DSRI, Denmark;
Brauer, P. – Ørsted DTU MI, Denmark IAA-B4-1101
- The RapidEye Mission Design**
Tyc, G. ; Tulip, J.; Schulten, D. – MDA, Canada;
Krischke, M.; Oxfort, M. – RapidEye AG, Germany IAA-B4-1102
- Small Satellite Constellation for Disaster Prevention and Rescue**
Oraevsky, V.N.; Boyarchuk, K.A.; Dokukin, V.S. – IZMIRAN, Russia;
Salikhov, R.S.; Vladimirov, A.V.; Sennik, N.A. – NIEM, Russia IAA-B4-1103

A Microsatellite Payload Platform for Hot Spot Detection Walter, I.; Briess, K.; Baerwald, W.; Lorenz, E.; Skrbek, W.; Schrandt, F. – DLR, Germany	IAA-B4-1104
<i>Wednesday, April 9, 2003, 16.40-17.40</i>	
SESSION - POSTERS	
METSAT – A Dedicated Meteorological Mission of ISRO Kaila, V.K.; Katti, V.R. – ISRO, India	IAA-B4-0205P
Thermal Plasma Measurement Unit for Micro-Satellites Hruska, F.; Chum, J.; Kolmasova, I.; Smilauer, J.; Truhlik, V. – CAS, Czech Republic	IAA-B4-0405P
MUNIN – A Swedish Nanosatellite Johnson, K. – SISP, Sweden	IAA-B4-0406P
Space Monitoring for the Future Burdyuzha, V. – RAS, Russia	IAA-B4-0407P
Singapore’s Satellite Mission X-SAT Bretschneider, T. – Nanyang Technological University, Singapore	IAA-B4-0506P
Software Error Protection Technique for High Density Memory Saturno, M.E. – INPE, Brazil	IAA-B4-0705P
Micro ASC, a Miniature Star Tracker Jørgensen; J.L.; Denver, T.; Betto, M.; Jørgensen, P.S. – Ørsted DTU, Denmark	IAA-B4-0706P
Magnetometer Measure Subsystem of the Nanosatellite IRECIN Ferrante, M.; Di Ciolo, L.; Povia, M. – VITROCISSET, Italy	IAA-B4-0707P
LAGRANGE RO: A GNSS Receiver for Radio Occultation De Cosmo, V.; Vespe, F. – ASI, Italy; Banfi, E. – LABEN, Italy	IAA-B4-0708P
Application of APS Detector to GNC Sensors Boldrini, F.; Monnini, E., Procopio, D. – OFFICINE-GALILEO, Italy	IAA-B4-0709P
Tracking Algorithm for Star Sensors Using CMOS Devices Accardo, D. – University of Naples; Italy	IAA-B4-0710P
Hyperspectral Monitoring Data Processing Montenegro, S.; Behr, P. – FhG FIRST, Germany; Rodionov, I.; Rodionov, A.; Fedounin, E. – REAGENT, Russia	IAA-B4-0711P
Compact High Resolution Imaging Spectrometer (Chris) Cutter, M.A.; Lobb, D. R. – SIRA, England	IAA-B4-0712P
Earth Observation from Elliptical Orbits with Very Low Altitude Perigee Ceccanti, F.; Marcuccio, S. – ALTA-SPACE, Italy	IAA-B4-0805P
Earth Reference Sensor of IRECIN Nanosatellite Ferrante, M.; Di Ciolo, L.; Povia, M. – VITROCISSET, Italy	IAA-B4-0905P

- Specialized Small Satellites with Wireless Power Transmission as New Way in Micro-Gravity Technology**
Chuyan, R.; Grechnev, A.; Kvasnikov, L.; Smakhtin, A. – MAI, Russia;
Savvin, V. – MSU, Russia; Shalimov, V.; Zemskov, V. – BAIKOV IMMS,
Russia; Resh, G. – NPO Mashinostroenie, Russia IAA-B4-0906P
- Antenna Deployment Mechanism for Spacecraft SPARTNIK**
Prabhakar, S.; Sing Sidhu, R. – San Jose State University, USA IAA-B4-0907P
- The RapidEye Spacecraft**
Tyc, G.; Buttner, G. – MDA, Canada;
Krischke, M.; Oxfort, M. – RAPIDEYE AG, Germany IAA-B4-1105P
- The New Approach towards Commercial Earth Observation –Rapid Eye**
Krischke, M.; Jung-Rothenhäusler, F. – RAPIDEYE AG, Germany;
Schulten, D.; Tyc, G. – MDA, Canada IAA-B4-1106P
- Microsatellite Configuration Design for an Earth Observation Mission based on the Distributed Sensor Concept**
Tancredi, U.; D’Errico, M. – Second University of Naples, Italy IAA-B4-1107P
- Small Satellite Platform “Vulkan”**
Salikhov, R.S.; Vladimirov, A.V.; Sennik, N.A. – NIEM, Russia;
Oraevsky, V.N.; Dokukin, V.S.; Boyarchuk, K.A. – IZMIRAN, Russia IAA-B4-1108P
- Scientific Instrumentation for the Small Satellite Platform “Vulkan”**
Oraevsky, V.N.; Boyarchuk, K.A.; Dokukin, V.S. – IZMIRAN, Russia IAA-B4-1109P
- Small Satellite “KOMPAS-2”**
Oraevsky, V.N. – IZMIRAN, Russia; Danilkin, V.A. – State Rocket Centre
“V.P. Makeyev”, Russia; Boyarchuk, K.A.; Dokukin, V.S. – IZMIRAN, Russia IAA-B4-1110P
- A Simple Low Cost Digital Sun Sensor for Micro-Satellites**
Chum, J.; Vojta, J.; Base, J.; Hruska, F. – Academy of Sciences,
Czech Republic IAA-B4-1205P
- Onboard Autonomous Corrections for Accurate IRF Pointing**
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Thursday, April 10, 2030, 09.00-10.30

SESSION 12 - ATTITUDE CONTROL SYSTEMS

Chair: M. Ovchinnikov – RAS, Russia

Rapporteur: K. Lundal – SSC, Sweden

**The TUBSAT Attitude Control System: Flight Experience with
DLR-TUBSAT and MAROC-TUBSAT**

Renner, U.; Bleif, J.; Roemer, S. – TU Berlin, Germany

IAA-B4-1201

Design and Testing of Magnetic Controllers for Satellite Stabilization

Guelman, M.; Waller, R.; Shiryaev, A. – ASRI, Israel;

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Gyrostat Attitude Control Using Nonlinear SDDRE Method

Nayeri, M.R.D. - Sharif University, Iran; Mirshams, M. - Toosi University,
Iran

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**Space Vehicle Stabilization Using Angular Velocity Sensors Sign
and Gas Jets Actuators**

da Silva, W.C.C. – UBC, Brazil; Milani, P.G.; Gadelha de Souza, L.C. – INPE,
Brazil

IAA-B3-1204

Thursday, April 10, 2003, 10.50-12.10

SESSION 13 – SPECIAL ASPECTS OF SMALL SATELLITE MISSIONS

Chair: H.-P. Röser – University of Stuttgart, Germany

Rapporteur: J. L. Joergensen – DTU, Denmark

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Observation Satellite (WEOS)**

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Masumoto, Y. – Japan

IAA-B4-1301

First Steps in the Disaster Monitoring Constellation

da Silva Curiel, A.; Boland, L.; Cooksley, J.; Stephens, P.; Sun, W.;
Sweeting, Sir M. – SSTL, UK

IAA-B4-1302

New Possible Roles of Small Satellites in Maritime Surveillance

Wahl, T.; Høyve, G. K. – NDRE (FFI), Norway

IAA-B4-1303

Quality Assurance for Space Instruments Built with COTS

Guldager, P. B.; Thuesen, G. G.; Jørgensen, J. L. – Ørsted DTU, Denmark

IAA-B4-1304

Thursday, April 10, 2003, 13.30-15.00

SESSION 14 (Special) - COST EFFECTIVE EARTH OBSERVATION MISSIONS

Chair: J. Esper – NASA/GSFC, USA

R. Sandau – IAA

Rapporteur: U. Renner – TU Berlin, Germany

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IAA-B4-1401

**Cost Effective Earth Observation Missions
- Fundamental Limits and Future Potentials -**

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Grigoryan, O.R.; Dobriyan, M.B.; Nozdrachev, M.N.; Papkov, A.P.;
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Hsiao, F.-B. – National Cheng Kung University, Taiwan, China;
Wu, A.-M.; Chern, J.-S. – NSPO, Taiwan, China IAA-B4-1404

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SESSION 15 - LAUNCH SYSTEMS AND GROUND SEGMENT

Chair: K. Briess – DLR, Germany
Rapporteur: M. Ovchinnikov – RAS, Russia

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SYMPOSIUM SUMMARY

Chair: H.-P. Röser – University of Stuttgart, Germany
Chief Rapporteur: G. Fountain – JHU/APL, USA

AWARDS

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Best Poster Presentation Award

STUDENT PRIZE PAPER COMPETITION

Final see Session 06 (Special)

The awards for the winner of the *Student Prize Paper Competition* will be presented during the IAA Dinner, Tuesday, April 8, 2003 19.00 at Berlin Hilton Hotel

A Special Thanks to the Students Paper Evaluation Committee:

Dr. Rainer Sandau, DLR, Germany

Dr. Leon Alkalai, NASA/JPL, USA

Dr. Klaus Brieß, DLR, Germany

Jaime Esper, NASA/GSFC, USA

Prof. Tomonao Hayashi, Chiba Institute of Technology, Japan

Dr. Einar-Arne Herland, ESA/ESTEC

Prof. Michael Ovchinnikov, Keldysh Institute of Applied Mathematics, Russia

Dr. Craig Underwood, SSTL, UK

Dr. K. Thyagarajan, ISRO, India

Student Prize Contributors:

ESA

EADS Launch Vehicles

DLR

ASTRIUM GmbH

OHB System GmbH

JHU/APL

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Paradella, W. R.	IAA-B4-0203	Earth Observation Missions
Parkhomenko, N.	IAA-B4-1209P	Attitude Control Systems
Paules, G. E.	IAA-B4-1001	NASA Earth Science Small Satellite Missions
Penné, B.	IAA-B4-0201	Earth Observation Missions
Penné, B.	IAA-B4-0404	Earth Explorer Missions
Pereira Farias Costa, M.	IAA-B4-0203	Earth Observation Missions
Pharnaakeev, I. V.	IAA-B4-1403	Cost Effective Earth Observation Missions
Pletner, S.	IAA-B4-0702	Technologies and Instruments
Povia, M.	IAA-B4-0707P	Technologies and Instruments
Povia, M.	IAA-B4-0903	Spacecraft Subsystems
Povia, M.	IAA-B4-0905P	Spacecraft Subsystems
Prabhakar, S.	IAA-B4-0907P	Spacecraft Subsystems
Procopio, D.	IAA-B4-0709P	Technologies and Instruments
Psiaki, M.	IAA-B4-1202	Attitude Control Systems
Puls, J	IAA-B4-0203	Earth Observation Missions
Radchenko, V. V.	IAA-B4-1403	Cost Effective Earth Observation Missions
Rajendran, S.	IAA-B4-0503	Educational Programs
Rasheed, Ad. A. Ad	IAA-B4-0701	Technologies and Instruments
Raymond, C.	IAA-B4-1004	NASA Earth Science Small Satellite Missions
Razali, R.	IAA-B4-1308P	Special Aspects of Small Satellite Missions
Renner, U.	IAA-B4-1201	Attitude Control Systems
Resh, G.	IAA-B4-0906P	Spacecraft Subsystems
Richter, J.	IAA-B4-1504	Launch System and Ground Segment
Ritzmann, S.	IAA-B4-1310P	Special Aspects of Small Satellite Missions
Rodionov, I. D.	IAA-B4-0702	Technologies and Instruments
Rodionov, I.	IAA-B4-0711P	Technologies and Instruments
Rodionov, A.	IAA-B4-0711P	Technologies and Instruments
Roemer, S.	IAA-B4-1201	Attitude Control Systems
Rosdi, Md. R. Md.	IAA-B4-0701	Technologies and Instruments
Röser, H.-P.	IAA-B4-1402	Cost Effective Earth Observation Missions
Rücker, U.	IAA-B4-1509	Launch System and Ground Segment
Rufino, G.	IAA-B4-0703	Technologies and Instruments
Sabatini, P.	IAA-B4-0204	Earth Observation Missions
Sabatini, P.	IAA-B4-0802	Technology Demonstration
Said, Md. A. Md.	IAA-B4-1308P	Special Aspects of Small Satellite Missions
Salikhov, R. S.	IAA-B4-0702	Technologies and Instruments
Salikhov, R. S.	IAA-B4-1103	Constellations and Platforms

<u>Name</u>	<u>Paper/ Poster Reference</u>	<u>Session</u>
Salikhov, R. S.	IAA-B4-1108P	Constellations and Platforms
Sandau, R.	IAA-B4-0404	Earth Explorer Missions
Santandrea, S.	IAA-B4-0303	Results and Lessons Learned
Saturno, M. E.	IAA-B4-0705P	Technologies and Instruments
Savvin, V.	IAA-B4-0906P	Spacecraft Subsystems
Schiavi, F.	IAA-B4-0802	Technology Demonstration
Schlage, J.	IAA-B4-1504	Launch System and Ground Segment
Schmälder, E.	IAA-B4-0401	Earth Explorer Missions
Schrandt, F.	IAA-B4-1104	Constellations and Platforms
Schroeder, R.	IAA-B4-0203	Earth Observation Missions
Schulten, D.	IAA-B4-1102	Constellations and Platforms
Schulten, D.	IAA-B4-1106P	Constellations and Platforms
Schwarz, J.	IAA-B4-1506P	Launch System and Ground Segment
Sennik, N. A.	IAA-B4-1103	Constellations and Platforms
Sennik, N. A.	IAA-B4-1108P	Constellations and Platforms
Settle, J.	IAA-B4-0303	Results and Lessons Learned
Shalimov, V.	IAA-B4-0906P	Spacecraft Subsystems
Shiryaev, A.	IAA-B4-1202	Attitude Control Systems
Shotwell, R.	IAA-B4-1004	NASA Earth Science Small Satellite Missions
Singh Sidhu, R.	IAA-B4-0907P	Spacecraft Subsystems
Skottke, H.-J.	IAA-B4-1506P	Launch System and Ground Segment
Skrbek, W.	IAA-B4-0304	Results and Lessons Learned
Skrbek, W.	IAA-B4-0402	Earth Explorer Missions
Skrbek, W.	IAA-B4-1104	Constellations and Platforms
Smakhtin, A.	IAA-B4-0906P	Spacecraft Subsystems
Smakhtin, A. P.	IAA-B4-1309P	Special Aspects of Small Satellite Missions
Smilauer, J.	IAA-B4-0405P	Earth Explorer Missions
Stephens, P.	IAA-B4-1302	Special Aspects of Small Satellite Missions
Studemund, H.	IAA-B4-0304	Results and Lessons Learned
Suarez, M.	IAA-B4-0804	Technology Demonstration
Sun, W.	IAA-B4-1302	Special Aspects of Small Satellite Missions
Sweeting, M.	IAA-B4-1302	Special Aspects of Small Satellite Missions
Tamkovich, G. M.	IAA-B4-1403	Cost Effective Earth Observation Missions
Tancredi, U.	IAA-B4-1107P	Constellations and Platforms
Terzibaschian, T.	IAA-B4-0304	Results and Lessons Learned
Teston, F.	IAA-B4-0303	Results and Lessons Learned
Thuesen, G. G.	IAA-B4-1304	Special Aspects of Small Satellite Missions
Thuesen, G. G.	IAA-B4-1305P	Special Aspects of Small Satellite Missions
Thyagarajan, K.	IAA-B4-0501	Educational Programs
Tobehn, C.	IAA-B4-0201	Earth Observation Missions
Tobehn, C.	IAA-B4-0401	Earth Explorer Missions
Tobias, A.	IAA-B4-0101	Programmatics
Tobler de Sousa, C.	IAA-B4-1505P	Launch System and Ground Segment
Tomita, H.	IAA-B4-1301	Special Aspects of Small Satellite Missions
Tretjakova, N.	IAA-B4-1209P	Attitude Control Systems
Truhlik, V.	IAA-B4-0405P	Earth Explorer Missions
Tulip, J.	IAA-B4-1102	Constellations and Platforms
Tyc, G.	IAA-B4-1102	Constellations and Platforms
Tyc, G.	IAA-B4-1105P	Constellations and Platforms
Tyc, G.	IAA-B4-1106P	Constellations and Platforms
Van den Braembussche, P.	IAA-B4-0803	Technology Demonstration
Varatharajoo, R.	IAA-B4-1208P	Attitude Control Systems

<u>Name</u>	<u>Paper/ Poster Reference</u>	<u>Session</u>
Vasiliev, S. I.	IAA-B4-1403	Cost Effective Earth Observation Missions
Veldman, S.	IAA-B4-0403	Earth Explorer Missions
Venus, H.	IAA-B4-0304	Results and Lessons Learned
Vespe, F.	IAA-B4-0708P	Technologies and Instruments
Viertel, Y.	IAA-B4-1501	Launch System and Ground Segment
Vladimirov, A. V.	IAA-B4-1103	Constellations and Platforms
Vladimirov, A. V.	IAA-B4-1108P	Constellations and Platforms
Vojta, J.	IAA-B4-1205P	Attitude Control Systems
Vuilleumier, P.	IAA-B4-0303	Results and Lessons Learned
Wahl, T.	IAA-B4-1303	Special Aspects of Small Satellite Missions
Waller, R.	IAA-B4-1202	Attitude Control Systems
Walter, I.	IAA-B4-1104	Constellations and Platforms
Wu, A.-M.	IAA-B4-1404	Cost Effective Earth Observation Missions
Yang, H.-S.	IAA-B4-0701	Technologies and Instruments
Yang, S.-U.	IAA-B4-0701	Technologies and Instruments
Yokoyama, K.	IAA-B4-1301	Special Aspects of Small Satellite Missions
Yokoyama, K.	IAA-B4-1307P	Special Aspects of Small Satellite Missions
Zeitzev, A. N.	IAA-B4-0504	Educational Programs
Zelenyi, L. M.	IAA-B4-1403	Cost Effective Earth Observation Missions
Zemskov, V.	IAA-B4-0906P	Spacecraft Subsystems
Zhukov, B.	IAA-B4-0402	Earth Explorer Missions
Zucconi, A.	IAA-B4-0802	Technology Demonstration

GENERAL INFORMATION

Symposium Venue

The symposium will take place in the BERLIN HILTON HOTEL, Conference Center
Mohrenstrasse 30, D-10117 Berlin,
Tel. +49-30-20 23-0, Fax. +49-30-20 23-4269.
Underground Station: Stadtmitte (U2, U6).

On-site Registration

The Registration Desk will be set up in the Symposium Room Foyer of the Berlin Hilton Hotel.

It will be open::

April 6, Sunday	16.00 - 20.00
April 7, Monday - April 10, Thursday	08.00 - 19.00

Name Badges

Name Badges must be worn at all times in order to be admitted to the sessions and the social events.
The following colors have been assigned:

Participants	White
Students	White
Press	Yellow
Accompanying Persons	Blue
Organization	Green

Language

The official language of the symposium is English.

Offices

- The Symposium Office will be co-located with the Registration Office in the Symposium Room Foyer of the Berlin Hilton Hotel
Tel. +49-30-20 23-1338 Fax. +49-30-20 23-4938
Pay Fax, Telephone
- Chairpersons' and Rapporteurs' meeting room: "Ratsherrenzimmer"
Meeting of Session Chairpersons and Rapporteurs at 08.30 each day for introduction to their duties.
- Authors are requested to arrive at the session room assigned 10 minutes before the start of the session in order to meet the session chairperson for final preparations. Please bring your short biographies.

Slide Testing Center

Berlin Hilton Hotel, Conference Center, Ratsherrenzimmer

In this center you may test your slides and borrow magazines.

The session room will be equipped with a video projector with PC interface, video recorder, 24 x 36 mm slide and overhead projectors. Other audio-visual equipment may be rented, please apply to the office.

Publication of Papers

A selection of contributed papers will appear in a Special Issue of ACTA ASTRONAUTICA, the journal of the International Academy of Astronautics to be published after the symposium.

Messages

A message center will be located in the registration area at the Conference Center of the Berlin Hilton Hotel. There will be an internet terminal available for you to access your web-based e-mail accounts.

Lunch, Coffee Breaks

The registration fee of the participants will cover the coffee breaks and the lunch buffet. Accompanying persons who want to take part in the lunch buffet may purchase a voucher at the Registration Desk (€15,00/day).

Social Events

Date/Time	Event	Venue
April 6 Sunday 19.00 - 20.00	Get-Together	Berlin Hilton Hotel
April 7 Monday 18.30 -22.00	Reception (included in the registration fee)	City Hall “Rotes Rathaus” Heraldic Room 20 minute walk from Hilton Hotel
April 8 Tuesday 19.00	IAA Dinner Tickets can be purchased at the Information Desk at the cost of €40,00 per person, no later than Tuesday, April 8, 2003 at 11.00	Hilton Restaurant
April 9 Wednesday	Elzbieta Sternlicht piano “Works from romantic period”	Berlin Philharmonie
April 10 Thursday 21.00	Film Presentation (included in the registration fee) “Space Station 3D”	Discovery Channel IMAX Berlin Marlene-Dietrich-Platz 4 10785 Berlin Station: Potsdamer Platz

Excursions

April 11 Friday

09.00-12.00 Visit to

WISTA, Science and Technology Center Berlin-Adlershof
Rudower Chaussee 5, 12489 Berlin

Bus Shuttle Departure from the Berlin Hilton Hotel at 09.00,
Approximate Return at 13.00

Sightseeing and Tours

During the symposium, local sightseeing and tours with an English-speaking guide will be arranged on demand by the Hilton Hotel for accompanying persons. Please fill in the Supporting Program Form and send it together with your Registration Form and Hotel Reservation Form to CMT ConTour GmbH.

Daily

Sightseeing Tour in Berlin (by bus)

Duration: 3 hours

A sightseeing trip through the most famous historical parts of Berlin as well as the new sites of the growing German capital, including Potsdamer Platz and "Deutscher Bundestag".

Meeting place: Main Entrance of Hilton Hotel Departure: 9.20 and 13.20

Price: €21,50 / person

Full day tour to Potsdam (by bus) -not on Mondays-

Sightseeing in Potsdam, the capital of Brandenburg, including a visit to the world-famous palace of Frederic the Great "Sanssouci" and its park, visit to the palace "Neues Palais".

Meeting place: Main Entrance of Hilton Hotel Departure: 09.20

Price: €35,00 / person Arrival: 17.00

The Discover Berlin Walk

You walk through Berlin's complex, sometimes tragic past and its exciting dynamic present. You are introduced to the famous (and infamous) personalities, who left their mark on the city and you are shown the main sights in the historic heart - the Brandenburg Gate, the Reichstag, Checkpoint Charly, remains of the Berlin wall and lots more.

Meeting place: taxi stand at Zoo station Departure: 10.00

Price: €10,00 / person Arrival: 14.30

On demand

Full day Tour to Dresden (by bus) -only on Tuesdays-

Bus transfer to Dresden, sightseeing in the historic center, lunch, visit to the museum Grünes Gewölbe, Dresdner Zwinger, Taschenbergpalais etc., transfer back to Berlin.

Meeting place: Kurfürstendamm/U-Bahn station Uhlandstraße Departure: 08.00

Price: €51,00 / person Arrival: 19.00

(dependent on the number of participants)

On demand

A sightseeing tour by ship

A guided sightseeing tour on Berlin's waterways. You can experience the variety of architectural styles from another point of view and discover that Berlin has more bridges than Venice.

Meeting place: Jannowitzbrücke Departure: 11.30

Price: €15,00 / person Arrival: 15.30

4 th IAA Symposium on Small Satellites for Earth Observation	MONDAY April 7, 2003	TUESDAY April 8, 2003	WEDNESDAY April 9, 2003	THURSDAY April 10, 2003	FRIDAY April 11, 2003
09.00 - 09.30 Paper	09.30 - 09.50 Welcome	Session 04	Session 08	Session 12	Visit of:
09.30 - 09.50 Paper	and Greetings	Earth Explorer	Technology	Attitude	09.00 - 12.00
09.50 - 10.10 Paper	09.50 - 10.45	Missions	Demonstration	Control	WISTA, Science
10.10 - 10.30 Paper	Keynote			Systems	and Technology
10.30 - 10.50 Coffee Break	10.45 - 11.15 Break and				Center,
10.50 - 11.10 Paper	Press Conference	Session 05	Session 09	Session 13	Berlin-Adlershof
11.10 - 11.30 Paper	11.15 - 12.30 Session 01	Educational	Spacecraft	Special Aspects	
11.30 - 11.50 Paper	Programmatics	Programs	Subsystems	of Small Satellite	
11.50 - 12.10 Paper				Missions	
12.10 - 13.30 Lunch Break	12.30 - 13.30 Lunch				
13.30 - 14.00 Paper	Session 02	Session 06	Session 10	Session 14	
14.00 - 14.20 Paper	Earth Observation	Student	NASA Earth Science	Cost Effective	
14.20 - 14.40 Paper	Missions	Conference	Small Satellite Miss.	Earth Observation	
14.40 - 15.00 Paper		(Special Session)	and Technologies	Missions	
15.00 - 15.20 Coffee Break			(Special Session)	(Special Session)	
15.20 - 15.40 Paper	Session 03	Session 07	Session 11	Session 15	
15.40 - 16.00 Paper	Results and	Technologies	Constellations	Launch Systems and	
16.00 - 16.20 Paper	Lessons Learned	and Instruments	and Platforms	Ground Segment	
16.20 - 16.40 Paper					
16.40 - 17.40 Panel	<i>Launch Opportunities</i>	<i>Future NASA Space</i>	Session Poster	Symposium	
	<i>for Small Satellites</i>	<i>Technologies</i>		Summary	
	<i>(J.-M. Contant)</i>	<i>for Small Satellite</i>			
		<i>Missions</i>		Awards	
		<i>(L. Alkalai)</i>			
18.30 Social Event (19.00/21.00)	Reception (18.30-22.00) Rotes Rathaus	IAA-Dinner (19.00) Hilton Hotel <i>Student Awards</i>	Concerts	Film Presentation (21.00) IMAX Berlin	