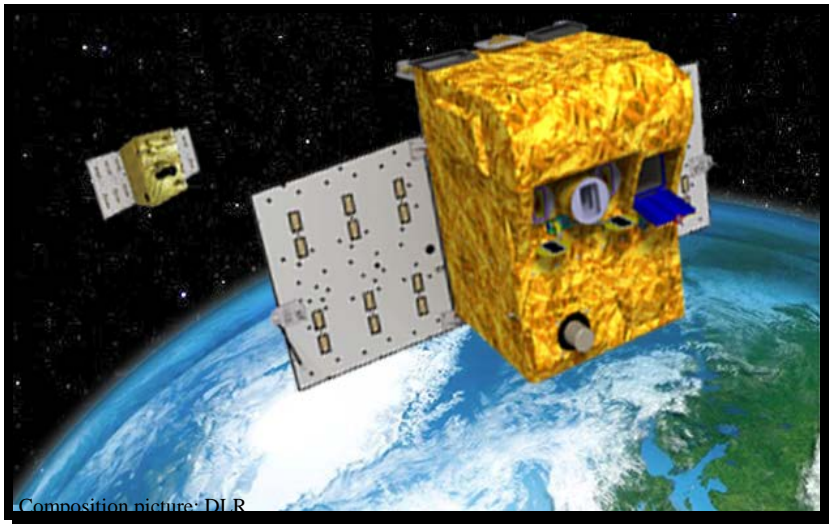


10th IAA SYMPOSIUM

ON SMALL SATELLITES

FOR EARTH OBSERVATION

Final Program



April 20 – 24, 2015

**BBAW,
Gendarmenmarkt**

BERLIN, GERMANY



*International
Academy of
Astronautics*

Supported and hosted by



**Deutsches Zentrum
DLR für Luft- und Raumfahrt e.V.**

Institute of Optical Sensor Systems

HONORARY CHAIRMAN

Johann-Dietrich Wörner

Chairman of the Executive Board of the German Aerospace Center (DLR)

CHAIRMEN

Rainer Sandau

IAA Technical Director, Satellite and Space Applications (Germany)

Hans-Peter Röser

Director

Institute of Space Systems, University of Stuttgart (Germany)

Arnoldo Valenzuela

IAA Commission Space System Operation & Utilisation (Italy)

SCIENTIFIC PROGRAM COMMITTEE

W. Balogh (UN-OOSA)
K. Brieß (TU Berlin, Germany)
J.-M. Contant (IAA, France)
C. Elachi (NASA/JPL, USA)
E. Gill (TU Delft, The Netherlands)
A. Ginati (ESA)
S. Hardhienata (LAPAN, Indonesia)
L. Boloh (CNES, France)
Y.-A. Liou (CSRSR, Taiwan, China)
L. Maresi (ESA/ESTEC)
P. Lier (CNES, France)
S. Nakasuka (Univ. of Tokyo, Japan)
R. Navalgund (ISRO, India)
S. Neeck (NASA/HQ, USA)
M. Ovchinnikov (KIAM, Russia)
P. Patterson (USU/SDL, USA)
L. Paxton (JHU/APL, USA)
H. Reile (DLR, Germany)
Sir Martin Sweeting (SSTL, UK)
C. F. Varotto (CONAE, Argentina)
Y. Zhu (CAST, Beijing, China)

PROGRAM COMMITTEE

L. Alkalai (NASA/JPL, USA)
J. Esper (NASA/GSFC, USA)
L. Fröbel (ASTRIUM, Germany)
W. Halle (DLR, Germany)
H. Jahn (DLR, Germany)
H. Kuiper (TU Delft, The Netherlands)
H. Müller (DLR, Germany)
T. Segert (BST, Germany)
A. da Silva Curiel (SSTL, UK)
S. Roemer (Astrofein, Germany)
A. Rogers (JHU, USA)

LOCAL ARRANGEMENTS

Matthias Hetscher, Symposium and Program
Co-ordinator, c/o DLR, Berlin

Henriette Urban/Dietmar Hennig,
Symposium Organizer CMT ConTour GmbH

M e s s a g e
from the Governing Mayor of Berlin, Michael Müller,
at the Berlin-Brandenburg Academy of Sciences and Humanities



Welcome to Berlin for the 10th Symposium on Small Satellites of the International Academy of Astronautics (IAA)!

Berlin is an ideal setting for your symposium. The capital city region, where Otto Lilienthal caused a sensation with his first glider flights, is the birthplace of German aviation. Today, too, Berlin is again having an impact on developments in aviation. The aerospace industry is represented here by prominent companies. And the Berlin-Adlershof location of DLR, Germany's national aeronautics and space research center, is one of the capital's outstanding research institutes and is involved in countless space missions. Together with many different partners, DLR and its Berlin-Adlershof location have helped to make small satellites a growing factor in aerospace both at home and abroad.

The International Academy of Astronautics (IAA) has decided to hold this symposium in Berlin again this year, and we believe that choice pays tribute to Berlin's excellent reputation as a conference and congress venue. And the distinguished scientists, successful engineers, and talented young scholars from around 25 different countries who are coming to Berlin for this symposium are compelling evidence of Berlin's international appeal as a center of science and learning and of DLR's own reputation as the host institute.

On that note, I would like to wish all of you a successful and productive symposium, many interesting discussions with your international colleagues, and a stay in Berlin that allows you some time to explore the wealth of cultural attractions in our history-charged city.

A handwritten signature in black ink that reads "Michael Müller". The signature is written in a cursive, flowing style.

Michael Müller
Governing Mayor of Berlin

ACKNOWLEDGEMENT

We wish to thank the following for their contribution to the success of this conference (in alphabetical order):



Astro-
und Feinwerktechnik
Adlershof GmbH



DLR Deutsches Zentrum
für Luft- und Raumfahrt
German Aerospace Center



AGENDA

Sunday, April 19, 2015

- 16:00-20:00 Registration, BBAW¹
19:00-20:00 Get-Together

Monday, April 20, 2015

- 08:00-09:00 Registration, BBAW
- 09:00-09:15 **Welcome:**
J.M.Contant,
Secretary General, IAA
France
- 09:15-09:45 **Keynote Address:**
“Will entrepreneurs change the
face of the EO space industry?”
Sir M. Sweeting,
SSTL, UK
- 09:45-10:30 BREAK, PRESS CONFERENCE
- 10:30-12:20 **Session 01:**
PROGRAMMATICS
Chair: J.M. Contant, IAA, France
Rapporteur: E.Gill, TU-Delft, The
Netherlands
- 12:20-13:30 LUNCH
- 13:30-15:00 **Session 02:**
MISSIONS I
Chair: S. Neeck, NASA, USA
Rapporteur: H.-W. Hübers,
DLR, Germany
- 15:00-15:20 BREAK
- 15:20-16:40 **Session 03:**
INSTRUMENTS
Chair: L. Maresi, ESA ESTEC
Rapporteur: C. Underwood, Univ.
of Surrey, UK

- 16:40-17:40 **Panel Discussion:**
Entrepreneurship in Space
Chair: Sir M. Sweeting
SSTL, UK

Tuesday, April 21, 2015

- 09:00-10:30 **Session 04:**
MISSIONS II
Chair: A. da Silva Curiel,
SSTL, UK
Rapporteur: S. Mostert,
SCS, South Africa
- 10:30-10:50 BREAK
- 10:50-12:10 **Session 05:**
SPECIAL ASPECTS
Chair: L.-J. Smith
Leuphana, Germany
Rapporteur: W. Halle,
DLR, Germany
- 12:10-13:30 LUNCH
- 13:30-15:00 **Session 06: (Special)**
STUDENT CONFERENCE
Chair: M. d’Errico,
Univ. Of. Napley, Italy
Rapporteur: R. Laufer, Baylor
University, USA
- 15:00-15:20 BREAK
- 15:20-16:40 **Session 07:**
EDUCATION
Chair: E. Gill, TU Delft,
The Netherlands
Rapporteur: O. Koudelka,
Univ. Graz, Austria
- 16:40-17:40 **POSTER SESSION I**

¹ Berlin-Brandenburgische Akademie der Wissenschaften

AGENDA (cont.)

Wednesday, April 22, 2015

- 09:00-10:30 **Session 08:
LESSONS LEARNED**
Chair: J. Esper
NASA, USA
Rapporteur: Z. Yoon,
TU-Berlin, Germany
- 10:30-10:50 BREAK
- 10:50-12:10 **Session 09:
SOFTWARE**
Chair: S. Montenegro,
TU-Würzburg, Germany
Rapporteur: H. Kuiper, TU- Delft,
The Netherlands
- 12:10-13:30 LUNCH
- 13:30-15:00 **Session 10:
NEW PLATFORMS**
Chair: A. Rogers, JHU, USA
Rapporteur: V.V. Phuong, VNSC,
Vietnam
- 15:00-15:20 BREAK
- 15:20-16:40 **Session 11:
PROPULSION**
Chair: I. Belokonov, SSAU,
Russia
Rapporteur: H. Adirim, Aerospace
Innovation, Germany
- 16:40-17:40 **POSTER SESSION II**

Thursday, April 23, 2015

- 09:00-10:30 **Session 12:
SUBSYSTEMS**
Chair: K. Brieß, TU-Berlin,
Germany
Rapporteur: R. Kawashima,
UNISEC, Japan
- 10:30-10:50 BREAK

- 10:50-12:10 **Session 13:
COMMUNICATION &
GROUND SEGMENT**
Chair: R. Laufer, BAYLOR
University, USA
Rapporteur: A. Rogers, JHU,
USA

12:10-13:30 LUNCH

- 13:30-15:00 **Session 14:
AOCS**
Chair: I. Belokonov, SSAU,
Russia
Rapporteur: T. Terzibaschian,
DLR, Germany

15:00-15:20 BREAK

- 15:20-16:40 **Session 15:
MISSIONS III**
Chair: C. Underwood, Univ.of
Surrey, UK
Rapporteur: W. Halle, DLR,
Germany

- 16:40-17:40 **Symposium Summary**
Chair: R. Sandau, IAA,
Germany
Chief Rapporteur:
E. Gill, TU Delft,
The Netherlands

AWARDS

Friday, April 24, 2015

- 08:00-19:00 **Visit to:
Historical Site of Peenemünde**

TECHNICAL PROGRAM

Session 1: Programmatics

Monday, April 20, 2015, 10:30 - 12:20

Chair: J.M.Contant, IAA, France

Rapporteur: E.Gill, TU-Delft, The Netherlands

- NASA's Earth Science Program and Small Satellites** IAA-B10-0101
Neeck, S. P., NASA Headquarters, USA
- National Programs for Earth Observation Satellite Development in Vietnam Until 2020** IAA-B10-0102
V.V. Phuong, VNSC, Vietnam
- Small Satellite Mission Program of the Technical University of Berlin** IAA-B10-0103
K. Bri  , TU-Berlin, Germany
- AstroBus S, the high performance and competitive Small Satellites platform for Earth Observation** IAA-B10-0104
Lelong, P., Lemerrier, C., Chegan  as, J., EADS, France

Session 2: Missions I

Monday, April 20, 2015, 13:30 - 15:00

Chair: S. Neeck, NASA, USA

Rapporteur: H.-W. H  bers, DLR, Germany

- The DLR-BIROS-Satellite for fire-detection and technological experiments** IAA-B10-0201
Halle, W., Terzibaschian, T., DLR, Germany
- The Earth remote sensing small satellite "ISS-55"** IAA-B10-0202
Vygon'skiy, Y., Vil'kov, Y., Yakovlev, A., Yakovleva, A., Valov, M., Okhotkin, K., Okhotkina, E., Russian Academy of Science, Russia
- KhalifaSat mission overview** IAA-B10-0203
Al Marri, S., EIAST, UAE
- The COSMOS Mission Operations System and its Application to the HawaiiSat-1 Mission to Test New Remote Sensing Technologies** IAA-B10-0204
Sorensen, T., Chan, J., Nunes, M., Pilger, E., Wright, R., Yoneshige, L., Univ. of Hawaii, USA

Session 3: Instruments

Monday, April 20, 2015, 15:20 - 16:40

Chair: L. Maresi, ESA ESTEC

Rapporteur: C. Underwood, Univ. of Surrey, UK

- Compact X band Synthetic Aperture Radar on 100kg Small Satellite** IAA-B10-0301
Saito, H., Akbar, P. R., Ravindra, V., Pyne, B., Hirokawa, J., Ando, M., JAXA, Japan
- An Optical Payload for Multispectral Observation of the Earth from Small Satellites** IAA-B10-0302
Ferrario, I., Holbrouck, P., Rossi, M., Taccola, M., MLT, Italy
- Ice-Cube: Spaceflight Validation of an 874 GHz Sub-millimeter Wave Radiometer for Ice Cloud Remote Sensing** IAA-B10-0303
Esper, J., Wu, D., Piepmeier, J., Ehsan, N., Racette, P., NASA, USA
- Using small satellites and instruments for an operational air quality service** IAA-B10-0309P
de Goeij, B., van der Valk, N., Otter, G., TNO, The Netherlands
de Groot, Z., ISIS, The Netherlands

Panel Discussion:

Entrepreneurship in Space

Monday, April 20, 2015, 16:40 - 17:40

Chair: Sir M. Sweeting, SSTL, UK

Panelists:

M. Bello-Mora, Deimos Space, Spain
R. Villain, Euroconsult, France
M. Krischke, CloudEO-AG, Germany
W. Larson, Urthecast, Canada
J. Kreisel, JKIC, Germany
A. Ginati, ESA

Session 4: Missions II

Tuesday, April 21, 2015, 09:00 - 10:30

Chair: A. da Silva Curiel, SSTL, UK

Rapporteur: S. Mostert, SCS, South Africa

Kent-Ridge 1 – A high performance small satellite carrying a novel hyper spectral instrument operating in the VNIR and SWIR range

IAA-B10-0401

Segert, T., BST, Germany

Hiang, G.C., Chaing, C.K., Swee-Ping, Y., Nat. Univ. of Singapur, Singapur

Small satellites for vessels and airplanes monitoring in JSC “Russian Space Systems”: status and perspectives

IAA-B10-0402

Romanov, A.A., Romanov, A.A., Tyolin, A.E. ISC Rss, Russia

Microsatellite "Chibis-M" (25.01.2012 – 15.10.2014) Results, lessons and prospects

IAA-B10-0808P

Klimov, S.I., Zeleyi, L.M., Angarov, V.N., Nazarov, V.N., Gotlib, V.M., Eismont, N.A.,

Dolgonosov, M.S., Karedin, V.N., Novikov, D.I., Vavilov, D.L., IKI, Russia

Pansayuk, M.I., SINP, Russia, Korepanov, V.E., Dudkin, D.F., NANU-NKAU, Ukraine,

Ferneck, Cs., Szegedi, P., Space Res. Group of Eötvös Univ., Hungary

TRUTHS-Lite: A Microsatellite Based Climate Benchmark Mission

IAA-B10-0404

Underwood, C., Univ. of Surrey, UK,

Fox, N., Gorrone, J., NPL, UK

Session 5: Special Aspects

Tuesday, April 21, 2015, 10:50 - 12:10

Chair: L.J. Smith, Leuphana Univ., Germany

Rapporteur: W.Halle, DLR, Germany

Production engineering a low cost video imaging constellation

IAA-B10-0501

Da Silva Curiel, A., Cawthorne, A., Penson, J., Sills, L., Sweeting, M., SSTL, UK

Update on legal and policy aspects of small satellites: Sustainability, frequency interference, registration and ownership

IAA-B10-0502

Smith, L.J., Leuphana Univ., Germany

Key breakthroughs for future small satellite Earth Observation systems

IAA-B10-0503

Kuiper, H., TU-Delft, The Netherlands

Achieving Successful End-Of-Life Disposal in LEO

IAA-B10-0504

Krag, H., Lemmens, S., Bastida, B., ESA/ESOC, Germany

Metz, M., DLR, Germany

Session 6: Student Conference (special) Tuesday, April 21, 2015, 13:30 - 15:00

Chair: M. d'Errico, Univ of Naples, Italy

Rapporteur: R. Laufer, Baylor Univ. Waco, USA

- A Regional Microsatellite Constellation with Electric Propulsion in Support of Tuscan Agriculture** IAA-B10-0601
A. Papa, A. Bechi, S. Gregucci, P. Pergola, S. Marcuccio, Univ. of Pisa, Italy
- In-Orbit Performance of the Pico-Satellite UWE-3** IAA-B10-0602
P. Bangert, S. Busch, K. Schilling, Univ. Würzburg, Germany
- A novel Stare-based technique for ice edge sensing using spaceborne GNSS reflectometry** IAA-B10-0603
J. Tye, Univ. of Surrey, UK
- Implementation of the Fault Tolerance Module in PHOENIX CubeSat** IAA-B10-0604
Chen, L.-W., Huang, T.-C., Nat. Cheng Kun Univ., Taiwan
- CubeSat-sized Re-entry Capsule MIRKA2** IAA-B10-0605
Ehresmann, M., Behnke, A., Saumann, J.-P., Tietz, R., Franz, J. Galla, D., Grabi, F., Koller, M., Rieser, J., Schöneich, V., Seiler, H., Siedorf, M., Univ. Stuttgart, Germany
- HIRES: Holland's Intelligence, Reconnaissance, and Earth Surveillance** IAA-B10-0606
B.J. Beckers, M.R. Haneveer, E.J. Hekma, J.B. van Ingen, D. Jimenez Lluva, D.J. Kok, A. Krikken, J.W. Lopes Barreto, P. Mesgari, L.Z.F. van Rossum, A. Cervone, Ir. H. Khanbareh, T. Watts, TU-Delft, Netherlands

Session 7: Education Tuesday, April 21, 2015, 15:20 - 16:40

Chair: E. Gill, TU Delft, The Netherlands

Rapporteur: O. Koudelka, Univ. Graz, Austria

- Results and Lessons Learned from the CubeSat Mission First-MOVE** IAA-B10-0701
M. Langer, C. Olthoff, J. Harder, A. Hoehn, U. Walter, TUM, Germany
- CubeSat Atmospheric Probe for Education (CAPE)** IAA-B10-0702
Pagan, A.S., Herdrich, G., Univ. Stuttgart, Germany
Laufer, R., Baylor University, USA
- The ESEO mission: current status and achievements** IAA-B10-0703
Bruzzi, D., Melega, N., Tortora, P., ALMA Space, Italy
Giuletti, F., Galeone, P., Univ. Bologna, Italy
De Luca, A., ESA ESTEC
- PlanetaryProbe Design Workshop: Collaboration Hands-On Small Satellite Training for Engineering Students** IAA-B10-0706P
Laufer, R., Baylor Univ., USA
Herdrich, G., Pagan, A.S S., Univ. Stuttgart, Germany

Poster Session I Tuesday, April 21, 2015, 16:40 - 17:40

- Current situation in Russian space industry and Russian launch market** IAA-B10-0105P
Gubiev, A., CST, Russia
- An Overview of Topology Control Algorithms in Distributed Satellite System** IAA-B10-0205P
Chen, Q., HIT, China
Zhang, J., EPFL, Switzerland
- Small satellite missions in developing countries, EgyptSat-1 programmatic aspects and lessons learned** IAA-B10-0206P
Argoun, M., Kairo Univ., Egypt

Poster Session I (cont.)

NetSat-4G: A Four Nano-Satellite Formation for Global Geomagnetic Gradiometry Nogueira, T., Schilling, K., Univ. Würzburg, Germany	IAA-B10-0207P
A Small Satellite Mission for ISS Debris Collision Avoidance Vina, L., Heimann, A., Huang, T.-C., Wu, S.-H., Juang, J.-C., National Cheng Kung University, Taiwan	IAA-B10-0208P
6DoF GNC simulation framework for multiple small satellites using COSMOS Nunes, M. A., Sorensen, T. C., Pilger, E. J., Univ of Hawaii, USA	IAA-B10-0209P
Dhruva-1: Jump starting India's Satellite Industry with Earth Observation Narayan, P. N., Sanjay, S. N., Abishek R., Dhruva Space, India	IAA-B10-0210P
A systems architecture approach starting with Optical Telescope Assembly choices for small earth observation satellites Westerhoff, T., Schott AG, Germany Hull, T., Univ. of New Mexiko, USA	IAA-B10-0305P
Receiver hybrid working regime for AIS mission small satellite Kuznetzov, A.M., Romanov, A. A., Romanov, A.A., JSC, Russia	IAA-B10-0306P
Process Development of Aspheric Metallic Mirrors for a High Resolution Optical Payload for Earth Observation Arcangeli, L., Mazzolani, R., Pedrali, M., Spinelli, S., MLT, Italy	IAA-B10-0307P
A Small Satellite Radar Earth Observation Mission with a Large Deployable Antenna Nicolai, A., Eberwein, R. Raschke, C., Astro und Feinwerktechnik, Germany Schmidt, T., Zajac, K., HTS GmbH, Germany Reichmann, O., Lori, M., Schmidt, J., Ihle, A., HPS GmbH, Germany Schraml, K., RWTH Aachen, Germany	IAA-B10-0308P
PanelSAR, an affordable small satellite miniSAR radar in support of infrastructure surveillance van Duijn, P., SSBV, The Netherlands	IAA-B10-0310P
An idea to create a satellite with the capability to rescue Phuong, V. V., VNNSC, Vietnam	IAA-B10-0507P
Optimization of a Star Recognition Algorithm for Miniaturized Star Sensors Fischer, W., Balagurin, O., Kayal, H., Univ. Würzburg, Germany	IAA-B10-0705P
The Validation of TET-1 Fire Observations Borg, E., Daedelow, H., Fichtelmann, B., Jahnke, D., Renke, F., Schiller, C., DLR, Germany	IAA-B10-0805P
Initial attitude Acquisition In-Orbit Results from ALSAT-2A Remote Sensing Satellite Benzeniar, H., Kameche, M., NSA, Algeria	IAA-B10-0806P
In-Orbit Results of ALSAT-2A Ground-Satellite Communications Kameche, M., Bouanani, N., Henna, H., Boualem, N., Lassakeur, A., Aroui, A., Messaoudi, N., Moulay, M., Derghal, F., Benzeniar, H., NSA, Algeria	IAA-B10-0807P
A seamless mass-memory integration with the CCSDS recommended standards for an optimal Small-Satellite communication subsystem Tsamsakizoglou, M., Stralsjö, S., Brodin, P., AAC Microtec, Sweden Greif, F., DLR, Germany	IAA-B10-0905P
High level software development for a standalone data processing and memory unit for a microsatellite hyperspectral payload Domse, N., Horch, C., Schäfer, F., Buhl, M., EMI and BST, Germany	IAA-B10-0906P
MODULAR GROUND SUPPORT SOFTWARE FOR NANOSATELLITES Werner, P., Starke, M., Gordon, K., Graf, A., Barschke, M. TU-Berlin, Germany	IAA-B10-0907P

Poster Session I (cont.)

- VIDANA – A Distributed Data Management Approach** IAA-B10-0908P
Walter, T., Hilgarth, A., Mikschl, T., Montenegro, S., TU-Würzburg, Germany
- SSCAM: Micro-satellite platform for Earth observation** IAA-B10-1005P
Leomanni, M., Garulli, A., Giannitripani, a., Univ. Siena, Italy.,
Pergola, P., Petroni, F., SITAEL, Italy
Scortecci, F., Aerospazio Tecnologie, Italy,
- A Service and Deorbit Module for CubeSat Applications** IAA-B10-1006P
Schöneich, V., Grabi, F., Seiler, H., Baumann, J.-P., Ehresmann, M., Franz, J., Galla,
D. Koller, M., Rieser, J., Siedorf, M., Tietz, R., Pagan, A. S., Herdrich, G. Univ. Stuttgart, Germany
Laufer, R., Baylor Univ., USA
- CHEOPS mission: A low cost platform for Science** IAA-B10-1007P
Borges, A., Montes, T., Cortes, D., Airbus, Spain
- Flight Model Development of the Micro-satellite TSUBAME** IAA-B10-1008P
Matsushita, M., Kawajiri, S., Nagasu, T., Kim, E., Miyasato, K., Suzuki, S., Tawara, K., Ohta, M.,
Ting, H., Kurita, S., Arimoto, M., Yatsu, Y., Moriyama, N., Kimura, S., Matunaga, S., JAXA, Japan
- International Academic Platform for Space Mission Analysis and Design** IAA-B10-1009P
Heimann, A., Miao, J.-J., Juang, J.-C., NCKU, Taiwan
- Emerging Small Satellite Earth Observation Technologies at the Space Flight Laboratory** IAA-B10-1010P
Ibrahim, N. S., Grocott, S. C. O. , Zee, R. E., Univ. Toronto, Canada
- Universal Small Satellite Platform BIROS suitable for different payload accommodations** IAA-B10-1011P
Halle, W., Amigues, X., Kotz, A., Schultz, C., Bärwald, W., DLR, Germany
- PEASSS - a new design approach for success of cubesat missions** IAA-B10-1012P
Celotti, L., Solyga, M., Pons Mora, I., AST, Germany

Session 8: Lessons Learned

Wednesday, April 22, 2015, 09:00 - 10:30

Chair: J. Esper, NASA, USA

Rapporteur: Z. Yoon, TU-Berlin, Germany

- First results from the UK TechDemoSat-1** IAA-B10-0801
Da Silva Curiel, A., Liddle, D., O'Donovan, V., Unwin, M., Sweeting, M., SSTL, UK
- Results on verification and validation of OOV-TET1 multispectral camera observations within the FireBIRD project** IAA-B10-0802
Frauenberger, O., Lorenz, E., Terzibaschian, T., Halle, W., Paproth, C., Wohlfeil, J., Säuberlich, T.,
Mitchell, S., Borg, E., DLR, Germany
- Development of Miniaturised Radiation Environment Monitors for the TDS-1 Mission: MuREM/RM Flight Results** IAA-B10-0803
Underwood, C., Dyer, A., Hands, A., Ryden, K., Univ. Surrey, UK
Taylor, B., UCL, UK,
Rason, S., SSTL, UK
- First results and next steps in Kazakhstan Earth Observation missions in cooperation with SSTL** IAA-B10-0804
Ten, V., Murushkin, S., Lambert, H., Ghalam LLP, Kazakhstan
Da Silva Curiel, A., King, D., Kadhem, H., Taylor, G., Sweeting, M., SSTL, UK

Session 9: Software

Wednesday, April 22, 2015, 10:50 - 12:10

Chair: S. Montenegro, TU-Würzburg, Germany

Rapporteur: H. Kuiper, TU-Delft, Netherlands

Increasing computing performance of ADCS subsystems in small satellites for earth observation IAA-B10-0901
Carvajal Godinez, J., TU-Delft, Netherlands

**PRACTICAL EXPERIENCES IN USING CONTINUOUS INTEGRATION
WITHIN THE DEVELOPMENT OF NANOSATELLITE SOFTWARE** IAA-B10-0902
Gordon, K., Graf, A., Barschke, M. F., TU-Berlin, Germany

Software Evolution from TET-1 to Eu:CROPIS IAA-B10-0903
Maibaum, O., Heidecker, A., Gerndt, A., DLR, Germany

Resource sharing, communication and control for fractionated spacecraft (YETE) IAA-B10-0904
Kempf, F., Schilling, K., Montenegro, S., Mikschl, T., Hilgarth, A., TU-Würzburg, Germany
Tzschichholz, T., Zentrum f. Telematik, Germany

Session 10: New Platforms

Wednesday, April 22, 2015, 13:30 - 15:00

Chair: A. Rogers, JHU, USA

Rapporteur: V. V. Phuong, VNSC, Vietnam

ESA's OPS-SAT Nanosatellite Mission – A Laboratory in the Sky IAA-B10-1001
Koudelka, O., Univ. Graz, Austria
Wittig, M., MEW Aerospace, Germany
Evans, D., ESA

**InnoSat and MATS – An Ingenious Spacecraft Platform applied to
Mesospheric Tomography and Spectroscopy** IAA-B10-1002
Larsson, N., Lilja, R., OHB, Sweden
Örth, M., Södermalm, S., AAC Microtec, Sweden
Köhler, J., Lindberg, R., Nat. Space Board, Sweden
Gumbel, J., Stockholm Univ., Sweden

SMALL SATELLITE PLATFORM MS-2 IAA-B10-1003
Halaburda, D., Kavun, V., Maslyey, V., Moskalov, S., Shovkoplyas, Yu., YYSDO, Ukraine

The ESAIL programme IAA-B10-1003
Buursink, J., Rouesnel, F., LuxSpace, Luxemburg

Session 11: Propulsion

Wednesday, April 22, 2015, 15:20 - 16:40

Chair: I. Belokonov, SSAU, Russia

Rapporteur: H. Adirim, Aerospace Innovations Germany

**Adaptation and Optimization of the RIT- μ X miniaturized Ion Propulsion System
for small Satellites** IAA-B10-1101
Leiter, H. J., Altmann, C., Lauer, D., Kukies, R., Airbus DS, Germany

Electric Propulsion Microsatellites in a Versatile Constellation for Remote Sensing Applications IAA-B10-1102
Gregucci, S., Pergola, P., Alta SpA, Italy
Papa, A., Maruccio, S., Univ.Pisa, Italy

MEPS: A Low Power Electric Propulsion System for Small Satellites IAA-B10-1103
Misuri, T., Alta SpA, Italy, Waldvogel B., RAFAEL, Israel,
Di Cara, D., ESA/ESTEC

Development and testing of a milli-Newton high test peroxide monopropellant thruster IAA-B10-1104
Cocomazzi, R., ALMA Space, Italy, Margesin, B., Fondazione B. Kessler, Italy
Modenini, D., Tortora, P., Univ. Bologna, Italy

- Validation of a Low-Thrust Spacecraft Simulator for Earth Observation Missions** IAA-B10-1105P
Pergola, P., Gregucci, S., Alta SpA, Italy
Bechi, A., Marcuccio, S., Univ. Pisa, Italy
- Innovative Modular Propulsion Systems for Small Satellites** IAA-B10-1106P
Adirim, H., Kreil, M., Kron, M., Mitrofanov, A., Aerospace Innovation, Germany
Halle, W., Lieder, M., Bärwald, W., Babben, S., Terzibaschian, T., DLR, Germany
- Verification of an Extendable Boom System for Nanosatellite Applications in Microgravity Environment** IAA-B10-1205P
Barschke, M., Weise, J., TU-Berlin, Germany
- The “off the shelf” VES16 battery range** IAA-B10-1206P
Carre, A., Remy, S., Borthomieu, Y., Saft, France
- Pre-Mission Analysis and Architecture Design of Electrical Power Subsystem for 2U CubeSat** IAA-B10-1207P
Sheng, H. W., NCKU, Taiwan
- ESEO Power Management Board** IAA-B10-1208P
Tambini, A., Antonini, F., Tortora, P., Almaspace, Italy
- CHEOPS thermo-mechanical architecture; downscaling SEOSAT platform** IAA-B10-1209P
Canay, M., Melendo, I., Airbus DS, Spain
- Reconfigurable cryptographic subsystem for Cubesats** IAA-B10-1210P
Domse, N., Weber, M., Schäfer, F., EMI, Germany
- PREDICTION OF THE CHARACTERISTICS OF THE BATTERIES OF SMALL SATELLITES** IAA-B10-1211P
Bezruchko, K. V., Davodov, A. O., Kharchenko, A. A., Nat. Aerosp. Univ., Ukraine
- A NOVEL COMMAND AND DATA HANDLING SUBSYSTEM FOR THE DELFFI MISSION** IAA-B10-1212P
Liu, G., Gou, J., Bouwmeester, J., Schoemaker, R., Sundaramoorthy, P., TU-Delft, Netherland
- Design of Satellite Passive Thermal Control System Using Inverse Solution of Governing Equations** IAA-B10-1213P
Akbarbeyglu, H., Ebrahimi, A., Khaniki, H. B., Univ. of Technology, Iran
- THE STRUCTURAL AND THERMAL DESIGN AND ANALYSIS OF THE SEAM CUBESAT** IAA-B10-1214P
Zimmerhagl, P., Langer, M., TU-München, Germany
Fagerudd, J., Ivchenko, N., Tibert, G., Royal Inst. Of Tachnology, Sweden
- LINK ANALYSIS FOR GEOSTATIONARY SATELLITE IN KA BAND** IAA-B10-1305P
Himeur, A., CDS/ASAL, Algeria
- A design method for the control system in the reuse of retired spacecraft antenna via linear matrix inequality approach** IAA-B10-1306P
Xiaoyu, L., Jinxiu, Z., Xibin, C., Harbin Inst. Of Tech., China
- Russian Satellite System Providing M2m Services** IAA-B10-1307P
Kuzovnikov, A., Domanova, I., Danilov, I., JSC, Russia
- Synchronously tracking multi-satellite based on spectrum monitoring using USRP** IAA-B10-1308P
Tsai, C.-H., Teng, A.-C., NCKU, Taiwan
- Dual-Channel High Data Rate X-Band Transmitter for Low Earth Orbit Satellites** IAA-B10-1309P
Öncü, E., Tutgun, R., Özen, O. E., Dudak, C., Karakus, K., Öruk, A., Baltaci, A., Space Tech. Res. Inst., Turkey
- Practical Development of Future Ground Infrastructure for Satellite Constellations** IAA-B10-1310P
Schulze, R., Stoll, E., Haylock, T., Shahid, K., Blackbridge, Germany

Poster Session II (cont.)

- Evaluation of a delay tolerant networking approach for inter-satellite-communication in LEO for time sensitive traffic monitoring** IAA-B10-1311P
Freimann, A., Kleinschrodt, A., Schilling, K., Univ. Würzburg, Germany
Stephan, H., Scheuermann, B., HU-Berlin, Germany
- OSIRIS Payload on DLR's BiROS Satellite** IAA-B10-1312P
Schmidt, C., Brechtelsbauer, M., Rein, F., Fuchs, C., Lauterbach, A., Krutz, D., Sebastian, I.,
Lieder, M., Schrandt, F., DLR, Germany
- A Quad-channel UHF Transceiver for TUBiX20** IAA-B10-1313P
Baumann, F., Brieß, K., TU-Berlin, Germany
- Real-time precise orbit determination of the ESA ESEO spacecraft** IAA-B10-1405P
Avanzi, A., Locarini, A., Tortora, P., Almaspace, Italy
- Control force and torque sharing method for spacecraft cluster based on electromagnetic force** IAA-B10-1406P
Hu, M., Fan, L., Wang, R., Academy of Equipment, China
- Angular motion synthesis for remote sensing satellite** IAA-B10-1407P
Machtakov, Y.,
- Overview of AOCS for Nanosatellites and Expected Short Term Evolution** IAA-B10-1408P
De Angelis, E. L., Giuletti, F., Modenini, F., Serrano, D., Tortora, P., Univ. Bologna, Italy
- Adaptation of an Earth observation AOCS to an exoplanet characterization mission** IAA-B10-1409P
Lopez-Pina, A., Pizarro, A., Torres, L., Airbus DS, Spain
- Performance evaluation of the miniature attitude control system iADCS** IAA-B10-1411P
Raghuprakash, S., BST, Germany
LeDang, H., Engelen, S., Monna, B., Hyperion Technologies, Netherlands
- Development of Total Orbital Real-time Attitude control Simulator for Small Satellites** IAA-B10-1412P
Toraya, T., Suzuki, Y., Hosoda, T., Sambe, M., Nishikori, S., Hoshika, M., Ogawa, T.,
Katayama, M., Mizutamari, H., Mitsubishi Precision Co., Japan
Aso, S., Kyushu Univ., Japan,
Yasaka, T., Sakurai, A., QPS Institute, Japan
- A New Actuator System for High Agility Demonstration with the Small Satellite BIROS** IAA-B10-1413P
Raschke, C., Terzibaschian, T., Halle, W., DLR, Germany

Session 12: Subsystems

Thursday, April 23, 2015, 09:00 - 10:30

Chair: K. Brieß, TU-Berlin, Germany

Rapporteur: R. Kawashima, UNISEC, Japan

- A Reliable On-board Data Handling System Design for Microsatellites** IAA-B10-1201
Zhu, L., Yu, X., Liang, J., Zhou, J., Bai, B., Northwestern Polytechnical Univ., China
- Micro Earth Sensor with COTS parts for Commercial Air Conditioner** IAA-B10-1202
Hirako, K., Omoto T., Meisei Electric Co., Japan
Tachahira, H., Takai, M., JAXA, Japan
Imaizumi, O., Advanced Engineering Services, Japan
- Will the future of hirel components be pure SCOTS or only SCOTisch** IAA-B10-1203
Leijtens, J., Lens Research, Netherlands
- Appropriate Selection of Radiator Surface Finish for Optimal Design of Satellite Thermal Control Subsystem** IAA-B10-1204
Malekzadeh Fard, K., Akbarbeyglou, H., Sharavi, M., Univ. of Technology, Iran

***Session 13: Communication and
Ground Segment***

Thursday, April 23, 2015, 10:50 - 12:10

Chair: R. Laufer, Baylor Univ., USA

Rapporteur: A. Rogers, JHU, USA

- CCSDS Mission Operations services API on OPS-SAT** IAA-B10-1301
Coelho, C., TU-Graz & ESA
- Experiment of 384 Mbps downlink from 50-kg class satellite** IAA-B10-1302
Fukami, T., Watanabe, H., Univ. Tokyo, Saito, H., Tomiki, A., Mizuno, T., JAXA, Iwakiri, N.,
NIICT, Shigeta, O., Nunomura, H., AI Electronics, Kojima, K., Shinke, T., Addnics Corp., Japan
- Spectral and power efficient S-band TM/Data transmitter for small satellite applications** IAA-B10-1303
Solymosi, J., Hetenyi, T., Negyesi, G., Folkmann, V., BHE, Hungary
- Buy or Build – An Analysis of Ground Station Concepts for Small Satellite Missions** IAA-B10-1304
Schulte, J., Eilertsen, B., Krynitz, M., Kongsberg Satellite Services, Norway

Session 14: AOCS

Thursday, April 23, 2015, 13:30 - 15:00

Chair: I. Belokonov, SSAU, Russia

Rapporteur: T. Terzibaschian, DLR, Germany

- Aerodynamically stabilized nanosatellite: Problems of design** IAA-B10-1401
Belokonov, I. V. , Timbai, I. A., Samara State Aerospace Univ., Russia
- Pointing Accuracy and Stability Analysis of CMG Control for Nano-satellite “TSUBAME”** IAA-B10-1402
Kawajiri, S., Ting, H., Matsushita, M., Tawara, K., Matunaga, S., Tokyo Institute of Tech., Japan
- Sliding mode control for three-axis magnetic attitude** IAA-B10-1403
Roldugin, D., Ovchinnikov, M., Penkov, V., Tkachev, S., Mashtakov, Y., Academy of Science, Russia
- Attitude estimation, control and momentum dumping: a case study for CONASAT** IAA-B10-1404
Bringhenti, P. M., Carrara, V., Kuga, H. K., INPE, Brasil

Session 15: Missions III

Thursday, April 23, 2015, 15:20 - 16:40

Chair: C. Underwood, Univ. of Surrey, UK

Rapporteur: W.Halle, DLR, Germany

- ESTCube-1 student satellite in-orbit experience and lessons learned** IAA-B10-1501
Slavinskis, A., Kuuste, H., Ilbis, E., Pajusalu, M., Eenmäe, T., Sünter, I., Laizans, K., Ehrpais, H.,
Liias, P., Kulu, E., Viru, J., Kalde, J., Kvell, U., Kütt, J., Kahn, K., Lätt, S., Envall, J., Toivanen, P., Polkko, J.,
Janhunen, P., Rosta, R., Vendt, R., Allik, V., Noorma, M., Univ. Tartu & Tallinn, Estonia,
Finnish Met. Institute, Finland, DLR, Germany,
- NUCLEAR POWER STATIONS WASTE MONITORING FROM SPACE** IAA-B10-1103
Tumanov, M., Teselkin, S, NIIEM, Karelin, A., TSNIIMASH,, Russia
- Microsatellite constellation for Earth Observation in the Thermal Infrared Region** IAA-B10-1503
Bacci di Capaci, F., Melega, N., Tambini, A., Fabbri, V., Cinarelli, D., ALMASpace, Italy
- Greenhouse Gas Monitoring with small Satellites at Airbus Defence & Space** IAA-B10-1504
Münzenmayer, R., Airbus DS, Germany

R. Sandau, IAA Symposium Co-Chair

E. Gill, IAA Symposium Chief Rapporteur

AWARDS

Best Paper Presentation Award

Best Poster Presentation Award

STUDENT PRIZE PAPER COMPETITION

Final see Session 06 (Special)

The awards for the winners of the Student Prize Paper Competition will be presented during the IAA Dinner, Tuesday, April 21, 2015, 19:00 at Hotel de Rome.

A Special Thanks to the Students Paper Evaluation Committee:

Leon Alkalai, NASA/JPL, USA

Klaus Brieß, TU Berlin, Germany

Jaime Esper, NASA/GSFC, USA

Sias Mostert, Space Commercial Services, Stellenbosch, South Africa

Shinichi Nakasuka, University of Tokyo, Japan

Michael Ovchinnikov, Keldysh Institute of Applied Mathematics, Russia

Rainer Sandau, IAA, Germany

James Torley, University of Colorado at Colorado Springs, USA

Craig Underwood, SSC, University of Surrey, UK

Best Poster Award

Which is the best in your opinion?

Just write the number of the poster in the box below and drop this note into the ballot-box.

The best poster presented during **Poster Session 1** is

IAA-B10-

P

The best Poster and best Paper (chosen by the conference committee) will be awarded on Thursday, April 23, 2015, 16:40

Best Poster Award

Which is the best in your opinion?

Just write the number of the poster in the box below and drop this note into the ballot-box.

The best poster presented during **Poster Session 2** is

IAA-B10-

P

The best Poster and best Paper (chosen by the conference committee) will be awarded on Thursday, April 23, 2015, 16:40

Symposium Venue

The symposium will take place in the Berlin-Brandenburgische Akademie der Wissenschaften (BBAW), Jägerstraße 22/23, 10117 Berlin (mail address), **entrance from Markgrafenstraße 38 (Gendarmenmarkt)**.

Underground station: Stadtmitte (U2, U6).

More information: www.bbaw.de

On-site Registration

The Registration Desk will be set up in the symposium room foyer of the BBAW.

It will be open:

April 19, Sunday	16:00-20:00
April 20, Monday – April 23, 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 Desk in the Symposium room foyer of the BBAW
Phone +49 (0)30 20370422
- Chairpersons' and Rapporteurs' meeting room: room 226 (2nd floor),
Meeting of Session Chairpersons and Rapporteurs at 08:30 each day for introduction to their duties and latest changes.
- Authors are requested to arrive at the session room 10 minutes before the start of the session in order to meet the session chairperson for final preparations. Please bring your short biographies.

Publication of Papers

A proceedings CD/DVD will be dispatched after the symposium (including all submitted 8-page Final Papers).

Messages

A message center will be located in the registration area at the BBAW.

The lecture room will be equipped with wireless internet access (hot spot).

Lunch, Coffee Breaks

The registration fee of the participants covers 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 19, Sunday 19:00 – 20:00	Get-Together (included in the registration fee)	Berlin-Brandenburgische Akademie der Wissenschaften (BBAW) www.bbaw.de
April 20, Monday 19:00 – 23:00 (meeting point BBAW)	Reception (included in the registration fee)	Naturkundemuseum (Invalidenstr. 43, 10115 Berlin) www.naturkundemuseum-berlin.de
April 21, Tuesday 19:00 – 23:00 (meeting point BBAW)	IAA-Dinner €120/person	Hotel de Rome Behrensstr. 37, 10117 Berlin https://www.roccofortehotels.com/de/hotels-and-resorts/hotel-de-rome/
April 22, Wednesday 20:00 – 22:00	Concert:	Konzerthaus Berlin www.konzerthaus-berlin.de

Excursion on Friday, April 24 (€40,00 per Person)

08:00 -19:00

Visit to ***historical technical Museum at Peenemünde***

The A4 rocket, which was developed in [Peenemünde](#) can be considered the prototype of all later booster rockets, both military and civil. It is the emblem of modern rocketry, whose humanitarian and utopian roots stand in stark contrast to the suffering of its victims. There are few sites where the gains and risks of technological progress are as intimately intertwined as at Peenemünde. The Peenemünde Historical Technical Museum attempts to explore and address the ambivalence of this technological development.



Departure: 08:00 - Boarding the bus in front of BBAW

Sightseeing and Tours

During the symposium local sightseeing tours and tours to Potsdam with an English-speaking guide will be arranged on demand by ConTour GmbH for accompanying persons. If you wish to order tickets for other events, concerts or theatres, please contact the concierge of the Hilton Hotel close to the BBAW or ask the hostesses on site at the Symposium Registration Desk.

Sightseeing Tour in Berlin (by bus) – daily

Duration: 3 hours, German- and English-speaking guided

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”. Please note: This bus tour ends at Kurfürstendamm. You’ll have to organize the way back to your hotel or to BBAW by yourself.

Meeting place: Main Entrance of Hilton Hotel (Gendarmenmarkt)
Departure: 9:15 (and 13:15 only on Friday, Saturday, Sunday)
Fee: €20.00/person

City Circle Tour (by bus) – daily

Every 15 minutes - starting from 10:45 up to 15:45 - a sightseeing tour bus will pick you up at Gendarmenmarkt close to the Berlin-Brandenburgische Akademie der Wissenschaften. There are 16 bus stops at the most beautiful places in the town, where you can leave the bus and discover the town by your own as long as you want. The next bus will take you off and bring you to the next stop and at last home. Information in many languages is available at the sightseeing busses by headsets. Please note: This ticket is valid for 2 days.

Meeting place: Station Gendarmenmarkt (for the clearly defined place please ask the hostesses at the Symposium Registration Desk or the Concierge in the Hilton Hotel)
Departure: 10:00 – 15:45
Fee: €22.00/person

River Cruise on Spree River

Duration: 1 hour, German- and English-speaking guided (on demand)

The ride gives a short impression about the historic centre of the city and the area of the Parliament’s buildings, examples of new architecture of Berlin.

Departure: Station Nikolaiviertel (Stern - und Kreisschiffahrt)
Every 30 minutes between 10:00 and 18:30
Fee: €11.00/person

Tour to Potsdam (by bus) – daily except Monday

Duration: approx. 4 hours, German- and English-speaking guided

The rococo Palace of Sanssouci became the favourite refuge of Prussia’s greatest King, Friedrich II. Here, the Philosopher of Sanssouci entertained some of the most educated men of his time, among them the French poet Voltaire who was a frequent guest over many years. Our excursion takes you on a tour of the famous Sanssouci Palaces and the magnificent gardens.

Meeting place: Berlin Hilton
Departure: 9:15 and 13:15 (last departure only Saturday and Sunday)
Fee: €39.00/person

10th IAA Symposium on Small Satellites for Earth Observation	MONDAY April 20, 2015	TUESDAY April 21, 2015	WEDNESDAY April 22, 2015	THURSDAY April 23, 2015	FRIDAY April 24, 2015
09:00 - 10:30 <i>Papers</i>	09:00 - 09:15 Welcome and Greetings	Session 04 Missions II	Session 08 Lessons Learned	Session 12 Subsystems	Visit to: 08:00 - 19:00 Historical Site of Peenemünde
	09:15 - 09:45 Keynote				
10:30 - 10:50 Coffee Break	09:45 - 10:30 Break and Press Conference				
10:50 - 12:10 <i>Papers</i>	10:30 - 12:20 Session 01 Programmatics	Session 05 Special Aspects	Session 09 Software	Session 13 Communication & Ground Segment	
12:10 - 13:30 Lunch Break	Lunch Break 12:20 - 13:30				
13:30 - 15:00 <i>Papers</i>	Session 02 Missions I	Session 06 (Special) Student Conference	Session 10 New Platforms	Session 14 AOCS	
15:00 - 15:20 Coffee Break					
15:20 - 16:40 <i>Papers</i>	Session 03 Instruments	Session 07 Education	Session 11 Propulsion	Session 15 IMissions III	
16:40 - 17:40 <i>Panel/Poster</i>	Panel Discussion Entrepreneurship in Space	Session Poster I	Session Poster II	Symposium Summary Awards	
SUNDAY, April 19, 2015 Get-Together (19:00 - 20:00) BBAW	Reception (19:00-23:00) Naturkundemuseum	IAA-Dinner (19:00-23:00) Hotel de Rome	Concerts Konzerthaus Berlin		

Timetable

