

14th IAA Symposium on Small Satellites for Earth System Observation

Tentative Program

March 15, 2023

Symposium Schedule

Sunday, May 7, 2023

16:00-20:00 **Registration**
19:00-20:00 **Get-Together**

Monday, May 8, 2023

- 08:00-18:00 **Registration**
- 09:00-09:30 **Welcome**
Prof. Dr.-Ing. Anke Kaysser-Pyzalla, Chair of Executive Board of DLR
Dr. Anna Christmann MdB,
Stephan Schwarz/Ulrike Gote, Berlin Senate
Dr. Stefan Franzke, Berlin Partner
- 09:30-10:00 **Keynote Address**
Kristina Nikolaus, OKAPI:Orbits GmbH
- 10:00-10:40 **Coffee Break**
- 10:40-12:20 **Session 1 – Programmatic**
Chairs:
E. Stoll, TU Berlin, Germany
A. Pagels-Kerp, DLR, Germany
- 12:20-13:30 **Lunch Break**
- 13:30-15:00 **Session 2 – Infrared Missions**
Chairs:
W. Halle, DLR, Germany
D. Oertel, Astro- und Feinwerktechnik GmbH, Germany
- 15:00-15:20 **Coffee Break**
- 15:20-16:40 **Session 3 – Space Situational Awareness**
Chairs:
S. Roemer, OHB Group, Germany
M. Hetscher, DLR, Germany
- 16:40-17:40 **Panel – Future of Launch Opportunities for Small Satellites**
- 18:30-22:30 **Reception**

Tuesday, May 9, 2023

- 09:00-10:30 **Session 4 – Missions I**
Chairs:
A. da Silva Curiel, Surrey Satellite Technology Ltd., UK
R. Sandau, IAA, Germany
- 10:30-10:50 **Coffee Break**
- 10:50-12:10 **Session 5 – Instruments**
Chairs:
L. Maresi, ESA, The Netherlands
J. Kuiper, TU Delft, The Netherlands
- 12:10-13:30 **Lunch Break**
- 13:30-15:00 **Session 6 – AOCS**
Chairs:
T. Terzibaschian, DLR, Germany
S. Grau, TU Berlin, Germany
- 15:00-15:20 **Coffee Break**
- 15:20-16:30 **Session 7 – Lessons Learned**
Chairs:
A. Rogers, Raytheon Intelligence & Space, USA
S. Roemer, OHB Group, Germany
- 16:40-17:40 **Poster Session I**
Chairs:
E. Stoll, TU Berlin, Germany
S. Grau, TU Berlin, Germany
- 19:00-22:00 **IAA Dinner**

Wednesday, May 10, 2023

09:00-10:30 **Session 8 – Formations and Constellations I**

Chairs:

E. Gill, TU Delft, The Netherlands

M. D'Errico, Università degli Studi della Campania Luigi Vanvitelli, Italy

10:30-10:50 **Coffee Break**

10:50-12:10 **Session 9 – Subsystems**

Chairs:

S. Klinkner, Universität Stuttgart, Germany

S. Grau, TU Berlin, Germany

12:10-13:30 **Lunch Break**

13:30-15:00 **Session 10 – Special Session: On-Board Machine Learning**

Chairs:

E. Gill, TU Delft, The Netherlands

E. Stoll, TU Berlin, Germany

15:00-15:20 **Coffee Break**

15:20-16:30 **Session 11 – Special Aspects I**

Chairs:

H. Kayal, Universität Würzburg, Germany

S. Mostert, SCS Aerospace Group, South Africa

16:40-17:40 **Poster Session II**

Chairs:

S. Grau, TU Berlin, Germany

E. Stoll, TU Berlin, Germany

Thursday, May 11, 2023

- 09:00-10:30 **Session 12 – Special Aspects II**
Chairs:
N. N.
J. Bouwmeester, TU Delft, The Netherlands
- 10:30-10:50 **Coffee Break**
- 10:50-12:10 **Session 13 – Formations and Constellations II**
Chairs:
E. Stoll, TU Berlin, Germany
K. Ben Larbi, TU Berlin, Germany
- 12:10-13:30 **Lunch Break**
- 13:30-15:00 **Session 14 – On-Board Processing**
Chairs:
S. Montenegro, Universität Würzburg, Germany
M. Esposito, cosine srl, The Netherlands
- 15:00-15:20 **Coffee Break**
- 15:20-16:30 **Session 15 – Missions II**
Chairs:
R. Laufer, Luleå University of Technology, Sweden
R. Sandau, IAA, Germany
- 16:40-17:40 **Symposium Summary**
Chairs:
E. Gill, TU Delft, The Netherlands
E. Stoll, TU Berlin, Germany
Chief Rapporteur:
A. Rogers, Raytheon Intelligence & Space, USA
- Awards**
Best Paper Presentations
Best Poster Presentations

Friday, May 12, 2023

- 09:00-13:00 **Excursion – Chair of Space Technology, TU Berlin**

Detailed Technical Program

Monday, May 08, 2023

Opening

Session 1 - Programmatic

Chair : Enrico Stoll, TU Berlin, Germany

Co-Chair : Anke Pagels-Kerp, DLR, Germany

Rapporteur : N.N.

Talks

- [IAA-B14-0101] A. Preci, "Small Satellites Initiative in Germany."
- [IAA-B14-0102] P. Ekweozoh, "Small Satellites for Sustainable Science and Development in Africa: Policy Perspectives."
- [IAA-B14-0103] A. da Silva Curiel, "Debunking spacecraft capabilities - a spacecraft buyers guide."
- [IAA-B14-0104] E. Lamboglia, "New Space SmallSats concepts, from programmatic to governance and sustainability benefits - the ESA perspective and lesson learnt."

Session 2 - Infrared Missions

Chair : Winfried Halle, DLR, Germany

Co-Chair : Dieter Oertel, Astro- und Feinwerktechnik GmbH, Germany

Rapporteur : N.N.

Talks

- [IAA-B14-0201] J. Bartholomäus, "Performance Analysis of the TUBIN Payload Suite for the Detection of High-Temperature Events in the Thermal Infrared Range."
- [IAA-B14-0202] R. Benvenuto, "HiVE, an agile microsatellite constellation for thermal infrared Earth observation enabling "more crop per drop"."
- [IAA-B14-0203] D. Oertel, "A Prospective Thermal InfraRed Small Satellite Constellation with Fast Revisit Times."
- [IAA-B14-0204] T. Maue, "Calibration of the multispectral MWIR payload of the ERNST microsatellite."

Session 3 - Space Situational Awareness

Chair : Stephan Roemer, OHB Group, Germany

Co-Chair : Matthias Hetscher, DLR, Germany

Rapporteur : Elizaveta Klioner, TU Berlin, Germany

Talks

- [IAA-B14-0301] M. Hoque, "A CubeSat mission for plasmasphere monitoring for space weather impact prediction."
- [IAA-B14-0302] S. Rowe, "The ESA Nanosatellites for D3S Phase 0-A Study – A Distributed Space-Weather Sensor System using Small Satellites."
- [IAA-B14-0303] C. Kepschull, "CASCADE – Coordination of collision avoidance maneuvers for constellation operators."
- [IAA-B14-0306] A. Vandenberghe, "DeDUST - Debris Detection Using Star Trackers."
- [IAA-B14-0307] S. Kazemi, "Enhancement of Orbit Prediction Accuracy using Transformer."

Panel - Future of Launch Opportunities for Small Satellites

Tuesday, May 09, 2023

Session 4 - Missions I

Chair : Alex da Silva Curiel, Surrey Satellite Technology Ltd., UK

Co-Chair : Rainer Sandau, IAA

Rapporteur : N.N.

Talks

- [IAA-B14-0401] I. Syniavskiy, "Aerosol-UA satellite mission for polarimetric study of aerosols in the atmosphere onboard YuzhSat platform."
- [IAA-B14-0402] M. Anger, "Radiation considerations for the Foresail-2 CubeSat mission to the Van-Allen belts."
- [IAA-B14-0403] A. Zegrar, "Forest Regeneration Assessment by Integrated Index and Remote Sensing in Semi Arid Land in the North West of Algeria."

- [IAA-B14-0404] N. Orger, "Multispectral camera payload to monitor orbital sunrise and sunset with LEOPARD 3U CubeSat – a technology demonstration mission for a lunar CubeSat."
- [IAA-B14-0405] M. Sosonkin, "Polarimetry of stratospheric aerosol on CubeSat satellite."

Session 5 - Instruments

Chair : Luca Maresi, ESA, The Netherlands

Co-Chair : Hans Kuiper, TU Delft, The Netherlands

Rapporteur : N.N.

Talks

- [IAA-B14-0501] I. Dornach, "In-lab Characterization of HYPSONS, a Novel Stereo Hyper spectral Observing System: Latest Results."
- [IAA-B14-0502] C. Serief, "On-orbit Calibration and Radiometric Performance of Alsat-1B Optical Imager over Four Years."
- [IAA-B14-0503] J. Bouwmeester, "Enabling Cost-effective High-resolution Earth Observation with Deployable Space Telescopes."
- [IAA-B14-0504] M. Corti, "A compact and rugged hyperspectral camera for Remote Sensing based on FT spectrometry."

Session 6 - AOCS

Chair : Thomas Terzibaschian, DLR, Germany

Co-Chair : Sebastian Grau, TU Berlin, Germany

Rapporteur : Elizaveta Klioner, TU Berlin, Germany

Talks

- [IAA-B14-0601] B. Jäger, "Optimal control methods for sequential slew maneuvers enabling target detection and observation on a microsatellite."
- [IAA-B14-0602] S. Hahn, "The ASTRO CL Star Tracker for Small Satellites and in a Stellar Gyro Configuration."
- [IAA-B14-0603] J. Leijtens, "Advent of the IBIS."
- [IAA-B14-0604] C. Vogt, "Technology demonstration of novel ferrofluidic systems as mission enablers."

Session 7 - Lessons Learned

Chair : Aaron Rogers, Raytheon Intelligence & Space, USA

Co-Chair : Stephan Roemer, OHB Group, Germany

Rapporteur : Toon Stolk, Kongsberg Defence & Aerospace, Norway

Talks

- [IAA-B14-0701] C. Jongléz, "ADCS performance assessment using payload cameras: lessons learned on the TechnoSat and TUBIN small satellite missions."
- [IAA-B14-0702] T. Saito, "Results and Lessons Learned from In-Orbit Thruster Control Demonstration of Microsatellite ALE-2 with a Small Propulsion System."
- [IAA-B14-0703] J. Freymuth, "RACCOON and SALSAT: A Payload for Cyber Security Applications and a Small Satellite mission for RF Spectrum Monitoring."
- [IAA-B14-0704] T. Segert, "N.N."

Poster Session I

Chair : Enrico Stoll, TU Berlin, Germany

Co-Chair : Sebastian Grau, TU Berlin, Germany

Rapporteur : N.N.

Posters

- [IAA-B14-0406P] T. Segert, "Examples of the LEOS-50 Platform."
- [IAA-B14-0407P] W. D. Munter, "AQUALIS: Affordable Quality Images from Space."
- [IAA-B14-0408P] M. Hoque, "A CubeSat mission for plasmasphere monitoring for space weather impact prediction."
- [IAA-B14-0409P] R. Huq, "Design of an Earth Observational CubeSat Payload using Hyperspectral Sensor Array and Inter-Orbital Hybrid Phased Array Communication System."
- [IAA-B14-0410P] B. Grefen, "Design of a chemical multi-purpose propulsion system for small satellites."
- [IAA-B14-0412P] K. Felemou, "First Small Satellite, Republic of Guinea - Study Phase."
- [IAA-B14-0413P] C. N. Peroy, "KvarkenSat: A joint Finnish-Swedish Nanosatellite to Create and Stimulate a Regional Space Economy Cluster."
- [IAA-B14-0414P] J. Bartholomäus, "From LEO to Venus: Readiness of the TUBiX20 Platform for Interplanetary Missions."

- [IAA-B14-0415P] M. Purio, "In-Orbit Results of a Commercially-of-the-Shelf Imaging Payload for BIRDS-4 1U CubeSat Constellation."
- [IAA-B14-0416P] M. Pupkov, "Observation of near-Earth objects by a small spacecraft located in the vicinity of the libration point."
- [IAA-B14-0505P] A. Ray, "GNSS Reflectometry Sensors for Micro and Nano Satellites."
- [IAA-B14-0506P] G. Seth, "System Design of MIMO based F-Scan SAR at Ka Band."
- [IAA-B14-0508P] P. Chinchilla, "DRAGO: compact uncooled cameras for Earth observation from space."
- [IAA-B14-0509P] W. Jordaan, "Towards payload-in-loop for improved earth observation efficiency."
- [IAA-B14-0510P] N. Singh, "C-Band Frequency Generator for Space-borne SAR."
- [IAA-B14-0511P] J. Murcia, "Orbit Selection for the RaioSat Mission using Lightning Flashes Simulation over the Brazilian Territory."
- [IAA-B14-0605P] R. V. de Putte, "Development of an attitude fusing library for star trackers."
- [IAA-B14-0606P] T. Kaiser, "Attitude-independent Calibration of Magnetometers in Orbit using Particle Swarm Optimization."
- [IAA-B14-0607P] C. Liman, "Using Shape Descriptors for Star Identification."
- [IAA-B14-0608P] H. Villar, "Controlled Atmospheric Reentry Phase Modeled in Six Degrees of Freedom."
- [IAA-B14-0609P] T. Baumann, "Integrated Attitude Determination and Control Test-Setup for Model-, Software- and Hardware-In-The-Loop Testing for the InnoCube Mission."
- [IAA-B14-0610P] K. Djebko, "Learning attitude control."
- [IAA-B14-0611P] J. Koch, "Multi-Domain Simulation Tools for Mission Analysis and Correlation."
- [IAA-B14-0612P] S. Carletta, "Experimental characterization of a Flux Pinning Interface for the control of a satellite formation."
- [IAA-B14-0613P] M. Hu, "Control strategy optimization for large-scale low Earth orbit satellite constellation based on continuous low thrust."

Wednesday, May 10, 2023

Session 8 - Formations and Constellations I

Chair : Eberhard Gill, TU Delft, The Netherlands

Co-Chair : Marco D'Errico, Università degli Studi della Campania Luigi Vanvitelli, Italy

Rapporteur : Toon Stolk, Kongsberg Defence & Aerospace, Norway

Talks

- [IAA-B14-0801] M. D'Errico, "Separation Maintenance of Parasitic Distributed SAR Systems in Low Earth Orbits."

- [IAA-B14-0802] C. S. Fagonde, "Satellite Formation Control Using Aerodynamic Forces, Sol Radiation Pressure and Electric Propulsion Via Attitude Maneuvers."
- [IAA-B14-0803] M. von Arnim, "Cooperative control of the CloudCT formation for simultaneous cloud monitoring."
- [IAA-B14-0812] S. Montenegro, "TeilAutonome Montage/Aufbau und Rekonfiguration im Weltraum, Tamariv."

Session 9 - Subsystems

Chair : Sabine Klinkner, Universität Stuttgart, Germany

Co-Chair : Sebastian Grau, TU Berlin, Germany

Rapporteur : Ties Rozema, TU Delft, The Netherlands

Talks

- [IAA-B14-0901] P. Gurfil, "Omnidirectional Vision Sensor for Small Satellite."
- [IAA-B14-0902] N. Aksteiner, "Increasing the power density of Cubesats -a Demonstration Scenario for Large Solar Arrays."
- [IAA-B14-0903] S. Mahato, "Modeling and simulation of TDI CCD detector to study the influence of different artifacts from dynamical behavior of small satellites for LEO."
- [IAA-B14-0904] T. Sproewitz, "A 1U 100W Deployable Solar Array for Smallsats."

Session 10 - Special Session: On-Board Machine Learning

Chair : Eberhard Gill, TU Delft, The Netherlands

Co-Chair : Enrico Stoll, TU Berlin, Germany

Rapporteur : N.N.

Talks

- [IAA-B14-1001] M. Langer, "Generating Synthetic Ground Truth Data for Machine Learning Based On-Orbit Fire Detection."
- [IAA-B14-1002] M. Esposito, "Towards operational hyperspectral constellations for rapid response applications."
- [IAA-B14-1003] A. Ahmed, "Downstream/User Perspective."
- [IAA-B14-1004] S. Roemer, "The potential of On-Board AI for Small Satellite based Earth Observation and its Status at Antwerp Space (OHB Group)."

Session 11 - Special Aspects I

Chair : Hakan Kayal, Universität Würzburg, Germany

Co-Chair : Sias Mostert, SCS Aerospace Group, South Africa

Rapporteur : N.N.

Talks

- [IAA-B14-1102] G. Korff, "Hybrid pose estimation of space debris with neural networks developed using photorealistic synthetic data."
- [IAA-B14-1103] L. Ziemer, "LIZARD Experiment."
- [IAA-B14-1104] A. Schweinfurth, "MOVE-III and DEDRA: In Situ Sub-millimetric Space Debris and Micrometeoroid Detection and Characterisation."

Poster Session II

Chair : Sebastian Grau, TU Berlin, Germany

Co-Chair : Enrico Stoll, TU Berlin, Germany

Rapporteur : N.N.

Posters

- [IAA-B14-0804P] A. Kleinschrodt, "TOM/TIM Realization - A formation of three nano satellites for retrieving multi view stereoscopic data."
- [IAA-B14-0805P] D. Roychodhury, "Feasibility Analysis of Rendezvous and Docking Operations in LEO for CubeSats with Limited Delta-V Budget."
- [IAA-B14-0806P] S. George, "The potential of hybrid hyperspectral constellations."
- [IAA-B14-0807P] F. Zhengqing, "Low-Thrust Control of Constellations Using Artificial Potential Function for Multipoint Emergency Observation."
- [IAA-B14-0808P] R. Griesbach, "The past and the future of SmallSat constellations - a success story."
- [IAA-B14-0809P] M. Grassi, "CubeSat-Based Modular and Distributed System for Earth Observation."
- [IAA-B14-0810P] V. Martinusi, "Formation-Keeping for Space-Based Antennas."
- [IAA-B14-0811P] W. Xiu, "Observability-based orbiter aided cooperative navigation for asteroid landing."

- [IAA-B14-0813P] S. Montenegro, "HyMOVE: modular Orbital Transportation System for Small Satellites."
- [IAA-B14-0905P] Y. Ghelamallah, "Mitigation of space radiation in on-board data handling subsystems of Alsat-1B microsatellite."
- [IAA-B14-0906P] J. Scharnagel, "Versatile CubeSat Platform as a Solution for the Challenges of EO Missions."
- [IAA-B14-1105P] A. Rabah, "High antenna array for aerospace field."
- [IAA-B14-1106P] J. Buursink, "Breaking new Earth Observation processing thresholds: LuxSpace achievements with the multipurpose Triton-X platform."
- [IAA-B14-1107P] M. Wendt, "Evaluating the performance of ionic liquid coating for mitigation of spacecraft surface charges."
- [IAA-B14-1108P] K.-A. Nguyen, "Urban greenspace (garden) mapping with small satellite data."
- [IAA-B14-1110P] C. Juang, "Cloud removal and image reconstruction by using U-Net and cGAN techniques."
- [IAA-B14-1111P] A. Zegrar, "Analysis and Monitoring of Phenomenon of Desertification by using Algerian Micro Satellite Data ALSAT in Algerian Steppe."
- [IAA-B14-1112P] Y. Gu, "Asynchronous coordinated scheduling approach for optical imaging satellites considering cloud coverage uncertainty."
- [IAA-B14-1113P] H. Feiyao, "A method for classifying ship precisely in harbor on remote sensing satellites."
- [IAA-B14-1114P] Z. Rui, "Recognition of High-value Ship Activities at docks on Small Remote Sensing Satellites."
- [IAA-B14-1115P] N. Bakhadyo, "Enhancing Planet's Satellite Images using SRGAN for Disaster Response in Nepal."
- [IAA-B14-1116P] M. I. Rashed, "Autonomous Global Ground Station Network Strategy and Analysis for Smallsat Constellations."
- [IAA-B14-1117P] N. Khorchef, "Loss Assessment for Solar Panel Performance in LEO."
- [IAA-B14-1118P] T. Segert, "Introduction to the LEOS-100 Platform."
- [IAA-B14-1119P] P. Njemanze, "Expanded Roll-Back Malaria Initiative: Towards Eradication From A Global Perspective Using Satellite-based Technologies."
- [IAA-B14-1120P] G. Caritá, "Dynamical perturbations analysis of small satellites around Earth."
- [IAA-B14-1122P] C. N. Peroy, "Building a Center of Competence on Testing and Qualification Facilities at the Kiruna Space Campus in Northern Sweden."
- [IAA-B14-1123P] Mayank, "S-band Septum Dual circularly polarized feed for Rooftop mounted Ground station."
- [IAA-B14-1124P] S. Shetty, "Autonomous Greenhouse with Swarm robots for Mars Exploration."
- [IAA-B14-1404P] S. Wentz, "Twins4Space: Enabling Modular Space Systems Using a SpaceWire Network."

Thursday, May 11, 2023

Session 12 - Special Aspects II

Chair : Jasper Bouwmeester, TU Delft, The Netherlands

Co-Chair : Elizaveta Klioner, TU Berlin, Germany

Rapporteur : N.N.

Talks

- [IAA-B14-1201] A. Hylton, "Optical High-Rate Delay Tolerant Networking Towards International Space Station Integration."
- [IAA-B14-1202] R. Noteborn, "Challenges in Accommodating Multiple IOD Experiments on a Single Small Satellite."
- [IAA-B14-1203] M. N. Peixoto, "A CubeSat Add-on to Improve Robustness and Accuracy of Radar-Derived Digital Elevation Models."
- [IAA-B14-1204] J. von Chorus, "A Custom Electromagnetic Compatibility Testing System for Multi-Band, Remote Sensing Small Satellites."

Session 13 - Formations and Constellations II

Chair : Enrico Stoll, TU Berlin, Germany

Co-Chair : Mohammed Khalil Ben Larbi, TU Berlin, Germany

Rapporteur : Ties Rozema, TU Delft, The Netherlands

Talks

- [IAA-B14-1301] E. Armandillo, "CubeSat-powered constellation with novel micro-LiDAR instrument for GHG emissions monitoring."
- [IAA-B14-1302] A. Kleinschrodt, "CuBy – The Bavarian Small Satellite Formation for Bio-monitoring."
- [IAA-B14-1303] Y. Ito, "Research on SAR Satellites Constellation for Disaster Monitoring Focusing on Revisit Time and Cost Performance."
- [IAA-B14-1304] K. Sugihara, "A Novel Approach to Microwave Radiometry using Constellations of Small Satellites with Preliminary Experimental Demonstration."

Session 14 - On-Board Processing

Chair : Sergio Montenegro, Universität Würzburg, Germany

Co-Chair : Marco Esposito, cosine, The Netherlands

Rapporteur : N.N.

Talks

- [IAA-B14-1401] T. Greiner, "SONATE-2 – Using Artificial Intelligence for In-Orbit Image Processing and Anomaly Detection."
- [IAA-B14-1402] M. H. bin Azami, "On-orbit image classification data of 6U CubeSat KITSUNE."
- [IAA-B14-1403] P. Gómez, "Decentralised Semi-supervised Onboard Learning for Scene Classification in Low-Earth Orbit."

Session 15 - Missions II

Chair : Rene Laufer, Luleå University of Technology, Sweden

Co-Chair : Rainer Sandau, IAA

Rapporteur : N.N.

Talks

- [IAA-B14-1502] H. Saito, "DiskSat SAR for Mega Constellation 2D Satellite of Synthetic Aperture Radar with Deployable Slot Array Antenna."
- [IAA-B14-1501] G. Leccese, "EarthNext CubeSat Mission and System Study for Multispectral Earth Observation from Very Low Earth Orbit."
- [IAA-B14-1504] E. Lamboglia, "Small satellites for global water monitoring: sustainability and new frontiers."
- [IAA-B14-1505] J. Cordova-Alarcon, "Overview of Horyu-VI 6U CubeSat mission to monitor light scattering events by lunar dust exosphere over the terminator region."

Friday, May 12, 2023

Excursion to the Chair of Space Technology at Technische Universität Berlin.