PROGRAMME (all times Central European Time)

3rd ECATS Conference
Making aviation environmentally sustainable

Tuesday 13 October 2020

9:00 – 10:00 Conference Set up

10:00 – 10:20 **Opening and conference start** by ECATS Chair Sigrun Matthes (DLR) and Conference Chair Tomas Grönstedt (Chalmers University)

10:20 – 11:40 Keynote SESSION
Chairs: Tomas Grönstedt / Volker Grewe

Let's start the clear sky revolution by **Henri Werij** (TU Delft)

Perspectives on climate change by **Myles Allen** (Oxford University) and David Lee (MMU)

A policy perspective by **Rickard Nordin** (Member of Swedish Parliament, Spokesperson for Climate- and Energy Policies for the Center Party)

*Note: Further KEYNOTE: Challenges for aviation by **Daniel Jacob** (FAA) in Session I, part 2*

Questions & Answers: Henri Werij, Myles Allen, Rickard Nordin

Coffee break

11:50 – 12:40 SESSION I – Airport Air Quality – part 1
Chair: Bethan Owen / Rapporteur: Ling Lim

Airport emission particles: exposure characterization and toxicity following intratracheal instillation by **Ulla Vogel** (NFA), K Bendten, A Brostrom, AJ Koivsto, IK Kopponen, T Berthing, N Bertram, KI Kling, M Dal Maso, O Kangasniemi, M Poikkimäki, K Loeschner, PA Clausen, H Wolff, KA Jensen, AT Saber

Regional Sensitivities of Air Quality to Aviation Emissions by **Flávio Quadros*** (TU Delft), Irene Dedoussi

Improvement of airport local air quality assessment by **Kateryna Synylo** (National Aviation University), Andril Krupko

Questions & Answers: Vogel, Quadros, Synylo

12:40 – 13:00 POSTER SESSION I – Airport Air Quality

13:00 – 13:50 Lunch break

13:50 – 15:10 SESSION I – Airport Air Quality part 2

Chair: David Raper / Rapporteur: Ling Lim

Time-resolved Aircraft Dispersion Modelling by **Ulf Janicke** (Janicke Consulting), Emmanuel Montreuil, Weeded Ghedhaifi, Etienne Terrenoire

Simulation of Aircraft emissions dispersion by tracking aircraft using CFD by Weeded Ghedhaïfi, **Emmanuel Montreuil** (Onera), Etienne Terrenoire

AVIATOR Project: PM Characterisation from Measurement Campaigns at INTA Stack by Victor Archilla, Maria Sánchez-García, Jesus Sánchez-Valdepeñas, **Devora Hormigo** (INTA), Paola Moreno, David Raper, Mark Johnson, Andrew Crayford, Jesus Rodríguez-Maroto, Imara Ibarra, Enrique Rojas.

A Nation-wide Assessment of Particle Number Concentrations from Commercial Aircraft by **Sarav Arunachalam** (UNC Chapel Hill), Jiaoyan Huang, Lakshmi Pradeepa Vennam, Francis Binkowski, Benjamin Murphy.

Fourth KEYNOTE Challenges for aviation by **Daniel Jacob** (FAA)

Questions & Answers: Arunachalam, Janicke, Montreuil, Archilla, Jacob

Coffee break

15:20 – 16:00 POSTER SESSION II – Climate Impact and Mitigation Concept

16:00 – 17:00 Icebreaker

Wednesday 14 October 2020

10:00 – 11:00 SESSION II – Climate Impact and Mitigation Concept part 1

Chair: Sigrun Matthes / Rapporteur: Didier Hauglustaine

Impact of present and future aircraft emissions on atmospheric composition by **Etienne Terrenoire** (ONERA), Didier Hauglustaine

Effective Radiative Forcing of Contrail Cirrus by **Michael Ponater** (DLR), Marius Bickel, Lisa Bock, Ulrike Burkhardt, Svenja Reineke

The Contribution of Aviation NO_x Emissions to Climate Change by **Volker Grewe** (DLR) Sigrun Matthes, Katrin Dahlmann

Evaluation of the Climate Impact of the Steam-Injecting and Water-Recovering Aero-Engine Concept by **Regina Pouzolz** (MTU Engines), Oliver Schmitz, Hermann Klingels

Questions & Answers: Terrenoire, Ponater, Grewe, Pouzolz

Coffee break

11:10 – 12:20 SESSION II – Climate Impact and Mitigation Concept part 2

Chair: Sigrun Matthes / Rapporteur: Didier Hauglustaine

Parametric study of Contrails formation by **Emmanuel Montreuil** (Onera), Weeded Ghedhaïfi, Etienne Terrenoire

The contrail mitigation potential of aircraft formation flight scenarios by **Simon Unterstrasser** (DLR)

Mitigating Climate Impact of Aviation by Minimizing Aircraft Contrails by **Ulrich Schumann** (DLR), Roger Teoh, Marc E.J. Stettler

Impact on Contrails Coverage when Flying with Hybrid Electric Aircraft by **Feijia Yin*** (TU Delft), Volker Grewe

The Role of Electric-Powered Flight in Real-World Commercial Operations by **Alejandro Sobron*** (Linköping)**,** Ingo Staack, Petter Krus

Questions & Answers: Unterstrasser, Sang, Schumann, Yin, Sobron, Montreuil

12:20 – 13:00 POSTER SESSION: III Alternative Fuels for Aviation + IV Future Materials for Aircraft + V Propulsion Integration

13:00 – 13:50 Lunch break

13:50 – 15:10 SESSION III Alternative Fuels for Aviation

Chair: Simon Blakey / Rapporteur: Ehsan Alborzi

JETSCREEN Programme update by **Bastian Rauch** (DLR), Uwe Bauder

Thermal Stability Behavior of Alternative Fuels: Experimental and Modeling Approaches by **Maira Alves Fortunato** (IFP Energies), Livio Neocel Axelle Baroni, Emanuelle Bracco Mingant, Mona Marie Obadia

Understanding Thermal Stability of Future Jet Fuels Using Computational Chemistry by **Charlie Adams*** (Sheffield University), Simon Blakey, Meijer Anthony, Ehsan Alborzi, Christopher Parks

Questions & Answers: Rauch, Fortunato, Adams

Effect of Fuel Composition on Emissions from RQL Combustion Rig by **Joseph Harper*** (Cardiff University), Andrew Crayford, Eliot Durand, Mark Johnson

Aircraft Engine Particulate Matter Emissions using Sustainable Aviation Fuels by **Prem Lobo** (NRC Canada), Tobias Schripp, Joel Corbin, Patrick Osswald, Michael Shook, Ewan Crosbie, Claire Robinson, Zhenhong Yu, Richard Miake-Lye, Andrew Freedman, Greg Smallwood, Philip Whitefield, Markus Köhler, Bruce Anderson

Questions & Answers: Harper, Lobo

Coffee break

15:20 – 16:00 SESSION IV Future Materials for Aircraft
Chair: Leif Asp, Rapporteur: Johanna Xu

Multifunctional Materials, a Step Towards the Future of Aviation by **Linnea Selegård** (SAAB), Linnéa Runqvist, Thirza Poot, Kajsa Uvdal, Ragnar Larsson, Danilo Carastan

Teaching Activities for Future Multifunctional Composite Material by **Johanna Xu*** (Chalmers), David Carlstedt, Shanghong Duan, Leif E Asp

Multi-Functional Materials towards Environmentally Friendly Aviation by **Peter Linde** (Chalmers), Leif E Asp

Questions & Answers: Selegård, Xu, Linde

16:00 – 17:10 SESSION V Propulsion Integration
Chair: Huadong Yao, Rapporteur: Carlos Xisto

Propulsion integration and the Centreline project by **Arne Seitz** (Bauhaus)

Propulsion Installation Modelling for Ultra-High Bypass Ratio Engine Cycle Design by **Josefin Andersson*** (Chalmers), Tomas Grönstedt

Questions & Answers: Seitz, Andersson

Experimental aerodynamic investigation of powered nacelles for high-bypass turbofan engines by **Vinicius Tavares Silva*** (Chalmers), Olivier Petit, Anders Lundbladh, Tomas Grönstedt

Harmonic Forcing from Distortion in a Boundary Layer Ingesting Fan by **Hans Mårtensson** (FOI)

Questions & Answers: Silva, Mårtensson

Thursday 15 October 2020

10:00 – 11:50 SESSION VI Green Flights
Chair: Volker Grewe, Rapporteur: Jan Middel

Climate Impact Mitigation Potential of Formation Flight by **Tobias Marks*** (DLR), Katrin Dahlmann, Volker Grewe, Volker Gollnick, Florian Linke, Sigrun Matthes, Eike Stumpf, Majed Swaid, Simon Unterstrasser, HiroshiYamashita & Clemens Zumegen

Assessing the climate impact of formation flights by **Katrin Dahlmann** (DLR), Sigrun Matthes, Hiroshi Yamashita, Simon Unterstrasser, Tobias Marks

Contrail Formation Conditions and Instantaneous Radiative Forcing by **Klaus Gierens** (DLR), Susanne Rohs (FZJ), Sigrun Matthes (DLR),

Questions & Answers: Marks, Dahlmann, Gierens

Weather and Location Dependency of Aviation Climate Effects: 4-D-Climate-Change-Functions by **Christine Frömming** (DLR), Volker Grewe, Sabine Brinkop, Amund S. Haslerud, Simon Rosanka, Jesper van Manen, Sigrun Matthes

Comparison of Various Aircraft Routing Strategies Using the AirTraf 2.0 by **Hiroshi Yamashita** (DLR), Feijia Yin, VolkerGrewe, Patrick Joeckel, Sigrun Matthes, Bastian Kern, Katrin Dahlmann, Christine Frömming

Reducing Aviation Emissions and Fuel Burn by Re-routing Transatlantic Flights by **Cathie Wells*** (University of Reading), Paul Williams, Nancy Nichols, Dante Kalise, Ian Poll

How Will Climate Change Affect Flight Routes and Turbulence? by **Paul Williams** (University of Reading)

Questions & Answers: Frömming, Yamashita, Wells, Williams

Coffee break

11:50 – 13:10 SESSION VII Cryogenic Fuels / Electrofuels

Chair: Carlos Xisto, Rapporteur: Selma Brynolf

Hydrogen – a path to sustainable flying by **Anders Lundbladh** (GKN Aerospace)

Large scale Bio-Electro-Jet fuel-production integration at CHP-plant in Östersund, Sweden by **Anton Fagerström** (IVL)

Decarbonizing Nordic Transports - the Role of Alternative Aviation Fuels by **Julia Hansson** (IVL), Martin Hagberg, Selma Brynolf, Maria Grahn

Fuel tank sizing methodology for cryogenic hydrogen fuelled air transport by **Devaiah Nalianda** (Cranfield University)

Energy transition in aviation: the role of cryogenic fuels by **Arvind Gangoli Rao** (TU Delft) & Feijin Yin

Questions & Answers: Lundbladh, Fagerström, Hansson, Nalianda, Gangoli Rao

13:10 – 13:30 POSTER SESSION VI - Green Flights

13:30 – 14:15 Lunch break

14:15 – 16:00 Early career researchers (NFFP/SARC)*

Chair: Tomas Grönstedt, Niklas Andersson, Sigrun Matthes

14:15 – 15:05: Early career I

Cavity Acoustics and Rossiter modEs – CARE by **Steffen Hammer** (KTH), Jens Fridh, Mattias Billson

Experimental Study of Transition in a Turbine Rear Structure by **Isak Jonsson** (Chalmers), Valery Chernoray

Aerodynamic Investigation of the flow in a Turbine Rear Structure by **Valentin Vikhorev** (Chalmers), Valery Chernoray

Quantifying the Environmental Design Trades for a State-of-the-art Turbofan Engine by **Marily Thoma** (Chalmers), Xin Zhao, Tomas Grönstedt

Questions & Answers: Hammer, Jonsson, Vikhorev, Thoma

Coffee break

15:15 – 16:00: Early career II

Microstructural evolution during thermal post-treatment of additively manufactured Alloy 718 by **Sneha Goel** (University West), Uta Klement, Shrikant Joshi

Integration of Airborne Early Warning Radar Platforms on Aircraft by **Prabhat Khanal** (Chalmers), Jian Yang, Marianna Ivashina, Anders Hook, Roushan Luo, Per Hallander

A System of Systems View in Aerospace Product Development by **Ludvig Knöös Franzen** (LiU), Ingo Staack, Christopher Jouannet, Petter Krus

Autonomous Navigation Support from Real-Time Visual Mapping by **Daniel Sabel** (KTH), Asvarn Dag

Questions & Answers: Khanal, Franzen, Sabel, Goel

16:00 – 16:20 Closing statements – Dave Raper (MMU)
Early career awards (Ivar Isaksen prize, SARC prize)

16:20 End of conference

**Early career researcher*

ECATS Conference Poster Presentations

SESSION I – Airport Air Quality

Emmanuel Montreuil (Onera), Sigrun Matthes, Francois Garnier, Weeded Ghedhaifi, Mattia Righi, Johannes Hendricks, Etienne Terrenoire, Eduardo Mezquida Orti: CFD and aerosol dynamics Box-model to improve dispersion models

Emilien Preux, Loïc Barach, Romain Deleplace, Violaine Huck Ted Elliff, Ayce Celikel (Envisa), Frédéric Murzyn: Airport air quality – State-of-the-art and Evolution of methodologies and possible improvements

Irene Dedoussi (TU Delft): Future air quality implications of decision-making for sustainable aviation

Florian Ungeheuer* (Goethe University Frankfurt), Diana Rose, Dominik van Pinxteren, Florian Diatas, Stefan Jacobi, Alexander Vogel: Chemical Characterization of Ultrafine Particles by Mass Spectrometry

Dogushan Kilic (University of Manchester), Paul Williams, Victor Archilla, David Raper, Silvia Lopez: Low-Cost Sensor Development as Part of the AVIATOR Project

SESSION II – Climate Impact and Mitigation Concept

Florian Linke (DLR), Volker Grewe, Roelof Vos, Malte Niklass, Benjamin Lührs, Feijia Yin: How to efficiently design aircraft with minimum climate impact?

Feijia Yin* (TU Delft): The climate footprint of aviation propulsion technology: The climate propulsion modelling approach

Sigrun Matthes (DLR), Ling Lim, Simone Dietmüller, Ulrike Burkhardt, Johannes Hendricks, Mattia Righi: Mitigation of non-CO_2 climate impact of aviation by changing cruise altitudes

Etienne Terrenoire (Onera) Xavier Vancassel, Weedeed Ghedhaïfi, Emmanuel Montreuil: Near-field modelling of contrails microphysics

Colin Tully* (ETH Zurich), David Neubauer, Ulrike Lohmann: Non-CO_2 impacts of aviation through aircraft-induced clouds (AIC)

Yaohui Li (CAFUC): Research on the Sandstorm Numerical Prediction Model Based on GRAPES

Robert Sausen (DLR) Klaus Gierens, Sigrun Matthes and the ACACIA Project team (EU Horizon 2020): The EU project ACACIA (Advancing the Science for Aviation and ClimAte)

Alessandra Tedeschi (Deep Blue) & ClimOP Project Team (EU Horizon 2020): ClimOP – Climate assessment of Innovative Mitigation strategies towards OPerational improvements in aviation

Michael Finke (DLR), Peggy Favier, Marco Temme, Matthias Kleinert, Attila Pasztor, Fanni Kling (EU Horizon 2020): Optimized Flight Trajectories to limit the climate change

Gustavo Alonso (UPM) and the ALTERNATE Project team (EU Horizon 2020): The EU H2020 project ALTERNATE (Assessment on aLTERNative AviaTion fuEls development)

SESSION III – Alternative Fuels for Aviation

Karna Dahal* (Chalmers University of Technology), Selma Brynolf, Maria Grahn, Julia Hansson, Mariliis Lehtveer: Reviewing the Development of Alternative Jetfuels and Aircraft Propulsion Systems

Simon Blakey (University of Birmingham), S. Christie, D. Raper, John Andresen, M. Maroto-Valer, P. Bowen, R. Marsh, C. Lewis, M. Pourkashanian: Overview of the NewJET Network+

Carlos Xisto (Chalmers), Carlos Xisto, Jonsson Isak, Grönstedt Tomas: Conceptual design of a compressor-vane-HEX for LH2 aircraft engine applications

Seyed Yoosof Sadat* (Sheffield University), Simon Blakey, Ehsan Alborzi: Novel Small Scale Isothermal Stability Test Method For Aviation Fuel

Daniel Sauer (DLR), Hans Schlager, Bruce Anderson, Patrick LeClercq, Christiane Voigt, Tiziana Braeuer, Christopher Heckl, Stefan Kaufmann, Richard Moore, Monika Scheibe, Tobias Schripp, Michael Shook, Kenneth L., Thornhill, Edward Winstead, Luke Ziemba: Impact of Alternative Jet Fuels on Aircraft Emissions in Cruise

SESSION IV – Future Materials for Aircraft

Shanghong Duan* (Chalmers), Johanna Xu, David Carlstedt, Leif E Asp: Structural positive electrode produced using tape casting

David Carlstedt* (Chalmers), Johanna Xu, Shanghong Duan, Peter Linde, Leif E Asp: Structural Battery Composite Demonstrator

SESSION V – Propulsion Integration

Xiaojian Li* (Chalmers): The installation effects on nacelle design

Josefin Andersson* (Chalmers): Propulsion Installation Modelling for Ultra-High Bypass Ratio Engine Cycle Design

SESSION VI – Green Flights

Laurent Tabernier, Esther Calvo Fernández, Andreas Tautz, Robin Deransy (Eurocontrol): Fuel Tankering: economic benefits and environmental impact
Johannes Pletzer, formerly Emmerig* (DLR), Patrick Jöckel, Volker Grewe: The Climate Impact of Hypersonic Transport
Malte Niklaß* (DLR): Concept of Climate-Charged Airspaces
Majed Swaid* (DLR), Tobias Marks, Volker Gollnick: Fuel Planning Strategies for Aerodynamic Formation Flight
Jana Moldanová (IVL), Langner Joakim, Lindskog Magnus, Bergström Robert, Mårtensson Tomas, Wall Martin, Ekstrand Henrik, Rydal Martin, Näs Anette, Optimization of flight routes for reduced climate impact (OP-FLYKLIM) project
Benjamin Lührs (DLR), Florian Linke, Sigrun Matthes, Volker Grewe, Feijia Yin & Keith P. Shine: Climate impact mitigation potential of European Air Traffic
Sigrun Matthes (DLR), Lührs Benjamin, Linke Florian, Volker Grewe, Feijia Yin, Keith Shine: Robustness of climate-optimized trajectories and mitigation potential: Flying ATM4E
Sigrun Matthes (DLR), Volker Grewe, Florian Linke; Benjamin Lührs, Fejia Yin, Christine Frömming, Hiroshi Yamashita, Manuel Soler, Abolfazl Simorgh, Daniel Gonzalez Arribas: Towards robust and eco-efficient reduction in aviation's climate impact by identifying climate-optimised aircraft trajectories

**Early career researcher*