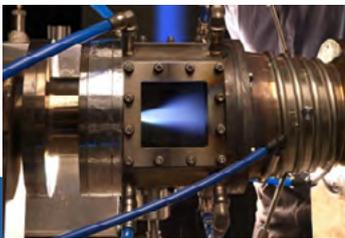


BULLETIN AEROSPACE EUROPE

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"I HAVE THE PRIVILEGE TO REPRESENT ERA IN THE PREPARATORY GROUP RESPONSIBLE FOR PREPARING THE NEXT GENERATION EU AERONAUTICS RESEARCH PROGRAMME 'CLEAN AVIATION PARTNERSHIP' AND I AM GLAD TO SEE THAT THE SENSE OF URGENCY IS WIDELY SHARED AMONGST THE STAKEHOLDERS" (Michel Peters)

Association of European
Research Establishments
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INTERVIEW WITH MICHEL PETERS, CEO OF ROYAL NLR, CHAIRMAN OF THE

ASSOCIATION OF EUROPEAN RESEARCH ESTABLISHMENTS IN AERONAUTICS (ERA)

CEAS

The Council of European Aerospace Societies (CEAS) is an International Non-Profit Organisation, with the aim to develop a framework within which the major European Aerospace Societies can work together.

It was established as a legal entity conferred under Belgium Law on 1st of January 2007. The creation of this Council was the result of a slow evolution of the 'Confederation' of European Aerospace Societies which was born fifteen years earlier, in 1992, with three nations only at that time: France, Germany and the UK.

It currently comprises:

- 12 Full Member Societies: 3AF (France), AIAE (Spain), AIDAA (Italy), AAAR (Romania), CzAeS (Czech Republic), DGLR (Germany), FTF (Sweden), NVvL (The Netherlands), PSAA (Poland), RAeS (United Kingdom), SVFW (Switzerland) and TsAGI (Russia);
- 4 Corporate Members: ESA, EASA, EUROCONTROL and EUROAVIA;
- 8 Societies having signed a Memorandum of Understanding (MoU) with CEAS: AAE (air and Space Academy), AIAA (American Institute of Aeronautics and Astronautics), CSA (Chinese Society of Astronautics), EASN (European Aeronautics Science Network), EREA (European association of Research Establishments in Aeronautics), ICAS (International Council of Aeronautical Sciences), KSAS (Korean Society for Aeronautical and Space Sciences) and Society of Flight Test Engineers (SFTE-EC).

The CEAS is governed by a Board of Trustees, with representatives of each of the Member Societies.

Its Head Office is located in Belgium: c/o DLR – Rue du Trône 98 – 1050 Brussels. www.ceas.org

AEROSPACE EUROPE

Besides, since January 2018, the CEAS has closely been associated with six European Aerospace Science and Technology Research Associations: EASN (European Aeronautics Science Network), ECCOMAS (European Community on Computational Methods in Applied Sciences), EUCASS (European Conference for Aeronautics and Space Sciences), EUROMECH (European Mechanics Society), EUROTURBO (European Turbomachinery Society) and ERCOFTAC (European Research Community on Flow Turbulence Air Combustion).

Together those various entities form the platform so-called 'AEROSPACE EUROPE', the aim of which is to coordinate the calendar of the various conferences and workshops as well as to rationalise the information dissemination.

This new concept is the successful conclusion of a work which was conducted under the aegis of the European Commission and under their initiative.

The activities of 'AEROSPACE EUROPE' will not be limited to the partners listed above but are indeed dedicated to the whole European Aerospace Community: industry, institutions and academia.

WHAT DOES CEAS OFFER YOU ?

KNOWLEDGE TRANSFER:

- A structure for Technical Committees

HIGH-LEVEL EUROPEAN CONFERENCES:

- Technical pan-European events dealing with specific disciplines
- The biennial AEROSPACE EUROPE Conference

PUBLICATIONS:

- CEAS Aeronautical Journal
- CEAS Space Journal
- AEROSPACE EUROPE Bulletin

RELATIONSHIPS AT EUROPEAN LEVEL:

- European Parliament
- European Commission
- ASD, EASA, EDA, ESA, EUROCONTROL, OCCAR

HONOURS AND AWARDS:

- Annual CEAS Gold Medal
- Medals in Technical Areas
- Distinguished Service Award

YOUNG PROFESSIONAL AEROSPACE FORUM SPONSORING

AEROSPACE EUROPE Bulletin

AEROSPACE EUROPE Bulletin is a quarterly publication aiming to provide the European aerospace community with high-standard information concerning current activities and preparation for the future.

Elaborated in close cooperation with the European institutions and organisations, it is structured around five headlines: Civil Aviation operations, Aeronautics Technology, Aerospace Defence & Security, Space, Education & Training and Young Professionals. All those topics are dealt with from a strong European perspective.

Readership: decision makers, scientists and engineers of European industry and institutions, education and research actors.

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EDITORIAL



Jean-Pierre Sanfourche
Editor-in-Chief

FACING CHALLENGING TIMES

From the onset of the COVID-19 pandemic, the worldwide aviation system is crossing an ever-critical crisis, with at its beginning, the global air traffic brought to an almost complete standstill. This worldwide crisis particularly head-on strikes Europe, which was occupying a high ranking position in aerospace.

In the past, aviation has always been able to overcome many difficult crises, but will it be the same this time? Hopefully yes. However the debate is now open about how deep the crisis will be for aviation, how long it is going to last, what the impact will be on aerospace industry and how the dramatic economic and social situation now in front of us will be controlled.

Anyway, for certain the COVID-19 crisis will be the starting point of a considerable acceleration of all innovation processes, structured around the triptych 'Restore – Rethink – Redesign (3R)'.

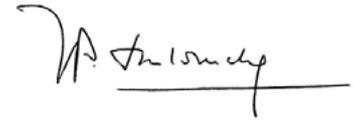
The subject will be regularly dealt with in the coming issues of our CEAS bulletin. In the present one, it is approached in two papers: on the one hand the interview with Michel Peters, Chairman of EREA and on the other hand a summary of the report and recommendations produced by ICAO aiming at restarting global air transport and aligning its global recovery.

AREA is again in evidence with the best papers which were presented at the EREA annual event of December 2019. It is to be noted that CEAS sets a high value to publishing high-standard aeronautical and space science and technology papers. It is the reason why this bulletin includes a special article about the CEAS Aeronautical and Space Journals, which should become internationally recognized reference reviews.

Within the framework of Aerospace Defence and Security stat Missile Defence's development in Europe is presented by OCCAR.

Then a short paper provides a summary report on SpaceX Crew Dragon Demo-2 mission which was successfully launched on 30 May. This mission indisputably constitutes an historic event. As a matter of fact, for the first time astronauts are flying on a commercial spacecraft owned and operated by a private company, opening a new era in space exploration led by commercial companies, the so-called 'New Space'. Besides this mission allowed to launch NASA astronauts from the USA to the ISS for the first time since 2011, ending this decade of sole reliance on Russian Soyuz.

In the end of this issue, two papers illustrate the intention of CEAS to open to international aerospace: first an overview of the Korean Society for Aeronautics and Space Sciences (KSAS), a society with which CEAS signed a MOU in 2009; second a description of the International Space University (ISU) as an encouragement to allow more and more European space students and young professionals to take advantage of its courses.



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PRESIDENT'S MESSAGE



Zdobyslaw Goraj
CEAS President

FINAL REMARKS ABOUT AEC2020, BORDEAUX 25-27 FEBRUARY

An overview of AEC2020 was widely described in the issue 2-2020 of our Aerospace Europe Bulletin. Parallel to keynote lectures, sectional lectures as well as very productive and private talks during breaks, there were a number of events important for CEAS management (Officers, Trustees, Presidents of CEAS National Societies, recipients of CEAS Awards). The key point of Gala Dinner - perfectly organized by French Hosts - was the ceremony of awarding with CEAS Medal of Prof. Richard (Ric) Parker - Commander of the Order of the British Empire, President of the International Society for Air-Breathing Engines (ISABE), Fellow of many international societies and doctor honoris causa of numerous British and overseas universities. The laudation speech I addressed and a number of photos taken during this ceremony can be seen in pages 8 to 10.

On 26 February, a Board of Trustees Meeting gathered and discussed issues important for CEAS future. Among different issues on the agenda there were (1) smooth leave of Mrs Mercedes Oliver Herrero, CEAS General Director; (2) requirements for Administrative Support Person, General Director and Officers and (3) candidates for the position of General Director and Financial Support Manager. After a discussion and voting, it was decided that in the months to come the Board of Trustees should finalise the requirements expected from candidates and then would look for proper candidates. Due to pandemic of COVID-19 and cancellation of the 2020 Berlin International Air Show ILA planned to be held in May, it was finally decided that discussion and approval of the list of requirements will be done remotely in the end of June using the Skype for business tool.

During the last day of AEC2020 the so-called Presidential Lunch was organised. Six of twelve presidents of CEAS Member National Societies attended it: Prof. Rolf Henke, DGLR; Prof. Tomasz Goetzendorf-Grabowski, PSAA; Prof. Sergey Chernyshev, TsAGI; Mrs Estefania Matesanz Romero, AIAE; Dr Christophe Hermans, NVvL and Dr Georges Bridel, SVFW. We deeply believe that

presidential lunches organised on the occasion of CEAS Conferences can play an important role in strengthening links between CEAS and national societies, the latter proposing orientations and initiatives which should be taken by CEAS with a view to improving the quality of its services. This time we know that some presidents had to cancel their trip to Bordeaux due to pandemic risk. Nevertheless, I appreciate the discussion and some ideas proposed by our presidents, who inspire us for some changes. Hopefully on the occasion of the next Aerospace Europe Conference - AEC2021 - we will gather a higher number of Member Society presidents.

ABOUT THE NEXT AEROSPACE EUROPE CONFERENCE

From the onset of the pandemic, the worldwide aviation system including research and dissemination is in permanent, very deep crisis. CEAS cannot idly wait on a full suppression of COVID-19, therefore since AEC2020 in Bordeaux the CEAS officers organised many remote discussions either by phone or Skype for business. The new challenges we have to face include rescheduling of many traditional aerospace events. For example ICAS moved its Shanghai Congress from September 2020 as initially planned to September 2021, thus creating a conflict with AEC2021 planned to be held also in September 2021.

It is therefore absolutely necessary to find a solution allowing to avoid such an overlapping which evidently would decrease the number of our potential delegates. So, should we move our next AEC from 2021 to 2022? This question must be solved during the upcoming Board of Trustees remote meeting in the end of this month.



AEC2020: THE CEAS BEST PAPERS AWARD CEREMONY

IN AERONAUTICAL BRANCH



Best Paper Award Ceremony in the Aeronautical Branch
Valérie Guéron presents the award to Vlad Ciobaca (DLR Braunschweig) and his co-authors for their work accomplished in aerodynamics: "CFD and Wind Tunnel Tests for Local Active Flow Control at the Wing-Pylon Nacelle Junction". © Zdobyslaw

CFD AND WIND TUNNEL TESTS FOR LOCAL ACTIVE FLOW CONTROL AT THE WING-PYLON-NACELLE JUNCTION

V. Ciobaca ^(prev. 1,4), F. Lange ⁽¹⁾, A. de Bruin ^(prev. 2), F.F.J. Schrijer ⁽³⁾, B. Stefes ⁽⁴⁾, M. Bauer ⁽⁵⁾, J. Zhai ⁽⁶⁾

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ABSTRACT:

Boundary layer control (BLC) has been successfully implemented especially on production tactical aircraft in the first half of the past century. Today Active Flow Control (AFC) technologies are being investigated for transport aircraft (a/c) towards lower environmental impacts, improved operating costs and for extending the capability of existing aircraft. Within the European Project Clean Sky2 Large Passenger Aircraft (LPA) numerical and experimental studies address the challenges to apply local active flow control technologies to delay the wing stall at high-lift conditions and enable the close-coupling of Ultra High Bypass Ratio (UHBR) engines as one part of a multidisciplinary evaluation. The research focuses on studying the impact of a so-called slat cut-back (i.e. a shorter slat generating less high lift) inboard of the under-wing mounted engine and verifies the aerodynamic benefits of flow control systems.

IN SPACE BRANCH



Best Paper Award Ceremony in the Space Branch
The Award was delivered to Mr Andrea Valmorbida for the paper "Deployment Requirements for Deorbiting electrodynamic Tether Technology". This paper has been coproduced by the University of Padova, SENER and the University Carlos III.
© Zdobyslaw

DEPLOYMENT REQUIREMENTS FOR DEORBITING ELECTRODYNAMIC TETHER TECHNOLOGY

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ABSTRACT:

Green deorbiting technologies have begun to be investigated and Electrodynamic tethers (EDTs) appear to be

a promising option. By generating a drag Lorentz force, EDTs decrease the orbit altitude of the satellite causing its re-entry in atmosphere without using propellant.

In this work, the requirements that drive the design of the Deployment Mechanism (DM) proposed for the H2020 Future Emerging Technologies FET OPEN Project E.T.PACK – Electrodynamic Tether Technology for Passive Consumable-less Deorbit Kit are presented. The main requirements that drive the design of the DM are discussed.

The paper presents the synthesis of the reference profiles used by the deployer motor to make the tethered system reach the desired final conditions.

The result is a strategy for deploying electrodynamic tape-shaped tethers that will be used for deorbiting satellites at the end of their operational life through a green technology that exploits Lorentz forces.



AEC2020: THE CEAS GOLD MEDAL CEREMONY

PROFESSOR RICHARD J. PARKER WAS AWARDED THE CEAS GOLD MEDAL 2019

Richard (Ric) Parker, CBE, FEng, FRAeS, FIMechE, FlntSP is an independent Special Advisor, working with various companies and institutions in the fields of technology strategy and technology transfer. Clients include BP, Northrop Grumman, NRF Singapore and A-Star, Singapore.

Ric is President of the International Society for Air-Breathing Engines (ISABE) since 2015. He was Chairman of the European Clean Sky research programme from 2012 to 2018. He was one of the founders of the clean Sky programme and chaired the launch meeting in Brussels in 2005. He is Chairman of the Singapore Aerospace Programme and Chairman of the Advisory Board for the Singapore Marine and Offshore Programme.

He was appointed Director of Research & Technology, Rolls-Royce Group in January 2001 and retired in April 2016. He was responsible for direction and co-ordination of Research & Technology programmes across all the Rolls-Royce businesses, worldwide. Ric joined Rolls-Royce in 1978, and has held various posts including Chief of Composites and Ceramics, Director - Compressor Systems and Director of Engineering & Technology, Civil Aerospace. Ric gained a CBE (Commander of the Order of the British Empire) for Services to Engineering in the 2013 UK New Year's honours list. He was European CTO of the Year in 2014. In 2015 he was awarded the Royal Aeronautical Society Gold Medal.

He is a Fellow of the Royal Academy of Engineering, a Fellow of the Royal Aeronautical Society, a Fellow of the Institute of Physics, a Fellow of the Institution of Mechanical Engineers and a Fellow of the City and Guilds Institute. Ric is a Liveryman in the Worshipful Company of Engineers.

Ric gained a BSc in Physics at Imperial College, London in 1975 and an MBA with distinction at Loughborough University in 1992. He has Doctorates (honoris causa) in Science and Engineering from Pusan National University, Korea and Nanyang Technological University, Singapore; and from Imperial College, Loughborough University, Sheffield University and Heriot Watt University, in the UK.

He is a visiting Professor in Aerospace and Transport Technology at Loughborough University, a visiting Professor in Mechanical Engineering at Imperial College, London and an Honorary Professor in Materials Engineering at Birmingham University, UK. He is a Distinguished Visitor at the UK National Physical Laboratory.

Ric is married to Jeanette, has two daughters, and has homes in Littleover, Derby, and Nine Elms, London, UK



AMONG PICTURES TAKEN DURING THE GOLD MEDAL CEREMONY



Handshaking after ceremony, Zdobyslaw Goraj and Ric Parker ©Zdobyslaw



Ric Parker speaks after getting the award. People around the table, from his right: Jeanette Parker, Mercedes Oliver Herrero, Georges Bridel, Joachim Szodrich, Christophe Hermans, Pierre Bescond, Beata Wierzbinska-Prus, Zdobyslaw Goraj ©Zdobyslaw



CEAS recipient presents the medal to the audience ©Zdobyslaw



Cocktail Party held in Bordeaux county hall, from left to right: Zdobyslaw Goraj, Jeanette Parker, Ric Parker, Dominique Nouailhas Corporate relationship 3AF, Sergey Chernyshev and Valérie Guéron ©Zdobyslaw



Gala Diner, after award ceremony. From left to right: Ric Parker, Georges Bridel, Jeanette Parker and Mercedes Oliver Herrero ©Zdobyslaw



Gala Diner. From left to right: Joachim Szodruch, Sergey Chernyshev and Rolf Henke ©Zdobyslaw



Gala Diner. From left to right: Cornelia Hillenherms, Petter Krus, Wieslaw Ostachowicz, Tomasz Goetzendorf-Grabowski ©Zdobyslaw



Presidential lunch held on 26 Feb. From left to right: Mercedes Oliver Herrero, Estefania Matesanz Romero, Pierre Bescond, Sergey Chernyshev, Christophe Hermans, Rolf Henke, Tomasz Goetzendorf-Grabowski and Georges Bridel ©Zdobyslaw



Handshaking after ceremony. Zdobyslaw Goraj congratulates Ric Parker ©Zdobyslaw

THE CEAS JOURNALS – TWO INTERNATIONAL PEER-REVIEW JOURNALS FOR HIGH-QUALITY RESEARCH IN AEROSPACE

By Dr.-Ing. Cornelia Hillenherms, German Aerospace Center (DLR), Managing Editor CEAS Aeronautical Journal

The **CEAS Aeronautical Journal** and the **CEAS Space Journal** were created in 2009 under the umbrella of CEAS to provide an appropriate platform for excellent scientific publications. Besides CEAS, the German Aerospace Center (DLR) and the European Space Agency (ESA), respectively, signed the agreements with Springer Nature (Springer-Verlag at that time).

Both journals are devoted to publishing high-quality research papers on new developments and outstanding results in all areas of aerospace-related science and technology, including important spin-off capabilities and applications.

As such the journals disseminate knowledge and promote aerospace research particularly in Europe, e.g. from current EU framework programmes, and they also foster the transfer of knowledge into practice. In addition, special issues are dedicated to topics of major relevance. To give an example, the titles of special issues published in the last three years are listed below.

CEAS Aeronautical Journal:

- Special Issue: Research in Air Transportation (Vol. 11, Issue 2, June 2020)
- Special Issue: Smart Fixed Wing Aircraft - Load Control (Vol. 10, Issue 1, Dec. 2019)
- Special Issue: Aircraft Noise Generation and Assessment (Vol. 10, Issue 1, March 2019)
- Special Issue: Scientific Access to the European Strategic Wind Tunnels (Vol. 9, Issue 2, June 2018)

CEAS Space Journal:

- Special Issue on Space Lidar and Space Optics (Vol. 11, Issue 4, Dec. 2019)
- Special Issue on EMSec – Real Time Services for Maritime Safety and Security (Vol. 11, Issue 1, March 2019)
- Special Issue on Guidance, Navigation & Control Systems (Vol. 10, Issue 4, Dec. 2018)
- Special Issue on Astrodynamics Tools and Techniques (Vol. 10, Issue 1, March 2018)
- Special Issue on Space Optics (Vol. 9, Issue 4, Dec. 2017)

The journals are published regularly with four issues per year. All articles are peer-reviewed by at least two

independent qualified reviewers selected by the highly competent associate editors of the journals. Both journals are currently still subscription-based journals, but optionally allow open access publication, i.e. they are so-called "hybrid journals". However, Springer Nature fully supports the transition to open access because of the benefits it provides to authors, readers and to promote open science:

- Higher visibility and greater impact: open access articles are accessed four times more often on average, and cited 1.6 more times on average compared with non-open access articles¹.
- Compliance with rules: Many funding institutions call for open access, and some take compliance into account when assessing future grant applications.
- The copyright remains with the author: Most Open Choice articles are published under the liberal Creative Commons Attribution 4.0 International (CC BY) license, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if changes were made.

Authors are increasingly making use of the open access publication option (Springer names it 'Open Choice') and are often even obliged to publish their results freely accessible, e.g. if their project is publicly funded. Many research institutions as well as universities have "Read and Publish" agreements in place with Springer Nature², allowing their authors to publish their article open access - at no cost to them - in most Springer hybrid journals, including the CEAS journals. Participating countries include, e.g., Austria, Netherlands, Finland, Norway, Sweden, Hungary, Poland, UK, and Germany.

The table below lists names of responsible persons, some essential features as well as a choice of journal metrics, which show the development of both journals in the past years.

1. Within the first three years of publication. Springer Nature hybrid journal OA impact analysis, 2018

2. See: <https://www.springer.com/gp/open-access/springer-open-choice/springer-compact>

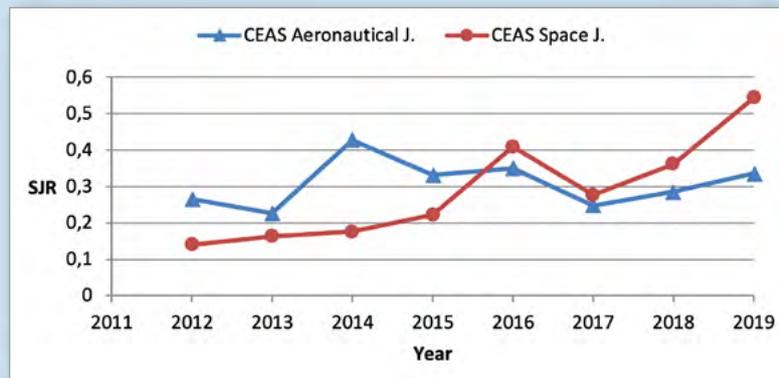
	CEAS Aeronautical Journal	CEAS Space Journal
Editor-in-Chief	Rolf Henke, DLR, D	Hansjörg Dittus, DLR, D
Managing Editor(s)	Cornelia Hillenherms, DLR, D	Stefan Leuko, DLR, D Rafael Bureo Dacal, ESA, NL Wilhelm Kordulla, DLR, D
Editorial Board	Peter Bearman, RAeS, London, UK Philippe Beaumier, ONERA, Palaiseau, F Hansjörg Dittus, DLR, Cologne, D Paolo Gaudenzi, AIDAA, Rome, I Christophe Hermans, NVvL, Amsterdam, NL Torben Henriksen, ESA, Noordwijk, NL	Peter Bearman, RAeS, London, UK Philippe Beaumier, ONERA, Palaiseau, F Paolo Gaudenzi, AIDAA, Rome, I Rolf Henke, DLR, Cologne, D Christophe Hermans, NVvL, Amsterdam, NL Torben Henriksen, ESA, Noordwijk, NL
Coverage	Flight Physics & Aerodynamics, Aeroelasticity & Structural Mechanics, Aeroacoustics, Structures & Materials, Flight Mechanics & Flight Control, Systems, Flight Guidance / ATM / CNS, Aircraft & Aircraft Design, Rotorcraft, Propulsion	Structures, Thermal, ECLS, Mechanisms, Robotics, Propulsion, Aerothermodynamics, GNC, Power, Mission Design and Space Systems, Satellite Communication, Materials, Operations, Optics, Optoelec- tronics and Photonics, Space Debris
Publisher	Springer Nature	
Senior Editor	Silvia Schilgerius, Springer Nature, Vienna	
		
Accepted Articles ³	191	141
Full-text Article Downloads 2019	62,546	33,150
SNIP ⁴ 2019	1,381	1,337
SCImago Journal Rank (SJR) ⁵ 2019	0,336	0,543

3. 2017 – 2019

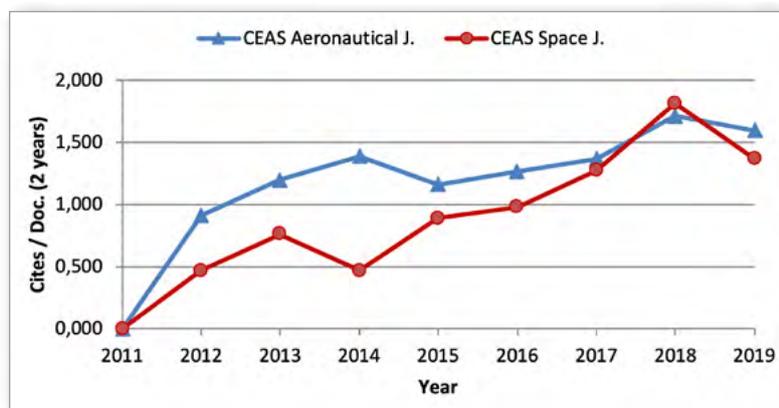
4. The **Source-Normalized Impact per Paper (SNIP)** measures contextual citation impact by weighting citations based on the total number of citations in a subject field. The impact of a single citation is given higher value in subject areas where citations are less likely, and vice versa (source: <https://www.scopus.com/sources>).

5. **SCImago Journal Rank (SJR)** is a measure of scientific influence of scholarly journals that accounts for both the number of citations received by a journal and the importance or prestige of the journals where such citations come from (source: <https://www.scimagojr.com>).

SCImago Journal Rank (SJR) trend



Cites / Doc.⁶(2 years) trend



CiteScore 2019⁷

2,8

2,3

WWW

<http://www.springer.com/13272>

<http://www.springer.com/12567>

Paper Submission

<https://www.editorialmanager.com/canj>

<https://www.editorialmanager.com/ceas>

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Copyright & Self-archiving Policy

RoMEO⁸ green

Open Choice Article Processing Charge

€ 2170,- (only if no agreement is in place)

6. Citations by document: This indicator counts the number of citations received by documents from a journal and divides them by the total number of documents published in that journal. The chart shows the evolution of the average number of times documents published in a journal in the past two (or three or four) years have been cited in the current year. The two years line is equivalent to the Journal Impact Factor, the most well-known indicator in the Journal Citation Reports[®] published by Clarivate Analytics.

7. CiteScore 2019 counts the citations received in 2019 to documents published in 2016, 2017 or 2018, and divides this by the number of documents published in 2016, 2017 and 2018.

The 3-year CiteScore time window was chosen as a best fit for all subject areas. Research shows that a 3-year publication window is long enough to capture the citation peak of the majority of disciplines.

8. See: <http://www.sherpa.ac.uk/romeo/index.php?la=en&fDnum=|&mode=simple>

INTERVIEW WITH MICHEL PETERS, CEO OF THE ROYAL NLR, EREA CHAIRMAN

By Jean-Pierre Sanfourche, Editor-in-Chief



Michel Peters, CEO of the Royal NLR, EREA Chairman

As of 1st of January 2020, Michel Peters, CEO of Royal NLR, is the new chairman of EREA. He will hold this position until 31 December 2021.

With the new European Commission setting ambitious climate goals, aerospace research must play a leading role in the "Green Deal". Top-level R&D is essential to achieve this, which puts the EREA members at the heart of this challenge.

At the same time, Europe is embracing defence research and innovation one of its key tasks by launching the European Defence Fund (EDF). As most of EREA members have a long experience in defence R&D, EREA is of course committed to play a central role in this new programme.

And at a time when we have to face the dramatic Covid-19 crisis, a strong impulse will be given to research and innovation, which will strengthen the role of EREA.

Jean-Pierre Sanfourche – The COVID-19 crisis has had a strong impact on the aviation sector. What actions can be taken in the EU in response to the coronavirus crisis? How do you see the role of research in overcoming this crisis?

Michel Peters - The Corona crisis has hit us all, the aviation sector in particular. Many airlines are struggling to survive and air traffic is a fraction of what it was in February this year. This cannot last much longer and we all must do our best to keep the sector afloat. Through coordinated effort, the EU must ensure a quick development of a vaccine. That said, I think that the crisis also holds opportunity to accelerate the transition to a sustainable, green aviation. As Commissioner Timmermans said: the climate crisis has not suddenly gone away. Many governments are taking action by adding sustainability demands to their support packages. Innovation is key here and we, the EREA institutes, are ready to play our part and step up our game.

J-P. S. – The new European Commission pays particular attention to disruptive research and breakthrough innovations. How should the Horizon Europe programme

respond to this directive?

M. P. - Rightfully so, the Commission is demanding a revolution, not an evolution. In order to do that, we must invest in disruptive, new solutions that challenge the way we think. At the same time, we should not forget that such solutions need significant time and that the climate crisis is an acute one demanding more short term innovation. This is not an or / or -situation, but an and / and one. It is vital to explore the potential of hydrogen powered aircraft, but we must also recognise that significant investments are needed in ultra-efficient gas turbines as no alternative will be available in the next decades. So the challenge is to strike the right balance. Applied research, the core business of EREA and its institutes, is right in the middle of it.

J-P. S. – How important is ACARE for EREA?

M. P. - EREA is one of the creators of ACARE and is supporting ACARE right from its start in 2001. From an EREA point of view, the ACARE approach bringing together all aviation R&I stakeholders, public and private, to elaborate and agree on joint European R&I strategies has proven its success in 20 years. Almost all European, national and regional R&I efforts in aviation are using ACARE as reference. Furthermore this common reference allows better coordination of European programs. Therefore we will continue to support and contribute to ACARE in its role as main advisory body council on aviation R&I not only but in particular for the European Commission and member states and as the central forum for strategic dialogue between its members.

J-P. S. – National and European aeronautics Research & Innovation programmes and agendas are not sufficiently coordinated. Better integration would allow faster progress in many areas. Does EREA draw up action plans to develop cooperation links and encourage synergies?

M. P. - Yes we do, mainly through our Joint Research Programme Future Sky and close cooperation among EREA members. A good example is the recently finished EU project Future Sky Safety. Not only was FSS the EU's flagship project on aviation safety, but it also explicitly coordinated national R&D efforts in this area. Not only were we able to significantly contribute to the Flightpath 2050 aviation safety goals, but the project also allowed for synergy between national institutional R&D agendas.

National programmes have an important role to play and by no means do we aim at diminishing its role. However, I do think that such programmes should not be a reason to stand with our backs to one another. The challenges

we face require a joint, coordinated effort and that's why we believe that European programmes are key in tackling those challenges. That is why I am proud of the close cooperation within EREA, within Future Sky, and EREA being a key actor to the work done in ACARE.

J-P. S. – What is your assessment of the main orientations of Strategic Research and Innovation Agenda (SRIA) of the proposed Institutionalised Partnership for Clean Aviation, the successor of Clean Sky 2?

M. P. - I have the privilege to represent EREA in the preparatory group responsible for preparing the next generation EU aeronautics programme Clean Aviation Partnership and I am glad to see that the sense of urgency is widely shared amongst the stakeholders. The SRIA that is now tabled reflects a compromise between realism vs. ambition and addressed both the wish for disruptive innovations as well as the strong need for as-soon-as-possible implementation. As with all compromises, there are a few things we would have done differently, but in general I feel the SRIA addresses the right things. The main priority now is to secure sufficient funding in order to address them.

J-P. S. – Public-private partnerships are an important part of Horizon Europe. How do you feel about the use of this concept and how can it be optimised?

M. P. - I fully support the use of this instrument. Public-private collaboration is key in bringing knowledge to the market, bridging the valley of death. Specifically the Article 187-partnerships, the Joint Undertakings, allow for a strategic programming over a long period of time, involving and committing a broad range of partners. In particular for aviation this is very much needed.

J-P. S. – With regards the aviation PPPs, what are your recommendations concerning their organisation (e.g. the different categories: large demonstrators, applied research, upstream research)?

M. P. - Any funding scheme should follow an innovation funnel, funding many smaller projects in the beginning, decreasing the number of projects and increasing funding intensity as one progresses through the funnel. The aviation PPPs are in principle demonstration programmes with a focus on large demonstrators of which applied research is a natural part. We believe, however, that in such ecosystems it would be interesting to also include a more technology push, upstream approach under the same 'roof'. Unfortunately the new Clean Aviation programme seems to exclude such activities and refer to the Horizon Europe collaborative research programme for this. Close coordination between the different programmes is needed in order to keep the innovation funnel intact and functioning. Finally, I think that any such PPP must include some form of impact monitor and technology evaluator. We must carefully assess whether the chosen route is the right one and if we are generating the desired impact, or not. We cannot afford losing time and resources on pursuing

dead-end technologies. By the way, this needs to be done under European leadership to avoid transfer of knowledge to competitors outside Europe.

J-P. S. – What role would you like to see EREA play in the long-term research programme?

M. P. - As mentioned before, EREA fulfils a key role in the innovation chain, having one foot in the area of applied research and one in that of industrial development. To me, applied research is therefore more about connecting different parts of the innovation chain and the different actors involved. Projects like IMOTHEP, the EREA-led Future Sky flagship project on electrification of aviation, clearly shows this by joining forces with Universities, Research Establishments and industry.

Being right in the middle of it all, EREA is in an interesting position to both see what today's challenges are as well as seeing what the future holds. That's why EREA is currently developing its own vision on the future of aviation. This vision is expected to be published end of this year. We did such exercise before and it proved to be very helpful in developing Flightpath 2050. If the Commission would decide to update Flightpath 2050, EREA is ready.

J-P. S. – Could you say a few words about the state of development of "Future Sky", EREA's Joint Research Initiative, and about the coordination of EREA with SESAR JU and Clean Sky 2 JU?

M. P. - Recently, Future Sky expanded its scope with Security for Aviation, Urban Air Mobility and Circular Aviation, complementing the existing themes of Safety, Quiet Air Transport and Energy. The EREA members have completed comprehensive roadmaps for all themes, comprising detailed descriptions of technologies and research areas to work on in order to reach the indicated milestones in the set time frames. These roadmaps will feed directly into our EREA Vision on the future of aviation. The point of these roadmaps is to represent a basis for dialogue with our European stakeholders, but also to coordinate and align the activities of the EREA members.

Finally, I would like to stress that Future Sky is an open programme for everyone to join. We explicitly invite all stakeholders to join us in our efforts towards a safe, secure, clean and innovative aviation.

J-P. S. – Europe is embracing defence research and innovation with the launch of the EDF (European Defence Fund): will EREA play a leading role in this area?

M. P. - Up until recently, defence R&D was almost exclusively done on national level. Many EREA members are actually a product of this, some once even started as national defence research institutes. Even my own institute, now the Royal Netherlands Aerospace Centre, once started over a century ago as a military institute. So yes, we have a significant role to play and we are fully prepared to do so. I am happy to say that EREA recently started a new working group fully devoted to defence, the Defence

Research Group, and is actively reaching out to other stakeholders. The EDF will be an important tool to ensure Europe's technological independence and superiority and I look forward to contributing to this together with our European stakeholders.

J-P. S. – Until the end of 2019, aviation was facing three main transitions: climate-ecological, social and economic. Since January 2020, with the Covid-19 outbreak, we are facing with a fourth transition: the health/safety transition. What are your very first thoughts about this new topic of great concern?

M. P. - In aviation, we actually have always had a keen eye for health on board an aircraft for many obvious reasons. Because of the airflow in the cabin and the HEPA-filters, nearly all bacteria and viruses are removed from the air. As a result, flying is actually quite safe. Still aviation played a major role in the spread of the virus, being an ever growing instrument to free movement all over the globe. We must step up our game to turn aircraft from a mechanism for spread, towards an early warning and monitoring system. Extensive additional research in this area is needed. I sincerely hope we will not have to face such a devastating crisis again, but we must prepare for one. We are committed to making flying even safer than it already is.

J-P. S. – A mission-oriented policy approach is outlined in the next framework programme Horizon Europe. What role do you see for research in the missions?

M. P. - In essence the Horizon Europe missions are research and innovation missions, so the role of research is key here. But we also recognise that these missions are meant to create a sense of common purpose, something we can all rally behind as Citizens of Europe. Aviation in particular would have been an interesting area for such mission, building the first fully electric commercial jet liner or a fully operational urban air mobility system. Unfortunately the first batch of missions have different priorities. Nonetheless it goes without saying that we are actively looking at how we can contribute to missions such as Climate Neutral and Smart Cities.

But I see the European Green Deal as a mission in itself, one that applies to aviation as well. We must strive for a climate neutral continent in 2050. Here I quote President Von Der Leyen when I say "this is our man-on-the-moon moment", this is our mission.

J-P. S. – In conclusion, what are your three priority goals you assign to EREA in the short-term horizon?

M. P. - My priorities for EREA are to make aviation more sustainable, safe and competitive. In order to do this, EREA must invest in having a clear vision for the future and roadmaps on how to get there. But perhaps most important of all, we must work together. I firmly believe that together we are more than the sum of our parts and that the journey that started 25 years ago is only just beginning. Closer cooperation is not only needed, it is inevitable.



SKYLINE 29 - EUROPEAN UNIVERSITIES: THE NEXT GENERATION OF INNOVATORS

Skyline 29 has landed, with a special focus on the next generation of young innovators! This edition highlights a selection of universities that are involved in some great Clean Sky projects! You'll read a view from the University of Nottingham on the importance of collaboration between universities, research centres, SMEs and industry on the path to climate-neutral aviation; and you can explore a selection of projects powered by Clean Sky that are led by universities: ACHIEVE, TICOAJO, FloCo-Tec, DevTMF, PROPTER, and ICOPE.

You'll also get insightful views on our Clean Sky Academy initiative, which is strengthening our links with academia, as well as from Professor Andreas Strohmayr of the European Aeronautics Science Network

(EASN) and the European Association of Aerospace Students (EUROAVIA) outlining their hopes and predictions for the future of clean aviation.

Finally, don't miss the updates on our current news and publications, including information on the public consultation on the proposed Clean Aviation Partnership.



**<< FOR MORE INFORMATIONS
CLICK HERE**



“TAKE OFF GUIDELINES TO RECONNECT THE WORLD”: ICAO COUNCIL ADOPTS NEW COVID-19 AVIATION RECOVERY

From ICAO NEWS RELEASE Montréal, 1 June 2020

On 1st of June, the ICAO Council adopted a new report and recommendations aimed at restarting the international air transport system and aligning its global recovery.

ICAO Council President Salvatore Sciacchitano declared: *“The world looked to the ICAO Council to provide the high-level guidance which governments and industry needed to begin restarting international air transport and recovering from COVID-19. We have answered this call today with the delivery of this report, and with its recommendations and Take-Off guidelines which will now align public and private sector actions and migrations as we get the world flying again, in full accordance with the latest and most prudent medical and travellers health advice available to us.”*

The COVID-19 report and guidelines were produced by the Council’s Aviation Recovery Task Force (CART). They were developed through broad-based consultations with countries and regional organisations, and with important advice from the World Health Organization (WHO) and key aviation industry groups including the International Air Transport Association (IATA), Airports Council International (ACI World), the Civil Air Navigation Services Organisation (CANSO), and the International Coordinating Council of Aerospace Industries Association (ICCAIA). CART Chairperson Ambassador Philippe Bertoux, the Representative of France to the ICAO Council, noted that the CART guidelines were intended to inform, align and progress the national, regional, and industry-specific COVID-19 recovery roadmaps now being implemented, but not to replace them.

Philippe Bertoux commented:

“These guidelines will facilitate convergence, mutual recognition and harmonization of Aviation related measures across the globe.”

“They are intended to support the restart and recovery of global air travel in a safe, secure and sustainable way.”

“In order to be effective, we need to take a layered and especially a risk-based approach. Measures will be implemented or removed as needed based on the wide ranging medical and other factors which will be at play.”

“Countries and operators need both autonomy and certainty as they take action to get the world flying again.”

“The CART guidelines are therefore designed to serve in both these capacities as a common reference, while remaining adaptable. This needs to be understood as a type of ‘living guidance’ which will be continuously updated based on latest risk assessments as we monitor progress and reconnect the world.”

THE CART’S REPORT



The CART’s Report contains a detailed situational analysis and key principles supported by a series of recommendations focused around objectives for public health, aviation safety and security, and aviation economic recovery.

<https://www.icao.int/covid/cart/Pages/default.aspx>
<https://www.icao.int/covid/Pages/CART-Report--context-and-Key-Principles.aspx>

THREE PILLARS

The CART was tasked to identify and recommend strategic priorities and policies to support States and industry based on three pillars:

- 1.** Coping with the challenges faced by States and the civil aviation industry due to the COVID-19 pandemic in the immediate term;
- 2.** Facilitating the restart of aviation operations in a safe, secure, sustainable and orderly manner as practicable taking into consideration the evolution of the pandemic and decisions taken by international and national public health authorities;
- 3.** Building a more resilient aviation system in the longer term.

TEN KEY PRINCIPLES

A safe, secure and sustainable restart and recovery of the global aviation sector is best supported by an internationally harmonized approach based upon the ten following key principles: 1) Protect people: harmonized but flexible measures; 2) Work as one aviation team and show solidarity; 3) Ensure essential connectivity; 4) Actively manage safety, security and health-related risks; 5) Make aviation public health measures work with aviation safety and security systems; 6) Strengthen public confidence; 7) Distinguish restart from recovery; 8) Support financial relief strategies to help the aviation industry; 9) Ensure sustainability; 10) Learn lessons to improve resilience.

RECOMMENDATIONS

Eleven recommendations are expressed :

FLIGHT PLAN FOR RECOVERY

Six measures: **1)** Aviation safety related measure; **2)** Baseline set of health risk mitigated measures; **3)** Aviation public health related measures; **4)** Safety and facilitation related measures; **5)** Economic and financial measures; **6)** Monitoring and sharing of experiences through ICAO.

BUILDING RESISTANCE

Five measures: **1)** High-level commitments; **2)** International obligations; **3)** Clear communication; **4)** Support to States and regional communities; **5)** Lessons learned.

THE WAY FORWARD

ICAO and all stakeholders involved in the production of the CART Report emphasize the importance of adopting a flexible and progressive approach.

THE CART TAKE-OFF GUIDANCE



This document provides a framework for addressing the impact of the current COVID-19 pandemic on the global aviation transportation system. It is divided into four operational modules:

<https://www.icao.int/covid/cart/Pages/default.aspx>

• AIRPORT GUIDELINES

<https://www.icao.int/covid/cart/Pages/Airports-Module.aspx>

• AIRCRAFT GUIDELINES

<https://www.icao.int/covid/cart/Pages/Aircraft-Module.aspx>

• CREW GUIDELINES

<https://www.icao.int/covid/cart/Pages/Crew-Module.aspx>

• CARGO GUIDELINES

<https://www.icao.int/covid/cart/Pages/Cargo-Module.aspx>

The appendix to the document includes mitigation needed to reduce public health risk to air passengers and aviation workers while strengthening confidence among the travelling public, the global supply chain included, and governments. It will assist in accelerating demand for essential and non-essential air travel impacted by COVID-19.



10TH SESAR INNOVATION DAYS

INSPIRING LONG-TERM RESEARCH IN THE FIELD OF AIR TRAFFIC MANAGEMENT

The **SESAR Innovation Days (SIDs)** are the main vehicle for SESAR Joint Undertaking to share progress and disseminate exploratory research results. Unlike other scientific events in air traffic management (ATM) research, the SIDs focus explicitly on exploratory research. Organised annually since 2011, the SIDs have become a landmark event in the European aviation research calendar. The SIDs will be further strengthened with the support of Engage, the SESAR knowledge transfer network.

This year's SIDs will be hosted by HungaroControl and take place at the Hungarian Academy of Sciences in Budapest, Hungary from 7th to 10th December. The aim is

to showcase results from European exploratory research and to discuss how to advance promising concepts towards industrial research within the SESAR innovation pipeline.

The SIDs are based on an open call soliciting contributions from ATM research. Exhibitions and poster, key-notes and networking events will provide further opportunities to learn about interesting projects and meet like-minded researchers.

Once again, this year's SIDs will host the annual Young Scientist Award, recognising young scientific talent in the field.



EREA BEST PAPER AWARD 2019

On 9 December 2019, was held in the Palace of the Academies of Brussel, rue Ducale 1, the 2019 edition of the EREA Annual Event. On this occasion, the EREA Best Paper Award Ceremony took place. The keynote speech was delivered by Jean-Eric Paquet, Director General of Research & Innovation at the European Commission. Then, Catalin Nae, EREA Chairman, handed over the Award to the winners of the contest. The three Papers are:

1. A CFD Benchmark of Active Flow Control for Buffet Prevention
 2. Robust Autoland design by Multi-Model H^∞ - Synthesis with a Focus on the Flare Phase
 3. High-Fidelity Aerostructural Gradient Computation Techniques with Application to a Realistic Wing Sizing
- It is to be noted that ONERA, the French Aerospace Lab, is represented on the three steps of the podium.

1ST WINNING PAPER

A CFD benchmark of active flow control for buffet prevention

Fulvio Sartor¹, ONERA, France – Mauro Minervino², CIRA, Italy – Jochen Wild³, DLR, Germany – Stefan Wallin⁴, KTH, Sweden – Hans Maseland⁵, NLR, The Netherlands – Julien Dandois¹, ONERA, France – Vitaly Soudakov⁶, TsAGI, Russia – Petr Vrchota⁷, VZLU, Czech Republic.

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<https://doi.org/10.1007/s13272-019-00415-z>

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Co-authors of the EREA Best Paper 2019 receiving the award from the EREA Chairman

Abstract

This paper will present the main results of the aerodynamic design and analysis for flow control applied to trailing edge of wings and profiles. This work has been conducted in the framework of the European project AFLoNext aiming at developing technologies allowing for an improvement of the performance and loads situation in the operational domain. The technologies are expected to provide an increase in aerodynamic efficiency and a structural weight reduction for the design flight conditions with a potential for 1–2% fuel savings and corresponding emission reduction. Numerical simulations

are performed on 2D and 3D test cases. Where available, a comparison with experimental data is performed. High-speed flow is considered, to investigate a transonic configuration representative of cruise conditions. Trailing edge devices (TED) such as fluidic Gurney flaps or micro-jets for circulation control are used for assessing the possibility of delaying the buffet onset or increasing the maximum achievable lift, thus extending the flight envelope of an aircraft. The purpose of the present paper is to present the result of the work performed by the different partners involved in the project.

2ND WINNING PAPER

Robust Autoland Design by Multi-Model H^∞ - Synthesis with a Focus on the Flare Phase

Jean-Marc Biannic^{*} and Clément Roos
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Aerospace, MDPI, 2018, 5 (1), page 1-18. HAL Id: hal-01735877 – <https://hal.archives-ouvertes.fr/hal-01735877>

Abstract:

Recent advances in the resolution of multi-model and



On the right| C. Nae, Chairman of EREA 2018-2019 and on the left| F. Dupoirieux (ONERA Deputy Scientific Director) receiving the 2nd winning paper diplomas on behalf of J.M. Biannic and C. Roos

multi-objective control problems via non-smooth optimization are exploited to provide a novel methodology in the challenging context of autoland design. Based on the structured H^∞ control framework, this paper focuses on the demanding flare phase under strong wind conditions and parametric uncertainties. More precisely, the objective is to control the vertical speed of the aircraft before touchdown while minimizing the impact of wind-shear, ground effects, and airspeed variations. The latter is indeed no longer controlled accurately during flare and strongly affected by wind. In addition, parametric uncertainties are to be considered when designing the control laws. To this purpose, extending previous results published by the authors in a conference paper, a specific multi-model strategy taking into account variations

of mass and center-of-gravity location is considered. The methodology is illustrated on a realistic aircraft benchmark proposed by the authors, which is fully described in this paper and freely available from the SMAC (Systems Modeling Analysis & Control) toolbox website (<http://w3.onera.fr/smac>).

3RD WINNING PAPER

High-Fidelity Aerostructural Gradient Computation Techniques with Application to a Realistic Wing Sizing
 Timothée Achard and Christophe Blondeau
 ONERA, Université Paris Saclay, F-92322 Châtillon, France and Roger Ohayon

CNAM, Conservatoire National des Arts et Métiers, 2 rue Conté, 75003 Paris, France – DOI: 10.2514/1.J056736

Abstract:



C. Blondeau and T. Achard receiving the 3rd winning paper diplomas from C. Nae, Chairman of EREA 2018-2019

Aerostructural optimization is a keystone process to concurrently improve aerodynamic performance and reduce the structural mass of an aircraft. However, gradient-based multidisciplinary design optimization is efficient only if the computation of gradients is fast and accurate. To this end, two high-fidelity aerostructural gradient computation techniques are proposed for strongly coupled aeroelastic systems. In the specific context of this work, the focus is on design variables affecting structural stiffness only. Scalar objective functions like aerodynamic performance criteria are considered as well as a field of structural grid forces. The most intrusive technique includes well-established direct and adjoint formulations that require substantial implementation effort. In contrast, an alternative uncoupled nonintrusive approach is proposed that is easier to implement and yet capable of providing accurate gradient approximations. The accuracy of these methods is first demonstrated on the ONERA M6 wing test case. Their efficiency and applicability are then illustrated via a mass minimization problem applied to the Common Research Model. Both methods lead to very similar optimal designs, and the detailed analysis of results promotes the nonintrusive approach as a promising gradient computation alternative.

THE KEYNOTE SPEECH DELIVERED

By Jean-Éric Paquet



Jean-Eric Paquet is Director General – Directorate “Research and Innovation” (RTD) at the European Commission

“ Good afternoon dear friends and colleagues,

First of all, I would like to warmly congratulate EREA on its 25th anniversary - bearing in mind that some of your members have already celebrated 100 years (Royal Dutch Aerospace Lab - NLR), it is a good idea to celebrate your cumulative anniversary! EREA is the backbone of the European Aviation research, with a track record of delivering world-class research and innovation, international collaboration for environmental research, strong bonds and partnerships between academia and industry, and unique research and technology infrastructures. Let's go back to one hundred years ago, at a time where aviation looked very different. In 1919, French Lignes Aériennes Latécoère established the first line between Europe and Africa - from Toulouse and Barcelona to Casablanca. In Germany, the Deutsche Luft-Reederei set up a regular service between Hamburg and Berlin. And in the Netherlands, Fokker, NLR (EREA member) and KLM were founded. Today, one hundred years later, 4.5 billion people travel safely via commercial flights, connecting globally more than 20,000 cities. Aviation's global economic impact is estimated at around €2.4 trillion (in 2017) or 3.6% of global GDP.

But with big progress comes big responsibility. Indeed, these benefits come with an environmental cost, which we are all familiar with, and this has partly prompted the first ACARE Strategic Research Agenda. When we read the daily news, we are all reminded about it. Global commercial aviation contributed 860 million tons of CO₂ in 2017, out of 37100 million tons of global anthropogenic fossil CO₂ emissions - or 2.3%. And the non-CO₂ emissions possibly double the CO₂ emissions. The issue for all of us is that our grandchildren will judge us on what we leave behind. That is why I would like research and innovation in aviation to lead the way towards sustainable aviation as soon as possible, helping us to contribute to the key headline ambition of the new Commission, that is climate-neutrality by 2050. Europe today is confronted with three main transitions: a climate-ecological transition, a social and an economic transition. The climate-ecological transition needs no introduction. The social transition is very much about demographics and an ageing Europe, but it's also about technology - AI

(artificial intelligence) – that is profoundly disrupting our social organisation. It's also about the fairness agenda and the need to really continue to uphold our European social model (balancing economic growth with social protection).

The economic transition is about our competitiveness and revisiting our economic policy to better take into account constraints on growth, notably linked to planetary boundaries.

These three transitions are highly complex, including obvious trade-offs which can be politically costly and economically challenging. Research and innovation provide knowledge to deal with this. But more than that, research and innovation provide packages of solutions to help public policies deal with these transitions. So I would like to share two specific messages with you on this: first, Europe's future can only be built in a completely inclusive way. It cannot be built by European institutions or European administrations acting in isolation. Second, Europe is capable of tackling these transitions, daunting though they are, and research and innovation will play a key part in that. "A European Green Deal" is one of the six political guidelines - six headline ambitions set out by President von der Leyen for Europe, to impact well beyond the five years of her mandate. This will include the first European Climate Law to enshrine the 2050 climate-neutrality target into law. Aviation is part of it. We will review the alternative fuels infrastructure Directive and make a real difference for air-quality in and around airports, for instance. From a research and innovation point of view, we will insist on tangible results and impact from the proposed partnerships to be set up under Horizon Europe (including Clean Aviation, the successor to Clean Sky 2, pending the full results of an ongoing impact assessment).

I am aware that there is no single technological or other solution today that would allow aviation to become climate-neutral by 2050. I am also well aware of the achievements of aviation R&I at global level. Technological advancements have saved over 10 billion tonnes of CO₂ between 1990 and 2017. There is no other industrial sector that achieved such enormous CO₂ savings for the environment through technological advancements alone. In the short-term, we will continue to invest in technological advancements and ensure better uptake of sustainable aviation fuels. In the long-term (beyond 2035), Airbus and Boeing are working on new aircrafts with specific optimum mission design (i.e range, speed) and aircraft propulsion electrification (e.g. hybrid-electric for short-haul flights) – both of which promise substantial CO₂ reductions.

Many things that we do not know today will shape our future European R&I landscape. That's why our new Commissioner pays particular attention to "Disruptive research and breakthrough innovations".

In Europe and the US the automotive industry is going through a deep crisis – 50,000 layoffs were announced just a few weeks ago. If we do not want the same to happen for aviation, this means that when you go back home,

and meet the heads of your departments next week, you should challenge them to come up with disruptive ideas that will put Europe in the lead of sustainable and carbon neutral aviation path.

As you may know, aligning national and European R&I agendas, has been one of my priorities for Horizon Europe. I strongly believe in this approach. I have discussed this explicitly with the ACARE chair, and I expect concrete actions, including from EREA as a leading part of ACARE. Research and innovation alone cannot achieve the ambitious targets for climate neutrality we are proposing. Across the Commission, and together with Member States, we should ensure that technological and operational roadmaps, towards 2050, will be compatible and aligned with the European and International Aviation regulatory framework.

Thirty years ago, we started the Research Framework Programmes. Without any doubt – with your help over three decades - it was the most transparent and successful collaborative research programme globally. And all of us are proud of it. But the world has changed. Business decisions are taken in a matter of hours, not years. Disruptive demonstrators in Airbus A3 (pronounced A cube) start at very low TRL. Are we going fast enough? EREA members, for example, together with their partners in academia and industry, are doing all the hard work within EU-funded projects. For example, European talents address to GoFly Prize, a two-year international incentive competition to create a personal flying device that can be safely used by anyone, anywhere. The GoFly Prize provides teams with expertise, mentoring, prizes and global exposure as they compete to create the world's first safe, ultra-compact, urban-compatible personal flying device. Horizon Europe will provide a full spectrum of prizes, fundamental research via the European Research Council, investment opportunities in the European Innovation Council, high-class mentorship from aviation experts, in all three Horizon Europe pillars seamlessly combined.

Our two proposed aviation partnerships under Horizon Europe are only a part of the response. Partnerships are expected to be focused to limited, large-scale, impact-driven demonstrators that no single country or company can do alone. They will be designed as the European flagship aviation demonstrators, making a tangible impact on climate neutrality goals. No "business-as-usual" compared to the previous two Clean Sky programmes – where the economic crisis had a measurable impact on the initial targets.

I want your ideas for a European aviation R&I ecosystem, that integrates opportunities from all pillars, including prizes, mentorship, access to EREA's research infrastructures, as well as investment funding from EIC, EIB, InnoFin and regional funds. EREA for me is the backbone of fundamental and technological aviation. I look forward to our next meeting, and to the next 25 years of EREA.

In the meantime, I wish you, your staff and your families a healthy and productive 2020. 🍀

SAMP/T NG: THE NEXT GENERATION OF EUROPEAN AIR-DEFENCE SYSTEM

By René Mathurin, FSAF PAAMS Technical Section Leader



Figure 1: FSAF PAAMS Systems
 a. Firing Aster 30 from Bergamini FREMM – b. French MAMBA deployment © French Air Force – c. Aster 30 firing from French Forbin Frigate © Marine nationale – d. Royal Navy firing UK Ministry of Defence © Crown Copyright 2019 – e. Royal Navy – warship HMS defender Aster 30 firing © Crown Copyright 2019 – f. Aster 30 firing from French © DGA Essais de Missiles

INTRODUCTION

The Naval (SAAM¹) and Ground (SAMP/T²) Air-Defence Systems developed within the framework of the FSAF-PAAMS Programme is the result of successful European cooperation between France, Italy and the United Kingdom (Figure 1).

These systems are capable of defeating diverse threats such as high-speed tactical missiles (Supersonic sea skimmers, Air-launched, Anti-radiation, Cruise and Tactical Ballistic Missiles etc.) and highly manoeuvrable aircraft, in saturation attack scenarios.

In the early 2000's, the management of the FSAF-PAAMS³

Programme was assigned to OCCAR-EA, which is now responsible for development and production contracts and managing the majority of the in-service support activities. Within OCCAR-EA, the FSAF-PAAMS Programme Division (PD) manages throughout the whole life of the programme, covering all different phases of the programme, from programme preparation to disposal (Figure 2).

Eurosam GIE is responsible for the design, production and the support of the ground and naval defence systems. This company, which is a joint venture created by MBDA (France and Italy) and Thales, the European lea-

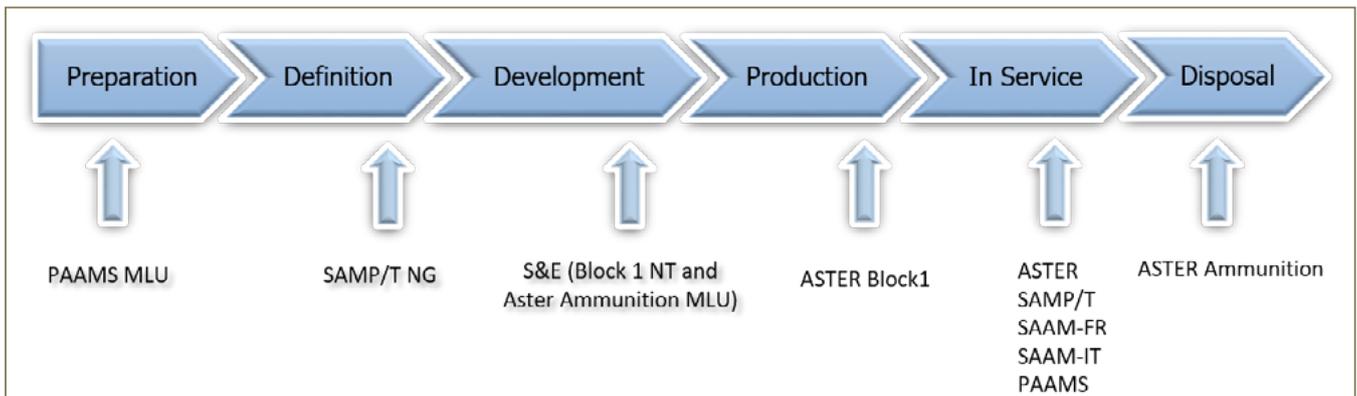


Figure 2: OCCAR-EA is responsible for the whole through life management of the FSAF PAAMS Programme.

1. System Surface-Air Anti-Missile
2. Système Sol-Air Moyenne Portée/Terrestre
3. Famille Surface Air Futur - Principal Anti Air Missile System

ders in missiles, systems and radars, provides it with unbeatable expertise in terms of operational requirements for air defence.

For years, these weapon systems have provided valuable advanced Air-Defence capabilities to the French Air Force and Navy, the Italian Army and Navy, and the British Royal Navy; it has now been decided to sustain and enhance the current systems in order to consider new and emerging threats.

The first step of the Sustainment and Enhancement (S&E) programme started in 2015 with the aim of addressing major sub-systems obsolescence and provide the Mid-Life Refresh (MLR) of the Aster missile (i.e. refurbishment of pyrotechnical components), ensuring continued improvement in performance. In addition, the Aster 30 Block 1 missile will be upgraded into Aster 30 Block 1 NT (NT for New Technology), mainly with the introduction of a high performance electromagnetic active seeker operating in the Ka-band and alongside a new weapon controller, which will allow for an extension to the Extended Air Defence domain. All these features bring a step change in capability, in particular Aster 30 Block 1 NT will provide against the TBM threats:

- Covering the entire SRBM (Short Range Ballistic Missile) threat domain and the entry of the MRBM (Medium Range) domain up to 1,500 km range.
- Treating Tactical Ballistic Missiles with separable warheads.

The second step, initiated in 2019, aims to provide major improvements of the SAMP/T system in terms of Extended Air Defence domain and range of threats incorporated. The contract, named SAMP/T New Generation (SAMP/T NG) will be placed with industry before the end of 2020. The Initial Operational Capability is planned during 2025.

SAMP/T PROGRAMME

The SAMP/T is an air defence system designed to protect National territories, external operations, high value assets and international major events against all airborne threats, including cruise missiles, manned and unmanned aircraft, stand-off and tactical ballistic missiles in the 600 km range class.

Field proven - SAMP/T is currently in service within the French Air Force (MAMBA system) and within the Italian Army. It is fully integrated into a NATO architecture, as demonstrated by the successful interception test against a ballistic missile representative target carried out on March 6, 2013. In addition, SAMP/T is regularly deployed during important events such as G20 meetings, the Paris Air Show and the Rome Jubilee. SAMP/T's reliability has been demonstrated during a 24/7, circa 4-year operational deployment by Italy in Turkey under a NATO mandate (*Figure 3*). Regular live firings demonstrate the level of reliability of the system (*Figure 4*).



Figure 3: Italian Army Deployment in Turkey
© Italian Army



Figure 4: Aster 30 firing with Italian SAMP/T Variant
© Italian Army

These very demanding activities are supported through a very efficient tri-national In-Service-Support contract managed by the FSAF-PAAMS PD, including Naval and Ground systems and munition support.

The SAMP/T System provides 360-degree protection capable of simultaneously engaging any combination of air and missile threats in the distance class of 100 km and 20 km altitude. SAMP/T has four main components:

- One multi-function radar;
- One engagement module (EM);
- Aster missile;
- Up to six launchers capable of firing eight missiles.

An additional commandment module (CM) is specific for the Italian Arm forces.

The common part of the FSAF-PAAMS System, the Aster Missile is capable of high responsiveness due to its two-stage booster (Max speed: Mach 4.5); and a very high associated accuracy thanks to a powerful aerodynamic control (PIF-PAF design) combined with a highly accurate electromagnetic seeker in the Ku-band.

Time to improve – After 10-years of operational lessons learnt, and considering evolving threats in terms of speed, manoeuvrability and range, Nations decided to upgrade significantly the SAMP/T System. For this reason, OCCAR-EA, on behalf of France and Italy, issued in October 2019, an Invitation to Tender for the Development and Production Phases of the SAMP/T NG to the Industrial consortium Eurosam. The negotiations with Industry are ongoing.

SAMP/T NG: A NEW CHALLENGE FOR THE FUTURE

In addition to obsolescence treatment and capability enhancement initiated through the S&E Contract, and based on the evolution of the geostrategic context and threat level, the SAMP/T NG shall be designed to cope with a new level of threat: High velocity air breathing targets, saturating attacks and stealthier targets. Faced with these new challenges, France and Italy have agreed on the possibility:

- To modify the layout and functions of new EMs;
- To interface new multifunction radars for SAMP/T NG FCU;

To take the benefits of the software open architecture;

New Engagement Module - The EM will be upgraded in order to provide new capabilities improving:

- Adaptability to highly demanding threats;
- Command and Control capabilities thanks to the introduction of additional engagement/ surveillance workstations for operators;
- Interoperability, for example the possibility for Italy to use CM as an alternative to EM and vice versa;
- Ergonomic improvements including internal space optimisation for the operators;

- Adaptability of the system to the software "Open architecture" context (to facilitate further improvements);
- Module Improvement in terms of ballistic protection, mobility and transportability taking into consideration the lessons learned from Operational deployments.

New Sensors integration - The current SAMP/T 1990's Arabel Radar design will be replaced respectively for France and Italy by the:

- Ground Fire 300 (GF300) developed by Thales;
- Kronos Grand Mobile High Power developed by Leonardo.

These new generation radars will increase significantly the detection range (Class 400 km) of the SAMP/T System and its capability to monitor simultaneous tracks.

Effector Optimisation – Therefore, to cope with system improvements, the Aster missile itself will be upgraded mainly to improve its long-range interception, and high altitude capabilities with the "so called" Aster 30 Block 1 NT EC (Extended Capability), including a new battery design, guidance algorithms optimisation, etc.

CONCLUSION

The SAMP/T System is the only European field proven long-range defence system. It is above all an excellent example of a successful European programme, led by OCCAR-EA, on behalf of France, Italy and the United Kingdom.

In order to continue and enhance this fruitful collaboration, OCCAR-EA will use all its knowledge and experience to ensure that SAMP/T remains an efficient system that continues to evolve to adapt to the evolution of threats whilst reducing the support costs throughout the life cycle of the weapon system.

This 30-year programme now will soon enter into a new phase with the development of the SAMP/T NG that is expected by the end of 2020 with an initial operational capability scheduled for 2025.

The extension of the capacities granted by the SAMP/T NG Programme will allow the system to be in a position to defeat more demanding emerging targets, and thus remain at the cutting edge of the Integrated Air and Missile Defence Systems (IAMDS) for the foreseeable future.



THE SPACEX CREW DRAGON 'DEMO-2' MISSION: AN HISTORIC TEST FLIGHT

By Jean-Pierre Sanfourche

SPACEX and NASA made history on 30 May 2020 with the first launch of astronauts to space from US soil from 2011 when the shuttle programme ended, i.e. in nearly a decade. It marks a major milestone ending this long period of sole reliance on Russian Soyuz spacecraft for carrying astronauts to the ISS.

The SPACEX Crew Dragon mission, called 'Demo-2' is the first crewed test flight of SPACEX's new Crew Dragon capsule and the first time astronauts have flown to orbit on a commercial spacecraft. It is the return of US space flights in an unprecedented way, marking a crucial leap for NASA's greater ambitions. SPACEX launched astronauts for the first time ever, by a privately owned and operated spacecraft since the dawn of the space age so making history signalling the beginning of a new era in space exploration missions led by commercial companies and opening a new age of commercial spaceflight.

THE SUCCESSIVE STEPS OF THE DEMO-2 MISSION

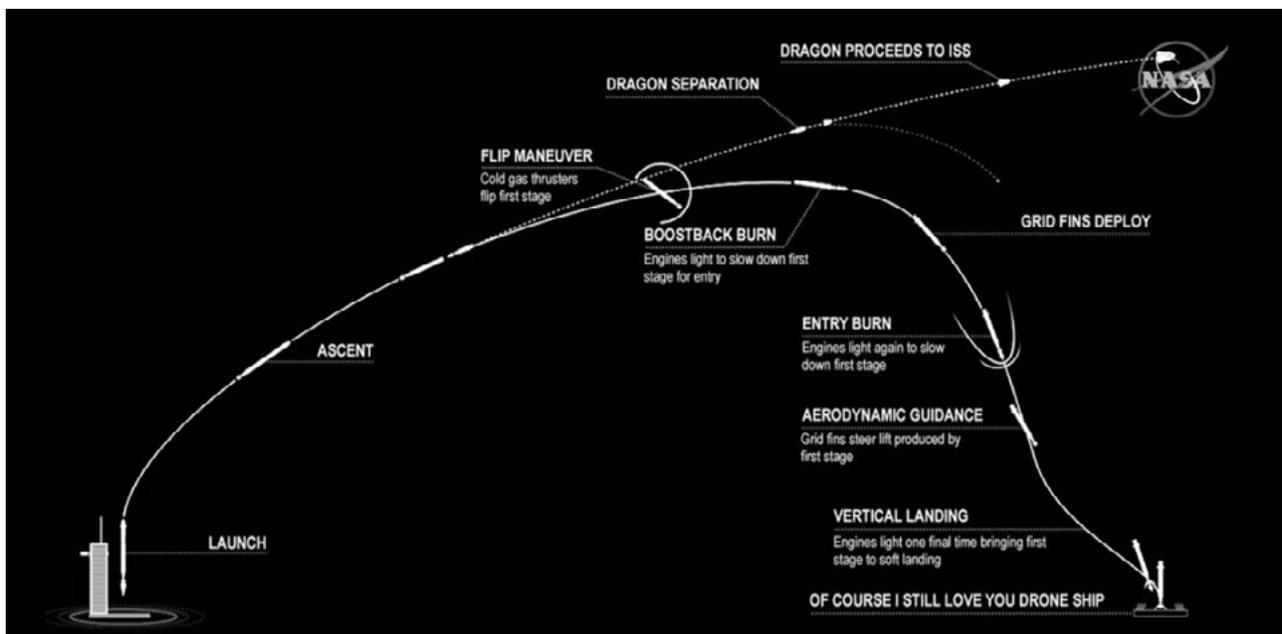


Figure 1: The different steps of SpaceX Crew dragon mission – Image credit: NASA TV

The schematic of illustration 1 shows these steps: launch – ascent – flip manoeuvre – boost back burn – entry burn – aerodynamic guidance – vertical landing of the first engine stage – and on the other part of the trajectory: Crew Dragon separation from the engine's second stage – grid fins deploy – Crew Dragon proceeds to ISS.

THE LAUNCH

Riding into the Crew Dragon, NASA astronauts Robert Behnken and Doug Hurley lifted off from NASA Kennedy Space Center, FLO, atop a 2-stage Falcon 9 rocket on 30 May at 19:22 GMT, beginning a 19-hour flight to the International Space Station (ISS).

[Figures 2, 3 and 4]

RETURN TO EARTH OF FALCON 9 BOOSTER'S FIRST STAGE

About 9 minutes after liftoff, the Falcon 9 booster's first stage returned to Earth after having made a pin-



Figure 2: Liftoff of Falcon 9 rocket, 30 May 2020 at 19:22 GMT, for SpaceX Crew Dragon Demo-2 mission – Image credit: NASA TV



Figure 3: The Demo-2 SpaceX Crew Dragon capsule seen before launch – Image credit NASA TV

point landing on the SpaceX drone ship so called “Of course I still Live You” which was stationed a few hundred miles off the Florida coast. The ship soon started heading back towards shore and on Tuesday 2 May, arrived at Florida’s Port Canaveral. This first stage secured to its desk will be refurbished in view of a next mission. [Figures 5, 6 and 7]



Figure 4: Donning their space suits: on the left, NASA astronaut Doug Hurley, spacecraft commander, and on the right, Robert (Bob) Behnken, NASA astronaut, commander of the Demo-2 mission to the ISS – Image credit: NASA TV



Figure 5: A view of spacecraft separation – Image credit: NASA TV

CREW DRAGON SEPARATES FROM ROCKET'S SECOND STAGE

A few minutes after the first stage’s landing, the Crew Dragon separated from the second stage, beginning their 19-hour space trip towards the ISS.



Figure 6: Demo-2 SpaceX Falcon 9 rocket booster during its re-entry burn a few minutes after launch – Image credit: NASA TV



Figure 7: SpaceX’s Falcon 9 rocket booster landing on the company’s drop ship “Of course I still love you”, stationed off the coast of Florida – Image credit: NASA TV

THE HISTORIC RENDEZVOUS WITH THE ISS

On 31 May at 14:16 GMT, SPACEX’s first flight Crew Dragon with astronauts docks at the ISS in historic rendezvous. Following a perfect climb to space Doug Hurley and Robert Behnken monitored an automated rendezvous with the ISS, approaching the lab complex from behind and below. Executing a precise series of thrusters firings, the Crew Dragon looped up to a point directly in front of the ISS and lined up on the lab’s forward docking port, the same once used by visiting space shuttles, Doug Hurley, former Marine test pilot, briefly took over manual control, firing thrusters by tapping High-Tech touch-screen cockpit displays to verify a crew’s ability to fly the spacecraft by hand if needed. Once the manual flying operations ended (somewhere between 220 and 170 m out of the ISS, the automatic system took over again and the Crew Dragon did the rest of the work to get to the ISS: the ship’s flight computer then resumed the approach and the Crew Dragon’s docking mechanism engaged its counterpart on the ISS at 14:16 GMT, a few minutes ahead of schedule. A little bit later, the capsule was pulled in and locked in place by 12 motorized latches. SPACEX made history when its Crew Dragon vehicle docked with the ISS and when the hatch of Crew Dragon spacecraft opened up to let the two NASA astronauts enter inside the ISS and join other astronauts on the ISS for a welcome ceremony. [Figures 8 and 9]



Figure 8: With the nose cone open for docking, the SpaceX Crew Dragon capsule successfully arrives at the ISS after a 19-hour journey – Image credit: NASA TV



Figure 9: This view shows the inside of the Crew Dragon capsule carrying NASA astronauts just after their successful docking with the ISS – Image credit: NASA TV

"It is great to get the US back in the crewed launch business. We are just really glad to be onboard this magnificent complex", Doug Hurley said.

TO INSPIRE THE WORLD

"Welcome to Bob and Doug" NASA Administrator Jim Bridenstine said to the crew in a call from Mission Control at Johnson Space Center JSC in Houston. He added: "The world saw this mission and we are so, so proud of everything you have done for our country and, in fact, to inspire the world."

"We sure appreciate that Doug Hurley replied, floating in the ISS Harmony Module, flanked by crewmate Robert Behnken, ISS commander Chris Cassidy and Russian cosmonauts Anatoly Ivanishin and Ivan Wagner.

"It is obviously been our honour to be just a small part of this", he added. "We have to give credit to SpaceX, the Commercial Crew Programme, and of course to NASA. It is great to get the US back in the crew launch business, and we are just really glad to be on board this magnificent complex." [Figure 10]

Nota: The American flag on hatch above the crew members flew in space on the Shuttle Columbia's mission maiden flight in 1981. It was left aboard the ISS by Doug Hurley and his Atlantis crewmates during the last Space Shuttle mission in 2011. Doug and Robert plan to bring the flag home at the end of this Demo-2 mission.

WHAT HAPPENS NEXT?

Now they have arrived, Hurley and Behnken are going to remain aboard ISS for up to 16 weeks. The total duration of the mission will depend on a number of factors including how well Demo-2 held up during its flight to ISS and progress on the next Crew Dragon vehicle. In order to certify Crew Dragon for operational mission, Hurley and Behnken have to carry out an array of tests on the ship's capabilities. The final demonstration to be accomplished is the capability of Crew Dragon to bring back to Earth the two astronauts.



Figure 10: The Expedition 63 team has grown to 5 participants along with the appearance of the SpaceX Crew Dragon. Left to right: Russian cosmonauts Anatoly Ivashin and Ivan Wagner; ISS commander Chris Cassidy; Crew Dragon joint operations commander Robert (Bob) Behnken and Crew Dragon vehicle commander Douglas Hurley – Image credit: NASA.

OVERVIEW OF THE KOREAN SOCIETY FOR AERONAUTICS AND SPACE SCIENCES (KSAS)



Prof. Jae-woo Lee - the 33rd President of the KSAS

The Korean Society for Aeronautics and Space Sciences (KSAS, hereafter) is a professional society for the field of aerospace engineering. The KSAS is the representative on the International Astronautical Federation and the International Council of the Aeronautical Sciences. As of March 2020, it has more than 5,100 members including 30 cooperative members and covers broad fields of academic activities in aerospace engineering and space sciences. The KSAS is one of the leading academic societies in Korea from the viewpoint of its size and activities.

The primary mission of the KSAS is:

- To facilitate advances in academic activities amongst the members of society for promotion of aerospace science and technology for national interest;
- To foster the domestic and international collaboration amongst industry, academia, and laboratory and to promote exchange between academic and technical information;
- To promote the dialogues and joint activities of various research fields (Aircraft System, Satellite System, Rotorcraft System, Aerodynamics and Applications, Structures and Materials, Guidance Navigation Control, Propulsion, Aviation Operation, Aviation Policy, Design and System Integration, Avionics, Manufacturing and Production, etc.).

HISTORY

The Korean Society for Aeronautical and Space Sciences was founded in May, 1967. Dr. Sangkyu Wie - Professor of Seoul National University at the time - was the first president. Under the same name, the society was authorized as an incorporated body by the Korean government in January 1985.

In 1991, the KSAS joined the International Council of the Aeronautical Sciences(ICAS) as a national representative. It also became a regular member of International Aeronautical Federation (IAF) in 2007.

Currently, the society publishes two academic journals: KSAS Journal (in Korean) and IJASS(International Journal of Aeronautics and Space Sciences, in English), which were launched in 1973 and 2000, respectively. Since its foundation, the head office is located in Seoul.

In 2020, Dr. Jae-woo Lee, Professor of Konkuk University, serves as the 33rd President of the KSAS.

ORGANIZATION

The organization of the society is shown below. Under the general assembly are the Council and the board of directors. On the main agenda, the president makes a decision in consultation with the board of directors, and the decision is approved by the council and the general assembly. Technical committees, subcommittees, and branches are organized to manage various tasks of the society.



Group Photo of 2020 KSAS New Year Meeting



Opening Ceremony of 2019 KSAS Fall Conference



1983 KSAS Spring Conference

Board of Directors

The KSAS is run by a board of directors, which consists of a president, a senior vice president, 4 vice-presidents, 22 academic directors, 15 academic-industrial cooperation executives and 2 auditors. The president and directors are elected by direct vote of the councilors. The auditors and councilors are elected by the vote of regular members. There are 3 types of KSAS members: individual, corporate, and library.

Individual : 5,100 (including 100 students members, 50 fellows)

Corporate: 30 (KAI, KAL, Hanwha aerospace, Hanwha System, Airbus Korea...)

Library: 18 (SNU Central library, KAIST science library...)



Branches (28 in total)

University

- Konkuk University (www.konkuk.ac.kr)
- Inha University (www.inha.ac.kr)
- Kyungpook National University (www.knu.ac.kr)
- Kyunghee University(www.khu.ac.kr)
- Korea Air Force Academy (www.afa.ac.kr)
- Jeonbuk National University (www.jbnu.ac.kr)
- Chosun University (www.chosun.ac.kr)
- Chungnam National University (www.cnu.ac.kr)
- Postech (www.postech.ac.kr)
- KAIST (www.kaist.ac.kr)
- Pusan National University (www.pusan.ac.kr)
- Seoul National University (www.snu.ac.kr)
- Sejong University (www.sejong.ac.kr)
- Yonsei University (www.yonsei.ac.kr)
- Ulsan University (www.ulsan.ac.kr)
- Hanseo University (www.helper.hanseo.ac.kr)
- Hanyang University (www.hanyang.ac.kr)
- Korea Aerospace University (www.hangkong.ac.kr)
- Gyeongsang National University (www.gnu.ac.kr)
- Sunchon National University (www.scnu.ac.kr)

Research Institutes

- Korea Institute of Machinery and Materials (KIMM, www.kimm.re.kr)
- Electronics and Telecommunications Research Institute (ETRI, www.etri.re.kr)
- Korea Aerospace Research Institute(KARI, www.kari.re.kr)
- Advanced Defense Development (ADD, www.add.re.kr)
- Korea Institute of Aviation Safety Technology(KIAST, www.kiast.re.kr)

Corporates

- Korea Aerospace Industry(KAI, www.koreaaero.com)
- Hanwha Aerospace (www.hanwhaaerospace.co.kr)
- Korean Air (www.koreanair.com)

Subcommittees

- Editorial Committee of KSAS Journal
- Editorial Committee of IJASS Journal
- Editorial Committee of Aerospace Magazine
- Policy Planning Committee
- Education Committee
- Publication Committee
- Award Committee

Technical Committees

- Aerodynamics
- Structures and Material
- Satellite System
- VTOL System
- Guidance and Control
- Aerospace Propulsion
- Space Exploration
- Avionics
- Aircraft Design and Certification
- Space Launchers
- UAV System
- Test and Evaluation
- Space Mission

ACTIVITIES

International relations

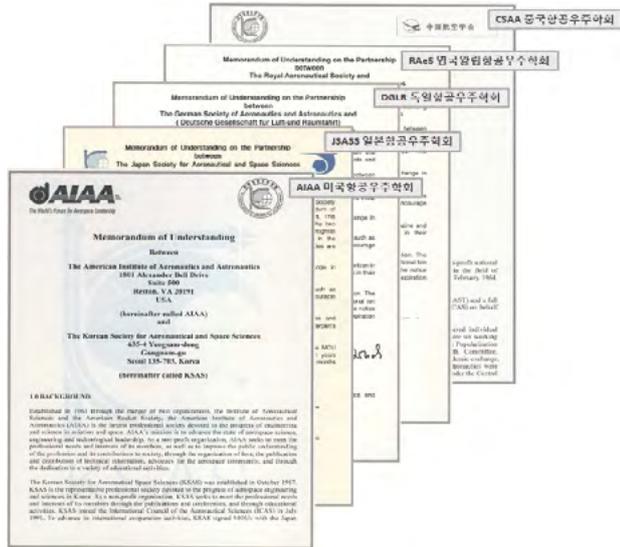
The KSAS is making efforts to internationalize academic activities, through which it has established an international aerospace academic network and is striving to advance the academic and technical level in the national aerospace community.

As the first step to broaden international collaboration, the MOUs were signed with prestigious academic societies, such as JSSAS of Japan, RAeS of UK, DGLR of Germany, AIAA of US, European Aerospace Society CEAS, and CSAA of China.

	Date of MOUs	Organization
1	March 2003	JSASS
2	May 2006	RAeS
3	April 2007	DGLR
4	November 2007	AIAA
5	October 2009	CEAS
6	November 2010	CSAA



MOU with CEAS signed in 2009. On the right, Dr Joachim Szodruich, President of the CEAS in 2009.



International cooperation with foreign countries

In addition, as part of international academic activities, various international conferences are frequently hosted by the KSAS to foster the exchange of ideas and the share of knowledge. To name a few, the 30th International Council of the Aeronautical Sciences (ICAS) Congress, the world's largest international conference on aerospace community was successfully held in 2016. The Asia-Pacific International Symposium on Aerospace Technology (APISAT) in 2017 and the Asian/Australian Rotorcraft Forum (ARF) in 2018 were successfully hosted. The APISAT 2020 will be held once again in 2020, and International Conference on High-Speed Vehicle Science and Technology (HiSST) is scheduled to be held in 2021.

Journals

As a major activity, KSAS currently publishes several technical journals. The Board of Publication plans and supervises all printings published by the Society. It contains more than 90 technical papers about recent research results of members each year.

The KSAS Journal is published on a monthly basis and serves as the flagship journal of the society. Founded in 2000, the International Journal of Aeronautical and Space Sciences (IJASS) has represented KSAS in introducing the academic excellence of Korean aerospace scientists and engineers to the world. Under the title of KSAS International Journal, it had been published twice a year before the publication frequency was increased to four times a year in 2010. To encourage the participation of international colleagues, its name was also changed to IJASS in 2009. Thanks to the strong support of the Korean Federation of Science and Technology Societies, the production quality has been significantly improved since 2011. Furthermore, to modernize the review system and production process, KSAS entered into a contract with Springer to co-publish IJASS, starting

from Vol. 19 (1), 2018. IJASS has been listed on Science Citation Index Expanded (SCIE) since Vol.13 No.1, 2012. KSAS's news magazine Aerospace Magazine is distributed quarterly to all members, and is also published online in digital format.

- *KSAS Journal* : Monthly
- *International Journal of Aeronautical and Space Sciences (IJASS)* : Quarterly
- *Aerospace Magazine* : Quarterly
- *Introduction to Aeronautics and Astronautics (text book)*: Yearly

Conferences

KSAS hosts several major conferences and smaller workshops throughout the year. The largest of those is the KSAS Annual Conference, which is held twice a year in spring and autumn. The APISAT (Asia-Pacific International Symposium on Aerospace Technology) is the prime forum for aerospace research and development of the Asia-Pacific region. Every year, the national aerospace societies of Korea (KSAS), China (CSAA), Japan (JSASS) and Australia (RAeS Australian Division) holds the conference in turn. Since the inception of APISAT in 2008, KSAS played a decisive role in the success of this forum. In 2019, APISAT was held in Gold coast, Australia.

Awards

- **KSAS Award**: KSAS's highest award for those who have contributed to the aeronautics and space sciences.
 - Academic award : For those who have made remarkable academic achievement
 - Technical achievement award : For those who have made significant achievement in the technical advancement in aerospace industry
- **Miyon Academic Award** : Given every year for those who have contributed significantly to the area of education, named after famous aerodynamicist Prof. Ohyun Roh
- **Seho Research and Development Award** : Given every four years for those who have contributed significantly to the area of aerospace engineering

Concluding remarks

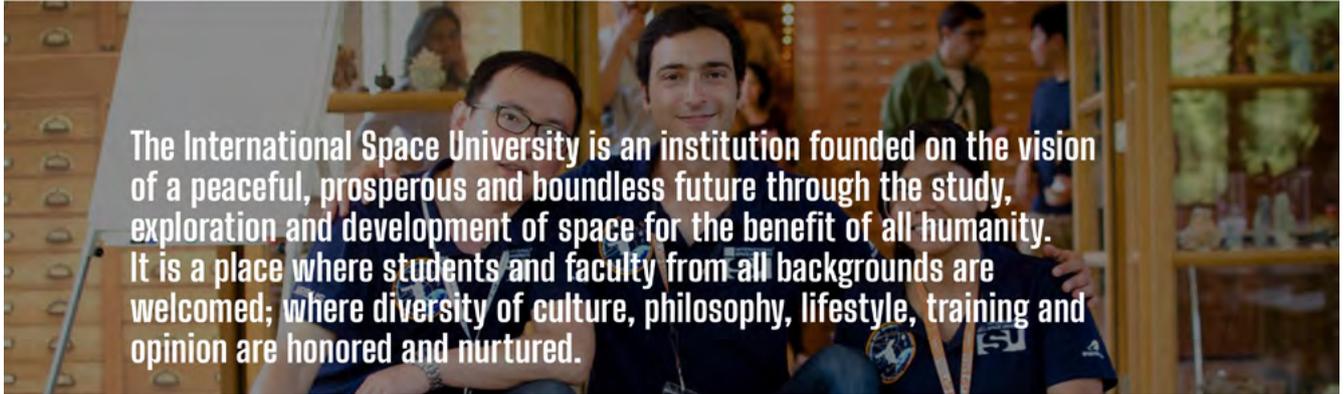
For more than 50 years since its establishment, the Korean Society for Aeronautical and Space Sciences has strived to drive the development of aeronautics and space sciences to the global level in South Korea. Based on the achievements so far, our society is now putting its efforts to improve international visibility through active international collaboration.

The CEAS is the key international partner for the globalization of the KSAS and it is hoped that the two organizations would continue a solid cooperation in the future.



AN OUT-OF-THIS-WORLD UNIVERSITY

By Juan de Dalmau, President of the International Space University



THE INTERNATIONAL SPACE UNIVERSITY Central Campus is located in Illkirch-Graffenstaden near Strasbourg (France). ISU was founded in 1987 on the “3-Is” philosophy providing an Interdisciplinary, Intercultural and International environment for educating and training space professionals and post-graduate students.

The **ISU faculty members** include astronauts, space agency leaders, space engineers, managers and experts in space law and policy comprising an international collection of experts in technical and non-technical space-related fields.

Chairman: Dr. Christian Sallaberger – Chancellor: Prof. Pascale Ehrenfreund – President: Juan de Dalmau – Vice-President: Gary Martin – Directors: Prof. Chris Welch, Sylvie Mellinger, Goktug Karacalioglu. – Students: 250/year

JUAN DE DALMAU



Juan serves as President of the International Space University (ISU) and is based at ISU's Campus in Strasbourg, France since September 2018 when he took succession from Prof. Walter Peeters.

Juan studied mechanical engineering in Barcelona, business administration in Philadelphia, interdisciplinary space studies in Strasbourg, and languages. He has over 35 years of experience in the aerospace sector, in management, education and communications, including as Range Operations Manager (DDO) for CNES at Europe's Spaceport in Kourou, French

Guiana and as Head of Communications at ESA-ESTEC in The Netherlands.

Juan is a graduate of ISU's SSP Program of 1989, when he benefited from a joint scholarship from CNES and ESA. His involvement with ISU as Faculty member started in 1993, and he has also served as Director of ISU's Space Studies Program (SSP) and as Chair of the Academic Council.

Juan was raised in a German-Spanish family. He speaks seven languages. With his wife Cristina, he enjoys a family of three children.

More details are available here: [linkedin.com/in/juandedalmau](https://www.linkedin.com/in/juandedalmau)

With its roots in North America, its stem in Europe, branches in four continents and leaves and fruits in more than 100 countries and even in outer space, in just over 30 years, the International Space University has revolutionized the way space professionals are educated and trained.

Let's start with the fruits

Close to 5000 space professionals from over 100 countries have attended the unique international, intercultural and interdisciplinary courses offered by ISU. Some of them are astronauts, for example, Jessica Meir who is currently a crew member on board the International Space Station.



Space explorer **Jessica Meir**, a NASA astronaut currently on a six-month mission onboard the ISS, obtained her Master of Space Studies at ISU's Central Campus in Strasbourg in the year 2000. She has since followed the example of hundreds of ISU alumni by giving back to her alma mater as a visiting lecturer and sharing her knowledge and experience with ISU students.

These alumni share a passion for space and the values of peaceful international cooperation for space exploration and development. They have learned how to work in interdisciplinary and intercultural teams as if they were in a real-world project, through the proven ISU Team Project component of the curriculum. These Team Projects are feasibility studies on a future concept or a white paper that is often used as a reference by companies and space agencies and is presented at professional conferences worldwide.



Space entrepreneur **Robbie Schingler** graduated from ISU's Master in 2001 and went on to co-found Planet Labs, one of the world's most innovative and successful Earth observation companies. Like many other start-up entrepreneurs, Robbie has searched among ISU's alumni to build his team, as he knows that there will be an immediate empathy and a common approach to tackling complex challenges in ever changing environments – as they learned at ISU.

Today's "stem" of ISU is its Central Campus in Strasbourg, France

Here the Master of Space Studies program and other courses have been offered yearly since 1995 and where the Central Campus Faculty and Staff are based. The Strasbourg location results from an international competition where the local and regional governments had the vision of providing a custom-built campus as they antici-

pated space exploration and development as promising sectors for the future.

ISU's Faculty

ISU's Global Faculty is composed of some 150 experts and seasoned professionals, most of them employed outside of ISU in their own fields of space science, engineering, applications, policy, economics, law, human performance in space, but also space architecture, ethics, and space and society in general.

Professor Chris Welch, Director of the Master of Space Studies (MSS) and leading the newly established ISU Space Payloads Lab, is proud that some 80% of all MSS alumni find a job in the space sector within two years of graduating. Several of them are today heads of a national space agency or founders and CEOs of successful space start-up companies.

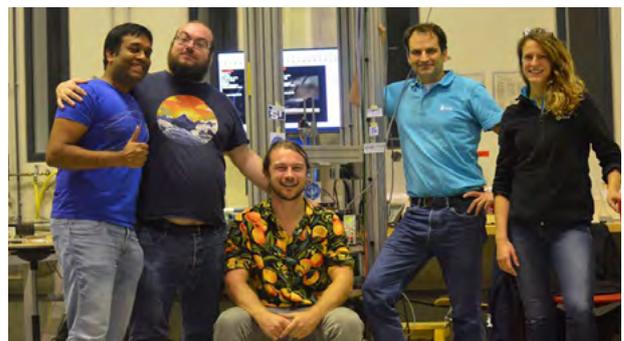


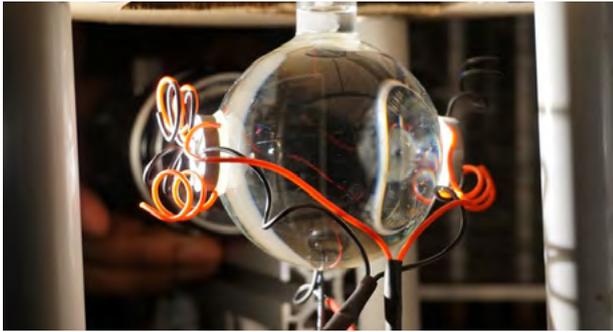
Also part of ISU's "stem" is its non-profit nature as well as its neutrality in teaching and research. No single country or organisation has the majority of voices at the Board of Trustees. The ISU governance of a Board of Trustees and a Board of Advisors is composed of representatives from space agencies, corporations and of individuals from Australia, Canada, China, Europe, India, Israel, Japan, Russia, the UAE and the USA. The European Space Agency has been an anchor partner since the foundation of ISU and a generous source of scholarships for the best candidates from its member states.

Chancellor Prof. Pascale Ehrenfreund is proud of being the most visible ISU ambassador and she regularly gives lectures at ISU's programs in a truly multidisciplinary setting with her strong background in physics, biology and space policy. Her predecessors as ISU Chancellors were Arthur. C. Clarke, Jean-Jacques Dordain and Buzz Aldrin.



Looking at the **ISU "branches"**, one finds an extensive network of alliances and partnerships with universities and other organizations, such as the United Nations Office for Outer Space Affairs, the International Astronautical Federation and many universities that have hosted





ISU's itinerant nine-week Space Studies Program (SSP) in five continents.

ISU students "drop their thesis" with the ESA Academy. After two years and hard work by several teams, ISU students finally succeeded in capturing images of the transformation of sound into light, a phenomenon known as sonoluminescence, during a test campaign in November 2019 at the ZARM microgravity research tower in Bremen, thanks to a grant obtained from the ESA Academy.

Systems engineering **Prof. Gongling Sun** is seconded to ISU by China's CASC corporation. Prof Sun brings in his many years of experience in cooperative programs between China and Europe, and is a key interface for the organization of ISU courses in China and the participation of Chinese space professionals to different ISU programs.



Some of these collaborations have matured into long-term collaborations and have generated joint educational programs such as the Southern Hemisphere SSP hosted every year in Adelaide by the University of South Australia, or the Commercial Space Programs graduate certificate offered in conjunction with the Florida Institute of Technology.

Space Applications faculty member **Taiwo Tejumola**. A member of the Resident Faculty at Central Campus with research experience in Nigeria and Japan, Dr Tejumola brings hands-on projects for the ISU students to practice on nanosatellite technologies. He is also actively promoting the access of African students to space education.



Space policy maker **Kendra Horn**, a US congresswoman, is chairing the House Subcommittee on Space. She acknowledges how much she learned from attending the one-week ISU Executive Space Course a few years ago.



At the core of the ISU curriculum is the interdisciplinarity of teaching and learning. Participants are accepted from any university background and they are expected to learn in all other disciplines so that they become true

space professionals and can provide value to their future employer or research project.

Space law professor Tanja Masson-Zwaan's main activity is to educate space law specialists at the University of Leiden. When at ISU, she helps engineers, scientists and entrepreneurs with the basic concepts in space policy, economics and law that will make them more effective members of their future multidisciplinary teams in the real world.



Other ISU "branches" emerge more and more frequently in recent years: **virtually every space start-up company** counts with ISU alumni as employees or even as co-founders. This has prompted the ISU to start offering incubation and acceleration services to space start-ups as a complement to the teaching offer in space entrepreneurship.

Cross-industry innovation expert Dr. Omar Hatamleh has recently completed a NASA detachment as ISU Director of the Space Studies Programs. He has introduced in the curriculum the theory and practice of strategic thinking, cross-industry innovation and has attracted many students and lecturers from non-space sectors.



The ISU roots are found in 1987, when three university students organized the Founding Conference and persuaded decision makers from space agencies and corporations from across the world to invest in a first "Summer School" that was held at MIT in Boston the year after. Their names are Peter Diamandis, Todd Hawley, and Bob Richards, and their vision was of "... a peaceful, prosperous and boundless future through the study, exploration and development of Space for the benefit of all humanity." **This vision drives all of ISU's activities, and the roots, stem, branches and fruits are already helping similar initiatives to germinate in other fields such as the oceans, or the use of technology to tackle humanity's challenges on Earth.**

Alumni representatives **Soyeon Yi** and **Halit Mirametoğlu** have been elected to represent the interests and aspirations of the ISU alumni at the university's Board of Trustees. For three years they are the ambassadors of an informal yet powerful network of professionals that has made many international projects and many job opportunities come true.



THE INTERNATIONAL SPACE UNIVERSITY DEVELOPS THE FUTURE LEADERS OF THE WORLD SPACE COMMUNITY BY PROVIDING INTERDISCIPLINARY EDUCATIONAL PROGRAMS TO STUDENTS AND SPACE PROFESSIONALS IN AN INTERNATIONAL, INTERCULTURAL ENVIRONMENT.

ISU also serves as a neutral international forum for the exchange of knowledge and ideas on challenging issues related to space and space applications.

ISU programs impart critical skills essential to future space initiatives in the public and private sectors while they:

- Inspire enthusiasm
- Promote international understanding and cooperation
- Foster an interactive global network of students, teachers and alumni
- Encourage the innovative development of space for peaceful purposes: to improve life on Earth and advance humanity into space.

ISU PROGRAMS IN 2020 (AS OF 25 JANUARY 2020)

- **5-day Executive Space Course (ESC)**, Strasbourg 20-24 April 2020.
- **6-week ISU Commercial Space Program (CSP)** Graduate Course at Florida Institute of Technology, 01 June-10 July 2020.
- **9-week Space Studies Program (SSP)**, Strasbourg 22 June – 21 August 2020. The SSP's a curriculum is desi-

gned specifically for professionals starting or changing emphasis in their space careers or for persons working in space-related fields who wish to broaden their knowledge and understanding beyond their current discipline.

- **1 or 2-year Master of Space de Studies (MSS)**, Strasbourg early Sept. 2020 – early Sept. 2021. The MSS is intended for individuals seeking professional development, further academic study, or both, through a one or two-year graduate degree program.
- **3-day Space Resources Short Course (SRC)**, Luxembourg, early October 2020.
- **5-day Executive Space Course (ESC)** at Museum of Flight, Seattle, WA, 26-30 October 2020.
- **5-day Executive Space Courses (ESC)** in other continents TBC for the Fall 2020 / Spring 2021.
- **5-week Southern Hemisphere Space Studies Program (SHSSP)** at the University of South Australia, Adelaide, mid-January – mid-February 2021.
- **9-week Space Studies Program (SSP)** at University of Granada, Spain, late June to late August 2021.



AMONG UPCOMING AEROSPACE EVENTS

2020

JULY

05-10 July – EUROMECH – **10th European Nonlinear Oscillations Conference** – Lyon (France) – <https://euomech.org/>

15-16 July – RAeS – **Air & Space Power Conference 2020** – London (UK) – IET, Savory Place – www.airpower.org.uk

19-24 July – ECCOMAS – **ECCOMAS Congress 2020 – Jointly organized with the 14th World Congress on Computational Mechanics** – Paris (France) – www.eccomas.org/lin-de/en

20-24 July – Farnborough – **VIRTUAL FARNBOROUGH INTERNATIONAL AIRSHOW 2020** – Five days of high quality content, collaboration, thought leadership and industry insight, connecting the global aerospace industry during a time when we cannot meet – <https://www.cleansky.eu/event-virtual-farnborough-international>

28-30 July – RAeS – **Applied Aerodynamics Conference 2020** – Bristol (UK) – POSTPONED TO A LATER DATE – www.aerosociety.com/events/

AUGUST

09-13 August – AAS/AIAA – **2020 AAS/AIAA Astrodynamics Specialist Conference** – Initially programmed to take place at South Lake Tahoe, CA (USA), is replaced by a Virtual Conference – <https://www.spaceflight.org/>

24-26 August – AIAA – **AIAA Propulsion and Energy Forum** – The only conference that covers both aeronautics and space propulsion - New Orleans, LA (USA) – Hyatt Regency - <https://www.aiaa.org/events/> Orleans, LA (USA)

SEPTEMBER

02-05 September – EASN – **10th EASN International Conference** – Innovation in Aviation and Space to the Satisfaction of European Citizens – Salerno (Italy) – Fisciano Campus – <https://easnconference.eu/home>

06-10 September – ICAS/CSAA – **ICAS Congress 2020 – 32nd congress of the International Council of the Aeronautical Sciences** – Covering the World of Aeronautics – Initially programmed to be held on 14-18 September, this event has been shifted to **06-10 Sept. 2021** – Shanghai (China) – Hosted by CSAA – www.icas2020.org/

06-10 September – EUROMECH – **13th European Fluid Mechanics Conference** – Zurich (Switzerland) – <https://euomech.org/>

08-10 September – ICAO – **ICAO Stocktaking Seminar on aviation in sector CO₂ emissions reduction** – Montréal (Québec) – <https://www.icao.int/Meetings>
Point of contact: officeenv@icao.int

08-11 September – ERF/CEAS/ROSTEC Russian Helicopters – **ERF2020 – 46th Edition of the European Rotorcraft Forum** – Moscow (Russia) – <https://rotorcraft-forum.eu/> – Moscow (Russia) – <https://rotorcraft-forum.eu/>

09-11 September – ICAO – **DRONE ENABLE 2020 – ICAO drone Enable Symposium** – rio de Janeiro (Brazil) – Windsor Barra Hotel – <https://www.icao.int/Meetings/>

14-18 September – ESA/CNES – **4S2020 – Symposium Small Satellites Systems and Services** – Vilamoura (Portugal) – Tivoli Marina – <https://esaconference.com>

16-17 September – ESA – **Industry Space Days 2020 – ESA VIRTUAL EVENT** – Space for Business Opportunities – <https://isd.esa.int>

21-25 September – ESA – **HiSST – 2nd Internal Conference on High-Speed Vehicle Science and Technology** – Bruges (Belgium) – Oud Sint Jan – www.aerosociety.com/events – DELAYED TO APRIL 2021

22-23 September – RAeS – **Simulation and modelling 2020** – Coventry (UK) – Coventry Transport Museum – www.aerosociety.com/events

28 September - **1st October** – IATA – **World Financial Symposium – Dubai (UAE)** – JW Marriott Marquis – <https://www.iata.org/events/>

30 September - **02** October – ESA – **SECESA2020 – 9th International Systems and Concurrent Engineering for Space Applications** – Delft (NL) – TU Delft – <https://atpi.eventsair.com/>

OCTOBER

05-09 October – 3AF/EUCASS – **SP2020 and ISRU – Space propulsion/ in situ Resources Utilization** – Estoril (Portugal) – www.spacepropulsio2020.com

07-09 October – RAeS – **7th Aircraft Structural Design Conference** – Limerick (Ireland) – University of Limerick – www.aerosociety.com/events/

12-16 October – IAF – **71st International Astronautical Congress** – Due to Covid 19, the 71st International Astronautical Congress, Dubai (UAE) hosted by MBRSC, has been delayed to **October 2021** – www.iafasro.org/events/

AMONG UPCOMING AEROSPACE EVENTS

iac/iac-2020/ - It will be replaced **IAC2020** 'The Cyberspace Edition' which will be held on **12-14 October 2020**

13-15 October - IATA - **Global Airport & Passenger Symposium** - Osaka (Japan) - <https://www.iata.org/events/>

13-16 October - AIAA - ICSSC/Ka - **38th International Communications Satellite Systems Conference (ICSSC2020) and 26th Ka and Broadband Communications Conference** - Arlington, Virginia (USA) - www.kaconf.org <https://www.aiaa.org/events/>

19-21 October - FSF - IASS2020 - **73rd International Air Safety Summit** - Paris (France) - <https://flightsafety.org/events/>

20-22 October - ACI Europe - **30th ACI EUROPE Annual Assembly and Congress** - Geneva (Switzerland) - Intercontinental - www.aci-europe-events.com/annual-general-assembly/

27-29 October - Aviation Week - **MRO Europe 2020 - Conference & Exhibition** - Barcelona (Spain) - Fira Barcelona Gran Via - <https://mroeuropa.aviationweek.com/>

NOVEMBER

03-04 November - RAeS - **RAeS Climate Change Conference 2020 - Steps to Greener Aviation** - London (UK) - RAeS/HQ - www.aerosociety.com/events

04-05 November - 3AF - **IES2020** - 15th European Forum on Economical Intelligence - Paris (France) - www.3af.fr

04-06 November - ERCOFTAC - **Conference Computation on Multiphase Flows** - Delft (NL) - TU Delft - <http://www.ercoftac.org/events/>

08-13 November - ESA - **11th International ESA Conference on GNC Systems** - Sopot (Poland) - Sheraton Sopot Hotel - <https://atpi.eventsair.com/>

10-15 November - Zhuhai Airshow Co, Ltd - **11th China International Aviation & Aerospace Exhibition** - Zhuhai, Guangdong (China) - www.airshow.com.cn

16-18 November - AIAA - **ASCEND - Accelerating Space Commerce Exploration and New Discovery** - The Event defining the future of space, for risk-takers, disruptors, and innovators - Las Vegas, Nevada (USA) - Caesars Forum - <https://www.ascend.events>

17-18 November - RAeS - **Defence Space 2020** -

Military Space: Mobilise, Modernise, Transform - London (UK) - 8, Northumberland Avenue - www.aero-society.com/events

18-20 November - Bahrain - **Bahrain International Airshow 2020** - Bahrain - Sakhir Air Base - <https://www.bahraininternationalairshow.com>

24-26 November - EC/BLDI - **TANDEM Aerodays 2020 (8th European Aeronautics Days) and Berlin Aviation Summit** - Aviation for the future: change is now - Berlin (Germany) - <https://www.aerodays2020.eu>

DECEMBER

07-10 November - SESARJU/EUROCONTROL - **SIDS2020 - 10th SESAR Innovation Days - Inspiring long-term research in the field of Air Traffic Management (ATM)** - Budapest (Hungary) - Hungarian Academy of Sciences - <https://www.sesarju.eu>

2021

JANUARY

11-15 January - AIAA - **AIAA SciTech Forum** - Nashville, TN (USA) - <https://www.aiaa.org/events>

28 January-**04** February - COSPAR - **COSPAR 2020 - 43rd Scientific Assembly on Space Research and Associated events** - Initially programmed to be held on 15-23 August 2020 has been postponed to this new date - Thematic: Connecting space research for global impact - Sydney (Australia) - International Convention Centre - <https://www.cospar2020.org>

FEBRUARY

03-07 February - Aero India - **13th Edition Aero India Air Show** - Yelahanka, Bengaluru - Air Force Station - www.aeroindia.gov.int

16-18 February - Saudi Arabia - **2nd Edition Saudi International Airshow** - Aviation, Aerospace, Defence and Space - Riyadh, KSA - <https://saudiairshow.aero>

MARCH

09-11 March - CANSO/EUROCONTROL - **World ATM Congress** - Madrid (Spain) - IFEMA - Feria de Madrid - <https://worldatmcongress.org> - events@canso.org

22-26 March - ESA/CNES/DLR - **ECSSMET2021 - 16th European Conference on Spacecraft Structures, Materials and Environment Testing** - Braunschweig (Germany) - Steigen Parkhotel Nime strasse 2 - <https://www.ecssmet2021.de/>