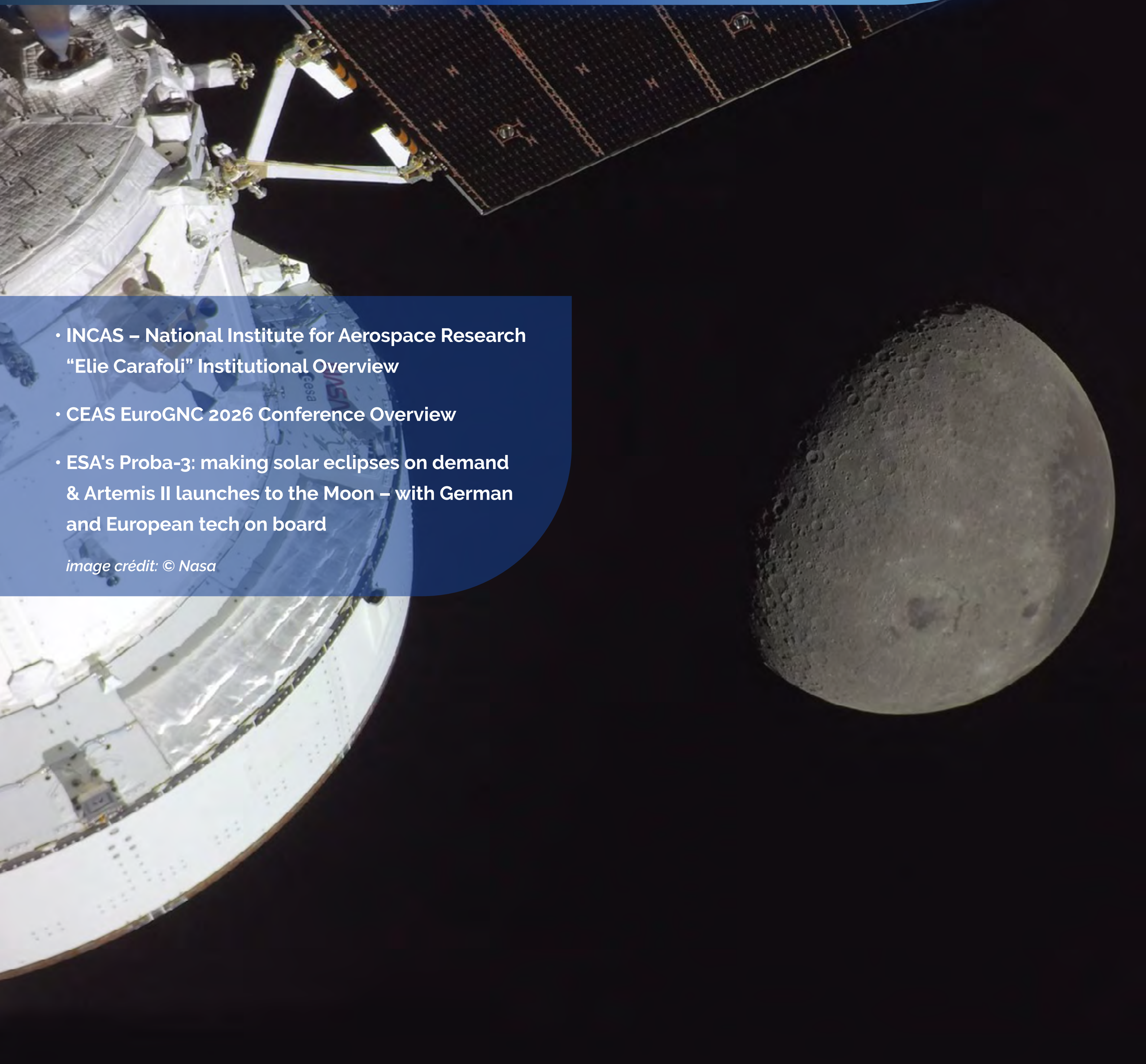
CEAS

Council of European Aerospace Societies

AEROSPACE EUROPE BULLETIN



- INCAS – National Institute for Aerospace Research "Elie Carafoli" Institutional Overview
- CEAS EuroGNC 2026 Conference Overview
- ESA's Proba-3: making solar eclipses on demand & Artemis II launches to the Moon – with German and European tech on board

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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.

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AEROSPACE EUROPE Bulletin

The **AEROSPACE EUROPE Bulletin** is a quarterly bulletin that aims to provide in depth information about the progress of European aerospace from every perspective.

We always welcome contributions from others parties such as decisions makers, scientist, engineers and students.

Write us at bulletin@ceas.org

EDITOR: CEAS
Director of the Publication: Cornelia Hillenherms

Editorial Committee
Editor-in Chief: Thomas Vermin
Aerospace.europe.editor@ceas.org

Committee's Members: Andrea Alaimo, Jonathan Cooper, Franco Bernelli, Anastasia Pesce, Thomas Vermin.

Art Direction & Design: Sophie Bougnon
sophie.bougnon1@sfr.fr / www.sbgraphisme.com

Full members directory:

Czech Republic – CzAeS

Novotneho Lavka 5 – 110 00 Prague
www.csvts.cz
President: Daniel Hanus / hanus@csvts.cz
CEAS Trustees: Daniel Hanus, Jan Rohac / xrohac@fel.cvut.cz
Point of contact: Daniel Hanus : + 420 221 082 295

France – 3AF

6,rue Galilée – F-75016 Paris
www.3af.fr
President: Bruno Berthet
CEAS Trustees: Louis Le Portz, Bruno Berthet / bruno.berthet@rafaut.fr
Point of contact: Clara Lasserre / clara.lasserre@3af.fr
T : +33 1 56 64 12 31

Germany – DGLR

Godesberger Allee 70 – D- 53175 Bonn – www.dglr.de
President: Roland Gerhards / roland.gerhards@dglr.de
CEAS President: Cornelia Hillenherms
CEAS Trustee: Daniel Reckzeh / daniel.reckzeh@dglr.de
CEAS Trustee and Vice-President Finance: Philip Nickenig
Point of contact: Birgit Neuland / birgit.neuland@dglr.de
T: +49 228 30 80 50

Italy – AIDAA

Casella Postale 227 – I-00187 Roma V.R. – www.aidaa.it
President: Sergio De Rosa / sergio.derosa@unina.it
CEAS Trustees: Erasmo Carrera / Erasmo.carrera@polito.it
Carlo Bettanini/carlo.bettanini@unipd.it
Point of contact: Daniela Vinazza / daniela@aidaa.it
T: +39 366 144 21 31

Netherlands (The) – NVvL

c/o Netherlands Aerospace Centre
Anthony Fokkerweg 2
NL- 1059 CM Amsterdam
www. nvvl.eu
President: Mark van Venrooij / mark.van.venrooij@nlr.nl
CEAS Trustees: Mark Van Venrooij, Fred Abbink / f.j.abbink@planet.nl
Point of contact: Regina Sluijter / nvvl@nlr.nl – T: +31 88 511 3113

Poland – PSAA

Nowowiejska 24 – 00-665 Warsaw
www.psaa.meil.pw.edu.pl
President: Tomasz Goetzendorf-Grabowski / tomasz.grabowski@pw.edu.pl
CEAS Trustees: Tomasz Goetzendorf-Grabowski, Lukasz Kiszkowiak / lukasz.kiszkowiak@wat.edu.pl
Point of contact: Beata Wierzbinska-Prus / beata.prus@pw.edu.pl
T: +48 22 234 54 28

Romania – AAAR

c/o COMOTI
Bd Luliu Maniu 220D
061126 Bucharest, Sector 6 – Romania C.P. 174, O.P. 76
www.aaar.ro – www.comoti.ro
President: Valentin Silivestru / valentin.silivestru@comoti.ro
CEAS Trustees: Radu Mihalache / radu.mihalache@comoti.ro
Ion Fuiorea / ifuiorea@yahoo.com
Point of contact: Valentin Silvestru
T : + 4 021 434 02 40

Spain – AIAE

Francisco Silvela 71, Entreplanta - 28028 Madrid
www.coiae.es
President: José Manuel Hesse Martin / jmhesse@coiae.es
CEAS Trustees: José Manuel Hesse Martin, Arturo de Vicente / arturodvh@coiae.es
Point of contact: Santiago Carmona / info@coiae.es – T : + 34 91 745 30 30

Sweden – FTF

c/o SSC, PO Box 4207
SE-17154 SOLNA
www.ftfsweden.se
President: Roland Karlsson / rkrolandk@gmail.com
CEAS Trustees: Svjetlana Stekovic / svjetlana.stekovic@liu.se
Point of contact: Björn Jonsson / bjorn.jonsson@fmv.se
T: + 46 70-782 62 61

Switzerland – SVFW

Laerchenstrasse 1 CH-5737 Menziken– www.svfw.ch
President :Jürg Wildi / juerg.wildi@bluewin.ch
CEAS Trustees: Jürg Wildi
Georges Bridel / georges.bridel@alr-aerospace.ch
Point of contact: Mirjam Hauser / mirjam.hauser@icloud.com
T: + 41 44 632 11 11

United Kingdom – RAeS

No.4 Hamilton Place – London W1 J 7 BQ – www.aerosociety.com
President: Prof Malcolm Macdonald FRAeS
CEAS Trustees: Emma Bossom MRAeS / emma.bossom@aerosociety.com
Jonathan Cooper CEng FRAeS / j.e.cooper@bristol.ac.uk
Point of contact: Emma Bossom
T: +44 (0) 20 7670 4332

Corporate members, MoU partners and ECAero-2:

• EASA
Konrad - Adenauer - Ufer 3
D-50542 Cologne (Germany)
www.easa.europa.eu
CEAS Representative:
David Solar

• ESA
24, rue du Général Bertrand –
75345 Paris Cedex 7
www.esa.int
CEAS Space Branch Members
Anastasia Pesce /
anastasia.pesce@esa.int
Johan Steelant /
johan.steelant@esa.int

• EUROAVIA
Kluyverweg 1 - 2629 HS, Delft, NL
www.euroavia.eu
Representative: Pedro Moreira /
pedro.moreira@euroavia.eu

• EUROCONTROL
Rue de la Fusée 96 - Brussels 1130
https://www.eurocontrol.int/
CEAS Representative: Eric Hoffman, Giuseppe Murgese

• INCAS
National Institute for Aerospace Research "Elie Carafoli"
220 Iuliu Maniu Blvd., Sector 6,
061126, Bucharest, Romania
https://www.incas.ro/
CEAS representative: Adriana Stefan
Email: incas@incas.ro

• SAE International
Address: Fred. Roeskestraat 115, 1076 EE Amsterdam, The Netherlands
https://www.sae.org
CEAS Representative:
Jacob Bangsgaard /
jacob.bangsgaard@sae.org

• Von Karman Institute
72, chaussée de Waterloo
1640 Rhode-St-Genèse, Belgium
https://www.vki.ac.be
CEAS Repres.: Christophe Schram
christophe.schram@vki.ac.be

Societies having signed an MOU with ceas:

• Académie de l'Air et de l'Espace (AAE)
1, avenue Camille Flammarion –
F-31500 Toulouse
www.academieairespace.com

• American Institute of Aeronautics and Astronautics (AIAA)
12700 Sunrise Valley Drive
Suite 200, Reston
VA 20191 – 5807 USA
www.aiaa.org

• Chinese Society of Astronautics (CSA)
CSA Zhang yao – WANG Yiran,
n° 8, Fucheng Road, Haidian district
P.O. Box 838
100 830 Beijing, China
wangyr@spacechina.com
www.csaspace.org.cn/

• European Aerospace Science Network (EASN)
EASN - Rue du Trône 98 –
1050 Brussels, Belgium
htpps://www.easn.net
Chairman: Andreas Strohmayer (University of Stuttgart)
Vice Chairman: Konstantinos Tserpes (University of Patras)
kitserpes@upatras.gr

• Association of European Research Establishments in Aeronautics (EREA)
Chairman of EREA:
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https://www.erea.org

• International Council of the Aeronautical Sciences (ICAS)
President: Chris Atkins
Executive Secretary: Axel Probst
c/o DGLR – Godesberger Allee
70 – D- 53175 Bonn
icas@icas.org – www.icas.org

• Korean Society for Aeronautical and Space Sciences (KSAS)
Room 1001, 635-4 – Yeogdam-Dong
– 135-703 Gangnam – Gu Republic of Korea – ksas@ksass.or.kr
https://www.ksas.or.kr

• Partnership of a European Group of Aeronautics and Space Universities (PEGASUS)
Chair: Emmanuel Zenou
emmanuel.zenou@isae-supaero.fr
www.pegasus-europe.org

• Society of Flight Test Engineers (SFTE-EC)
www.sfte-ec.org/

Six Societies in European Aerospace science and Technology Research closely linked with CEAS (Ecaero-2):

• EASN: European Aerospace Science Network
Vice Chairman: Konstantinos Tserpes – University of Patras
kitserpes@upatras.gr

• ECCOMAS: European Community on Computational Methods in Applied Sciences
Campus Nord UPC - Building C3
"Zona Comercial" – Jordi Girona, 1-3
(08034) – Barcelona (Spain)
www.eccomas.org/
eccomas@cimne.upc.edu
President: Ferdinando Auricchio
auricchio@unipv.it

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https://www.ercoftac.org/
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www.eucass.eu
EUCASS President:
Christophe Bonnal
christophe.bonnal@maia-space.com

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https://euromech.org
President: Professor Roberto Verzicco / roberto.verzicco@gssi.it

• EUROTURBO: European Turbomachinery Society
https://www.euroturbo.eu
Chairman: Raul Vasquez Diaz
Raul.Vasquez@Rolls-Royce.com

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EDITORIAL

Dear readers,

We live in interesting times, and sometimes we may be grateful for that..

As April came and went, we could look up at the Moon and, for the first time in more than 50 years, imagine astronauts circling it at that very moment.

Enabled by the European Service Module, the American Orion crew capsule carried its brave astronauts around the Moon, demonstrating the possibility for future missions to the lunar surface.

The moment for this mission may be now, but the work for it to happen started many months ago. If anything, it shows that working together and overcoming our differences can, quite literally, take us to the Moon and back.

It is the hope that this great work will inspire a new generation of people around the world to commit to projects that deliver extraordinary value for human kind, even if they required sustained persistence.

I wish you great reading pleasure,

Thomas Vermin
Deputy Editor-in-Chief
AEROSPACE EUROPE Bulletin
ceas.bulletin.editor@ceas.org

President's Message

Dr.-Ing. Cornelia Hillenherms
President of CEAS 2026

Dear CEAS Members, Interested Readers and Friends,

It's already the middle of the year – time to look back at what has happened in the European aerospace sector since our last Bulletin, and to see what's coming up.

For example, the ILA International Airshow took place in Berlin from 10 to 14 June, breaking records in terms of, amongst other things, the number of attendees, exhibitors and aircraft on display. The importance of the aerospace industry as a key sector and strategic infrastructure was emphasised, as was its innovative potential. The political focus was on competitiveness and technological sovereignty as well as on climate-friendly aviation and space technologies. Given the geopolitical developments of recent years, it is only logical that there has been a shift towards security and defence topics. Speaking of defence: the decision by Germany and France to scrap the NGF (New Generation Fighter) project as part of the European FCAS combat system was, unfortunately, to be expected following months of difficulties. It is now official, and I would argue that the pressure on Europe to ramp up its military capabilities is greater than ever...

The ILA kicked off with the Berlin Aviation Summit (https://berlin-aviation-summit.com/), on 9 June showing an impressive programme with many high-level speakers. The **ACARE** General Assembly took place on the same day in the same venue. I was honoured to participate for the first time, representing CEAS with an observer role (https://www.acare4europe.org/). At this meeting, the members thanked Bart de Vries for his commitment and leadership and welcomed Michael Grootenboer (Air France-KLM) to the Chair Team as the operators' representative. Catalin Nae (INCAS) remains on the Chair Team as the representative for research and education, as does Eric Dalbiès (Safran) as the representative for industry. At the ILA, ACARE presented and discussed their latest position paper "Safeguarding Europe's competitive edge in global aviation. A sectoral approach to aviation technology roadmaps and product vision (2028–2034)" together with the European Commission.

Now back to the life of CEAS. We held our first **Board of Trustees meeting** this year in Rome on 20 April 2026 in the beautiful new AIDAA office. Thanks again for hosting us! We welcomed our new corporate members INCAS and SAE, represented by Adriana Stefan (INCAS) and Jacob Bangsgaard (SAE). Furthermore, Bruno Stoufflet, President of the Air and Space Academy (AAE) was our guest, and we discussed potential ways forward in on our collaboration, based on the MoU between AAE and CEAS.

Figure 1: ACARE General Assembly.

Moreover, the date and venue for the next **CEAS Aerospace Europe Conference 2027** have been confirmed: **It will take place from 29 November to 2 December in Augsburg (Germany). Please save the date and stay tuned!** https://aec2027.dglr.de/

We also discussed on joint **CEAS/EASN activities**. Regular meetings are taking place between the CEAS and EASN boards to substantiate the organisation of the next event.

I'm pleased to share great news with you regarding the **CEAS Aeronautical Journal:** After it had been accepted into the Web of Science last year, it has now received its first **Journal Impact Factor** (JIF), which is **2,4**, and the journal ranks 20/59 in the "Engineering, Aerospace" category! This is a great achievement, made possible by all the hard work that has gone into this journal from authors, reviewers, editors, and the publisher Springer Nature.

We can already look back on three successful conferences this year, organised by CEAS Technical Committees:

- **The CEAS EuroGNC Conference** was held in Madrid from 5 to 7 May 2026 and brought together the navigation, guidance, and control community from across academia and industry. The article in this issue will provide a more detailed overview of this exciting event.
- **The 32nd AIAA/CEAS Aeroacoustics Conference** took place in Brussels from 21 – 29 May 2026 with more than 500 participants from all over the world. It was an honour to represent CEAS, and I gave a short welcome speech at the reception, which took place in a wonderful setting at Chalet Robinson. I also had the privilege of presenting the **CEAS Aeroacoustics Award to Professor Jan Delfs** (DLR), who was honoured with an excellent laudatory speech by Professor Wolfgang Schröder (RWTH Aachen University, retired) and subsequently delivered a compelling CEAS Aeroacoustics Award Lecture.

Figure 3: CEAS Aeroacoustics Award Ceremony (left: Prof. Roberto Camussi, Vice-Chair CEAS ASC).

- **The 21st International Forum on Aeroelasticity and Structural Dynamics IFASD** was held in Göttingen from 16 to 19 June 2026. It was a real honour for me to be part of this conference, especially as it was related to my own academic background. With an engaging scientific programme, high-calibre presentations and numerous technical discussions, the IFASD provided an excellent

Figure 2: CEAS BoT meeting in Rome.

Figure 4: Opening of the IFASD Conference in Göttingen (left: Prof. Lorenz Tichy, Conference Chair)

platform where experts from industry, research institutions, academia and regulatory bodies came together to discuss their ideas and exchange knowledge. A visit of the DLR site Göttingen completed the conference.

We are looking forward to the conferences that are still to come this year, especially the

- 52nd **European Rotorcraft Forum ERF:** Amsterdam (The Netherlands), 1 - 4 September 2026, https://www.erf2026.org/ - grab your ticket soon!

Thank you for your ongoing dedication to promoting the advancement of aerospace in Europe and beyond. Take care,

Cornelia Hillenherms,
CEAS President
Cologne, 30 June 2026

CEAS EuroGNC 2026 – A successful conference in welcoming Madrid with increased professional participation and student opportunities

By **Andrés Marcos** (UC3M, EuroGNC26 Chair) and **Raziye Tekin** (ROKETSAN, Chair of CEAS GNC Technical Committee)

The 8th CEAS European Guidance, Navigation and Control (EuroGNC26) conference took place in Madrid from 5-7 May 2026 at the Universidad Carlos III de Madrid (UC3M) campus in Puerta Toledo, right at the center of Madrid. It brough together over 200 participants from Europe and across the world who presented 102 articles and 15 posters. This EuroGNC conference included for the first time a pre-conference workshop day (4th May) and an undergrad/master students' poster session (5th May), and it emphasized student engagement and women-in-engineering recognition.

Personal message from the EuroGNC chair … thanks for a most successful conference

"In accepting the challenge of organizing the 2026 EuroGNC conference I was concerned, as is usual for any conference chair, with the potential for lack of success (mainly lack of participation, lack of quality of the submissions, and economic/organizational issues). These concerns were maximized when we learned in mid-2025 that the ESA-GNC conference will be held also in 2026 and in Spain (two happenstances that rarely occur due to the different periodicity of both conferences and the large number of European countries where each can be held).
I am happy to report that thanks to the support of the GNC community, the CEAS GNC Technical Committee, and the rest of the EuroGNC organizing team (my co-chairman Rafael Vázquez from the Universidad de Sevilla, and specially my local team at UC3M: Diego Navarro-Tapia and Gabriele Dessena) the 8th CEAS EuroGNC conference was a resounding success.

Out of all the EuroGNC conferences, this year had the largest number of article submissions (124), largest number of articles finally presented (102), and we actually ran out of participant badges (we had planned very optimistically for 200 but ended up needing 209). To our deep satisfaction, the feedback from the participants has been consistently extremely positive, both for the technical quality and for the social program. They have highlighted the many opportunities for engagement and networking as well as the very well-organized conference (and delicious lunches and dinners).
I personally pushed, and my team raise to the occasion, for organizing pre-conference workshops, augmenting the engagement with undergraduate/master-level students, and keeping the fees as low as possible by seeking sponsorships.
Reflecting on the contributions to the field made by women engineers and scientists, it was decided to name the auditorium and conference rooms after relevant historical and present figures (and a short description of their lives and impact posted at each entrance and presented during the opening ceremony of the conference). These were: Hypatia, Beatriz Galindo, Maria Gaetana Agnesi, Irmgard Flügge-Lotz, and Isaura Clavero Paradiñeiro.

All the extra work that these things entailed was key to make of EuroGNC26 such a success and so, in the next sections these efforts and results are summarized in the hope that it can serve as a baseline to help the next EuroGNC become even a greater success.

Emphasis on student engagement

EuroGNC conferences are professionally-oriented, which means that the community they catered to are composed of PhD-level students, early-career academics / professionals, and seniors.

With the idea of attracting the younger generation of aerospace and control engineers to the GNC field, an aim of enhancing undergraduate and master's-level student engagement was established from the very beginning. They do rarely have the opportunity to attend (and much less present) at professional conferences, so a three-prong approach was planned to achieve this aim: (i) establish a poster sessions focused on this student group; (ii) establish a volunteer student support team; and (iii) reduce the cost for their participation. The latter was achieved by seeking student grants from institutional opportunities as well as by waiving registration fees for students with accepted posters and for the student volunteers for the day they were volunteering.

The organizing team applied for, and was awarded, 5 student scholarships by ESA Education (covering student registration and travel/lodging). These scholarships were for students that had an accepted article and were going to attend the conference to present them.

In addition, 15 undergraduate/master student posters were presented (out of 20 submissions accepted) and 22 undergraduate students volunteered during the conference to support the organization.

Keeping the tab low: institutional and industrial sponsorship

The fees for EuroGNC were decided to be kept at a minimum (even lower than for the previous edition) to facilitate attendance. There is always a danger that if they are too low, but participation ends up being also low, then the organizing team may run into financial troubles. To avoid this, and thanks to the strong industrial network of the national organizing team, an early campaign seeking industrial sponsors was established. The primary goal was to create a funding budget to compensate for the risk of setting the fees low, but despite this being great for our peace of mind, the real aim was to engage with Spanish aerospace industry and promote the conference so as to attract their participation as article contributors or at least attendees.

We like to thank in here our gold (Indra), silver (Sener, GMV, Solarmems, COIAE) and institutional (UC3M and CITT-Espacio/Madrid-Region) sponsors, whose financial support helped maintain the quality of the EuroGNC. In addition, this effort resulted in having around 21% of articles presented by industrial partners (plus 65% from academia and 14% from research organizations).

Pre-conference workshops & invited sessions: an opportunity for learning & discussion

In contrast to previous EuroGNC conferences, two full-day workshops were organized this year the day before the conference started: one was titled *"Short Course on Parameter Identification and Estimation for Aerospace Systems"* (with 2 lecturers and 12 registrations), and the other *"Control Barrier Functions in Aerospace: from Foundations to Real-World Applications"* (with 5 lecturers and 19 registrations). To enhance the learning, the workshop registration included a dinner the following night with the lecturers so that the participants could discuss the workshops' topics in a more relaxed setting with the lecturers as well as with the EuroGNC TC members.

In addition, six invited sessions (24 contributions) were organized covering from *"airborne wind energy control"* to *"AI-based sensing and control in turbulence flows"* among other topics.

Plenary and Semi-Plenary sessions

There were three plenary talks and two semi-plenaries organized during the conference. They covered topics on Guidance, Navigation, and Control, and covered both, the space and the aeronautic domains. We would like to thank again the speakers for their very interesting talks:

BIOGRAPHY

Professor Andrés Marcos has over 27 years' work experience on robust control for aerospace systems, about half in academic posts and half in industry.

During his career he has been principal investigator for over 22 projects, directly responsible for obtaining more than 19M€ in competitive funding and has published over 170 peer-reviewed conference and journal publications.

Together with his team he has flight tested robust controllers and FDIR schemes in manned aircraft (DLR's ATTAS and JAXA's MuPAL-alpha), autonomous Vertical Take-Off and Landing vehicles (DLR's EAGLE), and small test rockets (NDUT). He specializes in bridging the gap between academia and industry for aerospace control systems.

He is full professor at the Aerospace Engineering Department of the Universidad Carlos III de Madrid (UC3M) where he is the director of the Master in Space Engineering (MISE), of the Center for Satellite Research and Technology (CSAT), and of UC3M's CubeSat student program (ST3LLARsat).

Dr.-Ing. Raziye Tekin works at the intersection of advanced academic research and cutting-edge defense industry applications, specializing in Guidance, Navigation, and Control (GNC) systems for 20 years As well as industrial experience, she also has graduate lectures in universities as well as lectures for professionals in GNC field.

She is honored with multiple internal and national R&D excellence awards for mission-critical contributions to aerospace systems and has widely published in journals like the AIAA Journal of Guidance, Control, and Dynamics, and serves as an Associate Editor for the IEEE Transactions on Aerospace and Electronic Systems.

She is now with ROKETSAN, head of Novel Algorithms Application Unit at Tactical Systems Section and also Rudolf Diesel Fellow of at Technical University of Munich, Advanced Institute of Study

Her research fields are missile guidance and control, vertical launch systems, advanced air mobility.

Plenary, **Tuesday May 5th:** Michael Niestroy (Lockheed Martin) "*Advances in Active Flow Control, Control Allocation, and L1 Robust Control*"

Plenary, **Wednesday May 6th**: Jose Vasconcelos (Indra Space) *"GNC solutions for Safe and Sustainable Space Operations"*

Plenary, **Thursday May 7th**: Massimo Casasco (ESA-ESTEC) ***"Current and future developments of on-board autonomy in GNC systems at ESA"***

Semi-Plenary, **Tuesday May 5th**: Sergio Ramirez (Sener) *"Navigation Technologies for Space Transportation Systems: new developments and trends"*

Semi-Plenary, **Wednesday May 6th**: Winfried Lohmiller (Airbus) *"Automation and Certification of Unmanned Aircraft"*

A More Active and Effective Technical Committee

At the end of the conference, a TC meeting was held where, among other things, the structure of the TC was discussed in order to be more active and effective. A subcommittee structure was proposed and accepted, with lead members assigned for the Award, Web, and Membership Subcommittees.

Also, due to the experience during EuroGNC26, it was noted that social media usage and visibility of the TC activities were hand to hand. The CEAS EuroGNC page, which was set up in its actual form for the previous edition in Bristol (2024), was actively used and expanded. The Marc Pélegrin Award for the Best Paper, which was established also in 2024 thanks to the support of ISAE-SUPAERO and ONERA, was discussed and the GNC TC committee agreed to expand this type of awards for EuroGNC by looking for additional funding support options. The Best Paper award is selected by members from the TC committee and for EuroGNC26 it was awarded to Maciej Michałów, Daniel Alazard, and Leandro Ribeiro Lustosa for their paper entitled Oscillatory control of rocket thrust vector for unthrottled powered precision landing (CEAS-GNC-2026-081).

The GNC TC also approved three new members: Dr. Diego Navarro-Tapia, DR. Gabriele Dessena and Prof. Sophie Armanini. We welcome them and would like to look for new members willing to be active in our community within the scope of a balanced gender and country distribution.

The TC committee takes now this opportunity to announce that e-Seminars will take place again so that members and interested participants can meet also in-between the EuroGNC conferences..

Madrid, a welcoming city for aerospace innovation & for an active social program

Madrid in May is a very welcoming city with Spring weather. It is also the only city in Europe with 5 universities offering degrees in aeronautics and/or space engineering, plus it has a very strong cluster of industries working on these fields. This is exemplified by the Cluster in Space Technologies (CITT-Espacio) of the Comunidad de Madrid, which incorporates more than 50 partners, or by the two innovation poles in the region: Getafe in the south and Tres Cantos in the north. It is also a vibrant city with many museums and restaurants.

The local committee at UC3M fully took advantage of the social and entertaining offering of the city and created a social program covering from Spanish traditions (a Flamenco show) to the High-Art (a guided visit to the Thyssen-Bornemizsa Museum) and of course gastronomy: 2 cocktail events, the conference dinner at one of our most traditional restaurants, a rooftop tapas' dinner, and a farewell lunch near the lake of Casa de Campo -one of the largest urban parks in Europe

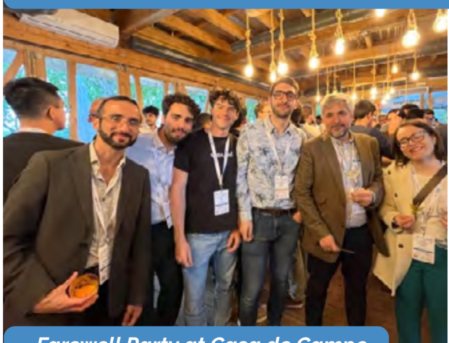
ESA Academy grantees: *Tommaso del Carro (USevilla), Pietro Bruschi (POLIMI), Alessandro Scalvini (POLIMI), Antonio Franke (TUDresden), Israe Zakaria (UToronto) with Massimo Casasco (ESA-ESTEC) and EuroGNC organizers A. Marcos & D. Navarro-Tapia*

EuroGNC2026 photos: opening and award ceremonies, round-table, poster session & socials

***EUROGNC 2026 organizing committee, from left to righ** : Andrés Marcos (Chairman), Rafael Vàsquez (co-chairman), Gabriele Dessena and Diego Navarro*

***EUROGNC 2026 organizing committee, from left to righ** : Andrés Marcos (Chairman), Rafael Vàsquez (co-chairman), Gabriele Dessena and Diego Navarro*

***Round-table with plenary / semi-plenary speakers moderated by EuroGNC26 chairman,** from left to right sitting at the table: Sergio Ramirez (Sener), Joao Vasconcelos (Indra), Michael Niestroy (Lockheed-Martin), Winfried Lohmiller (Airbus), Massimo Casasco (ESA)*



Farewell Party at Casa de Campo

Undergraduate / master -level poster session

***2nd edition** Marc Pélegrin Award, from left to right: Raziye Tekin (head CEAS GNC-TC) , Leandro Lustosa & Maciej Michalow & Daniel Alazard (authors of winning article), Andrés Marcos & Rafael Vázquez (EuroGNC26)*

INCAS – National Institute for Aerospace Research "Elie Carafoli" Institutional Overview

By – **Leonard Ulmeanu-Angelescu**

INCAS – National Institute for Aerospace Research "Elie Carafoli" is Romania's representative research and development establishment in aerospace sciences, with over 75 years of experience and expertise in aerospace engineering, flow physics and applied aerodynamics, using state-of-the-art technologies and unique infrastructure of national strategic importance. Headquartered in Bucharest, INCAS has played a central role in the development of national civil and military aeronautical programmes, while continuously expanding its research infrastructure and international collaborations.

Over the years, INCAS has become an active contributor to the European aerospace research ecosystem through its participation in major European associations and initiatives, including EREA – Association of European Research Establishments in Aeronautics, ACARE – Advisory Council for Aviation Research and Innovation in Europe, and ESRE – Association of European Space Research Establishments. Through these platforms, INCAS has contributed to strategic European research agendas such as FlightPath 2050 and future-oriented aerospace innovation policies. Currently INCAS is participating in ACARE representing research and academia in the Chair Team and has contributed to the latest ACARE Position Paper **"Safeguarding Europe's competitive edge in global aviation. A sectoral approach to aviation technology roadmaps and product vision (2028–2034)"** providing a consolidated, science-based perspective and neutral view of the priorities within the entire European aviation ecosystem.

INCAS has also participated extensively in European research and innovation programmes, including FP7, Horizon 2020, Horizon Europe, Clean Aviation and SESAR, ESA-related activities, and numerous collaborative projects. These projects have strengthened INCAS's role as an important regional and European partner in aerospace science, technology development, and multidisciplinary research.

INCAS was founded in 1949 as the Institute of Applied Mechanics of the Romanian Academy, later becoming the Institute of Fluid Mechanics, an entity focused on aeronautics and space. In 1968, the institute becomes **INCREST** - National Institute for Scientific and Technical Creation, and under this name is associated with the most significant achievements in the field of Romanian aerospace research and industry.

Later, in 1991, Romania restructures its aerospace sector into entities specialized in R&D and industrial activities, functioning as joint-stock companies. In 2008, INCAS S.A. receives national institute status and becomes INCAS - National Institute for Aerospace Research "Elie Carafoli", Romania's main entity for research and development for the aerospace sector.

INCAS presently operates as a national research institute, under Romania's Ministry of Education & Research, with unique capabilities and infrastructure at its disposal. With solid expertise in major as well as niche areas, the institute is invested in a long-term development plan for the expansion of Romania's aerospace science domain.

Major activities include: design authority and systems integrator, aerodynamic conceptual design, structural design and testing, aerostructures and advanced materials, global performance analysis, wind tunnel testing, large scale structural testing, harsh environment testing and technology transfer.

The institute's research, development and technical activities are organized within four major divisions, each contributing specialized expertise to the advancement of aerospace science and technology.

The Flow Physics Division focuses on the study and application of aerodynamics across a wide range of domains, including general aerodynamics, environmental aerodynamics, numerical simulation methods, and

INCAS Trisonic Wind Tunnel

space-related research. Its activities encompass the design and optimization of aerospace configurations, investigations in cloud physics and Earth observation, and the modelling of complex flow phenomena associated with both internal and external aerodynamics. The division also plays a key role in the development, validation, and testing of reusable aerospace demonstrators and advanced aerodynamic concepts.
The Systems Division is dedicated to the dynamics and control of aerial and space vehicles. Its research covers flight mechanics, control theory, and advanced control methodologies applicable to fixed-wing aircraft, rotary-wing platforms, and spacecraft. The division provides expertise spanning the full spectrum of flight control technologies, from conventional flight control systems to sophisticated command and control architectures for Cyber-Physical Systems (CPS), Unmanned Aerial Vehicles and Systems (UAV/UAS), and autonomous platforms incorporating Artificial Intelligence (AI).

Research within the Structures and Materials Division addresses both the design and performance of aerospace structures. The division is responsible for structural design, aircraft systems integration, and structural analysis, while also conducting extensive research into advanced materials and manufacturing technologies. Particular emphasis is placed on advanced composite materials, additive manufacturing of metallic and hybrid structures, surface engineering, tribological systems, and multifunctional materials. Through these activities, the division contributes to the development of lighter, stronger, and more efficient aerospace structures capable of meeting the demanding requirements of modern aviation and space applications.

The Experimental Installations Division provides the essential experimental infrastructure that supports national and international aerospace projects and programs. Through state-of-the-art aerodynamic testing facilities, the division delivers advanced testing services across a broad range of flow regimes, from subsonic to supersonic conditions. In addition to supporting research and validation activities, the division is responsible for continuously enhancing testing capabilities through the modernization of data acquisition systems, the adoption of advanced digital platforms, and the integration of emerging technologies, ensuring that experimental facilities remain aligned with the evolving needs of the aerospace sector.

INCAS operates through a distributed network of research and innovation facilities that combine advanced scientific infrastructure with specialized operational capabilities. At the center of this network is the institute's headquarters in Bucharest, which serves as the hub for scientific research, administrative management, and business development activities. The headquarters also hosts a significant portion of INCAS's research and development infrastructure, including some of the most advanced aerospace ground-testing facilities in the region. These comprise a trisonic wind tunnel, a subsonic wind tunnel, and a shock/Ludwieg tube, supporting investigations across a broad range of aerodynamic regimes. Complementing these facilities are state-of-the-art simulation environments, including Boeing 737NG and Airbus A320NEO flight simulators, the AERO-VR virtual reality laboratory, and an Air Traffic Management (ATM) simulation laboratory. Additional specialized laboratories support research in aerostructures and advanced materials as well as unmanned aerial systems.

Beyond its Bucharest headquarters, INCAS maintains a national presence through three strategic locations: Strejnicu and Măneciu in Prahova County, and Craiova in Dolj County. The institute also extends its international reach through representative offices in Brussels and Seattle, strengthening its engagement with the European and global aerospace sector.
The Strejnicu facility serves as the operational base for INCAS's fleet of research aircraft, which includes four Britten-Norman BN2 Islander aircraft and one Beechcraft King Air C90 GTx. These platforms function as airborne laboratories, supporting a wide range of scientific missions, specialized flight operations and environmental monitoring campaigns. Strejnicu is also recognized as

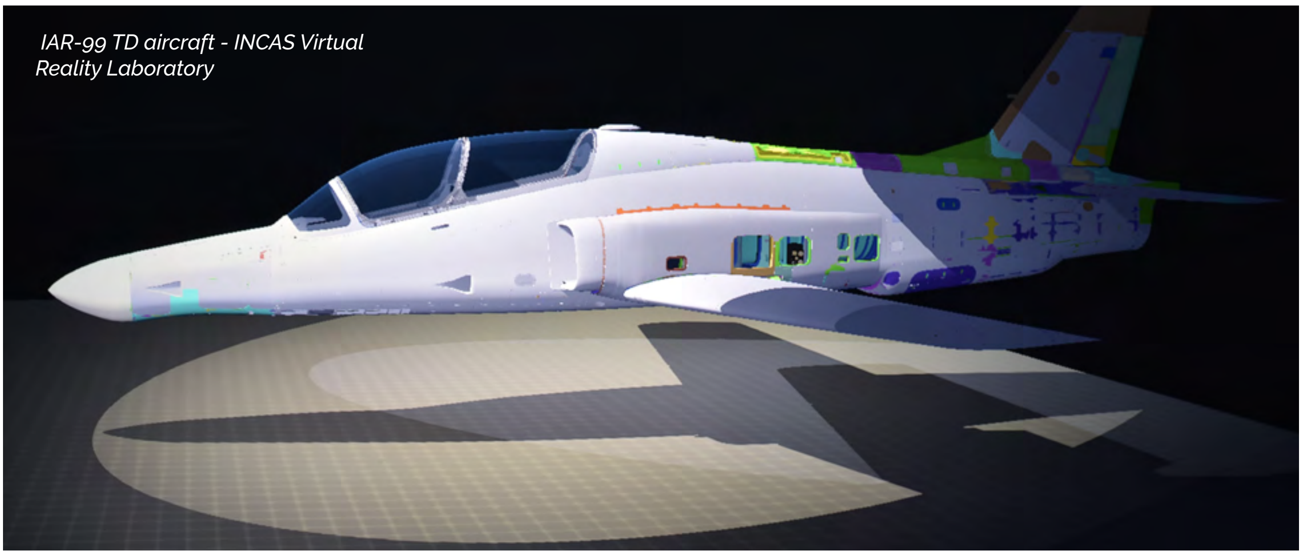
INCAS Subsonic Wind Tunnel

a center of excellence for environmental research and hosts the Center for Airborne Atmospheric and Topographic Research (CAART). This integrated research, innovation, and training infrastructure enables advanced atmospheric studies and Earth surface observation activities, providing unique capabilities for both national and international research programs.

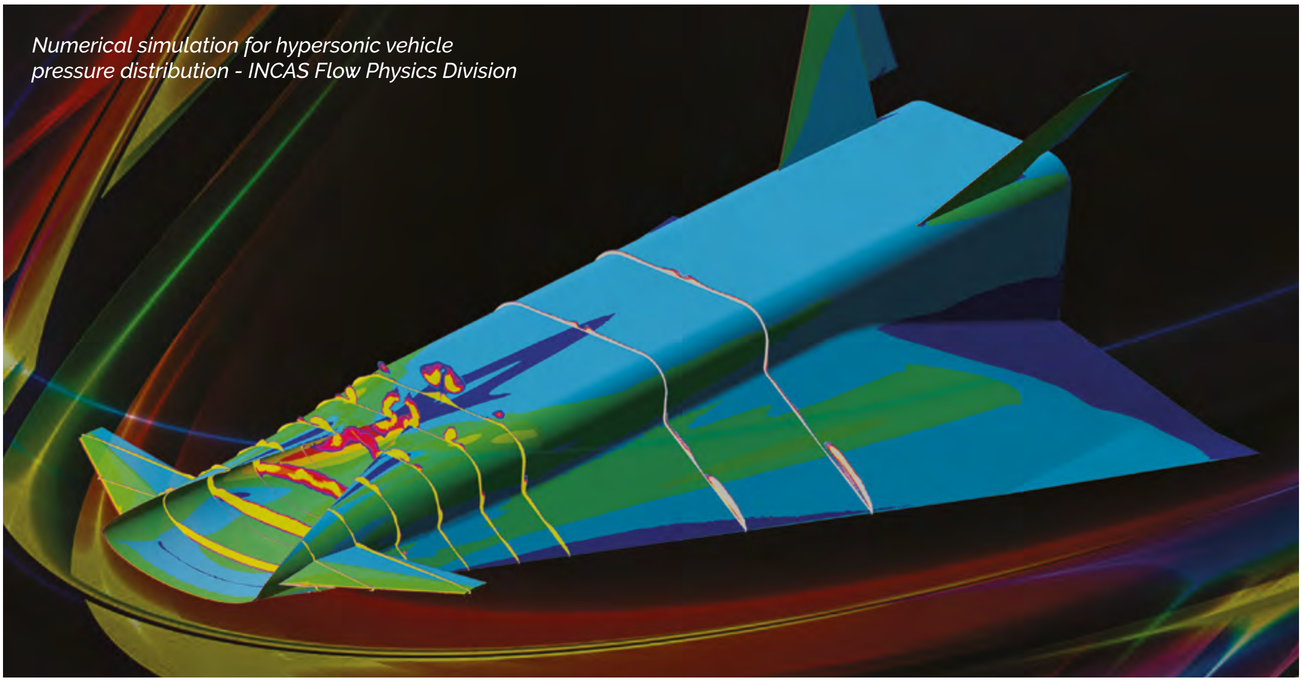
At Măneciu, the ECOTECH Experimental Platform represents a cutting-edge environment for the research, simulation, validation, and testing of next-generation aerospace technologies. Designed to support the digital transformation of aviation, the platform integrates Cyber-Physical Systems, Artificial Intelligence, Augmented Reality technologies, and Human-in-the-Loop robotic systems to advance Aviation 4.0 concepts. The facility supports multidisciplinary research, development, and innovation activities covering technology readiness levels from TRL 3 to TRL 7, while also providing capabilities for the simulation and testing of space systems and reusable aerospace vehicles. In addition, ECOTECH serves as a center for advanced training, fostering the development of skills and competencies required for future aerospace technologies.

The INCAS Technologies for Green Aviation (TGA) Center in Craiova represents one of the institute's most significant recent investments in advanced aerospace technologies. Strategically located near Craiova International Airport in southeastern Romania, the center has established itself as a unique research and technological development facility in Central and Eastern Europe. It provides state-of-the-art capabilities in composite materials manufacturing, additive manufacturing technologies—including Direct Metal Laser Sintering (DMLS)—and advanced subtractive manufacturing processes. The center also supports the development of controlled-atmosphere surface coatings for aerospace components, alongside advanced design, monitoring, and control technologies. Spanning approximately 14,000 square meters, the Craiova facility includes two technological halls, a dedicated aircraft hangar, specialized laboratories, and modern office spaces, creating an integrated environment for innovation across the aerospace value chain.

INCAS has played a significant role in the development of Romania's aerospace industry through its involvement in major national and European aerospace programs. Among its most notable achievements is the development of the IAR-99 Șoim aircraft, Romania's advanced jet trainer and light attack aircraft currently operated by the Romanian Air Force. During the 1980s, INCAS was responsible for the aircraft's conception, aerodynamic and structural design, development, and certification activities, contributing decisively to the creation of one of Romania's most important indigenous military aviation programs.
Today, the institute continues to support the aircraft throughout its operational lifecycle, serving as the Design Organisation Authority (DOA) and industrial model owner for the IAR-99 program. In this capacity, INCAS oversees the aircraft's airworthiness and certification activities while supporting modernization efforts intended



IAR-99 TD aircraft - INCAS Virtual Reality Laboratory



Numerical simulation for hypersonic vehicle pressure distribution - INCAS Flow Physics Division

to align the platform with the evolving operational requirements of the Romanian Air Force. These modernization programs are implemented in cooperation with Avioane Craiova, the aircraft manufacturer, ensuring that the IAR-99 remains a relevant and capable platform for pilot training and operational support missions.

At the European level, INCAS has demonstrated its capabilities through its participation in the RACER (Rapid and Cost-Effective Rotorcraft) demonstrator program, one of the most ambitious rotorcraft research initiatives undertaken in Europe. Developed under the coordination of Airbus Helicopters and involving 40 partners from 13 European countries, the program aims to demonstrate a new generation of high-speed rotorcraft technologies. Romania's contribution to this effort was delivered through the RoRCraft consortium, consisting of INCAS and ROMAERO and coordinated by INCAS.

Within the RACER program, INCAS led the design, manufacturing, testing, and certification documentation activities for the demonstrator's main fuselage, contributing to the development of a complex, multi-system Technology Readiness Level 6 (TRL6) aerospace structure. The successful integration of Romanian expertise into this flagship European initiative highlights the institute's ability to participate in large-scale international research and innovation programs. The RACER demonstrator achieved a major milestone with its maiden flight in May 2024 at the Airbus Helicopters facility in Marignane, France, followed by its first public presentation at the 2025 Paris Air Show, where it showcased the technological advances resulting from this extensive European collaboration.

Through its extensive research capabilities, advanced testing infrastructure, and active participation in both national and international aerospace programs, INCAS has established itself as a regional center of excellence in aerospace science and technology. The institute continues to shape the future of aviation and space technologies supported by a network of specialized facilities and multidisciplinary expertise spanning aerodynamics, systems, structures, materials, and experimental testing. INCAS plays a strategic role in advancing innovation, strengthening industrial competitiveness, and supporting the sustainable development of the aerospace sector in Romania and across Europe. As emerging technologies continue to transform aviation, INCAS remains committed to pushing the boundaries of research, fostering international collaboration, and delivering solutions that address future challenges.

EREA contribution to the EC's Call for Evidence on the new Aviation and Aeronautics Strategy for Europe

19/05/2026

The European Commission is advancing an ambitious vision for a new era of sustainable prosperity, industrial competitiveness, and strategic sovereignty for Europe. Central to this vision is the next Multiannual Financial Framework (MFF), which places research and innovation at the core of Europe's economic future to ensure leadership in frontier and clean technologies. The continuation of the highly successful Horizon Europe programme, alongside the creation of a European Competitiveness Fund (ECF), reflects the European Union's determination to strengthen industrial innovation, accelerate decarbonisation, and mobilise private investment in strategic sectors. Drawing heavily from the recommendations of the Draghi report on European competitiveness, the Commission is also pursuing simplification measures, reducing administrative burdens, and reforming the public funding landscape to create a more coherent, policy-driven framework capable of supporting long-term industrial transformation.

The Association of European Research Establishments in Aeronautics (EREA) welcomes the European Commission's initiative to prepare a new Aviation and Aeronautics Strategy for Europe. EREA strongly supports the ambition to reinforce Europe's competitiveness, technological sovereignty, resilience and global leadership in aviation and aeronautics while accelerating the green and digital transition.

Aviation is a strategic sector for Europe, one of Europe's most critical industrial assets, for which Europe is in a worldwide leading position. It is essential for mobility, economic growth, industrial competitiveness, territorial cohesion and technological sovereignty. Europe's global leadership in civil aviation, aeronautics and air traffic management has been built through sustained long-term investments in research and innovation, strong industrial ecosystems, collaborative research programmes and European partnerships. Maintaining this leadership in a rapidly changing geopolitical and technological context requires a renewed and ambitious European Aviation and Aeronautics strategy.

EREA particularly welcomes the EC's recognition that aviation and aeronautics are now facing a combination of unprecedented challenges: intensifying global competition, increasing dependencies in critical technologies and supply chains, the need for climate-neutral aviation, digital transformation and AI integration, resilience against crises and security threats and the rapid emergence of unmanned and autonomous aviation systems.
In this context, EREA strongly supports the development of a European "Smart and Clean Aviation Moonshot" as announced in the future FP10 framework and referenced in the Call for Evidence.

1. Recognise aviation as a strategic sector for Europe

EREA calls on the EC to explicitly recognise aviation as a strategic sector within the future European policy and funding framework, including Horizon Europe FP10 and the European Competitiveness Fund (ECF).

TThe aviation sector supports 2 million European jobs, contributes significantly to Europe's GDP and connectivity, enables European strategic autonomy and drives innovation across multiple industrial sectors.
Aviation technologies cover a very wide spectrum including for example materials, digital technologies, energy, manufacturing and defence capabilities. Only a joint European initiative can cover all aviation needs: therefore, Europe requires a strong, resilient and sovereign aviation ecosystem covering the full value chain represented by all actors (universities, research establishments, industries from leaders to SMEs supply-chain).

The future Aviation and Aeronautics Strategy must consequently strengthen Europe's technological sovereignty, secure resilient supply chains, reduce strategic dependencies, protect critical aviation technologies and start-ups and ensure a global level playing field for European actors.

2. Build Europe's Technological Leadership and Sovereignty through a "Smart and Clean Aviation Moonshot"

EREA supports the establishment of a European "Smart and Clean Aviation Moonshot" covering the entire research and innovation chain from low-TRL research to deployment and market uptake.

This initiative will position Europe as the global leader in climate-neutral aviation, digital aviation and advanced air traffic management and to achieve this goal the Moonshot needs to combine long-term strategic research with industrial deployment, support both disruptive and evolutionary technologies and create continuity across the full innovation pipeline.
Europe's future leadership in aviation will depend not only on breakthrough research but also on its ability to industrialise, certify, manufacture, operate and continuously improve advanced aviation technologies in Europe. The Smart and Clean Aviation Moonshot will therefore contribute to strengthening Europe's technological sovereignty and industrial resilience across the entire aviation value chain.
The initiative must support Europe's capacity to transform research excellence into certified products and scalable industrial solutions while reducing strategic dependencies and reinforcing resilient European supply chains in a rapidly evolving geopolitical context.

Europe's future competitiveness depends on maintaining strong investments not only in high-TRL demonstrators, but also in lower-TRL collaborative research where breakthrough ideas emerge for the preparation of the future.
The Aviation Moonshot must also support the development, maintenance and long-term sustainability of Europe's key aviation Research and Technology Infrastructures, including wind tunnels, propulsion test facilities, research aircraft, structural testing platforms, digital simulation environments and large-scale demonstrators. Independent European access to such infrastructures is essential to develop, validate and certify next-generation aircraft and propulsion technologies and therefore constitutes a prerequisite for Europe's long-term competitiveness and technological sovereignty.

Innovation is fundamental to advancing sustainability, competitiveness and safety. Hence, the EU's continued support for Joint Undertakings (JUs) in the next Multiannual Financial Framework (MFF), in particular Clean Aviation and SESAR, must remain a strategic priority. While Clean Aviation drives the development of next-generation aircraft and propulsion technologies, SESAR enables the modernisation and digital integration of European airspace. Together, these Joint Undertakings bridge the gap between research and deployment and therefore contribute to securing Europe's technological leadership.
Given the capital-intensive nature of aviation technologies, predictable and long-term funding is indispensable. Horizon Europe, as well as the Innovation Fund, must continue to provide substantial support for aviation-related projects — not only addressing aircraft manufacturing and air traffic management (ATM), but also the wider air transport system and its integration into the broader transport system as a whole.

On that basis, the notion of a "Smart and Clean Aviation Moonshot" project provides the opportunity for a European-wide research and innovation approach covering the entire research and innovation chain, from fundamental and applied research up to market uptake. In the case of coordinated support from various EU programmes such as FP10, the European Competitiveness Fund (ECF) and the EU Innovation Fund, such a Moonshot can become the key European model to ensure long-term European leadership, competitiveness and technological sovereignty.

EREA therefore advocates for:

- a balanced combination of bottom-up and top-down approaches,
- dedicated support for low-, medium- and high-TRL activities,
- long-term safeguarded and stable funding for aviation research and innovation, at a much higher level than what has been programmed for the last decade.

3. Involve stakeholders in the Governance

EREA considers that the success of the future Aviation and Aeronautics Strategy and subsequent Aviation Moonshot initiative as implementing concept will depend on an inclusive, balanced and transparent governance structure.

The future framework must:

- involve all aviation stakeholders in strategic agenda setting, as well as Member States,
- maintain strong stakeholder co-creation processes.

Therefore, EREA considers that this framework must be built on successful European coordination mechanisms like ACARE (the Advisory Council for Aviation Research and Innovation in Europe), which is representative of the whole Aviation ecosystem.

EREA recommends:
- a governance structure for the aviation moonshot covering the entire aviation R&I chain,
- clear distinction between aeronautics and ATM domains,
- a strong involvement of Research and Technology Organisations (RTOs), universities, SMEs and industry.

RTOs play a critical role in bridging the "valley of death", operating key technology infrastructures, bringing together the ecosystem, supporting industrial competitiveness and enabling cross-sector innovation. Their role should therefore be fully recognised within the future governance and advisory structures.

4. Preserve and strengthen European collaborative aviation research

The new EU Aviation and Aeronautics strategy for Europe needs to take into account the long development cycles of the aviation and aeronautics sector. Long-term continuity and strategic coherence are therefore indispensable.

In this framework, EREA underlines the fundamental role played for decades by collaborative European research programmes to Europe's aviation leadership.

Future programmes must therefore:
- preserve and reinforce collaborative research under FP10,
- ensure sufficient funding for Horizon Europe's Pillar II activities, with its collaborative research and partnerships,
- maintain existing and further promote new synergies between Horizon Europe, the ECF and national aviation programmes.

The future framework must support:
- small collaborative research projects for disruptive low-TRL technologies,
- medium-scale demonstration projects,
- large integrated system demonstrators,
- deployment projects enabling industrial uptake.

5. Set key innovation and technology priorities for competitive, sustainable and sovereign European Aviation

EREA supports a comprehensive technology approach aiming at increasing supply chain resilience and reducing critical technological dependencies in strategically important domains.

Within the EREA Future Sky Programme (https://futuresky.eu/), critical technologies to be addressed have been detailed. Highly efficient, net-zero aircraft technologies, advanced propulsion systems, hybrid-electric and hydrogen architectures, sustainable aviation fuels, lightweight materials and advanced manufacturing, AI, digital twins and automation, cyber-security and resilient navigation systems, advanced ATM technologies, autonomous systems and unmanned aviation, life-cycle analysis and circularity and environmental impact mitigation including non-CO_2 effects, among others are included.

Europe's future aviation competitiveness also depends on strengthening enabling technologies and industrial capabilities across the full value chain, including technologies from other sectors like advanced materials, semiconductors, batteries, resilient digital systems... Particular attention has to be paid to supply chain resilience and reduction of critical technological dependencies in strategically important domains.
The war in Ukraine proves the necessity of an integrated safety approach in the European airspace. EREA welcomes that the new Aviation strategy supports the Digital European Sky, the integration of unmanned aviation, the resilient GNSS and anti-jamming technologies, and synergies between civil and defence capabilities where appropriate. At the same time, EREA emphasises the importance of maintaining a clear distinction between civil and defence funding frameworks while supporting dual-use technological capabilities where relevant.

Finally, EREA underlines the importance of Europe's world-class aviation Technology Infrastructures and experimental capabilities, since they are strategic for Aviation. Access to large-scale testing and validation infrastructures is essential for accelerating innovation, supporting certification and ensuring Europe remains globally competitive in both civil and dual-use aviation technologies.

6. Leverage dual-use technologies and civil-defence synergies while preserving distinct civil and defence funding frameworks

EREA recognises the growing importance of dual-use technological capabilities in aviation-related research and innovation, in areas such as artificial intelligence, cyber-security, resilient navigation systems, autonomous systems, digitalisation... Strengthening appropriate synergies and cross-fertilisation between civil and defence domains can contribute to Europe's technological resilience, strategic autonomy and industrial competitiveness.

At the same time, EREA strongly emphasises the importance of maintaining clear and distinct funding frameworks for civil and defence research and innovation activities, building on the current separation between Horizon Europe on the one hand, and the European Defence Fund (EDF) on the other hand. Preserving this distinction is essential to ensure clarity, efficiency and coherence of European funding instruments and to avoid additional complexity in programme implementation.
EREA further underlines that dual-use considerations should be addressed progressively along the research and innovation chain. In early-stage and lower-TRL research activities, technologies are often not yet linked to specific civilian or military applications. Dual-use implications generally become more relevant at higher TRLs and closer-to-market developments, where end-user requirements and operational applications are more clearly defined.

Rather than creating new dedicated dual-use funding instruments, EREA supports strengthening existing cooperation mechanisms, coordination structures and expert exchanges between civil and defence research communities where relevant and strategically beneficial. This should include improved possibilities for technology and knowledge transfer between civil and military and vice versa so that such cooperation will fully safeguard European strategic interests, technological sovereignty and existing regulatory and security constraints.

7. Acknowledge technology infrastructures and skills are critical enablers

Europe's aviation leadership depends heavily on world-class technology infrastructures such as wind tunnels, research aircraft, propulsion test facilities, digital simulation platforms and structural testing infrastructures.

These infrastructures are essential for validating technologies, accelerating innovation and maintaining Europe's strategic autonomy.
The future Aviation and Aeronautics Strategy must support the entire European aviation Technology Infrastructure landscape, facilitate cross-border access, and ensure long-term investment (including maintenance) and renewal.

The Strategy must also address workforce development, education and training, reskilling and upskilling, and attractiveness of aviation careers for future generations.

8. Conclusions

EREA strongly supports the preparation of a new comprehensive European Aviation and Aeronautics Strategy aligned with Europe's competitiveness, climate and sovereignty objectives.

To succeed, the future strategy must recognise aviation as a strategic sector, establish a Smart and Clean Aviation Moonshot, support the full research and innovation chain, maintain strong collaborative European research, ensure balanced governance involving all stakeholders, strengthen Europe's technological sovereignty and resilience, and accelerate the transition towards climate-neutral and digitally enabled aviation, for the benefit of the European citizens.

Europe has all the necessary assets to remain a global aviation leader: world-class research and technology organisations, leading industries, strong universities, advanced Research and Technology Infrastructures, and a unique collaborative innovation ecosystem. The future Aviation Strategy must build on these strengths to ensure that Europe remains at the forefront of sustainable, competitive and sovereign aviation for decades to come.
Europe's future aviation sovereignty will depend not only on scientific excellence and innovation capacity, but also on Europe's ability to maintain sovereign industrial capabilities, resilient supply chains, strategic Research and Technology Infrastructures and secure digital ecosystems supporting the full aviation innovation cycle and implementing innovations along the entire aviation value chain.
EREA considers that preserving the clear separation between civil and defence funding instruments (HE and EDF) remains a fundamental principle for ensuring the effectiveness, coherence and strategic focus of European research and innovation policies, while enabling appropriate and targeted synergies where relevant.

EREA at a glance

The Association of European Research Establishments in Aeronautics (EREA) brings together Europe's key aeronautics and aerospace applied research organisations. EREA promotes joint strategies, coordinates activities, and strengthens the collective voice of European RTOs in aeronautics. By fostering collaboration, EREA contributes to Europe's scientific excellence, industrial leadership, and technological sovereignty.

Registered in the EU Transparency-Register under No. 010397411668-54

Contact: Anne-Laure Delot, Chair of the EREA Executive Secretariat, anne-laure.delot@onera.fr

Full members

AIT Austrian Institute of Technology (AT)

CEIIA Centro para a Excelência e Inovação na Indústria Automóvel (PT)

CIRA Centro Italiano Ricerche Aerospaziali (IT)

DLR Deutsches Zentrum für Luft- und Raumfahrt (DE)
FOI Totalförsvarets FOrskiningsInstitut (SE)

ILOT Institute of Aviation (PL)

INCAS National Institute for Aerospace Research "Elie Carafoli" (RO)

INTA Instituto Nacional de Técnica Aeroespacial (ES)

NLR Royal Netherlands Aerospace Centre (NL)

ONERA Office National d'Études et de Recherches Aérospatiales (FR)

VKI The von Karman Institute for Fluid Dynamics (BE)
VZLU VZLU AEROSPACE, a.s.. (CZ)

Affiliate member

AFIT Air Force Institute of Technology (PL)

Strategic partners

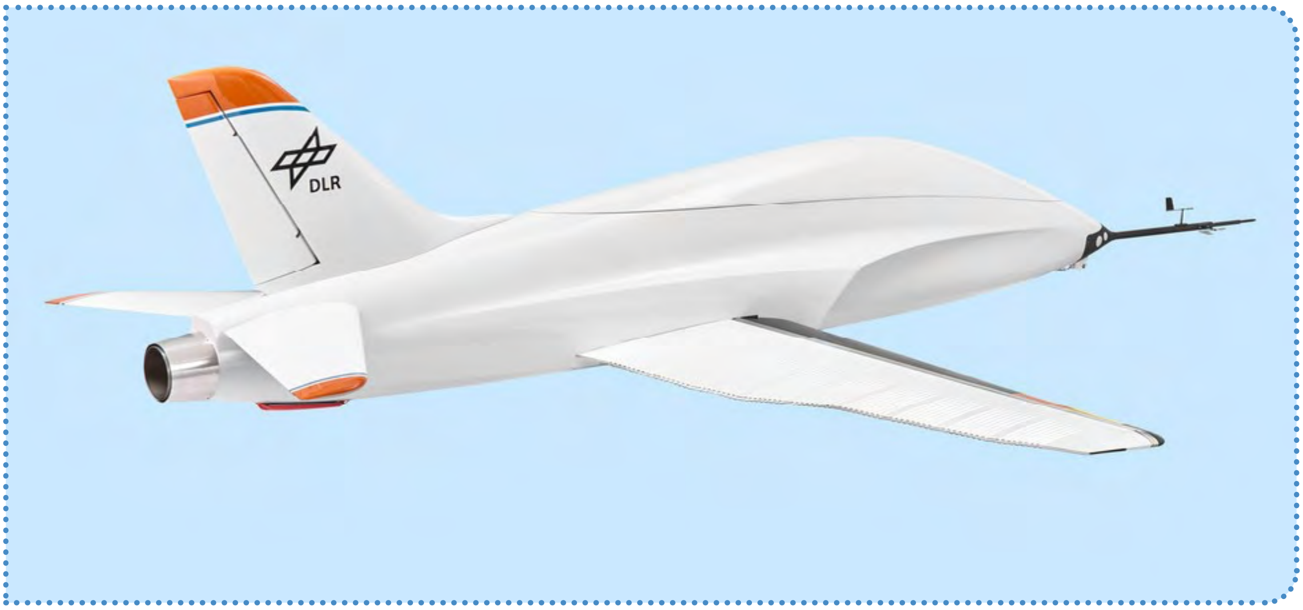
CSEM Centre suisse d'électronique et de microtechnique (CH)

NCC National Composites Centre (UK)

DLR tests shape-shifting wings in flight

Experimental aircraft PROTEUS with morphAIR wings

Deutsches Zentrum
für Luft- und Raumfahrt
German Aerospace Center



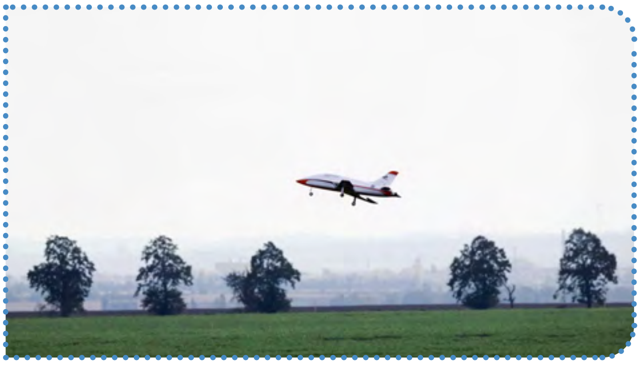
Graphic representation of the PROTEUS experimental aircraft in flight with its active morphAIR wings.
Credit: © DLR (CC BY-NC-ND 3.0)

- DLR has developed new aircraft wings capable of changing shape during flight.
- Artificial intelligence controls the wings and automatically adjusts them, even in the event of disturbances.
- The goal is to make aircraft equipped with such wings more efficient, easier to control and even safer.
- Following initial successful flight tests, the concept will be investigated further.
- Focus: Aviation, uncrewed aerial systems

A wing structure that can change shape during flight – this is the idea behind the morphAIR project from the German Aerospace Center (Deutsches Zentrum für Luft- und Raumfahrt; DLR). With this novel wing concept, researchers aim to make aircraft more efficient and easier to control. To this end, they equipped the PROTEUS uncrewed experimental aircraft with both a conventional and a morphing set of wings – that is, shape-changing. Flight tests at the National Experimental Test Center for Unmanned Aircraft Systems in Cochstedt have already allowed DLR to test the functionality of the wings.

"The morphing wing can change its shape during flight, allowing it to adapt optimally to different flight conditions," explains project leader Martin Radestock from the DLR Institute of Lightweight Systems.

PROTEUS taking off HyTEM technology replaces conventional flaps and ailerons



The experimental aircraft PROTEUS during takeoff.
Credit: © DLR (CC BY-NC-ND 3.0)

Both sets of wings are made entirely of fibre-reinforced composites. The morphing wing pair features a form-variable trailing edge section, made possible by a Hyperelastic Trailing Edge Morphing system (HyTEM), which enables the wing to deform seamlessly and without steps. "The HyTEM concept replaces conventional flaps and ailerons with an intelligent system comprising several small actuators distributed across the wingspan. These can precisely adjust the wing profiles at ten points without creating gaps between sections. The continuous shape reduces profile drag. In addition, lift, induced drag and aircraft control can all be influenced in a targeted manner – a major advantage for aerodynamics and flight mechanics," Radestock elaborates. Besides greater efficiency, this technology also promises improved safety as control functions can be distributed across the entire wing.

A central element of the project is an AI-assisted flight control system developed by the DLR Institute of Flight Systems, designed specifically to make full use of the unique movement capabilities of the morphing wing. During flight, the adaptive algorithm detects when the aircraft's actual behaviour deviates from its previously trained model and continuously adjusts its internal models. During training, specific damage scenarios and failures of individual control surfaces are also deliberately simulated. This allows the algorithm to learn to recognise such changes in flight and control the remaining actuators in a way that keeps flight behaviour as stable as possible. Unlike conventional flight control systems, this adaptive approach can optimally coordinate the many distributed actuators, making the most of the aerodynamic potential of the morphing structure while also improving fault tolerance.

A key element in this is the reliable method for reconstructing surface pressure distribution from just a small amount of measurement data. This capability, developed by the DLR Institute of Aerodynamics and Flow Technology for PROTEUS, gives the system an immediate 'sense' of its current flow field. The experimental aircraft can thus compare the reconstructed pressure field with the expected state, automatically detect local deviations and interpret them as relevant disturbances.

New wing concept successfully tested in flight

In initial trials, DLR researchers successfully tested both wing concepts in flight. They integrated both the reference wings and the newly developed morphing wings into the aircraft and tested them. The trials primarily served to demonstrate basic airworthiness and system integration, forming an important foundation for further measurement campaigns and investigations.
Although the researchers collected data during scaled flight tests, the aerodynamic and structural design, with a maximum speed of 300 kilometres per hour and a wing loading of 70 kilograms per square metre, is also relevant for light aircraft. To demonstrate scalability, DLR will conduct a flight test campaign in 2026 using PROTEUS with a total mass of approximately 70 kilograms. The findings will be developed further within the UAdapt (Unmanned Aircraft Wing Adaption) project.

PROTEUS and ISTAR

The PROTEUS uncrewed experimental aircraft alongside the ISTAR research aircraft.
Credit: DLR (CC BY-NC-ND 3.0)

For more information
https://www.dlr.de/en/latest/news/2026/dlr-tests-shape-shifting-wings-in-flight

Contact for this article is Jasmin Begli at DLR

Proba-3: making solar eclipses on demand

By ESA

Proba-3 Occulter spacecraft eclipsing the Sun for the Coronagraph spacecraft. Credit: © ESA – P. Carril

Proba-3's Occulter seen in the foreground, and Coronagraph spacecraft, during pre-flight testing at Redwire in Belgium in spring 2024. Credit: © ESA – P. Sebirot.

The mission operations team at ESA's European Space Security and Education Centre looked on nervously as the two spacecraft in their charge moved gradually nearer and nearer to one another, close enough to view each other clearly, to a final minimum of just 30 metres of separation.
Considering that a projected minimum distance between satellites of 1-2 km is normally enough to trigger serious consideration of a collision avoidance manoeuvre, it is easy to understand why the combined ESA and industries team felt a little apprehensive.

What made this close proximity formation flying manoeuvre of the dual-satellite Proba-3 mission on 27 November 2025 even more nerve-wracking? The mission controllers were not in the driving seat. One half of the mission, the 'Occulter' spacecraft, approached the stationary 'Coronagraph' spacecraft on an entirely autonomous basis – all the human onlookers could do was abort the operation if any serious problem emerged.

Damien Galano, Proba-3 Mission Manager, recalls: "The ground commanded this 'formation shrink', and the Occulter performed the manoeuvre autonomously. It occurred in slow motion, taking two hours to move from 150 m to 30 m and another two hours to go back again. This is how we successfully achieved our goal of demonstrating that we can change Proba-3's formation geometry while maintaining millimetre-scale precision.

"Technically we could have gone closer than 30 m, but that would require more effort to prove that the risk of collision is zero. This distance was close enough to demonstrate system capabilities."
Why did ESA build and fly a pair of satellites capable of such extraordinary precision? The first answer is simply to see if it were possible – the name of the Proba family of experimental satellites comes from the Latin for 'Let's try'. But the precise design of the two satellites originates from a thought experiment: how to create total solar eclipses – like the one due to take place in northern Spain on 12 August – in orbit at will?

Quest for the solar corona

Solar scientists travel the world to follow eclipses, treasuring the glimpses the Moon entirely covering the Sun offers of the normally invisible solar corona, the Sun's surrounding atmosphere. In the moment of totality, the Sun vanishes entirely, giving way to the ghostly white solar corona, made up of one-million-degree Celsius plasma, the very birthplace of the solar wind that flows out across our Solar System.

The problem is that across most locations on Earth total solar eclipses last for only two to four minutes, as the Moon's orbit conveys it onward. In 1931, French astronomer Bernard Lyot premiered the first 'coronagraph' – a telescope incorporating a disc to occult the Sun. Today they are in widespread use both on Earth and in space,

on missions like the ESA-NASA SOHO solar observatory. But coronagraphs have a fundamental limitation. Because light behaves both as particles and waves, it bends around the edge of occulting discs, giving rise to unwanted stray light. The best solution to this problem is to maximise the distance between the occulting disc and telescope lens, but this has obvious practical problems: on SOHO for instance the occulter is just 70 cm away from its telescope, both within the spacecraft hull.

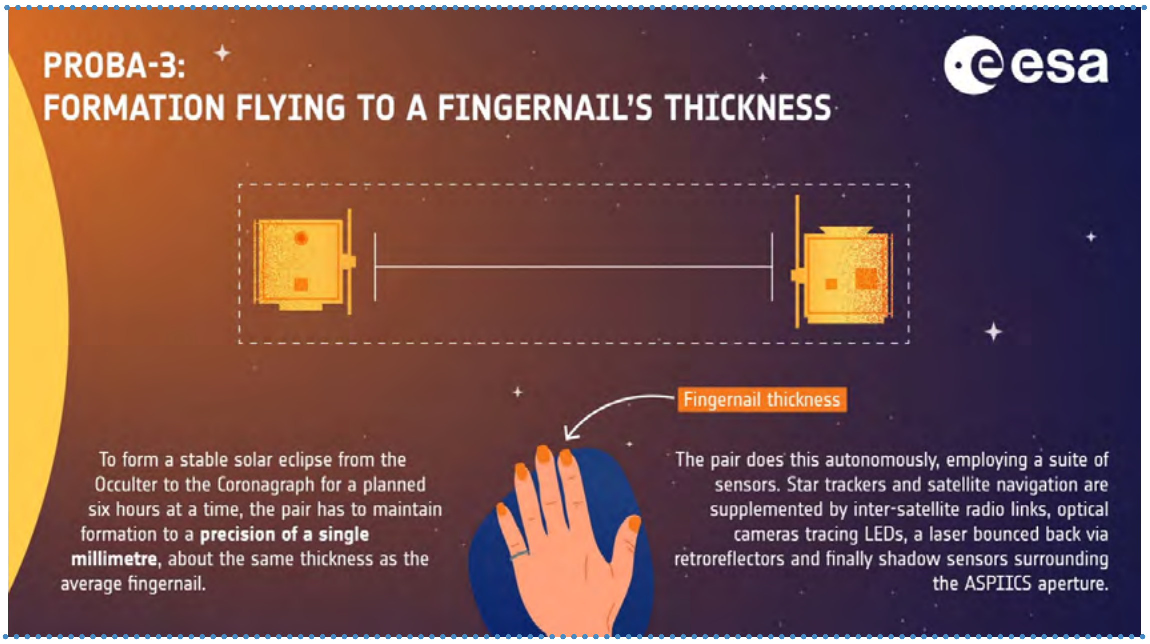
The power of two

So what about flying the occulter on a separate spacecraft, as far away as possible? It had been tried once, during the 1975 Apollo-Soyuz mission, when the cylindrical Apollo spacecraft blocked out the Sun for the watching Soyuz, but the bright glare produced by propellant thrusting from the spacecraft spoiled the view. Two decades ago, a Laboratoire d'Astrophysique de Marseille (LAM) team led by Philippe Lamy were the first to consider a custom-made artificial solar eclipse mission: "Formation flying seemed a natural fit," Philippe recalls.
ESA's Proba team inherited the concept, and the hard work of calculating trade-offs began. Mission scientist Joe Zender explains: "It became a compromise between what in theory this technology might provide and what could practically be achieved in space."

The chosen solution was a 150-m operating distance between the Coronagraph and Occulter spacecraft – a balance between optical performance, tracking efficiency and propellant budgets – along with the need to maintain their relative positions to within just a few millimetres.

Face off in space

Visualise this in technical terms: a pair of drones facing each other across a football pitch and a half's worth of distance, maintaining their positions relative to each other down to the width of a fingernail, so that one casts



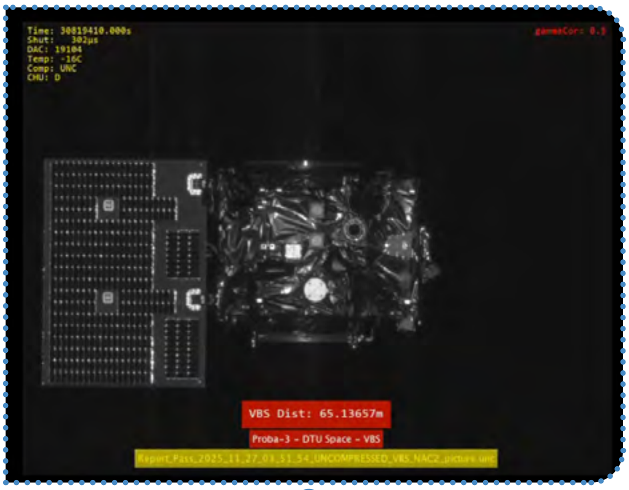
a steady shadow onto the face of the other.
In reality such stillness could never be achieved within Earth's turbulent atmosphere; it requires the vacuum of space. Even there, the satellite pair can only switch into 'observing mode' towards the top of their highly elliptical 60 500 km orbit, far above Earth's gravity, glare and remaining wisps of air.

Why so high? A standard low Earth orbit was quickly ruled out because of all the influences that would affect the pair: the stronger pull of gravity plus perturbations due to Earth's imperfect shape and air drag up at the top of its atmosphere, along with Earth's reflected light.
"Early simulations showed we would need to make so many positioning adjustments with our thrusters that our propellant would be exhausted swiftly; the mission would have been over in about half an hour!" recalls ESA's Frederic Teston, who has overseen the Proba family of missions. Instead, the pair needed to go where perturbations are minimal and the pull of gravity is much lower – meaning it takes less propellant to shift position.

Rollercoaster loop the loop

An ideal location would have been around one of the Sun-Earth Lagrange Points surrounding our planet, where gravitational fields are cancelled out, but it would have been too costly for such a budget mission to reach them. Instead Proba-3's orbit starts at an altitude of 600 km and reaches all the way up to 60 500 km during each 19 hour 36 minute orbit.

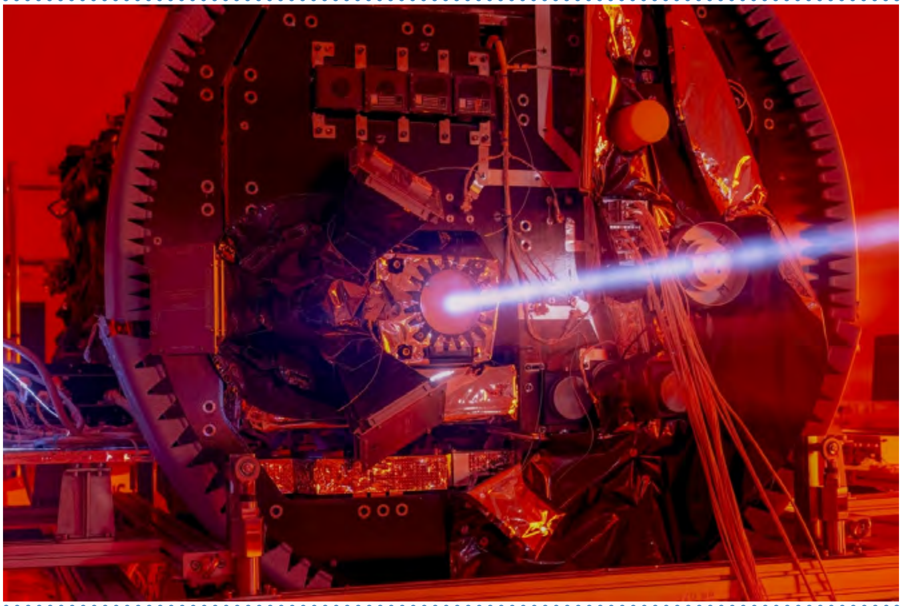
Picture it as a rollercoaster loop the loop: around the bottom of the orbit the spacecraft move much faster, but slow down as they climb higher, from 10 km/s down to 1 km/s – and because of this decreased velocity they spend more time at the 'apogee' of the orbit than at the bottom. For the lower part of the orbit the pair fly freely along safe paths – although ready to react if a collision risk emerges. Then as they move up towards apogee the signal is given for them to begin moving into active formation, which takes about two hours.
Any human oversight of Proba-3's formation flying would be impractical, not least because of the distances involved – any radio signal would take a fifth of a second to reach to the top of their orbit, an uncomfortably long pause when dealing with orbital velocities.



The two Proba-3 spacecraft autonomously move towards each other in this close proximity formation flying manoeuvre on 27 November 2025. Credit: © DTU Space

Self-driving spacecraft

Instead, the satellite pair line themselves up with the Sun on a fully autonomous basis, akin to terrestrial driverless cars. Enabling this was an essential task for the Proba-3 industrial consortium, overseen by Spanish company Sener for ESA, and involving more than 29 companies from 17 countries. "Coordinating flight systems, preci-



Infrared view of a laser beam shone from one spacecraft and reflected by a retroreflector on the other. Credit: © ESA - M. Pédoussaut / J. Versluys.

sion structures and in-orbit algorithms was an unprecedented experience for our team," comments Diego Rodriquez, Sener Director of Space and Science. "The technical demands of maintaining relative positioning in microgravity tested not only our expertise in space engineering, but also our ability to manage risk and lead international collaboration."

As with the case of self-driving vehicles, the Proba-3 consortium soon found that no single positioning system is sufficient by itself to achieve the necessary precision. So the mission combines a suite of absolute and relative positioning technologies ranging from GPS receivers and radio links to optical cameras and LEDs, a laser link and finally shadow position sensors.

To begin with, startrackers – computer-linked cameras that recognise the constellations around them – chart each spacecraft's 'attitude', or current pointing direction in space.
At lower altitudes, satnav receivers on both spacecraft calculate relative positions with high accuracy, although GPS signals can only be used operationally below the 20 200 km altitude of the GPS constellation. The spacecraft also exchange continuous ranging data through radio inter-satellite links. For more precision, Proba-3's Vision Based Sensor comes into play: wide- and narrow-angle cameras on the Occulter track an LED pattern on the face of the Coronagraph.

Achieving millimetre precision

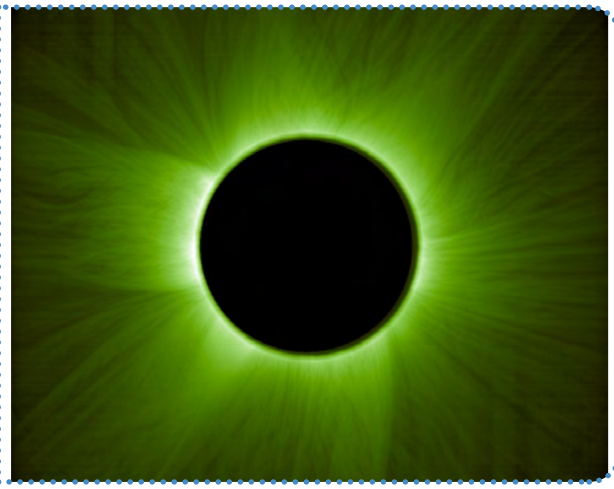
To shift from centimetre to millimetre precision, the Occulter's Fine Lateral and Longitudinal Sensor shines a laser onto a corner-cube retroreflector on the Coronagraph, which bounces the beam back in turn. Finally, a Shadow Positioning Sensor system – photodetectors arranged around the Coronagraph telescope's 5-cm aperture – ensures that the Occulter's 8-cm shadow remains perfectly centred. Any deviation triggers an immediate correction. To keep the system as stable as possible, both spacecraft were designed with no moving parts whatsoever, except for a rotating filter wheel inside the Coronagraph.

The remaining ingredients for mission success are a pair of occulting discs whose design was optimised to block 'spillover' light from the face of the Sun leaking around them: a 1.4 m disc on the Occulter spacecraft, and another just 3.5 mm across inside the central lens of the Coronagraph, which serves to block residual light focused at the centre of the larger disc's shadow (formally known as a Poisson spot).

First light, high quality

To support early detection of regulatory risks, ESA, national space agencies and industrial partners coordinate through the Materials and Processes Technology Board (MPTB) under ESCC initiative. This Board brings together technical specialists, national agencies and regulatory experts to analyse upcoming restrictions and consolidate sector-wide feedback. A dedicated Restriction Task Force (RTF) focuses on REACH activities, including the uPFAS restriction proposal. ESA also provides REACH workshops[2], webinars[3], guidance and a digital tool (ESA REACH Tool[4]) for tracking material availability and regulatory status, which is accessible to organisations participating in European space programmes.

By combining technical and regulatory expertise, these groups help identify potential issues early and support proportionate implementation of new legal requirements.



The Sun's inner corona captured on 23 May 2025 by the ASPIICS coronagraph aboard Proba-3. Credit: © ESA/ Proba-3/ASPIICS/WOW algorithm.

Formation flying into the future

Such discoveries should prove plentiful over the mission's planned two-year lifetime, but Proba-3's primary concern is with technology demonstration: proving the potential of close-range formation forming for all kinds of future applications. Coronal observations are only one type of formation flying being performed, along with resizing the baseline length between spacecraft and resetting their orientation, plus the kind of close rendezvous operations that took place last November.

The aim is to make it possible in the future for multiple small satellites to fly together as precisely as if they formed a single rigid structure in space. Imagine a mission made up of 'fractionated satellites' whose constituent elements can be swapped out or upgraded over time, or a satellite array that utilises interferometry techniques to combine their inputs, to attain the equivalent observing width and resolution of a single giant radio telescope (optical interferometry using visible light might also one day be possible, but would require orders of magnitude higher precision formation flying).

The Coronagraph is lost!

With all these future plans in mind, on the weekend of Valentine's Day 2026 the worst happened: a software anomaly onboard the Coronagraph led to a loss of attitude, meaning the spacecraft's solar panel was no longer pointing at the Sun. Its onboard battery drained to the point that mission control lost contact with it entirely. "This was a shock, but we never gave up hope," explains Damien Galano. "As is typical in this kind of scenario, a 'Tiger Team' was set up in ESEC, including experts from ESA's Flight Dynamics group and Space Debris Office from ESOC, the agency's main operations centre in Darmstadt, Germany, as well as representatives from industry."

ESA's ground station network, Estrack, became a valuable resource for the Tiger Team, with antennas around the globe being used during windows of visibility to try to connect to the silent spacecraft. Optical telescope and radar observations showed the Coronagraph as a dot that was brightening and dimming over time, showing it was spinning slowly.

The recovery strategy was to hail the Coronagraph whenever possible, from Estrack stations all around the world, in the hope this would be the moment when its solar panel was facing the Sun, making the spacecraft capable of replying.

The Coronagraph is found!

Finally the effort paid off: after more than a month of silence, ESA's ground station in Villafranca, Spain, received Coronagraph telemetry. Once contact was reestablished, the spacecraft was placed in safe mode and allowed to recharge. A systematic process of checking out followed, to ensure the spacecraft systems and instruments had not sustained damage. Its fuel tank was warmed up until its thrusters could be operated safely and the two spacecraft were relinked together.

"The success of the recovery came down to an all-ESA effort," concludes Damien. "Now the mission is back in action we are resuming planned operations, including science observations. People can see the quality of our technology for themselves through the quality of our imagery and the science it is making possible. The best is yet to come!"

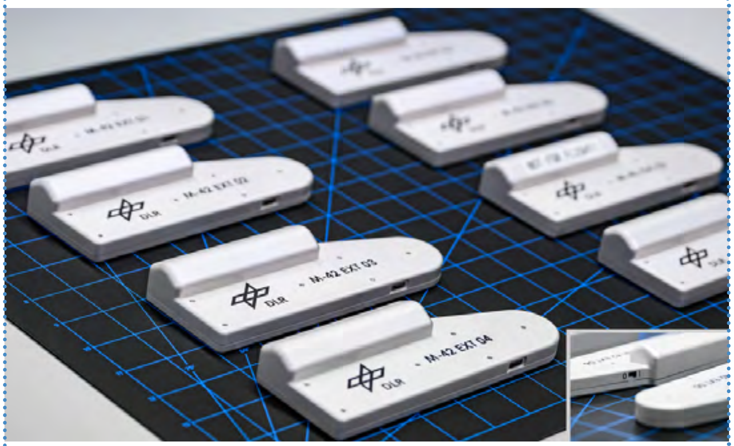
Authors:

Damien GALANO
PROBA 3 Project Manager
European Space Agency
ESTEC, Keplerlaan 1 - 2200 AG Noordwijk
The Netherlands

Sean BLAIR
Prints & Publications Projects,
Editorial And Publishing Service
Ejr Quartz B.V
ESTEC, Keplerlaan 1 - 2200 AG Noordwijk
The Netherlands

Artemis II launches to the Moon – with German and European tech on board

By – Deutsches Zentrum für Luft- und Raumfahrt



***Caption:** The radiation biology team at the DLR Institute of Aerospace Medicine has further developed the M-42 radiation detector, particularly with regard to its measurement electronics. The latest addition to the detector family, the M-42 EXT (extended), can measure space radiation more accurately during Orion's lunar orbit on the Artemis II mission than the previous version used on Artemis I.*

In addition, the new devices feature an on/off switch (see inset, lower right). The Orion crew will switch on the four identical dosimeters after launch and attach them with Velcro fasteners at four locations within the spacecraft, each shielded to various degrees from space radiation. In total, the DLR team designed, built, calibrated and tested a set of eight identical detectors: four flight units and four backup devices.

Credit: © DLR (CC BY-NC-ND 3.0)

With NASA's Artemis II mission, humans are heading towards the Moon for the first time in over 50 years. The launch date is currently scheduled for 1 April 2026 at 23:24 BST (18:24 local time at the Kennedy Space Center). This will be the first crewed flight of the Orion spacecraft which will carry a four-person crew. The mission plan foresees the crew flying by the Moon and returning to Earth after ten days. Germany and Europe are contributing several components and technologies to the mission. Four M-42 EXT (extended) radiation detectors from the German Aerospace Center (Deutsches Zentrum für Luft- und Raumfahrt; DLR) will once again measure space radiation between Earth and the Moon – this time with significantly higher resolution than during the Artemis I flight at the end of 2022. Orion with its European Service Module (ESM) will, on this mission, transport humans into space and to the Moon for the first time. In addition, the German small satellite demonstrator TACHELES will travel to the Moon, where it will be released into lunar orbit. The CubeSat was selected by the German Space Agency at DLR.

"Following the successful flight of the MARE radiation experiment on Artemis I, I am delighted that we can now further expand the unique dataset on space radiation between Earth and the Moon with this new mission," says Anke Kaysser-Pyzalla, Chair of the DLR Executive Board. "With further developed dosimeters – the M-42 EXT sensor – we will obtain even more detailed measurement data. In this way, we are continuing experiments that began more than 20 years ago on the ISS. To prepare for the future of robotic and human exploration, we are currently establishing the Human Exploration Control Center (HECC) at our Oberpfaffenhofen site. Through consistent knowledge exchange, we have built up expertise that makes us a recognised international partner while also strengthening Germany's technological sovereignty."

"Germany is at the forefront of humanity's return to the Moon," adds Walther Pelzer, DLR Executive Board Member and Director General of the German Space Agency at DLR. "We are particularly pleased that the European Service Module, built in Bremen, will for the first time in the history of spaceflight be an internationally provided element to join with the United States in transporting astronauts to the Moon. In addition, a small satellite from a German start-up is flying on the mission, intended to open up technologies for cost-effective access to lunar surface utilisation and to test the effects of space radiation on spacecraft. This will sustainably strengthen Germany as a space location in both technology and science."

NASA Administrator Jared Isaacman adds: "Artemis II marks a key step in humanity's return to deep space, and NASA is proud to be supported by our international partners on this mission. The German and ESA contributions – including the European Service Module, the M-42 EXT radiation detectors and the TACHELES CubeSat – reflect several international elements supporting Artemis II.

Together, these efforts contribute to the data and experience needed for sustainable human exploration of the Moon and for future missions to Mars."

The Orion crew consists of Reid Wiseman, Victor Glover and Christina Koch from the United States, and Jeremy Hansen from Canada. For NASA, the focus of the second test flight of the Artemis programme, launching from the Kennedy Space Center in Florida, includes validating all life-support systems in deep space, paving the way for the Artemis III demonstration mission in mid-2027. Should the launch of Artemis II be delayed, further launch opportunities are available.

ESM – the European Service Module carries humans towards the Moon for the first time

When humanity sets off for the Moon again after more than five decades, a crew will for the first time be carried on this journey by a system not fully developed in the United States. For its Artemis missions, NASA is relying for the first time on international partners for a critical component of human spaceflight. The propulsion and supply unit of the spacecraft – the European Service Module (ESM) – was developed under the industrial leadership of Airbus in Bremen, where it is also assembled. Components from eleven European countries and the United States are delivered to Bremen and integrated there into a unique spacecraft. NASA's reliance on a European system represents a major vote of confidence in the capabilities of European spaceflight. Germany is an important partner in the ESM programme, along with other ESA member states. Germany's share of the programme amounts to around 50 percent and is managed by the German Space Agency at DLR.

The Artemis crew spacecraft Orion consists of two parts: the US crew capsule and the cylindrical ESM-2 service module beneath it – the successor to ESM-1, which transported an uncrewed Orion spacecraft around the Moon at the end of 2022. The main engine for the trans-lunar injection is located here. Four solar arrays supply power to the spacecraft, while the ESM's thermal control systems ensure optimal temperature regulation for crew and payload. Fuel as well as oxygen and water supplies for the crew are also stored in the ESM. Fully loaded, the ESM weighs more than 15 tonnes at launch. After the Orion spacecraft separates from the upper stage of the Space Launch System (SLS) in Earth orbit, the ESM's main engine ignites to accelerate the spacecraft towards the Moon. At the end of the mission, the Orion crew capsule separates from the ESM shortly before arrival at Earth. While the crew spacecraft re-enters Earth's atmosphere and lands safely under parachutes in the Pacific Ocean, the ESM burns up in Earth's atmosphere.

DLR dosimeter M-42 EXT – measuring space radiation with greater precision

A dosimeter measures radiation exposure from heavy ions, which are considered particularly dangerous for the human body and represent one of the greatest challenges for long-duration human space missions. Following its deployment on Artemis I, the M-42 radiation detector was further developed by the radiation biology team at the DLR Institute of Aerospace Medicine, particularly with regard to measurement electronics. The new M-42 EXT device also features an on/off switch, and its battery has been further optimised for power supply. In total, the DLR team designed, built, calibrated and tested a set of eight identical dosimeters: four flight units and four backups, should technical issues arise with one or more flight units prior to launch. At the end of January, the institute team travelled to Florida to the Kennedy Space Center, conducted final tests and handed over the set to NASA on 2 February 2026 for installation in the Orion spacecraft.

A special feature of this Artemis lunar flight is that the sensors are stored on board in a cargo transfer bag during launch. Only after launch are they switched on by the crew and attached at measurement positions using Velcro fasteners. Four locations within the spacecraft were selected in advance, each offering different levels of radiation shielding. This enables a spatial picture of the radiation environment inside the capsule to be obtained during flight.

Thomas Berger, Head of Radiation Biology at the DLR Institute of Aerospace Medicine and project leader for the radiation experiments on Artemis I and II, explains: "The success of our MARE project on Artemis I showed that the concept of a small, versatile detector system works very well. With the new M-42 EXT sensor, we can once again measure space radiation between Earth and the Moon – now with a significantly larger measurement range and much greater precision. We expect a dataset covering an energy measurement range increased by a factor of six. This will complement our MARE data with valuable additional results. For all colleagues involved in our scientific contribution to Artemis II, an intensive and eventful period is coming to an end. We are very pleased to be flying on Orion again and eagerly await the new data."

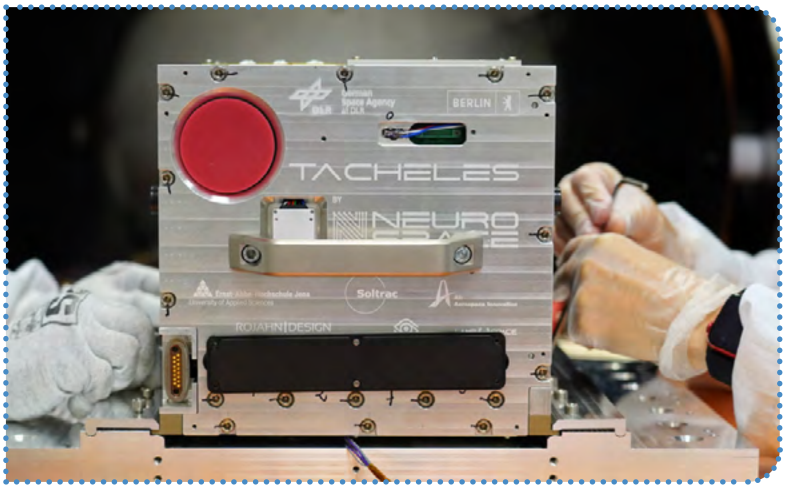
TACHELES – a German small satellite travels to the Moon

Also on board Artemis II is a German small satellite selected and financially supported by the German Space Agency at DLR. The TACHELES CubeSat, developed by NEUROSPACE in Berlin, was handed over to NASA on 16 September 2025 and shortly thereafter integrated into the Orion Stage Adapter of the Orion spacecraft. The

Background info: the evolution of space radiation research at DLR

Radiation exposure in space and the associated increased cancer risk, as well as the danger of acute radiation sickness caused by solar particle events, are among the greatest challenges for long-duration human missions beyond low Earth orbit. Radiation measurement has therefore been an integral part of space missions since the dawn of the space age. Both passive detector systems and active instruments are used, with silicon-based detectors currently predominating in space applications.

The DLR Institute of Aerospace Medicine in Cologne has been conducting research in this field for many years. The M-42 EXT is the latest version of the M-42 detector family. Previously, the silicon detector telescope RAMIS (Radiation Measurements In Space) has been operating in space since December 2018 on board the DLR mission Eu:CROPIS. For more than 2,500 days, RAMIS has been successfully collecting data on the complex radiation environment in the satellite's polar orbit at an altitude of approximately 600 kilometres.
With the M-42 system family, the DLR radiation biology team has developed a flexible, versatile, small and lightweight instrument with very low power consumption. Since its first generation, the system has undergone several updates. On MAPHEUS® sounding rockets, DLR detectors reached space for the first time during test flights, albeit only for minutes. At the end of 2022, they achieved their first scientific deployment during the Artemis I lunar mission as part of the Matroshka AstroRad Radiation Experiment (MARE). During the 25.5-day lunar flight, 16 M-42 instruments collected, for the first time, a homogeneous dataset of the radiation environment beyond the orbit of the International Space Station (ISS). Initial findings from Artemis I have already been analysed and published. Results on differences in radiation dose between the two DLR measurement phantoms Helga and Zohar, as well as on the effect of the AstroRad protective vest, will be published shortly. Further studies will follow.



The TACHELES CubeSat, developed by Berlin-based company Neurospace, will travel aboard the Orion spacecraft as part of the Artemis II mission, where it will be released into orbit around the Earth. TACHELES is designed to remain in orbit for two years, transmitting data back to Earth. This data will help the start-up to further develop its rover system.

The focus is on the impact of space radiation on the electrical components of a future rover – particularly when passing through the two highly radioactive Van Allen belts between Earth and the Moon.

Credit: © NEUROSPACE

small satellite will be released at the Moon and inserted into its own orbit before Orion continues on its lunar fly-around trajectory. TACHELES is expected to remain in orbit for approximately two years, transmitting data back to Earth to support further development of the start-up's rover system.

TACHELES will test the electrical components of a future lunar vehicle during its journey to the Moon. In particular, the influence of space radiation when passing through Earth's two radiation belts – the Van Allen belts – is considered especially critical for such systems. The Artemis II flight offers a unique opportunity to collect data on the radiation belts and their effects on CubeSat electronics. These data will also be made available for scientific research. For example, the SELDOM (Single Event Latchup Detection On Moon) experiment from Ernst-Abbe University of Applied Sciences Jena is also on board, testing a technology designed to protect spacecraft electronics from sudden disruptions caused by space radiation.

DLR antennas to track Orion flight from Earth

Ahead of the Artemis II lunar mission, NASA selected participants around the world to track the Orion spacecraft from Earth as it flies around the Moon. In total, 34 international partners and volunteers have been named, each contributing their own antennas to help monitor the trajectory and strengthen global participation in this historic

15-metre S-band antenna at the DLR site in Weilheim. DLR's German Space Operations Center (GSOC) will support the Artemis II mission using the ground station in Weilheim. It will receive signals from Orion and track the spacecraft's flight around the Moon from Earth. Credit: © DLR (CC BY-NC-ND 3.0)

mission. DLR's German Space Operations Center (GSOC) is supporting the initiative with its ground station in Weilheim; the 15-metre antenna there will receive signals from the spacecraft, contributing to precise tracking of the flight path and promoting international collaboration in space communications systems.

For more information
please visit https://www.dlr.de/
and https://www.dlr.de/en/latest/news/2026/artemis-ii-launches-to-the-moon-with-german-and-european-tech-on-board

Contact points for this article are Philipp Burtscheidt and Martin Fleischmann

EDA and ESA to focus on Earth observation technology for defence

By **European Defence Agency**

EDA Deputy Chief Executive Anders Sjöborg (left) together with ESA Director General Josef Aschbacher and respective teams at the signing ceremony in Brussels. Credit: © EDA

The European Defence Agency (EDA) and the European Space Agency (ESA) signed an arrangement on 22 April to better study space-based Earth observation technology for resilience, security and other defence needs.

The joint study, which builds on 15 years of collaboration between EDA and ESA, will look ahead to 2040 and beyond, identifying the technological gaps to fill and setting a technology roadmap for research and development priorities in Earth observation for defence.

Space-based Earth observation is essential for intelligence, surveillance and reconnaissance, as well as for situational awareness, crisis response, and strategic and operational decision-making across a wide range of security contexts.

The study will focus on several technology areas, including advanced optical imaging, next-generation radar systems, signal intelligence sensors and architectures, and data analytics, where the ability to process and exploit large volumes of information is becoming critical.

By launching the study, EDA and ESA aim to provide a forward-looking analytical basis to guide Member States towards future technological development, helping ensure that the EU maintains robust and credible Earth observation capabilities in the decades ahead, in alignment with existing European initiatives, such as the Earth Observation Governmental Service (EOGS) and the European Resilience from Space (ERS) programme.

EDA's Chief Executive André Denk said: "*In security and defence, knowledge is power, and from orbit, knowledge is constant, impartial, and without borders. That's why we invest today in foresight and resilience, creating the analytical basis to guide future research and development priorities. Together with ESA, we will be identifying the most promising technological pathways to ensure that the EU retains Earth observation capabilities in support of the security and defence of our continent.*"

ESA's Director General Josef Aschbacher said: "*Following the mandate given by our Member States to step up ESA's role in security and defence, this agreement marks a meaningful move from intent to delivery. Through initiatives such as the European Resilience from Space programme, ESA is already responding to Europe's urgent security capability needs. Strengthening our partnership with EDA allows us to align technology development more closely with both current and future operational and strategic requirements.*"

The study project has been shaped in coordination with EU and ESA Member States and technical experts, within EDA's research and innovation space community, notably its **Capability Technology Group on Space**, which consolidated the technical input.

Both agencies highlighted that the initiative aligns with broader European efforts to strengthen resilience, and strategic autonomy in space. The agreement also reflects a mature partnership, underpinned by balanced governance, shared costs, and trust developed through years of joint activities.

The study is conducted within the framework of the **2011 Administrative Arrangement between ESA and EDA**, and builds upon past cooperation experience related to Earth observation between the two organisations.

André Denk and Josef Aschbacher at ESA Headquarters in Paris, September 2025.

For more information:
https://www.eda.europa.eu/news-and-events/news/2026/04/22/eda-and-esa-focus-on-long-term-earth-observation-technology-for-defence-in-joint-research-push"

Outline of the latest issues of the **CEAS Aeronautical journal** and the **CEAS Space Journal**

The **CEAS Aeronautical Journal** and the **CEAS Space Journal** were created under the umbrella of CEAS to provide an appropriate platform for excellent scientific publications submitted by scientists and engineers. The German Aerospace Center (DLR) and the European Space Agency (ESA) support the Journals, which are published by Springer Nature. Both Journals publish peer-reviewed original articles, review articles and short communications.

The **CEAS Aeronautical Journal** is dedicated to publishing results and findings in all areas of aeronautical science and technology as well as new developments in digital design and manufacturing of aircraft, rotorcraft, and unmanned aerial vehicles. A key aspect of growing importance is the mitigation of the aviation-related climate impact. NEW: **Journal Impact Factor:** 2,4 (2025)

The **CEAS Space Journal** is devoted to excellent new developments and results in all areas of space-related science and technology, including important spin-off capabilities and applications as well as ground-based support systems and manufacturing advancements. Disciplines of interest include all those that reflect consolidated and new technologies and requirements that stem from new applications of space assets. Journal Impact Factor: 1,8 (2025)

Both journals are indexed in Scopus and Web of Science.

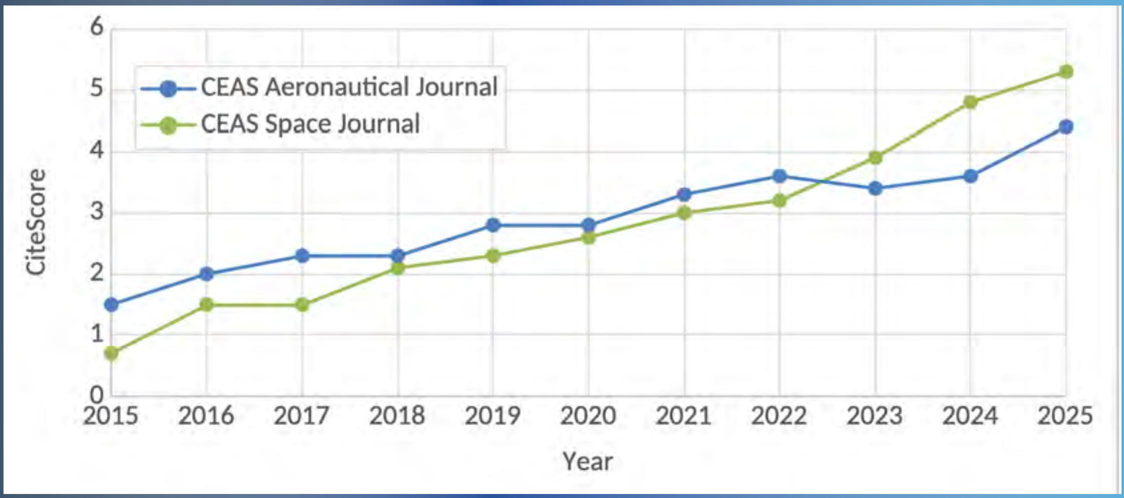
We invite you and your colleagues to contribute to the further development of these journals by submitting the results of your excellent research for publication, as well as acting as reviewers. If you are interested in becoming an associate editor, please contact the relevant Managing Editor:

• ***For the CEAS Aeronautical Journal:***
cornelia.hillenherms@dlr.de;
https://link.springer.com/journal/13272;

• ***For the CEAS Space Journal:***
andrea.dieball@dlr.de;
https://link.springer.com/journal/12567.

A list of articles published in the latest issues of both CEAS Journals is attached.

The Managing Editors:
• Andrea Dieball
• Cornelia Hillenherms
• Wilhelm Kordulla
• Janko Kreikemeier
• Johan Steelant



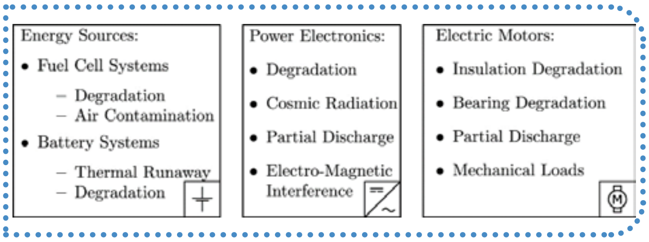
CiteScore: For a 4-year time span, the number of citations received for the publications in the same time span is divided by the number of publications in these years [Source: https://www.scopus.com/].

CEAS AERONAUTICAL JOURNAL

Volume 17, Issue 3, July 2026

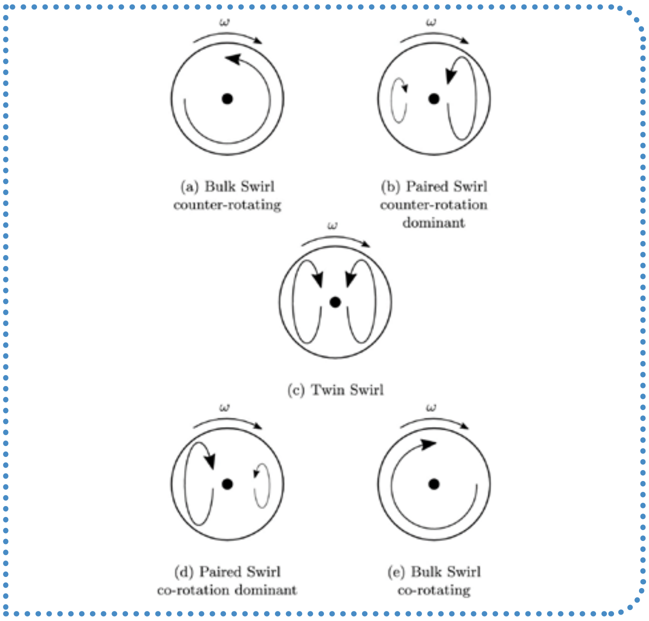
A comprehensive review of reliability factors in all-electric aviation

- Review Paper / Robert Keilmann, Lennart Kösters, Lukas Radomsky, Jonas Franzki, Markus Henke, Michael Heere & Regine Mallwitz / *Published: 09 April 2026 (Open Access)*



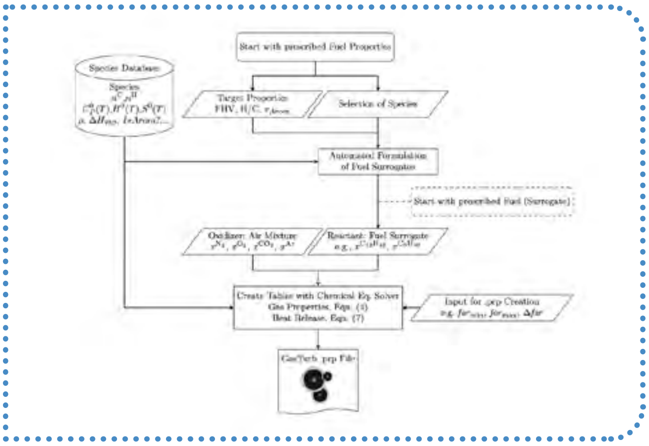
Intake distortions and their impact on compressor stability: an overview and evaluation of current approaches

- Review Paper / Amelie Haber & Dragan Kozulovic / *Published: 29 October 2025*



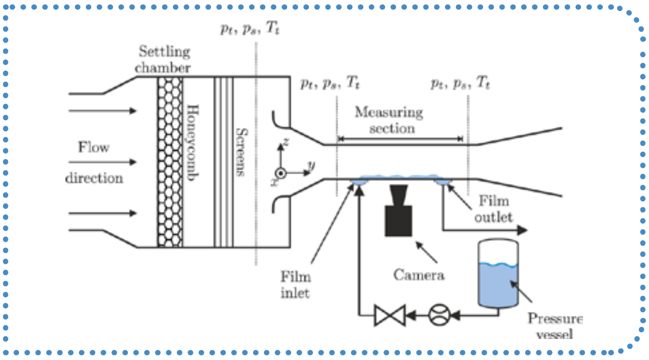
Alternative fuels in aero engine performance calculations

- Christian Klumpp, Daniel Weintraub, Sanket Girhe, Stefan Henninger, Heinz Pitsch & Peter Jeschke / *Published: 14 October 2025 (Open Access)*



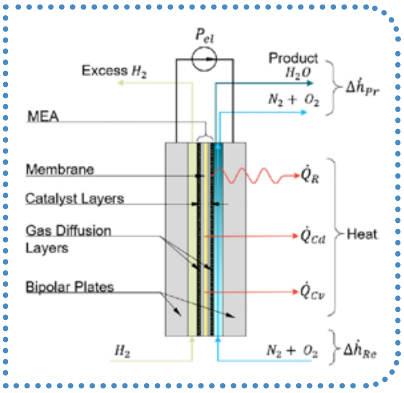
Temporal and spatial experimental investigation on thin shear-driven fluid films under turbomachinery conditions

- Jonas H. Ruesch, P. Jonathan Behn, Eric Nied, Markus Schatz & Bernhard Weigand / *Published: 21 October 2025 (Open Access)*



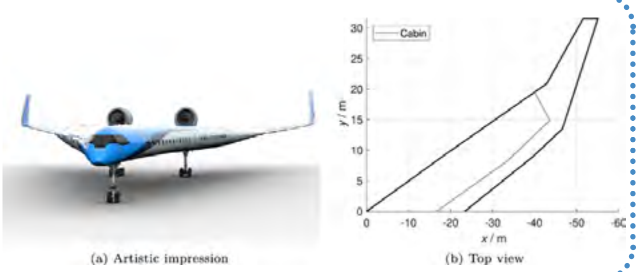
Evaluation of heat transfer technologies for high temperature polymer electrolyte membrane fuel cells as primary power source in a regional aircraft

- Friedrich Franke, Antje Link & Stefan Kazula / *Published: 22 October 2025 (Open Access)*



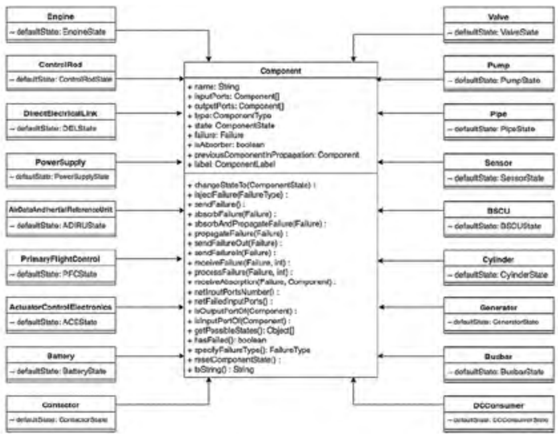
[Control surface allocation based on offline handling quality simulations for a flying wing aircraft]

• **Salvatore Asaro, Direnc Atmaca, Erik-Jan van Kampen & Roelof Vos** / *Published: 22 October 2025 (Open Access)*



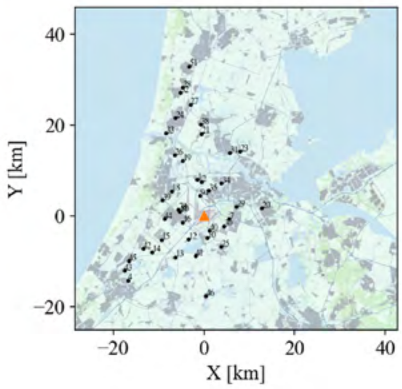
[The development of failure injection heuristics to enhance minimum cutsets detection of complex systems]

• **Akram Amin Abdellatif, Salma ElAnsary & Florian Holzapfel** / *Published: 25 October 2025 (Open Access)*



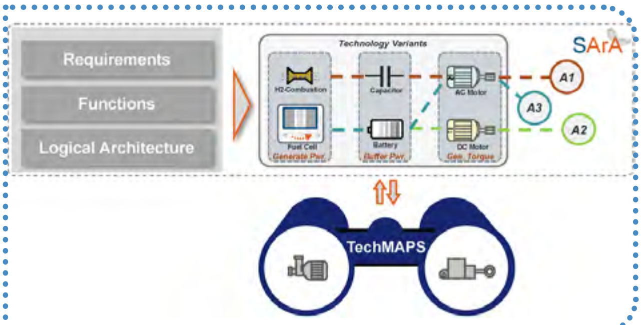
[Aircraft noise model improvement by calibration of noise–power–distance values using acoustic]

• **Rebekka van der Grift, Mirjam Snellen & Alireza Amiri-Simkooei** / *Published 25 October 2025 (Open Access)*



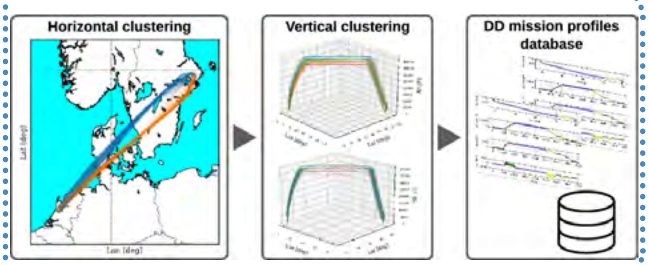
[TechMAPS: technology management for the architecting process of aircraft on-board systems]

• **Nils Kuelper, Vivian Kriewall Peters, Kai Beschorner & Frank Thielecke** / *Published: 25 October 2025 (Open Access)*



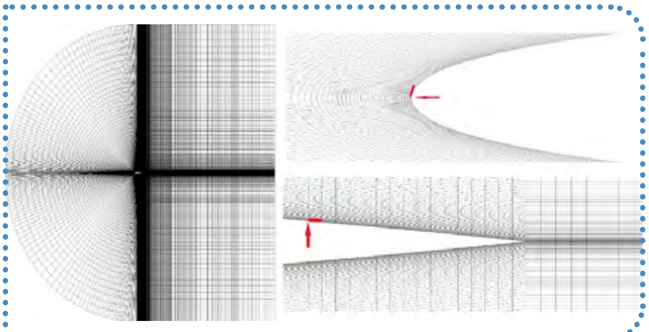
[Integrated aircraft and network optimization with airspace constraints]

• **Alejandro A. Rios Cruz, Bento S. de Mattos & José Alexandre T. G. Fregnani** / *Published: 30 October 2025*



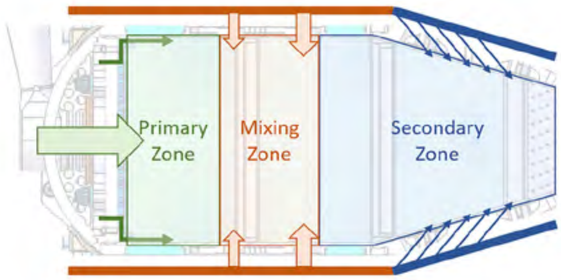
[Numerical investigation of single and multiple DBD plasma actuators integration on airfoils at low Reynolds number]

• **Mehmet Arslan & Ahmet Selim Durna** / *Published: 10 November 2025*



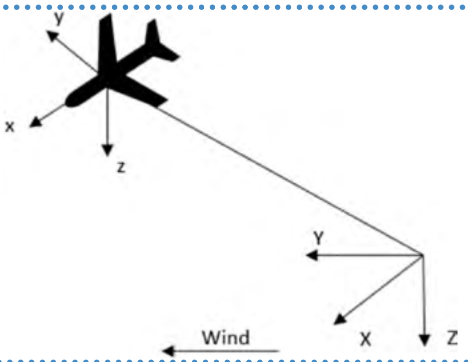
High-pressure testing of hydrogen fuel injectors in a triple-sector RQL-rig for the Rolls-Royce Pearl 15 Hydrogen Demonstrator Engine Program

- Sebastián Eisenring, Thomas Behrendt, Johannes Berger, Peter Tiessen, Bertram Janus & Carsten Clemen / *Published: 11 November 2025 (Open Access)*



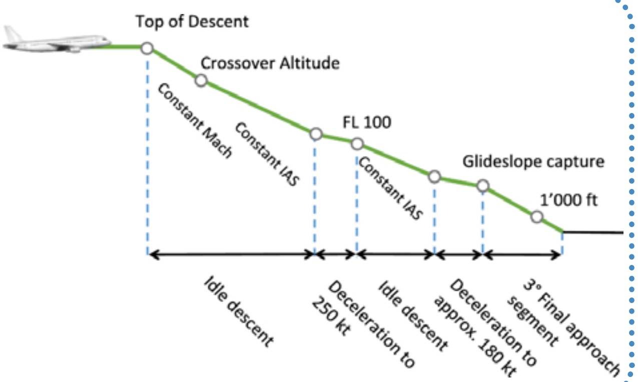
Trajectory tracking controller design and simulation of a tethered aircraft

- Anıl Sami Önen & Ozan Tekinalp / *Published: 11 November 2025*



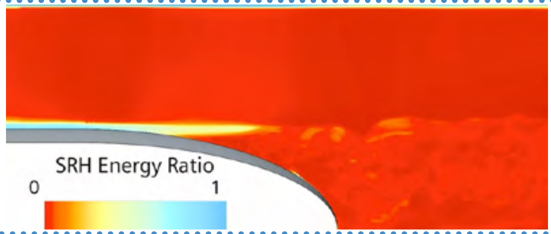
Improving aircraft energy and flightpath management through pilot support functions: demonstration of optimized continuous descent approaches with the Airbus A320neo at Zurich airport

- Martin Gerber, Marie Goetz, Falk Sachs, Peter Pauly & Fethi Abdelmoula / *Published: 12 November 2025 (Open Access)*



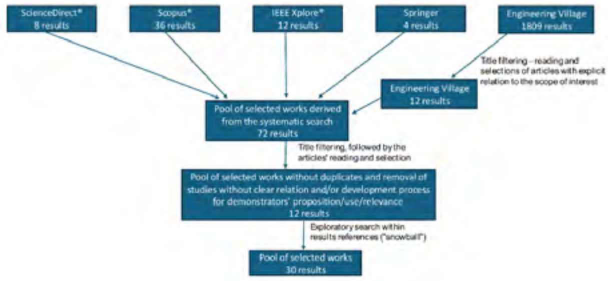
Application of hybrid-temporal LES to shock-induced boundary layer separation in hyperloop flows

- Benedikt Geiben, Marc Havermann, Errol Hale & Cees Bil / *Published: 18 November 2025 (Open Access)*



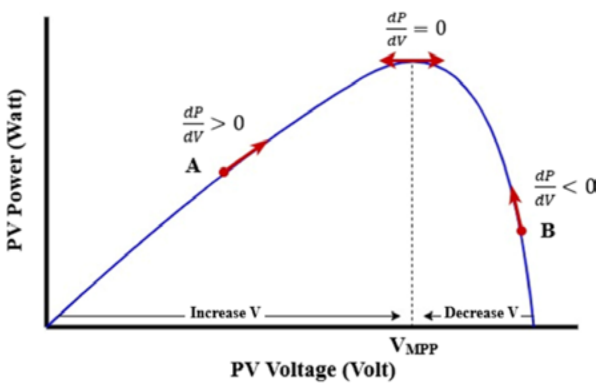
Technology demonstrators' guidelines: a contribution to technology funding and transfer process

- Rodrigo Bastos Fernandes, Victor Juliano De Negri, Talita Sauter Possamai & Marcos Paulo Nostrani / *Published: 18 November 2025*



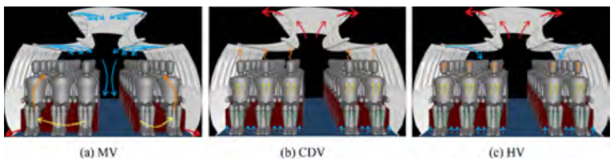
Evaluation of P&O algorithm efficiency under varying conditions for solar powered unmanned aerial vehicle

- Ozge Kucukkor, Umut Durak & Tahir Hikmet Karakoc / *Published: 18 November 2025 (Open Access)*



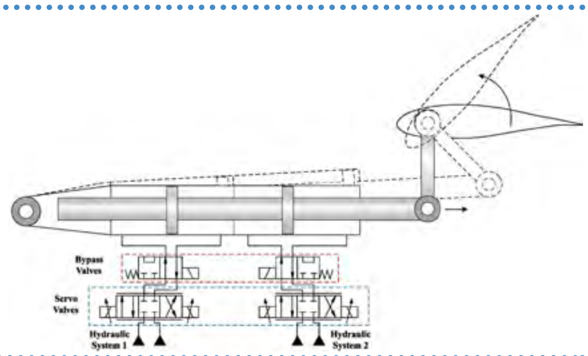
[Influence of seating position and ventilation on aerosol dispersion in a passenger aircraft approach]

• Tobias Dehne & Daniel Schmeling / *Published: 18 November 2025 (Open Access)*



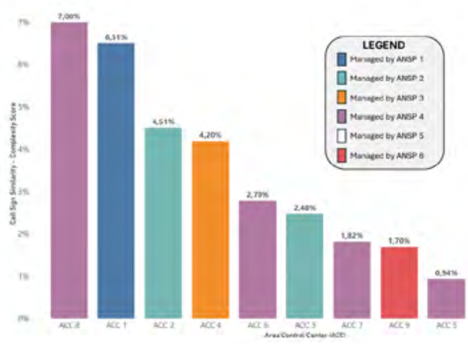
[An approach for reliability analysis of digital hydraulic actuator for aircrafts]

• Robert Pettersson, Heitor Azuma Kagueiama, Rodrigo Bastos Fernandes, Victor Juliano De Negri & Petter Krus / *Published: 18 November 2025*



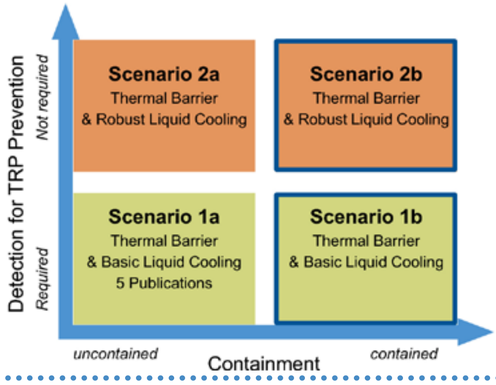
[A set of indicators to assess the impact of call sign similarities to airspace performance]

• Manuel Lombardi & Riccardo Patriarca / *Published: 27 November 2025 (Open Access)*



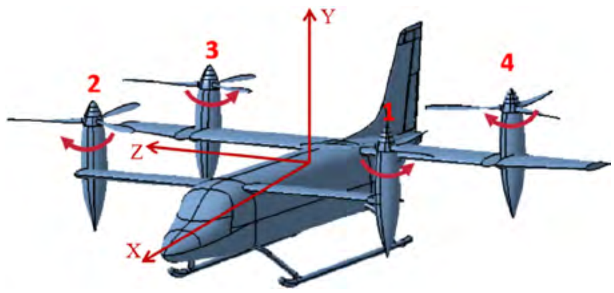
[Safety assessment for battery thermal runaway propagation for urban air mobility]

• Colin Bosch, Rishabh Pachchhao & Ilkay Yavrucuk / *Published: 09 June 2025 (Open Access)*



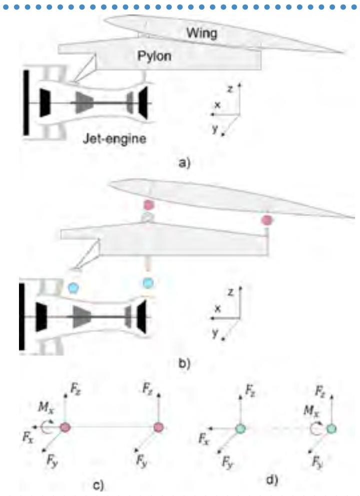
[Design of manipulation strategy and flight control for a quad tilt-rotor in helicopter mode]

• Bohai Deng, Jinfa Xu, Shengwei Li, Xin'ao Wang & Xiangchen Mao / *Published: 01 December*



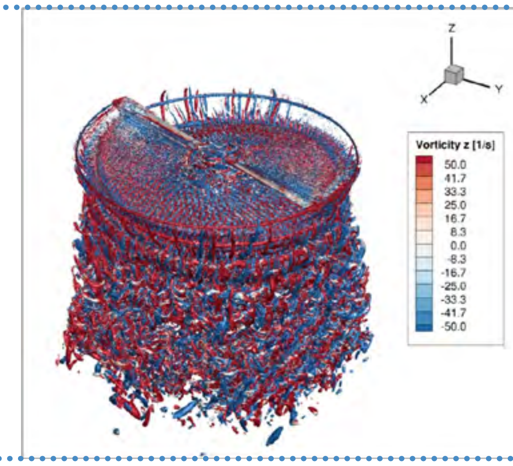
[Jet engine vibration model for estimating pylon–wing interface loads for realistic structural excitation]

• S. F. Zettel, M. Böswald, R. D. Dewald & R. Winter / *Published: 10 December 2025 (Open Access)*



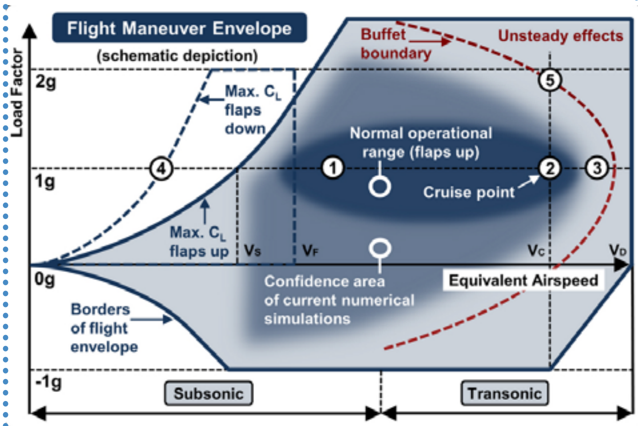
A comparison of numerical and experimental data from wake decay in hovering rotors

• Filippo Gajo, Alexander Heintz & Manuel Keßler / *Published: 11 December 2025 (Open Access)*



Validation of high-fidelity aeroelastic simulations with flight test data from DLR Dassault Falcon 2000LX ISTAR

• M. Bauer, J. Feldwisch, P. Mühlmann & T. Kirmse / *Published: 13 December 2025 (Open Access)*



Tight coupling of helicopter airframe including the influence of the gearbox

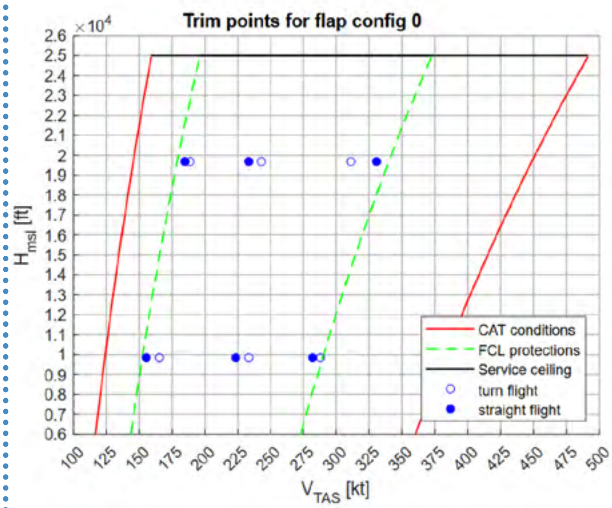
• Oskar Wengrzyn, Manuel Keßler, Ewald Krämer, Lennart Frie & Peter Eberhard / *Published: 15 December 2025 (Open Access)*

Crashworthiness considerations for liquid hydrogen tank integration in transport airplanes

• Matthias Waimer, Paul Schatrow, Erik Wegener, Nathalie Toso & Heinz Voggenreiter / *Published: 16 December 2025 (Open Access)*

Effectiveness and robustness of an independent flight control law monitor

• Dominik Hübener & Robert Luckner / *Published: 04 June 2026 (Open Access)*



CEAS SPACE JOURNAL

Volume 18, Issue 4, July 2026

Special Issue on Model-based systems engineering (MBSE) for space missions, systems, and software engineering

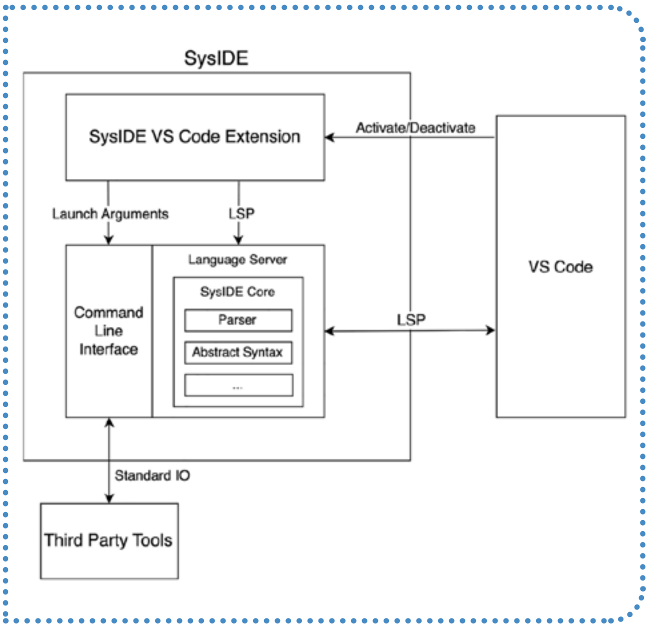
Guest editors:
Nils Fischer, Caroline Lange, Jasminka Matevska

Model-based systems engineering (MBSE) for space missions, systems, and software engineering

• Nils Fischer, Caroline Lange, Jasminka Matevska / Editorial – Published online: 08 June 2026

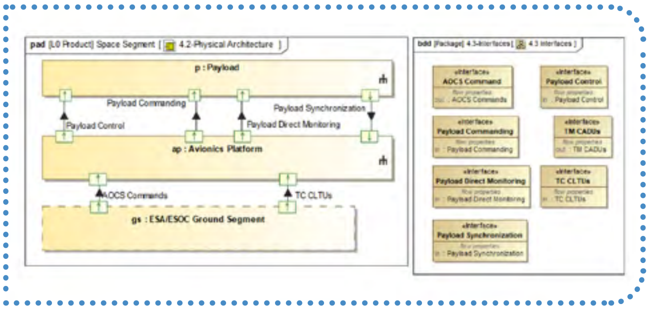
SysIDE: SysML v2 textual editing and analysis system: overview and applications

• Juozas Vaicenavičius, Tilo Wiklund, Daumantas Kavolis, Simonas Draukšas, Antanas Kalkauskas & Rimantas Vaicenavičius / *Published online: 13 February 2025*



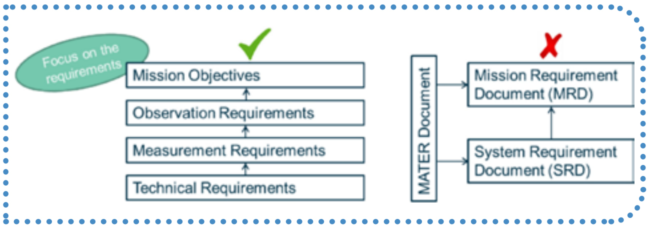
The ESA SysML solution evolution: introducing verification and interface management

• Anh-Toan Bui Long, Alex Vorobiev, Raphael Faudou, Clément Mezerette, Hans Peter de Koning, Pierre Gaufillet, Jean-Luc Marty & Alberto Gonzalez Fernandez / *Published online: 30 June 2025*



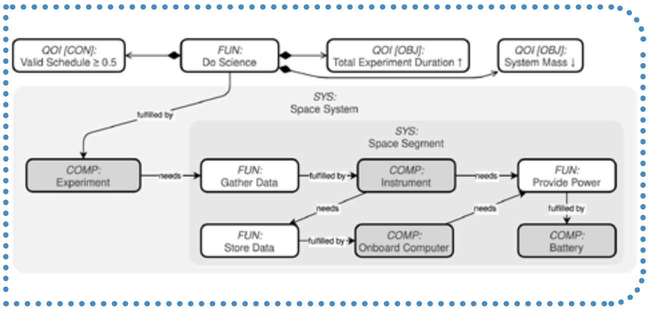
Requirement setting, flow down, traceability and maintenance for ESA EO Phase 0/A using MBSE philosophy

• K. Palmer, S. F. Rafano Carnà, E. De Witte, F. Bräuer, V. Mazeau & B. Carnicero Dominguez / *Published online: 23 July 2025*



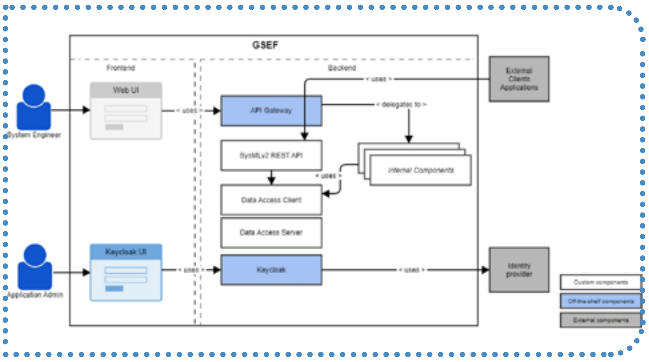
System architecture optimization: an example application to space mission planning

• Jasper H. Bussemaker & Thomas Firchau / *Published online: 18 June 2025 (Open Access)*



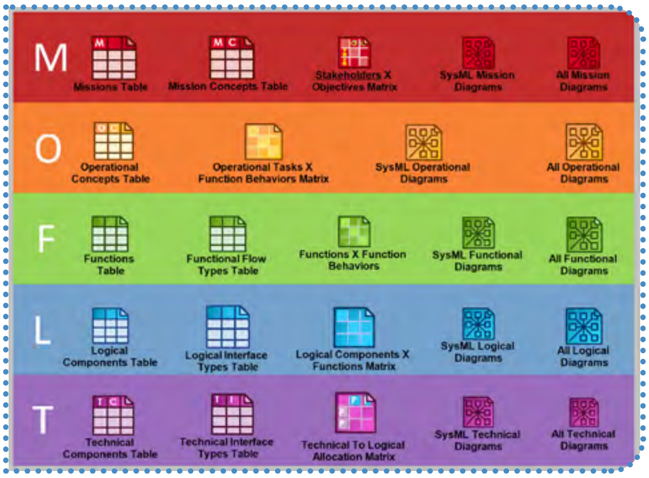
[Onboarding of ESA missions to the Ground Segment Engineering Framework: an open source MBSE framework for ESA mission and science ground segments]

• Marcus Wallum, Steve Foley, Riya Mody, Laurence O'Rourke, David Sanchez-Cabezudo & Todor Stoitsev / *Published online: 27 January 2026*



[System model exploitation techniques to foster MBSE adoption at airbus]

• Stéphane Estable, Rafaël Estanguet, Alexandre Cortier & Fabien Bouffaron / *Published online: 09 February 2026*

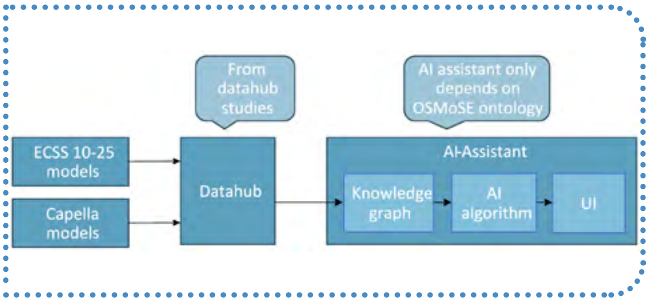


[Insights and lessons learned from implementing MBSE in EGNOS V3]

• François Pouzolz, Josua Höfgen, Lucie Laborde, Adrien Laborie & Pierre-Antoine Cier / *Published online: 18 November 2025*

[Implementation of an AI-powered digital assistant to support space system engineering activities]

• Paloma Maestro Redondo, Gérald Garcia, Annalisa Riccardi, Paul Darm, Jaime Bernar Jiménez Eguizabal, Antoine Théate, Sam Gerené, Alberto González Fernández & Gwendolyn Kolfschoten / *Published online: 03 November 2025*



UPCOMING AEROSPACE EVENTS

2026

JULY

- **20 – 24 July 2026** / Farnborough International Airshow, Farnborough, UK https://www.farnboroughairshow.com/
- **20 – 23 July 2026** / The International Conference on Aeronautical and Aerospace Engineering (ICAAAE), Rome, Italy

AUGUST

- **1 – 9 August 2026** / The 46th COSPAR Scientific Assembly, Florence, Italy; https://www.cospar-assembly.org/assembly.php
- **14 – 15 August 2026** / International Conference on Aeronautical and Aerospace Engineering ICAAAE – Warsaw, Poland

SEPTEMBER

- **1 – 4 September** / 52nd European Rotorcraft Forum ERF 2026 – Amsterdam (The Netherlands) - https://www.erf2026.org
- **6 – 7 September 2026** / International Conference on Aerospace Sciences and Aviation Technology (ICASAT), Prague, Czech Republic
- **13 – 17 September 2026** / The 35th Congress of the International Council of the Aeronautical Sciences (ICAS 2026), Sydney, Australia; https://icas2026.com/
- **14 – 15 September 2026** / ISASSME 2026 – International Summit on Aerospace, Space Science and Mechanical Engineering, Berlin, Germany
- **16 – 17 September 2026** / ESA Industry Space Days at ESA/ESTEC. https://isd.esa.int/
- **20 – 21 September 2026** / International Conference on Aerospace and Aviation Engineering (ICAAE), Lisbon, Portugal

OCTOBER

- **1 – 2 October 2026** / ESA/CNES Space Cost Engineering Conference 2026, Noordwijk, The Netherlands
- **5-9 October 2026** / International Astronautical Congress (IAC) in Antalya, Turkey.
- **13 – 16 October 2026** / 6th SPACE PASSIVE COMPONENT DAYS - SPCD 2026, ESA/ESTEC, Noordwijk, The Netherlands, https://www.spcd.space/
- **27 – 28 October 2026** / EASN Conference, Toulouse, https://easnconference.eu/

NOVEMBER

- **2 – 4 November 2026** / ICGA 2026 – The 4th International Conference on Green Aviation, Xi'an, China
- **4 – 5 November 2026** / International Conference on Aerospace and Aviation Engineering" (ICAAE), New York, USA
- **18 – 20 November 2026** / Bahrain International Airshow, Bahrain

DECEMBER

- **9 – 10 December 2026** / GAD World (Global Airfinance Conference), Milano, Italy

2027

JANUARY

- **11 – 15 January 2027** / AIAA SciTech Forum 2027, , Orlando, https://scitech.aiaa.org/
- **14 – 15 January 2027** / International Conference on Aeronautical and Aerospace Engineering (ICAAAE), Zurich, Switzerland
- **26 – 27 January 2027** / 18th European Space Conference, Brussels, Belgium

FEBRUARY

- **8 – 10 February 2027** / Defense and Intelligence Space Conference 2027 (DISC27), Orlando, Florida, USA
- **15 – 16 February 2027** / International Conference on Aerospace and Aviation Engineering (ICAAE), London, UK

MARCH

- **4 – 5 March 2027** / International Conference on Aeronautics and Astronautics (ICAA) - Barcelona, Spain
- **6 – 13 March 2027** / IEEE Aerospace Conference, Big Sky, Montana, USA
- **22 – 23 March 2027** / International Conference on Aeronautics and Aeroengineering (ICAA), Prague, Czech Republic

UPCOMING AEROSPACE EVENTS

MAY

- **24 – 28 May 2027** / 5th HiSST International Conference on High-Speed Vehicle Science and Technology, Beijing, China

JUNE

- **7 – 11 June 2027** / AIAA AVIATION Forum 2027, San Diego, https://aviation.aiaa.org/

- **14 – 20 June 2027** / 56th Paris Air Show, Paris-Le Bourget, France https://www.siae.fr/en/

- **24 – 26 June 2027** / The World Summit on Aerospace and Aeronautical Engineering (AERO2027), Amsterdam, Netherlands

- **28 June – 2 July 2027** / EUCASS, Glasgow, https://www.eucass.eu/conferences-and-publications/upcoming-events/eucass-2027

JULY

- **15 – 16 July 2027** / CAAAE 2027: Aeronautical and Aerospace Engineering Conference, Stockholm, Sweden

SEPTEMBER

- **27 Sept – 1 October 2027** / International Astronautical Congress IAC 2027, Poznan, Poland

NOVEMBER

- **15 – 19 November 2027** / Dubai Airshow, Dubai, UAE https://www.dubaiairshow.aero/en/

- **29 November - 2 December 2027** / 11th CEAS Aerospace Europe Conference, Augsburg, Germany, https://aec2027.dglr.de/

11th CEAS

AEROSPACE EUROPE CONFERENCE

29 NOVEMBER – 2 DECEMBER 2027
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