

VOLUME V - SPRING 2018 - HISTORY ISSUE

# RAes Journal

WASHINGTON, DC BRANCH



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AERONAUTICAL  
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Photo Credit: Boeing



Photo Credit: Boeing



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# CHAIRMAN'S WELCOME

## William Voss

It is a great honor to have been selected as the 2018 Chairman of the Royal Aeronautical Society Washington DC Branch. I follow in the footsteps of outgoing Chairman Ken Gazzola, who has handed me a healthy and robust organization supported by dedicated volunteers and an enthusiastic group of members. As the incoming Chairman, I thought I would share with you my personal perspectives about what makes the Society special, and how our branch in Washington, D.C., fits into the larger picture.

Over the last couple of decades, I have been lucky to work on complex aviation problems in every corner of the world. Often times the technical challenges were daunting, and the political obstacles formidable, but the aviation and aerospace professionals I had the pleasure of working with would always find a way forward. That is because our industry has a secret weapon, and that is the power of our professional community. In the aerospace community, our shared perspectives, common experiences, and professional affiliations routinely prevail over the political differences and technical challenges that would otherwise leave us grounded.

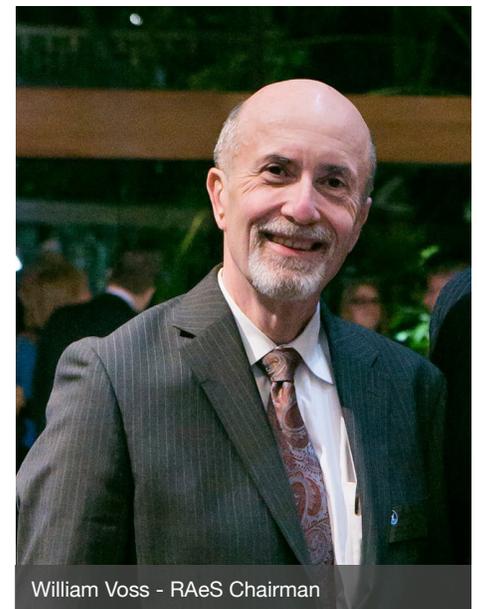
The Royal Aeronautical Society provides a global platform that helps binds this professional community together. It brings with it a sense of

dignity and gravitas that flows from a 150-year history of leadership as a learned society. It pulls the diverse airspace community together under a single organizational framework, and it links the professionals of the world through a global network of supporting branches and divisions.

Our Washington, D.C., branch is an important part of that global network. It grants professionals and policy makers the opportunity to exchange ideas in a collegial setting, and provide a setting where they can form new connections with members of the aerospace community they would have otherwise never met. We provide these meaningful opportunities through meetings and lectures where we discuss some of the most difficult challenges and emerging issues in our field. We don't shy away from the difficult topics, and we don't limit the debate. We provide a setting where the things that separate us -- such as nationality and political affiliation -- are less important than the profession that we share, and the common challenges that we face. In the past we have discussed things like Commercial Unmanned Systems, Counter-UAS, Global Cyber-Security, and the future of Humans in Space. None of these are easy topics, but for us they are crucial areas of interest that conversations could help move the needle closer to a solution.

Of course, I would be remiss if I didn't mention the biggest challenge that faces our community, and that is the renewal and growth of our workforce. The Society as a whole has been focused on our future workforce and our branch is no exception. We support scholarships and educational programs for students, and we will continue to reach out to young professionals to become active members of this exciting aerospace community that we call home.

I hope to see all of you at a future event as we face new challenges, rekindle our professional bonds, and show a few young people what a joy it is to take on exciting problems in the company of extraordinary professionals.



William Voss - RAeS Chairman



Boeing's hypersonic concept - Photo Credit: Boeing

# BOEING'S HYPER HOPE

Guy Norris *Reprinted with Permission from Aviation Week & Space Technology*

Boeing is raising the stakes in the accelerating race for U.S. hypersonic leadership by positioning itself to develop a potential future Mach 5-plus strike-and-reconnaissance aircraft.

The move, which was signaled by the unexpected unveiling of a reusable hypersonic demonstrator concept vehicle at an aerospace science and research conference in Florida in early January, directly challenges Lockheed Martin. In 2013, Lockheed revealed plans to develop a Mach 6 successor to the long-retired SR-71 Blackbird.

Boeing's ambitious plan emerges amid continuing signs of a significant upswing in U.S. hypersonic research and development and builds on decades of design experience gained through a variety of high-speed rocket and air-breathing-powered programs. The sharply swept delta-wing vehicle concept notably leverages the X-43 and X-51A hypersonic demonstrator programs but also incorporates several design features from projects produced from companies Boeing later acquired, including the Mach 3 XB-70 Valkyrie experimental bomber project.

"We asked, 'What is the most affordable way to do a reusable hypersonic demonstrator vehicle,' and we did our own independent research looking at this question," says Kevin Bowcutt, Boeing chief scientist for hypersonics. If selected for full-scale development, Boeing is considering a two-step process beginning with flight tests of an F-16-size single-engine proof-of-concept precursor vehicle leading to a twin-engine full-scale operational vehicle with approximately the same dimensions as the 107-ft.-long SR-71.

The concept model was unveiled at the American Institute of Aeronautics and Astronautics SciTech forum in Orlando, Florida. Bowcutt says the twin-tail, waverider configuration continues to evolve but is already representative of a feasible hypersonic design. "It's a really hard problem to develop an aircraft that takes off and accelerates through Mach 1 all the way to Mach 5 and beyond. The specific impulse of an air-breathing engine goes down with increasing velocity, so you have to make the engine larger to get to Mach 5. But doing that means a bigger inlet and nozzle, and trying to get that through Mach 1 is harder."

However, Bowcutt says careful integration of the airframe and propulsion system through multidisciplinary design optimization (MDO), a process in which designers incorporate all relevant disciplines simultaneously, has enabled Boeing to develop a working configuration. MDO was used to finalize the design of the X-51A waverider, which was the first vehicle to demonstrate sustained air-breathing hypersonic flight.

Although initially independently funded by Boeing, development of the hypersonic vehicle concept is continuing under DARPA's Advanced Full-Range Engine (AFRE) initiative and a closely related turbine-based combined-cycle (TBCC) flight demonstration concept study run by the U.S. Air Force Research Laboratory. Boeing's engine partner for the concept is Orbital ATK, which in September 2017 was awarded

a \$21.4 million contract for the AFRE program. Boeing began work on the AFRL TBCC flight demonstrator concept study, with Orbital ATK as subcontractor, in 2016.

The vehicle configuration is dominated by the TBCC propulsion system, which combines conventional turbine engines with dual-mode ramjets/scramjets (DMRJ). The turbine engines operate up to a sufficiently high Mach number to enable transition to the DMRJ. The engines will share a common inlet and nozzle, with the turbine cocooned after transition and then restarted once the hypersonic vehicle slows down for return to a runway landing. The inlets are divided by a prominent septum derived from the XB-70, says Bowcutt, who adds that the TBCC is only one of a number of potential propulsion options. The nozzles are also separated by a prominent boat-tail divider.

"The propulsion system determines the length of the vehicle," says Boeing Research and Technology chief hypersonic aircraft designer Tom Smith. Although Boeing declines to discuss specific aspects of the design, the broad inlets and wide lower fuselage-mounted nacelle suggest the turbine and DMRJ in each TBCC engine are housed side-by-side rather than arranged in an over-under configuration.

The inward-turning inlets are positioned to capture the initial shockwave from the nose of the vehicle, while the sharply swept forebody chines are contoured into the relatively large-span

delta wing to provide waveriding capability at hypersonic speed and sufficient lift for landing and takeoff at subsonic speed. The term waverider refers to a design in which the vehicle rides the shockwave attached to the leading edge, thus benefiting from lower induced drag. "As the narrow chine transitions to the wing, that produces a good vortex which you care about at low speed," notes Smith.

Outwardly resembling Lockheed Martin's SR-72 concept, Boeing's design differs in having twin tails and engines grouped in a single large nacelle rather than housed individually. The design, thought to be internally dubbed the Valkyrie II, continues to be refined and, according to sources, is unlikely to feature the distinctive humped forward fuselage shown in the model displayed at SciTech.

Lockheed Martin, which in 2017 indicated that significant progress has been accomplished toward development of a subscale hypersonic flight research vehicle, has been teamed with Aerojet-Rocketdyne on the project since 2006. Lockheed's project builds on earlier work completed under the Air Force/DARPA HTV-3X reusable hypersonic demonstrator program that was canceled in 2008 but goes a step further by integrating a high-speed turbine engine. The HTV-3X concept was an outgrowth of DARPA's Falcon program, which included development of small launch vehicles, common aero vehicles and a hypersonic cruise vehicle. Although Boeing was heavily

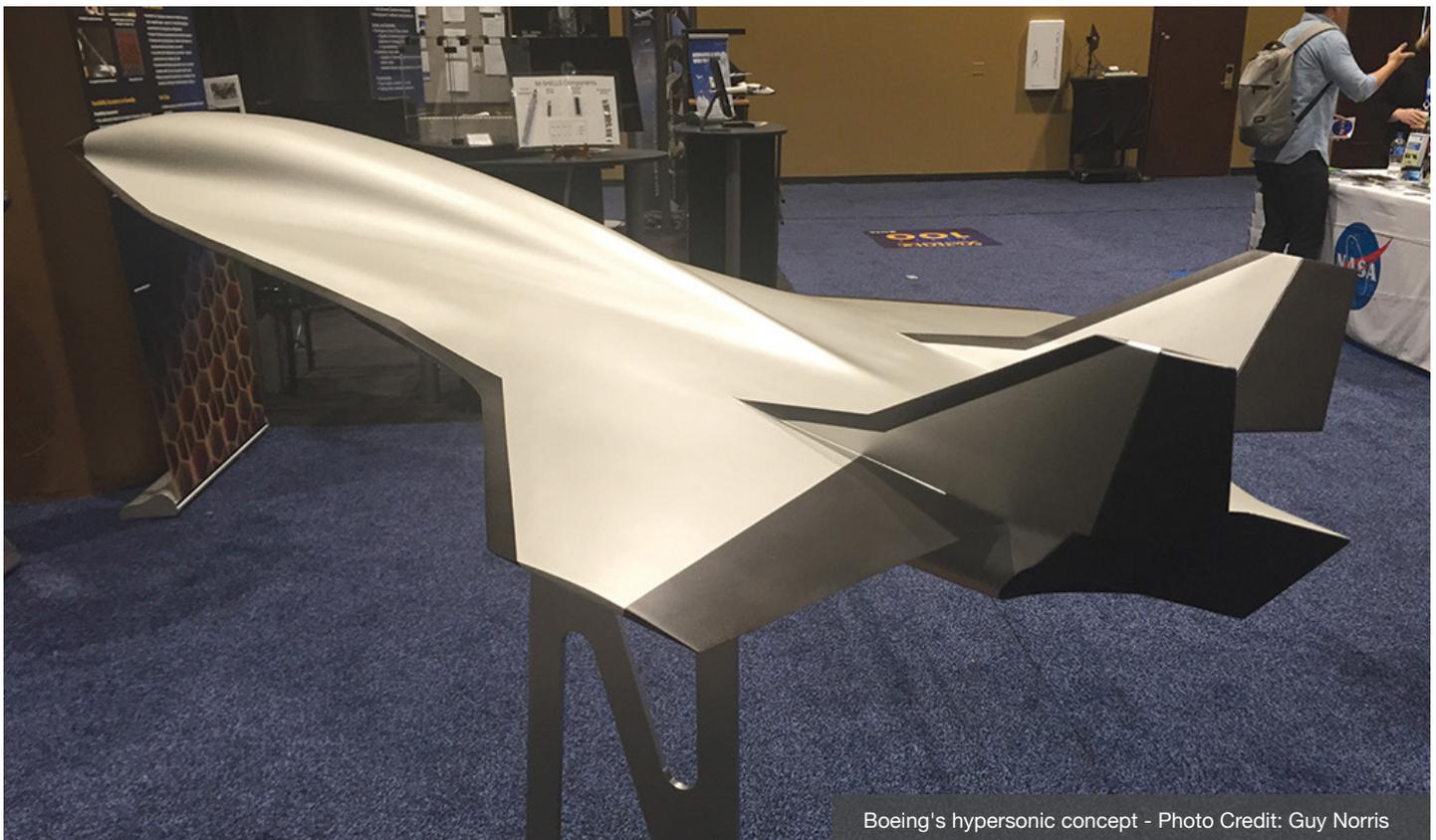
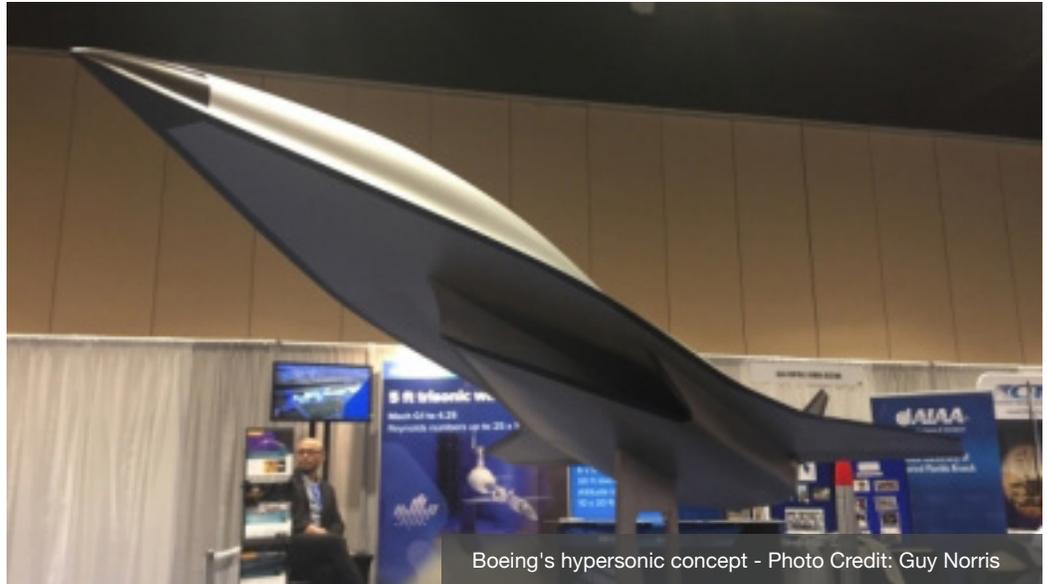
involved in the X-51A, which weapon, subsequent work on hypersonic development led by DARPA has largely gone to Lockheed. Under one initiative, Lockheed Martin and Raytheon are working competitively on the air-launched, rocket-boosted Hypersonic Air-breathing Weapon Concept. The second is the Tactical Boost Glide program

under which Lockheed Martin is developing an unpowered hypersonic vehicle that will detach from the air-launched rocket stage in the upper stratosphere and glide to its target.

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# BOEING'S HYPERSONIC CONCEPT

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Ruman saw A400Ms deliver much needed aid to the hurricane-hit Caribbean - Photo Credit: MoD

# ATLAS SHOULDERS THE LOAD

Tim Robinson *Reprinted with Permission from Aviation Week & Space Technology*

*Last year saw the Royal Air Force's Airbus Defence A400M swoop in to provide hope and much needed humanitarian aid in the aftermath of devastating hurricanes in the Caribbean – its first operational tasking. TIM ROBINSON reports from RAF Brize Norton as the Atlas flexes its muscles and takes over more of heavy lifting from the iconic Hercules.*

“Working side-by-side on the

hurricane relief was the first time I've heard a C-130 special forces support pilot turn around and say: "It's actually quite good at this, isn't it?" That was a mark of respect.” This, the words of Wg Cdr Gareth Burdett, OC XXIV Sqn (who was also in charge of the air mobility wing deployed for Operation Ruman, the UK's Caribbean assistance mission), is a tribute to the RAF A400M's operational debut in a major international humanitarian

mission in September of last year. The UK humanitarian relief effort, in the wake of the damage and destruction left by Hurricane Irma as it swept through the Caribbean, saw Army, Royal Navy, Royal Marines and RAF personnel scrambled a short notice to deliver urgent aid and assistance. As well as HMS Ocean and RFA Mounts Bay, the relief effort also included RAF Puma helicopters, C-17s, a C-130 and two A400Ms to

deliver much needed food, water and essential aid to UK Dependencies and other islands in the Caribbean that had been affected by one of the worst storms in history.

### International Rescue

Though the first Airbus A400M for the RAF was delivered in November 2014, Operation Ruman was the first operational debut for the UK A400M fleet and a significant milestone for a force that is still growing with a mix of 24/70 Sqn aircrew swinging into action.

The RAF now has 18 A400Ms in service, pooled between the OCU XXIV Sqn (24 Sqn), LXX Sqn (70 Sqn) and, 206(R) (responsible for trials and evaluation testing). Four more aircraft are set to be delivered between now and 2019 to take the whole force to 22 aircraft and another ex-C-130 squadron, 30 Sqn, is set to reform in 2018 as the second front-line A400M unit.

The OC of the RAF A400M's front-line operational unit, 70 (LXX) Sqn, Wg Cdr Ed Horne said: "It's worth stressing that the Atlas force of 70 Sqn and 24 Sqn, and our engineering colleagues, are still in growth and still a relatively immature organisation. It's not something that we held a standby commitment for, or anything like that. So to get two aircraft out the door in such a short timeframe, for over 4,000 miles away, really playing to the aircraft's strengths in terms of its reach and its range, was a fantastic achievement."



Operation Ruman was the operational debut of the RAF A400M Atlas in a major humanitarian airlift. - Photo Credit: MoD

Echoing this view, was 24Sqn's OC, Wg Cdr Burdett: "The A400M was remarkable in what it could do, It could take three times as much as a C-130 into a tight, small strip without taking any military risk in its performance. Whereas C-130 was taking in five tonnes, the A400 would be taking in 15."

During the airlift, two A400Ms deployed to Barbados via a refuelling stop in the Azores (the C-130 taking a longer route via Iceland, Canada and the US) before all three began 'hub and spoke' type transport missions to deliver much-needed supplies to the stricken islands of the British Virgin Islands, the Turks and Caicos Islands, Antigua and US Virgin Islands. In around a month of operations, the two A400Ms and C-130J delivered approximately 1,500 tonnes of aid, the vast majority of that delivered by the Atlas – thanks to its increased airlift capacity over the Hercules. Mixed loads were

common, said Wg Cdr Horne: "We had food, water, building materials, shelter kits, DFID aid type-stuff, in among JCBs playing to the volume sizes of the aircraft as well as its lift capacity, and then 54 passengers as well in the side seats."

Though the A400M is big (37 tonnes total cargo capacity) it is also remarkably 'light on its feet' thanks to 12 main wheels in two six-tyre pairs. This and its capability to operate into smaller airfields, while still carrying a huge load meant that the Atlas made its mark in Operation Ruman. Notes Wg Cdr Horne: "If I talk about Beef Island Airport in the British Virgin Islands, the runway length, it's concrete of course, but about 4,000ft long, and we were able to transport in the order of 20 tonnes, compared to the C-130's seven or eight tonnes. We love the C-130, but you can't help but draw comparisons." He added: "I would stress there is

that we didn't have to employ any sort of special take-off or landing techniques. Everything was done to the standard that all the crews are trained to, using the same sort of tactics and techniques that we would use here at Brize Norton.”

The range of the A400M also proved its worth in Operation Ruman, allowing the aircraft to deliver aid without needing to find somewhere to refuel at the delivery end. Says Horne: “if you could imagine that most of these places have been smashed up by a hurricane and therefore not only were there limited communications available, but there were also limited services available like the ability to refuel aircraft. If I take the Turks and Caicos Islands as an example, that's about 1,000 miles from Barbados. So to go 1,000 miles there and 1,000 miles back might be beyond the fuel range of other transport aircraft. The A400M wouldn't have any issue in going there and back without having to refuel.”

Horne also is enthusiastic about the aircraft from a pilot's perspective, especially the HUD,

situational awareness, powerful brakes and crisp, precise FBW system: “From an operational point of view, from a testing, environmental scenario where it's windy, gusty, you're trying to accurately land on a short strip, the fly-by-wire capability coupled to all that situational awareness really makes it a step above.”

The aircraft is also receiving praise from the RAF's loadmaster community – for its next gen qualities and design features. Rear ramp steadying struts and the ability of the aircraft to 'kneel' and reduce the angle of the ramp allowing vehicles and loads to be more easily loaded. This and an integral winch, means forgetting two pieces of essential equipment for the C-130J (an 'elephant's foot' support for the ramp and a winch) is now a thing of the past.

Sgt Andrea Harrison, a Loadmaster on 70 Sqn at Brize, highlighted the automatic load-locking system, which can be used either from a side panel or the loadmasters station as a step-up from the 'charismatic' C-130J she had previously flown. The

A400M's wider cargo hold, too, said Sgt Harrison, also allowed for easier checking of loads and pallets, with Loadmasters able to walk around the sides, rather than clamber over the loads.

Another advance over the C-130, she said, was that weight and balance calculations (for say additional cargo along a route), can be added on the fly while in flight, an improvement over the C-130J where the computer would only allow the Loadmaster to make changes while on the ground.

### Operational Conversion

Training for the A400M for the RAF is conducted by 24 (XXIV) Sqn, based at Brize Norton, which is the Air Mobility Operational Conversion Unit (OCU) for A400M, C-17 and C-130. The squadron has 12 pilot instructors, eight loadmaster instructors and ten engineer instructors, with the unit to add a further six pilot instructors in the future when at full strength. The squadron's strength, says Burdett, is its mix of highly experienced instructors. “The calibre of the instructors I have is phenomenal. They are all experts from the aircraft types they've flown before, and we've deliberately gone for a blend.” He added: “We've got people who are experts on the Herc, which is the obvious angle, but people who are experts on the C-17. We're bringing together the blend so we don't end up in groupthink and just using it in the same way that we've always used a Herc, because that would be a massive waste of this aircraft that can take three



A400Ms were able to deliver heavy loads into tight airstrips - Photo Credit: Gary Deakin/Airbus



A400M Full Flight Simulator device at the ASTL facility at RAF Brize Norton.

times as much into a small strip.”

For the A400M training and conversion, it works closely with ATSL (A400M Training Service Ltd) a joint venture between Airbus and Thales. Civilian instructors from ATSL (two pilots, three LMs and four engineers) provide initial conversion training, before handing over to the RAF instructors for the more operational and tactically focused part of the course.

A new A400M training facility features two full-motion flight simulators (FFS) from Thales which theoretically allow zero-flight time qualifications. However, the current type conversion course features 33 simulator flights, followed by four flights in the aircraft, with line training after that. All told, the OCU is aimed at lasting four months. As might be expected, a fair few of these new A400M pilots are from the shrinking C-130J force, but there are others from Shadow R1s as well as ab initio pilots direct from the King Airs at 45 Sqn. While 24 Sqn is currently in ‘surge mode’ at a steady state, the OCU will be training ten A400M crews a year.

As well as type conversion, 24 Sqn’s role also includes

refresher training, with front-line crews returning to the sims four times a year, to brush up on operating procedures and maintain standardisation. This refresher also includes annual checks and instrument ratings.

ATSL provides four sim flights a day per sim to the RAF, each lasting around three hours. The two simulators, with the latest visuals, can be linked to each other, to allow for formation flying, and instructor stations can also ‘fly’ additional AI A400Ms, allowing up to four aircraft to be flown simultaneously. However, notes Wg Cdr Burdett, despite the ramp-up in crews there is still spare capacity, and talks are ongoing with other A400M operators about potentially using this facility to train their pilots. While the simulators are currently used for type conversion, Wg Cdr Burdett also foresees that the A400M force will expand their use to include mission rehearsal. Networking to other simulators (its pace though, dependent on funding) is seen as part of the future of collective training for RAF.

The facility also features classrooms for training engineers with the latest in 3D ‘virtual reality’ which allows students to open, inspect and crawl all over a detailed 3D model on a desktop computer, before moving on to line training. At some point, 24 Sqn hope to add VR goggles to the training, to immerse students even further. As well as the FFS, computer-based training classrooms, the new 24 Sqn training facility also includes a Loadmaster Procedural Trainer.

Just outside of the building, 24 Sqn can make use of a 1:1 scale rear fuselage mock-up, the Cargo Hold Trainer-Enhanced (CHT-E). Though the outside looks like bare metal, inside the rear cargo bay and all its equipment (including working winch and ramp) is replicated to allow Loadmasters and movers to train in loading and unloading the real aircraft. One of three CHTs in existence, the RAF’s version is enhanced with additional features, including smoke that can be introduced into the cargo bay to train for smoke and fire emergencies. As well as training the squadron’s own personnel in loading and unloading the Atlas, the CHT-E also fulfils another function in allowing ‘third party’ user groups from Britain’s armed forces such as medics, logisticians, or 16 Air Assault Brigade to familiarise themselves with the cabin dimensions.

### Taking Up the Strain

While Operation Ruman saw the A400M and the Lockheed Martin C-130J working together, the new airlifter is now beginning to shoulder more and more of the Hercules’s traditional missions (although the C-130J is set to remain in service until 2035 – in the niche role as special forces support).

For instance, as well as a regular transport flight to RAF Akrotiri in Cyprus supporting Operation Shader, last November it was announced that a A400M is now detached to the Middle East to support UK forces around the

Arabian Gulf– taking over from the duty C-130 that has been based there since 2003.

The RAF A400M has also been used recently on support flights to Ascension Island, where its 'high flotation undercarriage' has made it invaluable in not damaging the runway further after concerns over the runway.

### Expanding the Capability

As well as growing the force with the OCU and replacing the C-130J on 'concrete to concrete' transport tasks, another priority is for the RAF to expand the Atlas with a programme of capability development, that includes low-level tactical flying, fielding the DAS (defensive aid systems), NVGs, parachute and cargo airdrops, austere airfields and AAR (air to air refuelling).

In 2018, notes Wg Cdr Burdett, "We'll be looking to develop low-level flight further. We'll be looking to develop air drop, because that's one of the core skills for tactical air transport, and one of the most useful when it comes to some of the tasks we don't get much choice over, such as humanitarian aid or evacuation operations."

Following airdropped container work, the next phase will see the RAF develop the A400M's parachutist role, with an initial goal of delivering 30 paratroops. Although this is smaller than the 108 paratroops that could be eventually carried, this will allow the RAF and air delivery specialists to gain experience and knowledge and work up



Round the clock - the A400M is now picking up more C-130 missions.  
- Photo Credit: Brent Maartens/Airbus

gradually to this final target.

While some test and evaluation work (like beach landings, trialled last year) falls to Airbus test pilots (with RAF pilots onboard too), 24 Sqn also has its own small capability development section of instructors, working up techniques such as low-level flying, for example using the famous Mach Loop. 70 Sqn too, is also expanding the range of Atlas capabilities – with crews going through a NVG training package. (Indeed, NVGs and austere airfield operations were also demonstrated when the RAF deployed the A400M to the major air mobility exercise, Exercise Mobility Guardian in the US last year – which also included the Atlas loading a US Army Stryker vehicle.)

Another upcoming string to its bow will be outfitting the A400M for the medical evacuation role. This will sit somewhere between the CH-47 MERT (Medical Emergency Response Team) and the C-17 'flying hospital' used for more deliberate,

planned evacuations. Though any A400M medical evacuation mission would undoubtedly be towards the more deliberate end, the ability of such a large airlifter (able to carry the C-17's equipment) to get into smaller and more austere airstrips will provide a leap in MEDVAC capability for UK forces.

### While Force at Brize Norton

Like many new aircraft before (and no-doubt after) the Airbus Defence A400M has suffered its share of teething troubles – the discovery of engine gearbox issues in 2016 and the crash of a pre-delivery A400M with the loss of four of the six Airbus flight crew onboard in 2015 saw the RAF temporarily 'pause' A400M operations in each case while it assessed the risk and instituted fixes.

However, by working proactively with OEM Airbus, the RAF has managed to mitigate many of the issues that has blighted it. For example, the RAF, said Wg Cdr Horne, working closely

with Airbus partners on site, reduced gearbox inspection and replacement process time (that involved taking the EPI turboprop off the wing) by half through the collaborative development of an on-wing process. Said Horne, that “made a huge difference when you're trying to generate aircraft.”

Operation Ruman, too, had seen the aircraft perform well in terms of serviceability. Said Wg Cdr Burdett: “There have been challenges with reliability. But in Ruman, we didn't miss a heartbeat on the A400 for serviceability, and its performance was absolutely superb.”

One major reason that may account for the difference between the RAF experience with the A400M and other operators, is the extremely close relationship at RAF Brize Norton between service personnel, manufacturer and civilians in supporting the A400M in the Single Engineering Organisation (SEO). A new state-of the art 24,000m(sq) hangar and MRO facility at Brize Norton, Government-owned but maintained by Airbus, was opened in May 2017 to provide integrated support for both line and depth maintenance. This facility features two large deep maintenance bays, underfloor power systems, as well as automated parts dispensing and tool-tracking. It also includes another bay for line maintenance. The new facility, which features 350 RAF, Airbus, FlyBe (which is contracted to provide depth maintenance) and

DE&S civilians working together under one roof, in a three-storey facility with Google-like ‘coffee spaces’ also has been built with an eye on the future. The depth maintenance bays, for example, are big enough not only for the A400M, but also for the Voyager MRTT and C-17.

This, another example of 'Whole Force' in action means that: “Our RAF technicians are interchangeable with their Airbus colleagues. It's something that works very well, because it means we can flex manpower here and there as we would require it.” says Wg Cdr Horne.

### Summary

In conclusion, the A400M has been a long time coming, from UK plans to replace the Short Belfast, to the Future Large Aircraft (FLA) and twists and turns of a much-delayed European defence procurement programme – the first developed under civil certification rules. While other snags could still

emerge, the evidence from the Royal Air Force, one of the most experienced and skilled air arms in the tactical air transport business, is that it is proving to be a worthy successor to the much-loved Hercules. Enthuses Wg Cdr Burdett: “A400 came into its own as an air mobility asset on Op Ruman.”

However, perhaps more instrumental in its success so far in RAF service, is in the men and women who fly, load, maintain and support it: (whether in uniform or not) and who are Atlas' real strength, according to Wg Cdr Horne. “I think that's really the main strength at Brize Norton, is that when the call comes, the capacity is there, but crucially, so is the willingness of the people. Our people dig in and go the extra mile.”



Beach landings are just one example of how the A400M is rounding out its full capabilities. - Photo Credit: Airbus

# PUSH TO GIVE AWAY ATC ENDS — FOR NOW

Joe Kildea

*Reprinted with Permission from  
AOPA.org*

House Transportation and Infrastructure Committee Chairman Bill Shuster (R-Pa.), the leading proponent of legislation calling for the removal of air traffic control from the FAA, announced he would no longer pursue the controversial proposal.

AOPA, along with hundreds of other aviation groups and organizations across the political spectrum, opposed the legislation, and AOPA members contacted their representatives in Congress more than 200,000 times asking them to oppose the bill.

In a statement, Shuster cited a lack of support among congressional Republicans and said, “Although our air traffic control reform provisions did not reach the obvious level of support needed to pass Congress, I intend to work with Senator Thune and move forward with a reauthorization bill to provide long-term stability for the FAA.”

AOPA President and CEO Mark Baker thanked members for

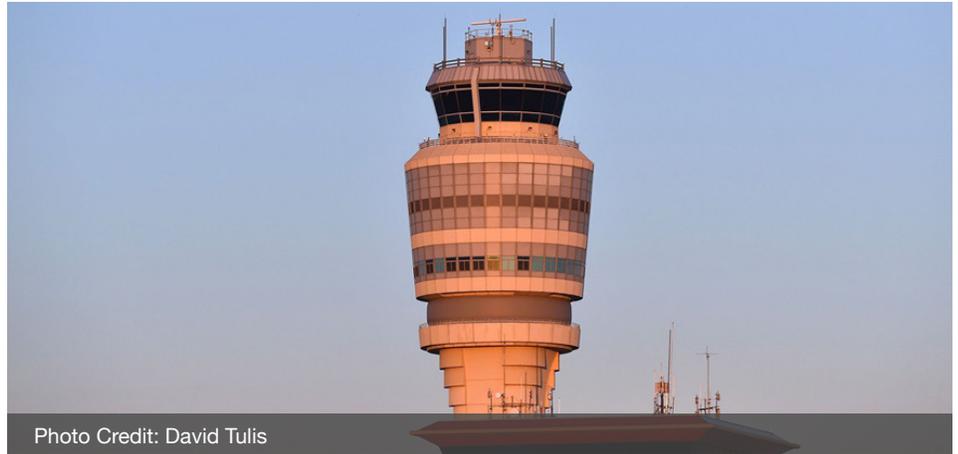


Photo Credit: David Tulis

their calls and letters to Capitol Hill and said, “In dropping the controversial air traffic control proposal, there’s now a chance to do something that all segments of aviation have been asking for—a long-term reauthorization bill.

“We look forward to working with Chairman Shuster and other leaders in Congress on a bill that improves aviation for every American and ensures our skies remain the safest in the world,” Baker continued.

Jim Coon, AOPA senior vice president of Government Affairs and Advocacy, said, “Chairman Shuster deserves a lot of credit for dropping support of the controversial proposal and pursuing long-term solutions for the FAA and aviation.”

“This is what advocacy is all

about,” Baker said. “AOPA and other groups identified the threat this bill posed for GA and with great support from AOPA members, we worked every angle on Capitol Hill, through the media, and with other organizations outside of aviation who would also be negatively impacted. The coalition and excellent strategy paid off and kept this bill from reaching the House floor.

“Now we can focus that energy on continuing to improve the excellent air traffic system we already have and in bringing other improvements to the FAA. Meanwhile, we will remain ever vigilant for future efforts that will be disruptive to general aviation because the GA we enjoy in this country is unique in the world and is worth protecting.”

# SPACEFLIGHT IN 2018 – A LOOK AHEAD

RAeS Space Group *Reprinted with Permission from Aerospace Magazine*

The Committee of the RAeS Space Specialist Group look back at the space achievements of 2017 and ahead to what's happening in the space sector in 2018.

Great technical achievements, new records, grand farewells, winners and losers - 2017 had it all in spades and all with a backdrop of, and often overshadowed by, flabbergasting political upheavals and fake news. 2018 looks set to deliver more of the same.

## Launchers

The past year started off with a proverbial bang for SpaceX. They had been grounded since September 2016 following a launch pad explosion that not only destroyed one of their Falcon-9 launchers, but also its \$200m AMOS-6 satellite payload. In a great display of return-to-form, the company not only successfully launched its revised Falcon-9 v1.2 rocket but also managed to bring it safely back down again, landing it on a drone ship stationed off the coast of California. Following that first launch, SpaceX went on from

there to complete an impressive total of 18 launches by the end of the year, all successful.

Another highlight of 2017 was delivered by India's PSLV-C37 launcher, which blasted off mid-February, heading simultaneously towards low-Earth orbit and the history books with a record-breaking 104 satellites on-board. A total of 101 of them were so-called 'cubesats' which come in various small sizes but are generally of the '3U' size, which is not much bigger than a full loaf of bread.

A number of highly-anticipated announcements regarding future launchers were also made last year. For example, in March, Blue Origin finally released more details about its upcoming New Glenn launch vehicle; the 82m-tall launcher which will be able to lift 45 tonnes to low-Earth orbit and 13 tonnes to geostationary transfer orbit. The two-stage launcher should be ready for its maiden flight by the end of 2019.

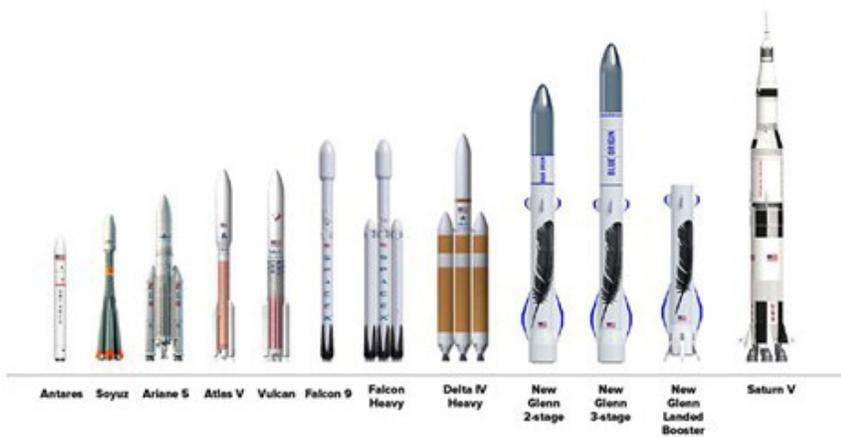
Often though, announcements of new rockets being developed go hand in hand

with announcements of their inaugural launch being delayed (yet again). A prime example of this is the development of the Falcon Heavy. Back in 2011 SpaceX was confident that it would be launching the new rocket by 2013. The latest postponement was announced as recently as last November and pushed the planning of the first launch into 2018. However,



A controlled landing of a SpaceX reusable first stage after it was flown again on a second launch. - Photo Credit: SpaceX

## BLUE ORIGIN



Blue Origin's New Glenn rocket compared to other launchers. - Photo Credit: Blue Origin

with actual rocket test firing happening this month, the chances are good that we now may finally actually get to see the inaugural flight of the SpaceX Falcon Heavy launcher this year. As if that by itself wouldn't attract enough media attention, the Big Boss has decided to put a rather unusual dummy payload on board: his own Tesla roadster car, painted Mars-red naturally.

### Successes and Failures

US manufacturer Rocket Lab, founded in 2006, on the other hand has managed to fly its first commercial launcher from the company's New Zealand based Launch Complex 1, the world's first privately owned launch site. The Electron launch vehicle targets the small sat market with its launch capacity of less than 150kg to Sun synchronous orbit. The aptly named maiden flight 'It's a test' had successful first and second stage burns and went into space but ultimately failed to reach orbit velocity. The second test flight, called 'Still testing', was due for launch in 2017 but finally flew on 21 January.

In contrast to the successes being booked by the likes of SpaceX and Rocket Lab, XCOR, founded in 1999 and an early pioneer in reusable rocket engine technology mostly known for the never-completed Lynx suborbital space plane, has closed up its shop for the very last time and filed for bankruptcy back in November. The remaining founders have taken up positions in other companies.

A total of 91 launch attempts were made over the course of 2017, with 86 of them reaching their target orbits and only five ultimately failing to do so. As for 2018, a record number of no fewer than 170 launches are planned. At nearly double the amount of flights made last year, this year could potentially break the all-time record set in 1967 when 139 launch attempts were made.

### Human Spaceflight

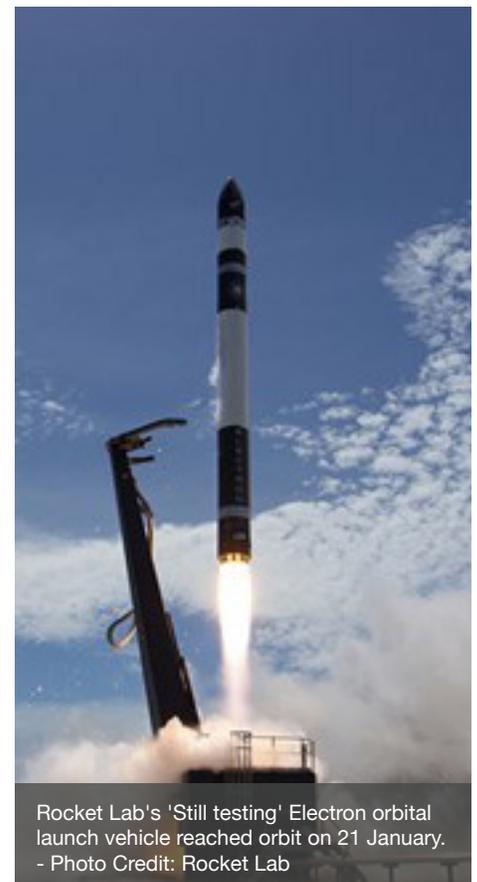
At some point this year, commercial space crews may finally get their chance to show off their skills. Boeing's Starliner

CST-100 may be performing its first uncrewed test flight by as early as August and, if all goes well with that, then the first crewed flight could happen by November. Meanwhile, SpaceX is not far behind (if at all) with their first Dragon-2 crewed flights.

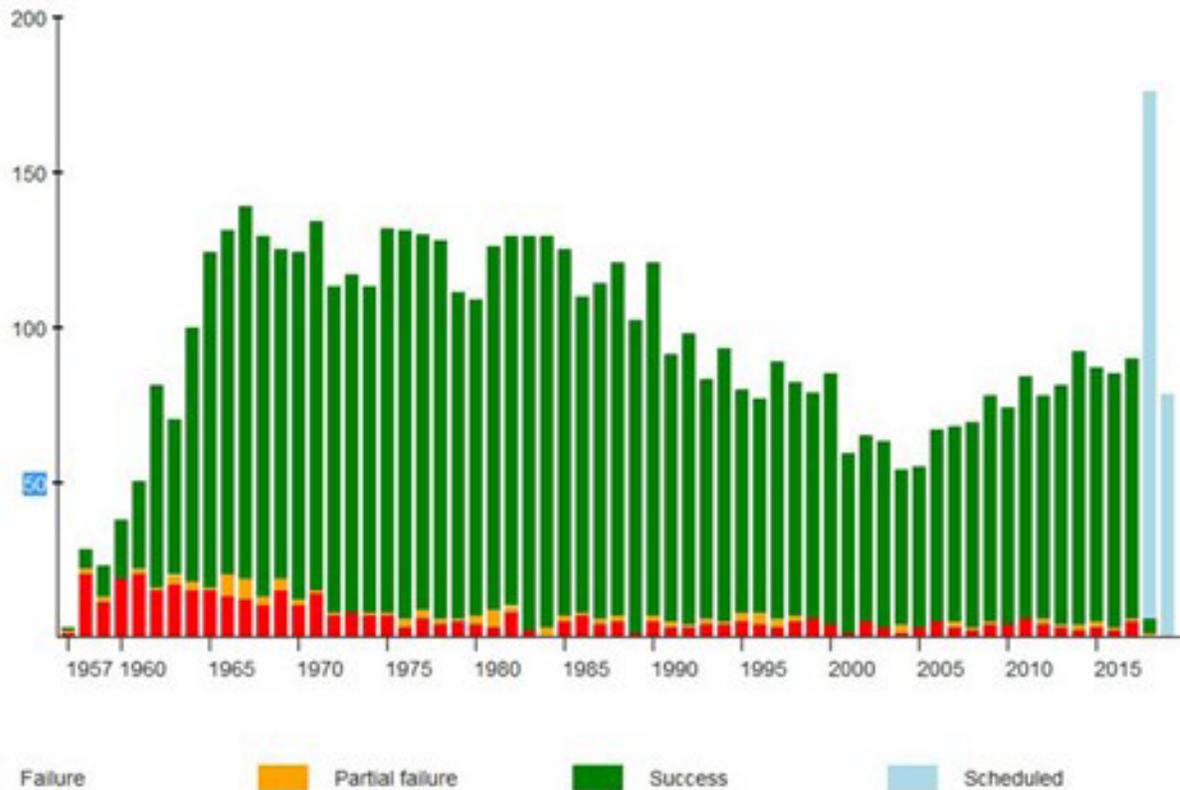
ESA astronaut Alex Gerst will be returning to the International Space Station (ISS) in June for Expedition 56 and take on the prestigious commander's role for the first time. He is only the second European to do so since Frank De Winne, who became the first during Expedition 21 in 2009.

### Space Debris

'What goes up, must come down' - this is true for anything orbiting the Earth. When anything eventually (on an astronomical



Rocket Lab's 'Still testing' Electron orbital launch vehicle reached orbit on 21 January. - Photo Credit: Rocket Lab



Number of orbital launches per year. - Photo Credit: Wikipedia

time scale) does come down, it can sometimes do so in a spectacularly fiery way, like for example the Chelyabinsk meteor back in 2013, which coincidentally became a global phenomenon by the combined virtues of dashcams and YouTube. When a man-made object is due to come back down but is too big to burn up in the atmosphere, it is commanded down in a controlled manner to minimise the risk of any pieces that survive the re-entry hitting anything other than the ocean surface. Unfortunately, in the case of China's 8.5-tonne, 10m long Tiangong-1 (Heavenly Palace) space lab, it has ceased to function and is no longer controllable. It is expected to re-enter the atmosphere by end of March.

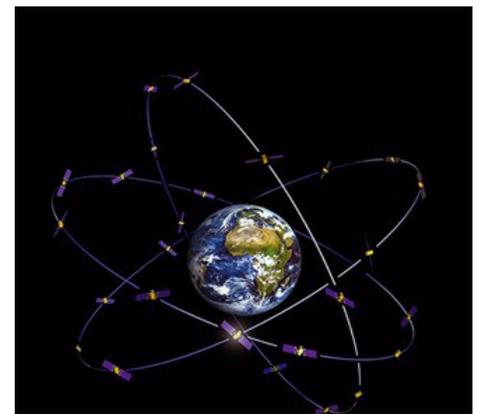
## Navigation

In December 2017, another quartet of Galileo satellites were launched successfully from Kourou under the expert guidance of the CNES Launch operations team who, for the first time, were working in a fully upgraded Jupiter-2 Control Room environment delivered by GTD and Telespazio UK. The launch, flight number VA-240 (carried out by an Ariane 5ES), has brought the tally of orbiting Galileo satellites up to 22. The next flight to carry Galileo satellites into orbit is currently earmarked for July 2018; it will be the only Galileo flight of the year and should bring the total up to 26 satellites in orbit. With two of the satellites launched into the wrong orbit back in 2016 and one satellite flagged since 2014 as unavailable for service until further notice due

to issues with the on-board navigation clocks, this will leave the Galileo constellation just one satellite shy from achieving full operational capability (FOC). The constellation is expected to be fully completed by 2020, counting 24 operational satellites and six active spares.

## Earth Observation

Continuing its contributions to the European Copernicus



The Galileo satellite constellation is now almost complete. - Photo Credit: ESA

programme, the European Space Agency (ESA) launched its Sentinel-5 Precursor satellite into orbit in October 2017. The satellite's primary objective is to monitor air pollution. It does this by means of its multi-band spectrometer Tropomi (TROPOspheric Monitoring Instrument), which was built by Airbus Netherlands. The observation data collected over the course of its operational lifetime will close a gap in the continuity of data that has arisen between the early demise of Envisat and the delayed launch of Sentinel-5. The treasure trove of data generated by this mission and all the other Sentinel missions, as well as the tools to process the data, can be retrieved for free from the Copernicus and Sentinel Open Access Hub web portals. Derived data products like climate indicators and essential climate variables can also be retrieved for free from

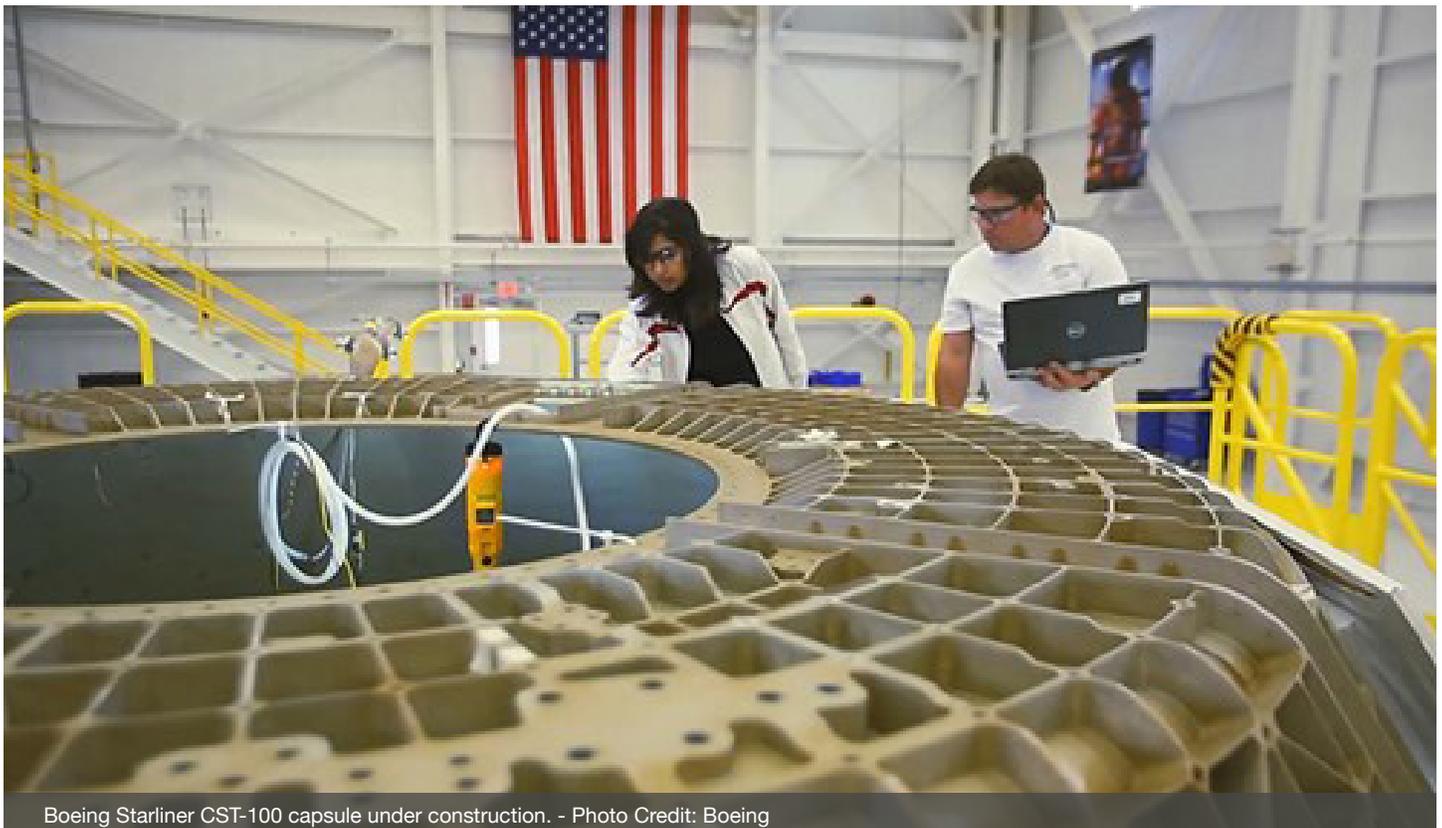
the C3S (Copernicus Climate Change Service) CDS (Climate Data Store) web portal.

In the middle of 2018 ESA will be launching its fifth addition to the Earth Explorer family of satellites. Going by the name ADM-Aeolus, the new Earth Explorer satellite will be making near-realtime wind observations using its ALADIN (Atmospheric LAser Doppler INstrument) instrument. This groundbreaking UV Lidar, developed by Airbus France, will provide data for the generation of global wind profiles on a daily basis. This data is one of the key missing elements that meteorologists need to further improve their weather forecasting and climate models.

### Commercial Space

During 2017, the world's venture capitalists appeared to be en masse on the hunt for

the NextBigThing in the space industry. Almost on a weekly basis there would be yet another new start-up company securing x millions of (mostly) US dollars to implement their unique business venture involving one or more of the following ingredients: an affordable launcher, constellation of small sats, IoT/M2M and automated big data processing. All these new and bold initiatives are evidence that space as we know it is continuing its status transition from 'final frontier' to 'means to an end' whereby, in most cases, the means comes shaped in either a global communications service, a global monitoring/tracking solution, or a global Earth remote sensing/Geo-Information application service. Many of the latest crop of start-up companies that make use of space assets in their value chain actually no longer advertise or see themselves as a space company but rather as



Boeing Starliner CST-100 capsule under construction. - Photo Credit: Boeing

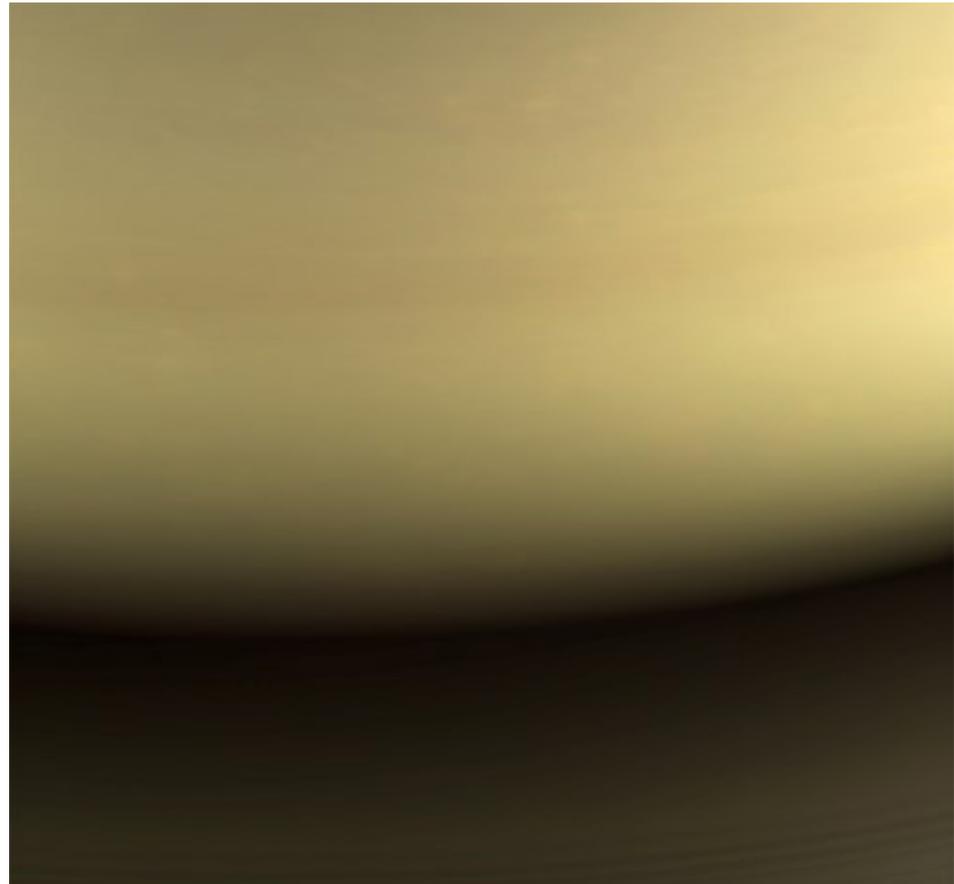
an information service provider.

The slightly less crowded (or more crowded, depending on one's view) scene of space tourism will see some developments happening this year. In particular, SpaceX hopes to add a new and really out-of-this-world exotic tourist attraction to the holiday makers' portfolio. Should everything go alright with the uncrewed test flight of its Dragon-2 capsule, then at the end of the year they hope to send two lucky/daring/deep-pocketed tourists out on a fast return trip around the Moon.

### Deep Space Missions

In December last year, after no fewer than 37 years, the Voyager-1 spacecraft successfully switched on its trajectory engines again. It was instructed to do so by the scientists and engineers who wanted to find out if those engines could be used as an alternative means for attitude control, as the main system has severely degraded over time. It took the command RF signal 19h35m to travel from Earth to the spacecraft and that time again for the confirmation RF signal to arrive back on Earth.

Surprisingly, no new interplanetary missions were launched in 2017. For the spacecraft already out there in the sticks, it was mostly business as usual with one notable 'end-of-an-era' career-defining mission wrapping up in a dramatic grand finale. Originating from an initial suggestion made in 1982 by two European scientists for a paired Saturn Orbiter and Titan



The last image sent back to Earth from Cassini before it entered the atmosphere of Saturn.  
- Photo Credit: NASA

Probe joint-European-American mission, Cassini-Huygens was launched on 15 Oct 1997 and entered orbit around Saturn on 30 June 2004. After releasing the ESA-provided Huygens probe onto its path towards Titan, NASA's Cassini orbiter duly carried out its four-year primary mission of observing Saturn and then diligently kept on going for another nine years until it had nearly spent all of its propellant.

In April 2017 the spacecraft was manoeuvred into a collision course with Saturn. On 15 September 2017 the spacecraft finally plunged into Saturn's atmosphere and used up its remaining drops of propellant to keep its antenna pointed back on Earth to send the final bits of invaluable once-in-a-lifetime data it was collecting along the

way. The final signals, travelling a distance of 1.5bn km and taking 1.5hr to arrive at Earth, were received by the Australian CSIRO team at the Canberra Deep Space Communication Complex. For the people closely involved in the mission it was an emotional send-off for an old friend that had played such a big part in their lives.

2018 will see its own edition of a grand finale. Another 'end-of-an-era' milestone will be reached when NASA's Juno spacecraft will make its final plunge into Jupiter's atmosphere. After Juno's gone under, there will be no spacecraft left orbiting any of the outer planets since the arrival of Galileo (the science mission) at Saturn in 1995.

In March, NASA is expected to

launch another mission to Mars. This latest mission, named InSight (Interior Exploration using Seismic Investigations, Geodesy and Heat Transport, formerly known as GEMS, Geophysical Monitoring Station), is a seismology mission scheduled to go up in May and touchdown on Mars in November. The InSight Lander will not be travelling alone. It will be accompanied by two experimental '6U'-sized cubesats called MarCO (Mars Cube One). Their purpose is to act as communications relay during the landing phase of InSight. These are the first cubesats to venture out into deep space.

### Asteroid Rendezvous

For those pining for more exhilarating space adventures like those that Rosetta provided not too long ago, you will be

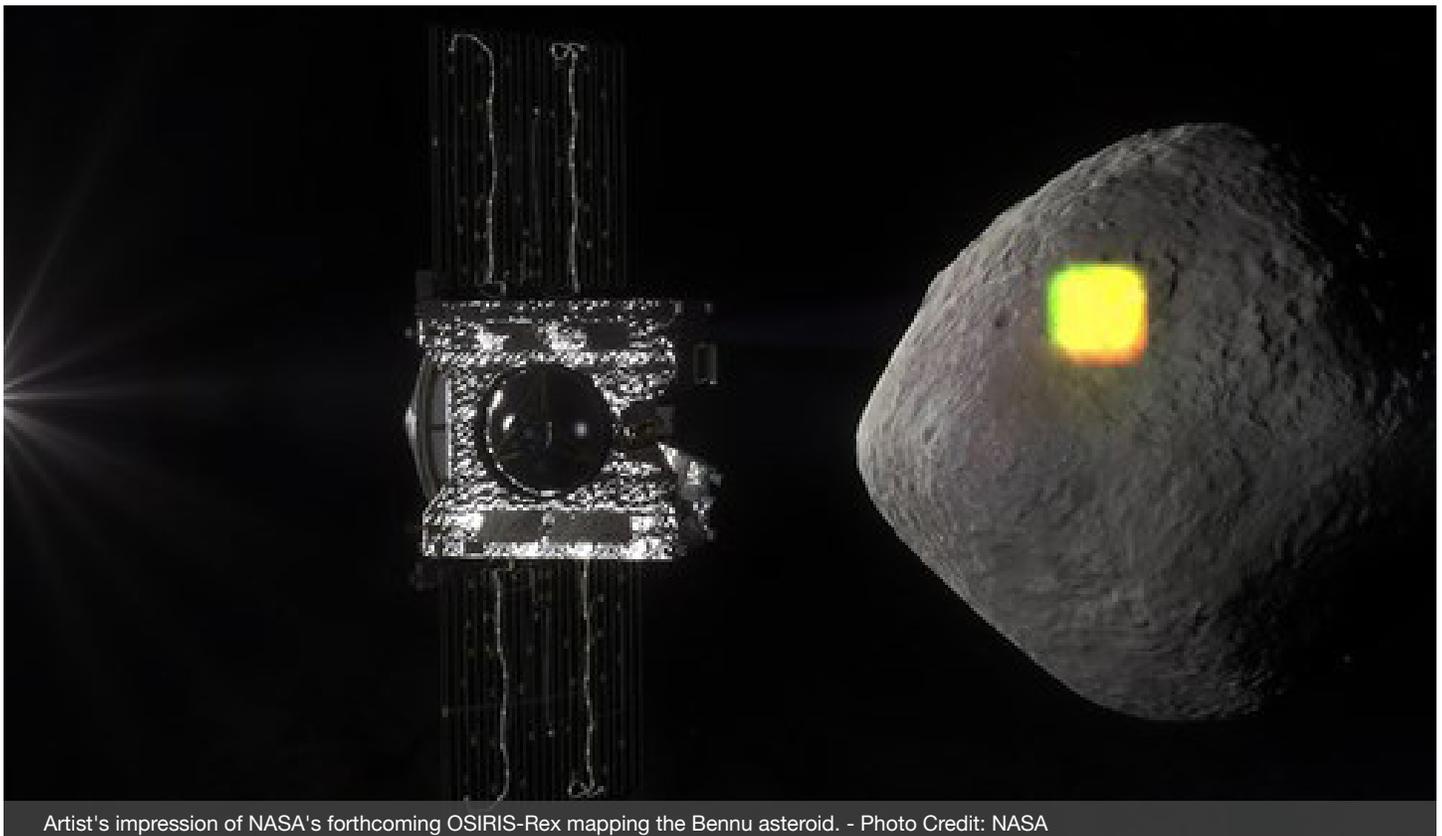
in for a treat this year. Not one but two missions will reach their target asteroid destinations this summer. The Japanese Space Agency JAXA's Hayabusa-2 and NASA's OSIRIS-Rex will attempt to touch down on asteroid 162173 Ryugu in June and asteroid 101955 Bennu in August, respectively.

Towards the end of 2018, BepiColombo will finally be setting off on its seven-year journey to Mercury. The mission is a collaboration between ESA and JAXA and is ESA's first mission heading to the inner planet. First proposed in 1993, it was eventually selected in 2009 as the last of the cornerstone missions of the Horizon 2000+ programme. The mission was named after Italian Professor Giuseppe 'Bepi' Colombo in honour of his achievements which included implementing

the interplanetary gravity-assist manoeuvre during the 1974 Mariner 10 mission.

NASA is aiming to fly even closer to the Sun than BepiColombo. Its Parker Solar Probe spacecraft is scheduled to launch from Cape Canaveral on July 31. Its mission: 'To touch the Sun'. To study the outer solar corona (the more scientifically expressed mission objective), the spacecraft will be hurtling past at a mere 5m km distance from the Sun's visible surface. That is 7.5 times closer than Mercury's perihelion distance. In doing so it will become the fastest spacecraft ever, reaching a speed of up to 200km/sec.

Two exoplanet discovery missions are set to launch this year. The first will be NASA's TESS (Transiting Exoplanet Survey Satellite) mission which is



Artist's impression of NASA's forthcoming OSIRIS-Rex mapping the Benu asteroid. - Photo Credit: NASA



Cassini mission alumni group photo. - Photo Credit: NASA/Jet Propulsion Laboratory-Caltech

due for launch on top of a Falcon-9 on 20 March. The spacecraft will use an array of telescopes to perform an all-sky survey of the nearest and brightest stars to detect terrestrial planets in the stars' habitable zones. The second exoplanet discovery mission, due for launch (from Kourou) in the tail end of 2018, is ESA's CHEOPS (CHaracterising ExOPlanet Satellite) mission and will be lifted up into a low Sun-synchronous orbit by a Soyuz ST-B Fregat-MT.

### **Fly Me to the Moon**

The hippest place to be in our little Solar System this year is going to be the Moon. As already mentioned above, later on in this year SpaceX hopes to be able to take a couple of tourists for a free-return spin around the Moon while China will be sending its Chang'e 4 lunar lander/rover to the far side of the Moon around the same time.

The Google X-prize team, Indus, was also supposed to launch their lunar lander this year, having secured a launch contract with India's Indian Space Research Organisation (ISRO) on its PSLV-XL launcher but has had to put it off due to a lack of funding - Indus is still short changed in the

order of \$35m. For the teams still running in the competition, time is running out. To win, it will need to complete their mission to the Moon before the competition's deadline on 31 March. Given the status of the other four finalist teams it is highly unlikely that the grand prize money of \$20m will be collected by anyone.

On their own account, ISRO aims to also launch their lunar orbiter/lander/rover Chandrayaan-2 in March, following up on Chandrayaan-1 launched a decade earlier. The lander is being provided by Russia's Roscosmos.

### **Twice in a Blue Moon**

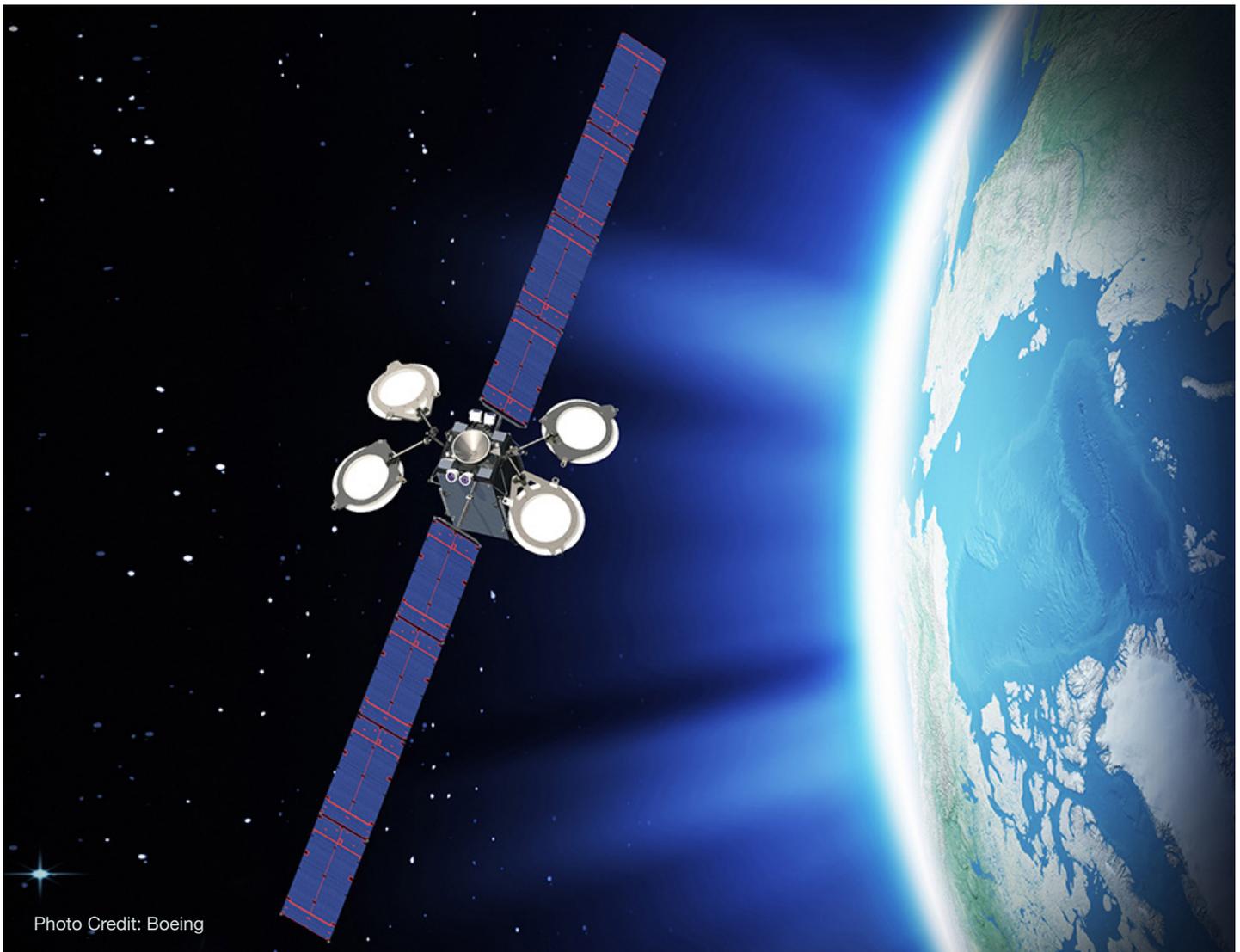
Once in a blue Moon there is an actual blue moon. This year there will actually be two, the first will occur on 31 January and the second on 31 March. Sadly though, the expression bears no relationship to the actual colour of the Moon. It just means that there is a second full moon appearing in a single calendar month. To complement the standard monthly spectacle in the night's sky, no fewer than three lunar eclipses (a.k.a. blood moons) and two partial solar eclipses complete the cosmic fireworks for the year. In addition,

as if having two blue Moons in a year isn't rare enough, the first one will also be the first of the lunar eclipses and will be only a day past its supermoon status (when the Moon is at its closest distance to Earth). There had better be clear skies on that night.

### **Upcoming Space Events**

On 1 and 2 February, an international conference called DATA.SPACE 2018 ('The information conference of the new space revolution') is going to take place in Glasgow, UK. Space-enabled data is an increasingly important means of observing our Earth and with this in mind, the conference aims to raise awareness of the commercial opportunities that will be created by the democratisation of space.

On 20 February, another edition of the 'Additive Manufacturing for Aerospace & Space 2018' conference will be held. The event is being hosted for the first time at Munich Airport, Germany. The event is a platform to help the additive manufacturing user exploit the performance gains and economic returns that additive manufacturing brings to aerospace and space, landscaping key topics such as:



Materials & Process Qualification, Certification, IP Protection, Industrial Implementation and Quality Management Systems. The 30th anniversary of UKSEDS' National Student Space Conference is planned to take place on 3-4 March at the University of Surrey, UK. The two-day PocketQube Workshop 2018 is being hosted by Delft University of Technology on 22 & 23 March.

That space isn't always about maths and engineering, is proven by 'Yuri's Night'. Each year, on 12 April, parties and events take place across the globe in celebration of Yuri Gagarin's historic flight.

On 29 and 30 May, the seventh Interplanetary CubeSat workshop iCubeSat takes place in Paris, France. The workshop provides a unique environment for open wide ranging practical collaboration between academic researchers, industry professionals, policy makers and students developing this new and rapidly growing field. International Space University's 31st Space Studies Programme (<http://www.isunet.edu/>) will be hosted this year in the Netherlands from 25 June to 24 August. It will be hosted jointly by Delft University of Technology, Leiden University and ESA-ESTEC in Noordwijk. Get in touch with your national

representative to find out about how to apply for a study grant.

From 1 to 5 October, the 69th International Astronautical Congress 2018 will be hosted in Bremen, Germany.

For the general public though, it's the annual World Space Week (WSW) (the biggest space event on Earth). Created in 1999 by a resolution of the United Nations, WSW has a fixed place on the annual calendar from 4 to 10 October.

## ALAN HICKLING VISITS THE BRITISH INTERNATIONAL SCHOOL OF WASHINGTON D.C.



What better way to inspire the next generation of future Navy pilots then to have Alan Hickling visit the British International School of Washington D.C. on Wednesday 7th February 2018. Mr Hickling shared a video of fast jets taking off from an aircraft carrier. He also discussed the difficulties that could arise, like an imperfect takoff or landing in the water. Learning about the developments.

Alan Hickling is a board member of RAeS Washington DC branch.

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## CAPTAIN WILLY HACKETT F35 LIGHTENING PROGRAM – YOUNG PERSONS LECTURE



Organized by Melinda Benson Viteri on January 29, 2018.

Guests included DCPS students and University of D.C. AMP Aviation degree program students and faculty.

## EDUCATION & SCHOLARSHIP UPDATE

### Education and Scholarship Update From Melinda Benson Viteri.

In 2017 I joined the RAeS board in the capacity of Education and Scholarship Chairman, tasked with the challenge of setting up a brand new scholarship program. I have served on other boards in this capacity and it is always a super task to create meaningful scholarships that can help young people achieve their potential in Aviation/Aerospace careers and courses.

This past year, we were able to award two NE Rowe scholarships and a Young Aviator of the Year award. We had some outstanding candidates, and immediately shortlisted 10 applicants for a scholarship interview at the AirBus experience centre. The panel of judges included David Hills from Airbus management, Alan Hickling RAeS Fellow board member, an external marketing manager and myself.

Students were asked to demonstrate their Aviation knowledge through an entry essay and presentation. The panel asked questions to help deepen each candidates subject knowledge. A range of topics were covered, such as jet propulsion, this flying car, flight levels and crash avoidance amongst others.

The applicants commented that the application process was straightforward and that the interview at Airbus gave them

a good experience to prepare for future work and college interviews.

RAeS Washington, D.C. Branch awarded 2 candidates the NE Rowe scholarship and Zahra Heussen won the Young Aviator of the Year Award.

### Zahra has submitted the following letter:

Dear Royal Aeronautical Society of D.C. Board,

Firstly, I would like to thank the Royal Aeronautical Society DC Branch for awarding me the 2017 Young Aviator of the Year Award. As a person who has been fascinated by aviation and aerospace ever since I was five, it was an honour and the resulting trip to London was truly an unforgettable experience.

The conference program was fascinating to me as it gave insight into the future of aviation. As a person who aspires to be part of this future, it was extremely intriguing and definitely increased my knowledge about aviation in general. From CAD systems, to virtual reality glasses to the future cockpit to the enhanced vision systems that were discussed; all the presentations were truly captivating, especially since I am learning to fly at Bravo Flight School in Frederick, MD

and aspire to have a career in aviation.

As I am planning my university studies to be in physics and mathematics, the conference allowed me to network and make multiple connections with people of similar ambitions and those already working in the industry. I also enjoyed visiting Oxford Aviation Academy and University.

My interaction with the conference participants furthered my knowledge on the types of aviation and aeronautical degrees, and the various jobs available in these fields, and gave me insight into different STEM opportunities. Overall, this conference has enhanced my passion for aviation even more and I hope to attend many more Royal Aeronautical Society events in the future.

Thank you for the opportunity!

Sincerely,  
Zahra Heussen



# RECAP

## Latest events from the Washington, DC Branch





## WHERE ARE HUMANS GOING IN SPACE?

**FEBRUARY 2017**

British Embassy, Washington, DC



Over 100 guests, members and students gathered to listen to guest panelists Jason Cruson, NASA; John Garvey, Vector Space Systems; and Mary Lynne Dittmar, Ph.D, Coalition for Deep Space Exploration, as they discussed where we might be within the next two decades given the advancements in technology, investments from private industries and support from the government. Mary Lynne Dittmar, stated that there is room in the industry for both government-funded space programs and private capital,

like SpaceX, to exist. She added that it does not make sense for government programs to stand down while waiting for entrepreneurs to make advancements. John Garvey offered a different perspective having worked solely in the private sector. He began by questioning why there is a need for human space travel at all. Adding that before each project, the question, "Why are we completing this mission?" must be answered.

— Maura Hunter



## LEADING EDGE AWARD TO MARGARET "PEGGY" GILLIGAN

**APRIL 2017**

Airbus DC Experience Center

On April 17th, members and guests of the Royal Aeronautical Society gathered at the Airbus Experience Center in Washington, DC to honor Margaret "Peggy" Gilligan as she became the sixth recipient

of the Transatlantic Leading Edge Award. The annual award recognizes a leader in aviation that has significantly contributed to improving safety in the U.S., U.K. and beyond. As the first female recipient,



Gilligan exemplified the spirit of the award, having recently retired from the Federal Aviation Authority (FAA) after a 33-year career which directly impacted the safety environment around the world.

— Maura Hunter

## ELECTRIC AIRPLANES - FUTURE OR FICTION?

**MAY 2017**

British Embassy, Washington, DC

Ashish Bagai, Ph.D., DARPA/TTO; Dr. Alan Epstein, Pratt & Whitney; and Mark Wilson, LibertyWorks and Rolls-Royce joined members and guests at the British Embassy in D.C. to discuss the accelerating field of electric and hybrid-electric propulsion research. The panelists discussed vertical take-off, urban transport, zero-emissions regional travel and energy-efficient airliners. Though exciting studies and current projects stirred endless possibilities for the future of electric travel in the minds of those attending, two of the panelists ended their presentations on another note, stating that electric aircraft may also prove to be a dead-end for aviation.

— Maura Hunter



## FIELD TRIP: A TOUR OF THE NTSB ASHBURN VA TRAINING FACILITY

**JUNE 2017**

NTSB Facility, Ashburn VA

RAeS members and guests were lead through the National Transportation Safety Board's Virginia training facility by the Honorable Robert Sumwalt. The NTSB is charged with determining the probable cause of transportation accidents, promoting transportation safety, and assisting victims of transportation accidents and their families.

— Maura Hunter





## AMBASSADOR'S RESIDENCE RECEPTION

**JUNE 2017**

British Embassy, Washington, DC

Since the Royal Aeronautical Society was found in London in 1866, the D.C. Branch has a close connection with the local British Embassy, who very graciously hosts a majority of our events. RAeS members, guests and students joined the British Ambassador at his residence to celebrate the enduring

aerospace innovation and technology cooperation between the US and UK. The Branch NE Rowe Education Scholarship Awards were also presented to outstanding students making exceptional advancements in the aerospace community.

— Maura Hunter





## COMMERCIAL UNMANNED SYSTEMS

OCTOBER 2017

New Zealand Embassy, Washington, DC

Diana Marina Cooper, PrecisionHawk; Rob Pappas, Manager, FAA UAS Integration Office; and Major General (ret) James Poss, USAF, and CEO, ISR Ideas; lead members and guests through the exciting future of commercial unmanned systems. They discussed how Beyond Visual Line of Sight (BVLOS) applications for Commercial Unmanned Aerial Systems (UAS) are moving rapidly toward routine operations. And, touched on how technology and regulations are critical to unlocking the business opportunities for these systems.

— Maura Hunter





## COUNTER-UAS (MILITARY)

**NOVEMBER 2017**

British Embassy, Washington, DC

Andrew MacDonald, Department of Homeland Security; Ryan McCreedy, Hex Horus LTD; Chris O'Donnell, Office of the Undersecretary of Defense Acquisition; and Robert D. Thompson, Jr., Falcon Foundation UAS L.C.C. and registered sUAS Lobbyist; joined members and guests at the British Embassy to discuss the proliferation of innovative unmanned technologies to improve productivity, bolster safety and create new business

opportunities. The panelists also touched on how these developments have also introduced new capabilities for adversaries. The panelists explored the emerging issues associated with drones and unmanned systems from a military perspective, including spectrum, safety and solutions, and discussed how to best capture lessons learned in theater to protect our homeland. — *Maura Hunter*



## EVENTS TO DATE



- 1.13.04 Operation Telic, The UK's Air Contribution to Operation Iraqi Freedom
- 7.1.04 The Boeing 7E7 and the Environment
- 10.6.14 The USAF, A Vision for the Future
- 4.6.05 Why the A380 and Airbus are Good for the US Economy
- 6.8.05 The Air Logistic Support to Operation Iraqi Freedom
- 10.11.05 The Very Light Jets (VLJs) are Coming: Perspectives from Government and Industry
- 2.23.06 The Development, Significance and Impact of the Revolutionary V-22 "Osprey" Tilt-Rotor Aircraft
- 6.28.06 The Technology Behind the Joint Strike Fighter
- 2.20.07 FAA International Initiatives and Harmonization
- 10.11.07 Aviation at the Crossroads, A Transatlantic Perspective
- 12.6.07 Aviation and Public Policy, Fresh Challenges
- 4.9.08 The Link Legacy
- 5.22.08 The A380 Flight Test and Certification Programme
- 11.6.08 Flying Higher and Faster: Hypersonic Flight for Military Applications and Beyond
- 4.15.09 The Helicopter, Thinking Forward and Looking Back
- 5.20.09 The National Air and Space Museum, America's Hangar
- 10.1.09 Integration of UAVs into the National Airspace System, Opportunities and Challenges
- 3.18.10 Can We Ever Improve Airport Experience?
- 5.13.10 The Economic Outlook for the Aerospace Industry
- 7.16.10 An Evening with J. Randolph Babbitt Administrator, U.S. Federal Aviation Administration
- 11.4.10 Bringing New Technology and Capability to the Theater
- 2.17.11 The Royal Aeronautical Society in North America: Challenges and Opportunities
- 6.30.11 Naval Aviation, First Century with Bobby Sturgell, Former Acting Administrator of the FAA
- 3. 8.12  2012 Leading Edge Award: William R. Voss, President & CEO, Flight Safety Foundation
- 4.4.12 Virgin Galactic and the Future of Commercial Space
- 6.20.12 Europe's Emission Trading Scheme: Conflict or Compromise
- 10.2.12 Royal Air Force Chief of the Air Staff, Air Chief Marshal Sir Stephen Dalton
- 11.8.12 F-35, The Technology and the Performance
- 2.13.13  2013 Leading Edge Award: David J. Barger, President & CEO of JetBlue Airways
- 2.28.13 Stimulating Advances in Aeronautical Technology & Safety  
Among the US, UK and Global Aeronautical Communities
- 3.14.13 GPS: Past, Present and Future: The Opportunity and Vulnerability for Navigation and Precise Timing
- 4.18.13 Foreign Ownership of Airlines: A Discussion with Siim Kallas, VP of the European Commission for Transport
- 9.25.13 Unmanned Aerial Systems: Technology and Integration with Civil Airspace
- 11.7.13 US-UK Space Technology Outlook and Challenges
- 3.17.14  2014 Leading Edge Award: Barry Eccleston, President & CEO, Airbus Americas, Inc.
- 5.22.14 Hypersonic: Today's Warp Speed, The Impact of Flying Above Mach 5
- 10.9.14 Flying on Auto-Pilot, New Military and Commercial UAV Technology
- 11.6.14 Touch Down and Mining an Asteroid
- 2.19.15 NASA Research: Future Aviation Technology and Safety
- 4.9.15  2015 Leading Edge Award: Jim Guyette, President & CEO, Rolls-Royce North America
- 5.14.15 Global Aircraft Tracking, Locating and Flight Deck Protection
- 9.24.15 The Future of Military Technology- Manned versus Unmanned
- 11.12.15 The Hubble Space Telescope: Past Successes and a Look to the Future
- 11.21.15 The Wright Experience Field Trip
- 2.11.16 The Martian: Science Fiction and Science Fact
- 4.21.16  2016 Leading Edge Award: Lt. Gen. Christopher C. Bogdan, USAF
- 5.12.16 An Evening with the TSA Administrator: Transforming Aviation Security and the Passenger Experience
- 6.13.16 150th Anniversary of the Royal Aeronautical Society Reception
- 9.28.16 Fieldtrip to Potomac Center and Air Traffic Control Center Systems Command Center
- 9.22.16 The Commercial Application and Regulation of UAS in the US and UK
- 11.10.16 The History and Future of Stealth
- 12.16.16 Field Trip: Tour the TSA Systems Integration Facility
- 2.23.17 Where are Humans Going in Space
- 4.17.17  2017 Leading Edge Award: Margaret "Peggy" Gilligan, Associate Administrator for Aviation Safety of the FAA
- 5.11.17 Electric Airplanes: Future or Fiction?
- 6.16.17 Field Trip: NTSB Training Facility Ashburn, VA
- 6.28.17 Ambassador's Residence Reception
- 10.5.17 Commercial Unmanned Systems
- 11.9.17 Counter-UAS (military)

# Upcoming Events

## **June - Constellations**

Over the next decade thousands of small satellites are planned to be launched driven by significant investments in technology and new launch capabilities. The majority of these satellites will be for constellations providing earth observation and broad band communication and other services. Our expert panel will explore the strategic implications of this enormous growth, including perspectives on capabilities and potential commodization.

## **October - Future of Lift**

We will explore technology investments and advancements supporting the future of vertical lift for the military

## **November - Urban Mobility**

We will focus on exciting developments in commercial air transportation that will transform people and cargo mobility



MEMBERS OF THE  
ROYAL AERONAUTICAL SOCIETY  
AND SIR HIRAM MAXIM'S ENORMOUS  
BIPLANE, AT BALDWIN'S PARK IN 1894.

# MEMBERSHIP

## RAeS Washington, DC Branch Membership

The Washington, DC Branch of RAeS was formally inaugurated on December 17, 2003. This is a momentous date in aviation, as it was the centenary of manned flight by the Wright brothers.

The aims of the branch are to stimulate advances in aviation safety and technology by providing a forum to further improve technical, political and social interchange between the US and UK aerospace communities.

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Annual Branch Dues: \$15.00  
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