Space Alert

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Space Force: Making Space Great Again

Victoria Samson

Recently, US President Donald Trump veered off-topic amidst giving a speech about a much-needed presidential directive about the future of space traffic management. Stating that when "it comes to defending America, it is not enough to merely have an American presence in space. We must have American dominance in space. I'm hereby directing the Department of Defense and Pentagon to immediately begin the process necessary to establish a Space Force as the sixth branch of the armed forces."

He went on to note, "We are going to have the Air Force, and we are going to have the Space Force — separate but equal." (He later signed Space Presidential Directive or SPD-3, which said nothing about a Space Force but instead had a lot of recommendations for shifting responsibility for space situational awareness away from the Pentagon and to the Department of Commerce.)

To say that this announcement came as a surprise to the military is an understatement. The concept of a Space Corps, or a branch under the Air Force that would be dedicated to space, has been under discussion for some time and in fact was supported by House legislation in 2017. However, it was not supported by current senior Pentagon leadership who had their own ideas for increasing the space profile within the Air Force, none of which included creating a new organisation. Although a study had been commissioned to examine this concept, it has not been finished and is not expected to be until later this year.

Scrambling to respond to Trump's statement, Air Force Secretary Heather Wilson, Air Force Chief of Staff Gen. David Goldfein, and Chief Master Sergeant Kaleth Wright sent a memo to Air Force personnel later that day which read, "This work directed by the president will be a thorough, deliberate, and inclusive process." It went on to caution, "As such, we should not expect any immediate moves or changes. Our focus must remain on the mission as we continue to accelerate the space warfighting capabilities required to support the National Defense Strategy."

Trump can and clearly has moved the debate forward on whether a Space Force/Corps is needed. However, only the Congress has the authority to officially change military organisation and through the power of the funding make the decision to create a new organisation or thoroughly revamp an old one as per the powers vested by the US Constitution. Therefore, in order to realize the Space Force, Congress needs to start legislating on this. In the best-case scenario, guidance for what should happen would not be created until the budgetary cycle negotiations, beginning next February.

In the meantime, what does this sort of statement accomplish? Worries about maintaining US dominance in space may sound different coming from Trump than, say, Obama. However, this concern has been paramount in many US national security circles for the past decade. Part of that is a slowly dawning recognition that the United States no longer has the lead in space technology and that other countries' achievements in space are perceived as a zero-sum game - their progress directly leads to weakening of the US position, according to the strategists. Part of it is an understanding of maintaining security, stability, and economy depending on space not just for the US but also for the world. Part of this is a response to the changing space domain, which is the playing field for not only the

established spacefaring nations but also the non-state actors and new entrants from around the world. And part of it is admitting that the way the US military space acquisition was built was for a world that no longer exists and therefore has to evolve in order to meet the existing demands and allow for future requirements.

It is hard to see how an impromptu call for a "separate but equal" Space Force changes any of that. What it does is cloud the US intent for its military space capabilities and force some players to interpret it as the US intending to put weapons on orbit. The US and other countries already wage warfare against space assets viz., jamming satellite signals, which is not a new phenomenon. (For more on the United States' counterspace capabilities, as well as those of Russia, China, and India, please see SWF's recent *Global Counterspace Assessment*.) However, by affecting international perception of the U.S. intent, the statement limits the potential for international cooperation weakening global security and stability in space.

The Trump statement was made at a time when representatives from countries around the world were meeting in Vienna for celebrating the 50th anniversary of the first United Nations Conference on the Exploration and Peaceful Uses of Outer Space. Later that same week was the start of the plenary session of the United Nations' Committee on the Peaceful Uses of Outer Space (COPUOS), where the United States has been one of the leaders in the nearly decade-long discussion of guidelines for the long-term sustainability of space. It would be a shame if real and useful recommendations for increasing the stability and sustainability of space were harmed by the specious call for an organisation that no one so far has been able to explain what it will look like nor what it will do.

Victoria Samson is Washington D.C. Office Director of Secure World Foundation. She can be reached @SWFoundation.

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Space: The New Battlefield

Lt. Gen. Vinod Khandare

US Vision

With the probability of space wars between great powers increasing, the US President Donald Trump announced a 'Space Force' in order to maintain tactical and strategic advantage on the geopolitical adversaries (the principal actors being the US, Russia and China). He announced that he is "directing the Department of Defence and Pentagon to immediately begin the process necessary to establish the Space Force as the sixth branch of the armed forces". Space dominance is always critical to US national interests and seeking a space force is gain greater advantages over other adversarial powers.

A realization that China and Russia are gaining a vital lead in space domain spurred the US President to make this announcement, which has been supported by his strategic advisors with military background. The firm strides being taken by Russia and China in their space programmes have pushed the US to revitalize its efforts for regaining dominance in the final frontier. It needs no emphasis that space domain is unrestricted.

Space Race – The Big Three

The Big Three – US, Russia and China rely immensely on space-based strategic and military domination for intelligence, operations and communications. The effectiveness of space technology has been proved in a number of wars and conflicts. Space domination is a strategic choice to become a great power.

The space race encompasses enhancement of space assets and associated paraphernalia quantitatively and qualitatively as well as the research and development. Russia announced the futuristic Hypersonic Glide Vehicle which can be launched into space, navigate on its own into Earth's atmosphere and capable of avoiding radar and missile defences. China has demonstrated its anti-satellite and anti-ballistic missile weapons capable enough to destroy the American space assets.

In this context, are we witnessing a reimagined space race and weaponisation of space? Would there be a covert warfare in space akin to what seems to be happening in the cyber domain? Would the Space Race lead to economic burnouts as seen after nuclear arms race in view of the extremely high investments involved? There are no binary answers.

The Outer Space Treaty of 1967 prevents placing weapons of mass destruction in space. However, the methodology of future wars is likely to manifest beyond the realms of regular methods. Employing cyber means to target space assets would fall under the ambit of being non-lethal, non-kinetic and non-contact. The US unipolarity is being challenged by Russia using asymmetric weaponry. They see the domination of space and cyber domains as an indirect approach to break the military stronghold of the US. The anonymity and deniability possible with the cyber domain makes wars informal and space assets could be targeted as well. Should the 'Red Lines' be crossed, the escalatory ladder of warfare could witness complete spectrum of warfare being initialized.

From 1985 to 2002, the US Space Command was managed as part of the US Strategic Command but later shifted to US Air Force. The Russian Space Force was established in August 1992, which was transformed as the Russian Aerospace Forces in August 2015. In September 2014, China created a fifth branch of the PLA devoted to space operations. The

ambitions of the Big Three are getting more aggressive and expensive.

While lethal weapons may not be stationed in space, various weapons and military applications can be employed in space, through space or from space. Electronic warfare tools to monitor, degrade or destroy communication; ground-based kinetic weapons are some of the possible strategies in space warfare. The ultimate aim is to cause degradation and destruction of space assets to compel an adversary to negotiate for 'Conflict Termination'. Where does India stand?

India – The Way Ahead

India has to envision optimal use of space so that it is not lagging behind the Big Three. Satellites for navigation, imaging and communication should be expanded. Detection of mobilization, nuclear/missile tests detection through space assets is a capability that must be acquired by India.

Currently, segmentation amongst the three services and intelligence agencies is retarding a focused approach to the space domain. Therefore, India needs to adopt organisational changes to acquire these capabilities. It could start with establishing a Defence Space Agency and raise it to a Space Command. It will help identifying new technologies and harnessing their potential for national interests under military and non-military situations. The Defence Space Agency / Space Command will synergise the efforts of academia and the armed forces.

Most importantly, the focus should be also on preparing relevant tech-savvy human resources. This is possible only with a dedicated organisation seeking and implementing measures for skilling through the education system. The responsibility of raising concerns at the apex level would rest with the custodian i.e. the Defence Space Agency/Space Command. Whether the services need to have separate specialist cadre for Intelligence, Surveillance & Reconnaissance operations (ISR Cadre) should also be debated.

There is also the Research & Development gap compared to the Big Three. The organisational changes will also reduce this ever-increasing gap in the space assets. Therefore, it is a matter of national urgency to get the Defence Space Agency established at the earliest. Space dominance is enabled by cyberspace and therefore a simultaneous impetus should be given to establishing a Cyber Agency/Command.

India need not replicate the models and structures of the Big Three in this process. To the contrary, India has to identify the gaps in its capabilities and capacities, the opportunities that exist and work out a comprehensive plan with clear-cut objectives, resources and timelines to close the gap in the space domain.

There is no apparent quick-fix solution but the urgency cannot be overstated. There are multiple challenges – financing, paucity of skilled manpower and lack of convergence of minds, attitudes and commitment between the different stakeholders. Although such divergences are common in democratic countries, US exemplifies the way by according top priority to comprehensive national security over other requirements.

Conclusion

At the moment, India need not blindly follow others for a Space Force but it must commence on prioritising the establishment of a Defence Space Agency with a provision to expand it into a Space Command. It will implement other necessary changes as discussed above.

Lt. Gen. Vinod Khandare, PVSM, AVSM, SM (retd.) is former Director General, Defence Intelligence Agency (India) and DCIDS (Int)

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A US Space Force In Trump's Shadow: Look Beyond The Man

John Sheldon

The recent pronouncement by President Donald Trump that called for the creation of a separate US Space Force has been met with

some consternation by a number of commentators around the world. This reaction seems more concerned with the controversial persona of President Trump rather than with the policy substance behind the rhetoric.

As strategic analysts, however, we are obliged to look beyond the flawed individual and pay attention to deeper currents and trends in the strategic environment. We are duty-bound to separate strategic insight and fact from salacious headlines and popular outrage. The call by President Trump for the creation of a separate US Space Force, equal to the US Army, Navy, and Air Force, is no different in this regard.

One does not have to like or agree with President Trump to understand that the debate about the need (or no need) for a US Space Force has been rumbling among and between US Air Force space operators and aviators for decades. Experts in national security space have been aware of this debate, and have even participated in it, over the years, including this author. It is irritating, therefore, to read claims made by people who hitherto have never participated in the separate space force debate that President Trump is somehow willfully "militarizing" space (space has been militarized since the late 1950's) for no reason whatsoever other than yet another attempt by the man to cause outrage among civilized people.

As far as these commentators are concerned, nothing could be further from the truth. The call for the creation of a separate US Space Force by President Trump is, in fact, the culmination of an internal strategic debate within the US national security space community for several years now. The intellectual antecedents for President Trump's position can be traced directly back to decisions made on US military space issues during President Barack Obama Administration.

President Obama managed to upturn the traditional US politics of military space by being a progressive Democrat who expressed concern to the US Joint Chiefs of Staff about the vulnerability of US satellites against increasing counterspace threats from China and Russia. This expression of concern resulted in a number of organisational reforms (especially in space acquisition), policy and doctrinal changes that took account of the increasingly threatening space environment, and a significant boost of the US national security space budget.

These Obama initiatives are significant for a number of reasons. First, drawing on the political logic that only Nixon (a Republican) could have gone to China, only a progressive Democrat could establish a more hawkish US policy in the space domain. Second, the initiatives drew relatively little criticism and alarm from US friends and allies around the world.

Third, at a time when US politics seems to be hopelessly fractured, the Obama national security space initiatives garnered rare bipartisan support in the US House of Representatives and Senate. Lastly, for a large part of the second Obama administration, its top officials from the Departments of Defense and State and the Intelligence Community spoke in unison on Capitol Hill to public audiences and the media about the growing threat to US space systems suggesting that there was consensus across the administration that the space threat was substantial. Furthermore, these officials briefed their foreign counterparts on the growing counterspace threat in bilateral and multilateral dialogues and their assessments found a ready audience.

It is in this context that President Trump's call for a separate US Space Force should be considered. The Trump Administration inherited from the Obama Administration the same intelligence assessments and expert national security space officials. Further, Trump Administration officials, like their predecessors, have been of one voice when it comes to warning Congress, the US public, and friends and allies about the growing counterspace threat posed by China and Russia, and to a more limited extent, Iran and North Korea.

The extent of the counterspace threat, and what to do about it, is eminently debatable and good people can honestly disagree on these issues. But no one serious is in doubt that a counterspace threat exists, and the reaction to Trump's call from US friends and allies has been measured rather than excitable, as was the case in the 1980's and 1990's. This author's informal discussions with a number of national security officials from US allied and friendly countries in East Asia, South Asia, Middle East, and Europe suggests that the US threat assessment of Chinese and Russian counterspace developments is widely shared.

President Trump's call for a separate US Space Force is just that – a call. For an actual separate Space Force to be created that is of equal political stature of the US Army, Navy, and Air Force, a set of legal measures need to be enacted by Congress, followed by a number of significant organisational changes across the US government. There is support for the Space Force among Congressional Republicans, most prominently by Representative Mike Rogers who chairs the Strategic Forces Subcommittee of the House Armed Services Committee that is responsible for US national security space matters. Congressional Democrats are more sanguine, but are hardly hostile to the idea either, and most likely will not choose the Space Force as an issue with which to oppose President Trump given the far more contentious political issues at hand.

Chinese and Russian reactions to President Trump's call for a Space Force have been predictable, but they should be taken seriously though not necessarily acquiesced to. Instead of blanket denials that were common from Soviet Union during the Cold War when confronted with their military space activities, today's leaders in Beijing and Moscow openly boast and reference their military space capabilities and ambitions.

President Trump's call for a separate US Space Force appears to be a reaction to these capabilities and ambitions, rather than a political stunt, and on matters to do with space security analysts should observe the rule that we should take Trump seriously, but not necessarily literally. In other words, when it comes to a US Space Force people should get over their outrage.

John B. Sheldon is the Chairman and President of ThorGroup GmbH, and publisher of SpaceWatch.Global. He has advised numerous ministries of defence and foreign affairs on national security space issues. He can be reached @JohnBSheldon

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FROM THE MEDIA

ISRO plans next launch mission in Aug.

"We are looking at including 25 to 30 small satellites of foreign customers in the next PSLV launch depending on the configuration. They may total 250 kg," said Rakesh Sasibhushan, Chairman and Managing Director of Antrix Corporation. It would have new customers as well as repeat users of the Indian launch vehicle.

Source: *The Hindu*, June 15, 2018

ISRO to transfer lithium ion cell technology for Rs. 1 crore

According to ISRO, the request for qualification (RFQ) will be issued from Wednesday for a price of Rs. 25,000 and a security deposit of Rs. 400,000 has to be paid along with the application. ISRO also said that the "competent firm's security deposit will be adjusted against the technology transfer fee of Rs. 100 lakh.

Source: *The Economic Times*, March 28, 2018

Isro to launch more satellites to boost rural internet connectivity under Digital India project

The Indian Space Research Organisation (Isro) will launch four more satellites to boost rural internet connectivity under the Digital India project, the space agency's chairman said on Monday.

Source: *Hindustan Times*, June 11, 2018

ISRO to monitor more crops via satellites

Indian Space Research Organisation (ISRO) is building more remote-sensing satellite capacity as it looks to expand space-based agricultural forecast to cover over 23 crops from the existing eight in the country, according to a top official.

Source: *Economic Times*, June 05, 2018

Isro looking for industries to participate in launch of rockets

"Isro wants the industries to come forward and develop the finished product from raw material to processing, integration, testing and launching of rocket from Sriharikota, in our plan to launch 12 to 18 rockets each year," said S. Pandian, director of ISRO Propulsion complex.

Source: *Times of India*, March 23, 2018

Isro: Trial of sat-based warning system at unmanned railway crossings satisfactory

Under a pilot project, the railways had last year installed Isro-developed integrated circuit (IC) chips on some train engines. The Indian Regional Navigation Satellite System was used to caution road users at unmanned crossings about approaching trains through hooters installed at these crossings."Trial of the satellite-based early warning system is over. Its performance has been satisfactory," Isro said.

Source: *Times of India*, May 28, 2018

Cabinet approves Continuation Programme for Geosynchronous Satellite Launch Vehicle Mark-III

The Union Cabinet chaired by Prime Minister Shri Narendra Modi has approved funding for the for Geosynchronous Satellite Launch Vehicle Mark-III (GSLV Mk-III) continuation

programme (Phase-I) consisting of ten (10) GSLV (Mk-III) flights, at a total estimated cost of Rs. 4338.20 crores.

Source: *Press Information Bureau*, June 6, 2018

Cabinet approves Polar Satellite Launch Programme – Phase 6

The Union Cabinet chaired by Prime Minister Narendra Modi has approved the Polar Satellite Launch Vehicle Continuation Programme (Phase 6) and funding of thirty PSLV operational flights under the Programme. The total fund requirement is Rs. 6131.00 Crores and includes the cost of thirty PSLV vehicles, essential facility augmentation, Programme Management and Launch Campaign.

Source: *Press Information Bureau*, June 6, 2018

LPSC to propel ISRO in developing Light craft and RLV

"It is not just the aircraft, the target is to develop light craft using laser propulsion for interplanetary mission. With such light craft, powered by high speed laser propulsion, it will be possible to go to Mars in four to eight minutes and the challenge is for LPSC to play a lead role in developing that," ISRO chairman K Sivan said.

Source: *Times of India*, March 11, 2018

ATIRA-made composites to lighten Isro satellites

"A satellite cost roughly Rs 500 crore. Of this, 80% is the cost of electronic components while 20% is structural expenses. We can help reduce the latter. Reducing every kilogram of satellite weight brings down the launch costs by Rs 10-15 lakh per unit," said Dr T Gangopadhyay, deputy director (composites) at ATIRA.

Source: *Times of India*, June 5, 2018

Isro gets nod for semi-cryogenic engine, will boost GSLV's lift capability by 1 tonne

Isro chairman K Sivan said, "After a presentation before the Space Commission, Isro has got the approval for developing the semi-cryogenic rocket stage. The deadline to develop this stage is 29 months. Once the stage is ready, the carrying capability of GSLV Mk III will increase from the existing four tonnes to five tonnes."

Source: *Times of India*, June 8, 2018

Indian PRL scientists discover an 'EPIC' planet

In an epic Indian discovery, a team from the Physical Research Laboratory, Ahmedabad, has spotted for the first time a distant planet six times bigger than Earth and revolving around a Sun-like star about 600 light years away. Both the planet and the star have been named EPIC.

Source: *The Hindu*, June 12, 2018

L&T to set up Rs 100 crore facility to make rocket motors for ISRO

J D Patil, director, defence, L&T said they would manufacture various components of satellites such as heat shields and other components that form the basic structural part of a satellite. "Currently, we are manufacturing these components in Baroda and we will shift all this to Coimbatore," he added.

Source: *Times of India*, May 21, 2018

BEL to make satellites for ISRO

Bharat Electronics Ltd., recently chosen by the Indian Space Research Organisation (ISRO) to make its future satellites, will acquire 30 acres of land near Devanahalli to pursue aerospace and defence activities. "[Space] is an important

focus area for us. We have some of the core satellite technologies and expect a good business growth in this segment,"BEL CMD M.V. Gowtama said.

Source: *The Hindu*, May 31, 2018

Isro's Antrix signs MoU with SatSure for promoting geospatial technology

The MoU would increase the penetration of geospatial technology-based services and develop large area analytics products in different sectors like agriculture, banking and financial services, social infrastructure, energy and telecommunications.

Source: *Business Standard*, June 5, 2018

Chinese satellite could link world to Moon's dark side: space expert

A satellite with a huge golden umbrella-shaped antenna is in an orbit more than 400,000 km from Earth, waiting for Chang'e-4, which is set to be the first ever probe to land softly on the Moon's far side.The satellite, named Queqiao, or Magpie Bridge, was launched on May 21 and has entered the Halo orbit around the second Lagrangian (L2) point of the Earth-Moon system, where it can "see" both the Earth and the Moon's far side.

Source: *Xinhua*, June 18, 2018

China joins private space race with landmark OneSpace rocket launch

A rocket built by Beijing-based company OneSpace debuted Thursday (May 17), launching from a site in northwest China and reaching a maximum altitude of about 24 miles (39 kilometers), according to media reports."Our focus is on the small-satellite market," said OneSpace founder and CEO Shu Chang.

Source: *Space.com*, May 22, 2018

China appoints new space agency administrator

China's State Council has appointed a new head of the China National Space Administration (CNSA). Zhang also becomes the head of the State Administration for Science, Technology and Industry for National Defence (SASTIND), which oversees Chinese space-related activities, for which he was previously deputy.

Source: *GB Times*, May 25, 2018

China's latest quantum radar won't just track stealth bombers, but ballistic missiles in space too

China's biggest defence electronics company said the next generation of its quantum radar system will be able to detect ballistic missiles and other objects flying at high speed through space.Once installed on a near-space vehicle, it could "effectively monitor high-speed flying objects in the upper atmosphere and above", the company said.

Source: *South China Morning Post*, June 15, 2018

China's new space tech test a success

China has successfully experimented with its space program's inflatable reentry and descent technology (IRDT), a technology that can allow China to land heavier spacecraft on celestial bodies with thin atmosphere, including the moon and Mars, specialists said.

Source: *Global Times*, May 23, 2018

China develops wireless systems for rockets

China has developed and tested a wireless measuring system for rockets. Developed by the China Academy of Launch Vehicle Technology, the wireless system has been installed in Long March-3B carrier rocket, which took the communication satellite APSTAR-6C into orbit in early May.

Source: *Space Daily*, May 29, 2018

Trump orders establishment of Space Force as sixth military branch

President Trump said on Monday that he would direct the Pentagon to establish a sixth branch of the armed forces dedicated to protecting American interests in outer space, an idea that has troubled lawmakers and even some members of his administration, who have cautioned that the action could create unnecessary bureaucratic responsibilities for a military already burdened by conflicts.

Source: *New York Times*, June 18, 2018

US Senator: Do not underestimate China's determination to win in space

China has made no secret of its ambitions to surpass the United States as an economic and military power. Although it still has a lot of catching up to do, China is tenaciously developing space technologies that will threaten U.S. satellites, and the United States should take this challenge seriously, said Sen. David Perdue, a Republican from Georgia and member of the Senate Armed Services Committee.

Source: *SpaceNews*, June 12, 2018

NASA selects US companies to advance space resource collection

NASA has selected 10 companies to conduct studies and advance technologies to collect, process and use space-based resources for missions to the Moon and Mars. NASA placed a special emphasis on encouraging the responders to find new applications for existing, terrestrial capabilities that could result in future space exploration capabilities at lower costs.

Source: *NASA*, June 1, 2018

Commerce department to create "SPACE administration"

The SPACE Administration, the department said, will incorporate the Commercial Remote Sensing Regulatory Affairs office and the Office of Space Commerce, currently part of the National Oceanic and Atmospheric Administration.The permanent creation of the SPACE Administration will require legislation, and the department said in its statement it is preparing a legislative proposal to do so.

Source: *Space News*, May 27, 2018

New policy directive implements commercial space regulatory reforms

"This directive will encourage American leadership in space commerce by creating more certainty for investors and private industry, while focusing on protecting our national security and public safety," Vice President Mike Pence, head of the National Space Council, said.

Source: *Space News*, May 24, 2018

Russia's Roscosmos, France's CNES agree to cooperate in solar system research

The CEO of Russia's space corporation Roscosmos Dmitry Rogozin and the president of France's national space research center CNES, Jean-Yves le Gall, have signed an agreement on cooperation in solar system and solar physics studies. The two sides expressed the readiness to expand cooperation in the

exploration of space with inter-planetary probes, manned missions and effective cooperation in using ground infrastructures.

Source: *TASS*, June 15, 2018

Russia, China sign space exploration deal

"What we are implementing at the moment is a study to find out whether we should modify the mission design to make the vehicle more flexible and able to perform a variety of servicing missions including removing objects from orbit," said Luisa Innocenti, head of ESA's Clean Space Office.

Source: *Space News*, March 21, 2018

Russia to create orbital Internet satellite cluster by 2025

Russian Space Systems Company (part of the State Space Corporation Roscosmos) plans to implement a project to create a global satellite communications network, which will require 288 satellites operating in the 870 km orbit by 2025, Company representative and project Head Yuri Mishin said on Tuesday.

Source: *TASS*, May 22, 2018

EU budget: A €16 billion space programme to boost EU space leadership beyond 2020

For the next long-term EU budget 2021-2027, the Commission is proposing to devote €16 billion to help maintain and further enhance the EU's leadership in space.The new EU Space Programme will invest more in space activities, adapting to new needs and technologies, while reinforcing Europe's autonomous access to space.

Source: *European Commission*, June 6, 2018

European space agency boss warns EU of rival agency risks

The EU has clashed with the head of the independent European Space Agency (ESA) over the bloc's plans to take greater control over the continent's space programmes, in a move that could cut the UK out of key decisions.EU officials have rubbished as "unfounded" claims made by Jan Wörner, the ESA's director general, that a restructuring of arrangements would "take decades and cost billions".

Source: *The Guardian*, June 6, 2018

UK military looking at smallsats to increase space resilience

The U.K.'s Royal Air Force is exploring the possibility of using constellations of cubesats and other mini-satellites to increase the military's space capabilities and improve resilience, according Air Chief Marshall Sir Stephen Hillier."Resilience, efficiency and rapid capability development and deployment of new space capabilities are at heart of our thinking," he said.

Source: *SpaceNews*, May 23, 2018

Dubai to fund 36 space exploration project proposals

The Mohammed bin Rashid Center for Accelerated Research, the think tank of the Dubai Future Foundation, has announced 36 funded projects for its first challenge, the MBR Space Settlement Challenge aimed at establishing space technology as a key economic sector in the UAE.

Source: *Arabian Business*, June 18, 2018

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OPINIONS AND ANALYSES

Malavika Vyawahare, "Launch failure, incommunicado satellite: Spate of setbacks leaves space agency ISRO on edge," *Hindustan Times*, June 04, 2018

Namrata Goswami, "What China's Upcoming Space Station Means for the World," *The Diplomat*, June 2, 2018

Mike Ives, "As America Looks Inward, China Looks to Outer Space," *New York Times*, May 23, 2018

Thomas Taverney, "The move from survivability to resilience," *Space News*, May 9, 2018

Blaine Curcio and Tianyi Lan, "The rise of China's private space industry," *Space News*, May 25, 2018

A.J. Mackenzie, "Space station prestige," *The Space Review*, June 4, 2018

Shubham Sharma, "Russia Teaming Up With China For Moon And Deep Space Exploration," *International Business Times*, June 9, 2018

Zhang Dan, "'The Elon Musk of China' aims to lead his spacecraft business onto the international stage," *Global Times*, June 1, 2018

Jeff Foust, "A step towards a "one-stop shop" for commercial space regulations," *The Space Review*, May 29, 2018

Bonnie Dunbar, "Sally Ride's Legacy Lives On," *Scientific American*, June 18, 2018

Michael Sinclair, "Why the US needs a 'Coast Guard' in space," *Observer Research Foundation*, May 25, 2018

Christian Davenport and Whitney Leaming, "The unsung astronauts," *The Washington Post*, June 15, 2018

Euan McKirdy, "How does Trump's Space Force compare to Russia and China's space capabilities?," *CNN*, June 19, 2018

Peter Jennings, "Australia's future in space," *Australian Strategic Policy Institute*, June 14, 2018

Melissa de Zwart, "Australia's commercial space industry remains earthbound despite high hopes," *ABC News*, June 12, 2018

Philip Ball, "The Galileo space row shows the mess of Brexit in microcosm," *The Guardian*, May 28, 2018

Caline Malek, "UAE champions MENA region space exploration," *The Arab Weekly*, June 10, 2018

Daniel Porras, "ASAT test guidelines: A viable option to implement TCBMs," *Observer Research Foundation*, June 16, 2018

Michael Sheetz, "How Elon Musk's rocket company SpaceX beat Boeing to become a $28 billion aerospace juggernaut," *CNBC*, May 22, 2018

Brad King, "NewSpace 2.0: Moving beyond the Minimum Viable Product," *Space News*, May 18, 2018

Jeff Foust, "The summer of small launchers," *The Space Review*, May 29, 2018

K.K. Nair, "The legal and financial challenges of privatizing the International Space Station," *The Space Review*, May 14, 2018

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NEW PUBLICATIONS

REPORTS/STATEMENS/MULTIMEDIA

Handbook on China Space Station and its Resources for International Cooperation, United Nations Office for Outer Space Affairs (UNOOSA), May 28, 2018.

US issued further Space Policy Directives: SPD-2 on commercial space regulatory framework and SPD-3 on space traffic management. SPD-1 on human lunar exploration was issued in December 2017.

Technical Presentations made at the Legal Subcommittee, UN Committee on the Peaceful Uses of Outer Space, April 9-20, 2018

Wilbur Ross, US Secretary of Commerce, 'That Moon Colony Will Be a Reality Sooner Than You Think,' White House website, May 25, 2018

JOURNAL ARTICLES

Mukund Rao et. al., "Future Indian Space: Perspectives of Game Changers," *NewSpace*Vol.16, Issue 2, June 2018, pp. 103-108

Frischauf Norbert et. al., "NewSpace: New Business Models at the Interface of Space and Digital Economy: Chances in an Interconnected World," *NewSpace*Vol. 16, Issue 2, June 2018, pp. 135-146

Jackelynne Silva-Martinez, "Exploring opportunities and challenges for establishing a South American Space Agency," *Acta Astronautica*, Vol. 147, June 2018, pp. 473-488

David Thompson, "Space as a War-fighting Domain," *Air & Space Power Journal*, Vol. 32, Issue 2, May 2018, pp. 4-8

Roberta Ewart, "Persistent Space Situation Awareness for the Guardians of the High Frontier," *Air & Space Power Journal*, Vol. 32, Issue 2, May 2018, pp. 84-92

Giancarlo Santilli, "CubeSat constellations for disaster management in remote areas," *Acta Astronautica*, Vol. 145, April 2018, pp. 11-17

CHAPTERS/BOOKS/MONOGRAPHS/OCCASIONAL PAPERS

Brian Keating, *Losing the Nobel Prize: A Story of Cosmology, Ambition, and the Perils of Science's Highest Honor* (W. W. Norton & Company: New York, April 2018)

David Weintraub,*Life on Mars: What to Know Before We Go* (Princeton University Press: New Jersey, May 2018)

Matteo Tugnoli et. al.,*European Access to Space: Business and Policy Perspectives on Micro Launchers* (Springer: New York, June 2018)

Commercial Activities from the Open Ocean to Outer Space, European Space Policy Institute, May 2018

Start-Up Space: Update on Investment in Commercial Space Ventures, Bryce, 2018

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