In Frank/Vogl (eds.): China's Footprint in Strategic Spaces of the European Union. New Challenges for a Multi-dimensional EU-China Strategy. Schriftenreihe der Landesverteidigungsakademie No. 11/2021

Encounter in the Low Earth Orbit and Outer Space

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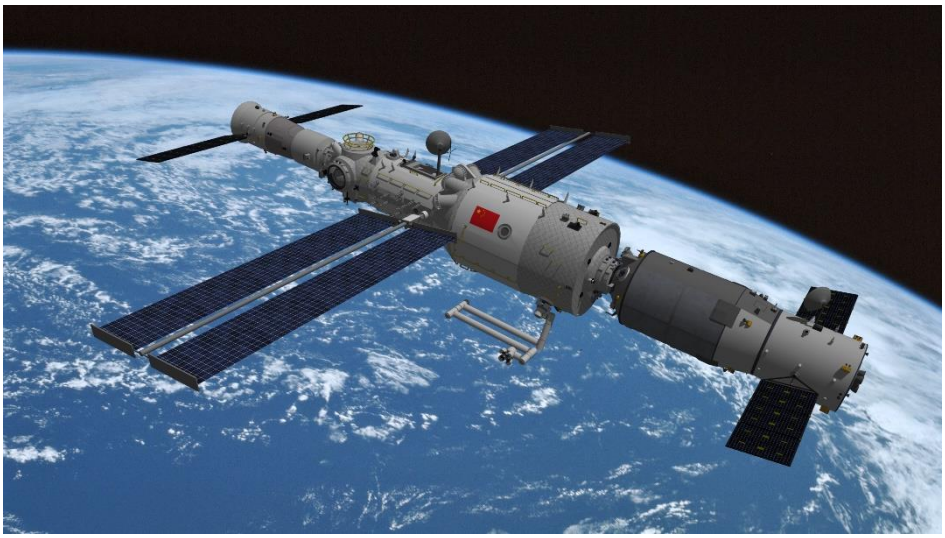

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The European Space strategy – challenges and perspectives

At the 13th European Space Conference in January 2021, four main priorities were presented: Europe's strategic autonomy in space, development of secure connectivity, development of the existing flagship programs Copernicus and Galileo, in the frame of digital and green transition, and the positioning of Europe as a hub for space entrepreneurship in the world.[1] The Low Earth Orbit (LEO)was assigned special strategic importance, since the capability of protecting satellite navigation or communication systems in the case of conflict has become crucial. The next step in the development of the Low Earth Orbit is the future built-up of networks of several thousand satellites to enable access to the internet from any point of the Earth.

[1] See keynote address of the European Internal Market Commissioner Thierry Breton at the 13th European Space Conference, in Brussels. January 12, 2021, https://audiovisual.ec.europa.eu/en/video/I-200898.

Since nearly all named priorities are embedded in the European security and defence strategy, the relationship between Brussels and China regarding space policy is of considerable relevance. In Part I of this volume, Anton Dengg analyses current trends and developments for the increasingly relevant domain LEO & Outer Space. According to his conclusion, there is little chance for Europe to stay separated from the competing major power blocs in space research and space technology due to financial reasons (see page 73).

The question remains, how the European Union is going to act vis-à-vis China under consideration of European "space policy guidelines" and which bilateral cooperative space programs are likely to be continued or come to an end.

Two issues must be taken into account when exploring the implementation of a European space strategy. Brussels is confronted with two specific problems that other major space players like the USA, Russia, and China are not confronted with:

- The institutional problem: NASA, Roscosmos and CNSA are fully under the control of their governments. However, in the case of ESA it should be noted that a number of financially strong non-EU member states such as the United Kingdom, Norway, and Switzerland are also members, with a relevant voice. On the other hand, EU-states such as Bulgaria, Croatia, Slovenia, Lithuania, and Slovenia are not ESA members.

- The problem of the incoherent interests of some EU member states, e.g. France, Germany or Italy. France operates the only European rocket launch platform in French Guyana and has shown considerable efforts to position itself as a major space power. On the other hand, Germany can draw on a flourishing small rocket and satellite industry with considerable R&D resources. Italy and Luxembourg signed the NASA-led Artemis Accords as the only EU member states in October 2020.

ESA and EUSPA

In the EU Council conclusions of May 31, 2011, titled "Towards a space strategy for the European Union", Brussels emphasized its readiness to act in and through space for the first time.[2] Since then, space had been identified as a core enabler for European defence-related capabilities. The European Space Agency (ESA) and the European Defence Agency (EDA) subsequently concluded an administrative arrangement, initiating a cooperation between the two agencies. As issues of common interest, they declared civil-military synergies in Earth observation, European independence with regard to critical space technologies as well as the coordination of research and study results.[3]

The Space Strategy for Europe (2016)[4] finally laid the foundation for a coherent European policy line in the Low Earth Orbit (LEO) and Outer Space. The strategy consists of four programs: Copernicus (initiated in 2014), Galileo (operational since 2016), Satellite Communications (GOVSATCOM), and the EU Space Surveillance and Tracking System (EU SST).[5] Although a common strategy paper has existed since 2016, implementation has lagged behind, due to the institutional reasons stated above. The strong dependency on the technological expertise of the European Space Agency was considered a political stumbling stone in Brussels. After several years of negotiation with ESA, the EU created the European Union Agency for the Space Programme (EUSPA) in April 2021.The latter is supposed to cooperate closely with ESA on a permanent basis and to serve as a communicative hub for various EU institutions such

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[2] See link: https://www.copernicus.eu/sites/default/files/2018-10/COM-2011-0152.pdf, a first joint ESA/EC document on a European Strategy for Space was adopted on November 16, 2000.

[3] See *EDA fact sheet* "EDA & Space," https://eda.europa.eu/docs/documents/factsheet_-Defence_space_final_1.

[4] European Commission (October 2016), *Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions*, "Space Strategy for Europe," 10. https://ec.europa.eu/transparency/regdoc/rep/1/2016/EN/COM-2016-705-F1-EN-MAIN.PDF.

[5] For more detail on the four space programs, see *European Space Policy Institute* (2020), Europe, Space and Defence – From "Space for Defence" to "Defence of Space", ESPI Report 72, 34-36.

as the European Defence Agency (EDA), the European Union Military Staff (EUMS), and the European Satellite Centre (SatCen).

At the same time, the EU Agency for the Space Programme (EUSPA) is supposed to interlink with defence initiatives at EU level, i.e. the Permanent Structured Cooperation (PESCO), the Coordinated Annual Review on Defence (CARD), and the European Defence Fund (EDF), which form the basis of the European defence framework. Against this background the establishment of EUSPA is regarded as more than just a complementary and mutually reinforcing measure. It is generally considered as a major step forward in shaping a coherent European "top-down" space policy.

Since EUSPA is responsible for the security accreditation of all EU Space Programme components, the long-standing cooperation between ESA and the China Space Agency might be downsized significantly, due to security reasons. This would concern, in particular, the year-long exchange of Earth observation data within the frame of the bilateral Dragon Programme. The Dragon Programme between ESA and the NRSCC (National Remote Sensing Centre of China) under the Chinese Ministry of Science and Technology has been in place since 2004, and Programme phase 4 (2016-2020) has already been completed. The central point of cooperation within the Dragon Programme is an exchange and joint exploitation of data collected from more than 30 European and Chinese Earth observation satellites. An ESA online brochure on Dragon-4-enthusiastic states:

> Dragon-4 has teamed up scientists to work on 28 projects and 77 sub-projects across a wide range of themes, which address societal issues facing Europe and China today. […] The volume of satellite data will increase substantially in the near future, providing even more research opportunities.[6]

Under the headline ESA – MOST China cooperation, Dragon-5 (2021-2024) will be officially opened within the framework of the 2021 Dragon Symposium, held online in July 2021. According to the Dragon-5 website, as many as 55 joint Chinese and European teams are addressing science and application development within 10 topics relating to Earth system science.[7] The topics include big data intelligent mining and the exploitation of satellite

[6] ESA e-brochure: http://dragon4.esa.int/ebrochure-executive-summary/#/6.
[7] See ESA website: http://dragon5.esa.int.

remote sensing on air quality, sea level rise or forest and grassland degradation. In view of recent security-related screening regulations at EU level, on the one hand, and the strong linkages between civilian economy and defence industrial base in the People's Republic, on the other hand, the near future of the Dragon-5 Programme could look rather bleak. The newly established EU Agency for the Space Programme (EUSPA) might reject the exchange of certain satellite data or research results, due to security concerns.

However, the extensive bilateral Dragon Programme and its related projects could also continue to exist as an important field of cooperation in the near future. What seems noteworthy as a side note: The public awareness of the Dragon Programme is extremely low.

Apart from the EU-China Dragon Programme, the new ESA director Josef Aschbacher sees the invitation for the ESA to participate in the planned Sino-Russian lunar station and joint trainings for astronauts quite positively.[8] When asked during an interview in April 2021 whether ESA wants to work more closely with Beijing, Aschbacher explained that in principle ESA remained open to any cooperation, as long as it was fair and to the benefit of both sides.[9] Former German ESA director Johann-Dietrich Wörner has a similarly welcoming attitude: he openly advocates inclusiveness vis-à-vis China in Outer Space activities.[10]

In the context of Earth observation data exchange the European Space Agency started diversifying its networking portfolio in 2020 by creating the

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[8] infoSat, April 23, 2021, https://www.infosat.de/technik/esa-generaldirektor-josef-aschbacher-besorgt-ber-drohenden-austritt-der-russen.

[9] Alexander Stirn, "Neuer ESA Chef: Wir müssen bereit sein mehr Risiko einzugehen," *Spektrum*, March 23, 2021, https://www.spektrum.de/news/neuer-esa-chef-wir-muessen-bereit-sein-mehr-risiko-einzugehen/1848406; relevant interview excerpt in German: "Grundsätzlich gilt: Die ESA ist offen für jegliche Zusammenarbeit. So eine Kooperation muss jedoch stets fair und zum Vorteil beider Partner sein. Bekommen wir das hin, können wir auch stärker mit China kooperieren."

[10] DW-Interview, April 12, 2021, Ex-ESA-Chef: "Europäer Ende des Jahrzehnts auf dem Mond", https://www.dw.com/de/ex-esa-chef-europ%C3%A4er-ende-des-jahrzehnts-auf-dem-mond/a-57118251, relevant interview excerpt in German: "Ich würde es sehr begrüßen, wenn europäische und amerikanische Astronauten auch in Zukunft mit den Russen fliegen und wenn russische Kosmonauten mit den Amerikanern fliegen. Wenn ein Traum erlaubt ist, dann hoffe ich, dass sich das noch Richtung China öffnet."

so-called Covid-19 Earth Observing Dashboard, which uses NASA as well as Japanese (JAXA) Earth observation data, together with European Copernicus data.[11] The question therefore arises whether the two ESA Earth observation cooperation frames, i.e. Dragon-5 and the EO-Dashboard can be merged into a single global program.

Incoherent Space industry interests

In addition to the political coordination problems of Brussels with ESA, a lack of cohesion among European national actors can also be observed. In view of the rapid increase in services provided by satellite systems, all EU member states with space industries are striving and competing at a national level, vying for an advantageous position in the rapidly expanding space market. Particularly the German and French space industries make no secret of long-standing divergences of interest. The only current European spaceport is under French control and to date the launching service has constituted a promising source of income for the French government, whereas Germany is highly ambitious in the field of small rocket development, with a focus on commercial approaches to space travel.[12]

In March 2021, France organised its first military exercise in space with the participation of Germany's space agency and the US Space Force. This space operation was not only a first for France but also for Europe. So far, European countries have only participated in this kind of manoeuvres as guests under US command.

The securitisation trend in space is reflected in the training's threat scenarios. The French National Centre for Space Studies (CNES) in Toulouse simulated eighteen hypothetical "crisis events", including an attack on a French satellite by foreign agents wanting to capture its data or destroy it,

[11] The EO dashboard is an interactive data resource making public the impacts of pandemic-related restrictions around the world through the lens of earth observation satellites, see www.eodashboard.org.

[12] The French spaceport in French Guiana/Kourouwill not be needed for the launch of small rockets as the German space industry is striving for its own access to space. When launching its first military nanosatellite BRI- II in March 2021, the Netherlands selected the US based company Virgin Orbitto carry out the launch instead of using French facilities.

and wayward space debris penetrating the atmosphere and threatening the population. The one-week exercise was codenamed AsterX in memory of the first French satellite, launched in 1965.

This first European military exercise in space did not go unnoticed in China. A commentary by Lan Shunzhang in the Chinese online journal *Military Daily*, expressed some unease about France's space ambitions:

> If France takes a pre-emptive step in the space or secures its position as a strong space power, it will have strategic independence in the domain, and consequently secure independence in other fields, maybe even advancing EU's strategic independence with France as a "bellwether." However, France's space-militarizing actions will undermine the international efforts to prevent a space arms race and are no good news for future space governance either.[13]

Indeed, the French space command has planned to expand significantly by 2025. Yet, it might appear overambitious when Radio France International announces in the frame of the AsterX exercise that "…Paris works to cement its position as the world's third-largest space power."[14]

A second illustrative example of the lack of cohesion of national space industries in Europe are the Artemis Accords. In this volume, Anton Dengg already discussed contents and intentions of the Artemis Accords.[15] Just to recall, these accords were initiated by US authorities and NASA with a focus on guidelines for future space industry. Out of 27 European Union member states only Luxembourg and Italy signed the accords, in November 2020. Against this background it is legitimate to wonder how two economically relatively insignificant EU members were able to opt out, even though the ESA only signed a few elements of the Artemis Accords.

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[13] Shunzhang Lan, "What's behind France's first-ever space-based military exercise," *China Military Online*, March 17, 2021, http://eng.chinamil.com.cn/view/2021-03/17/content_10005441.htm.

[14] RFI, March 12, 2021, "Sky's the limit as space drills show off French military prowess," https://www.rfi.fr/en/france/20210312-sky-s-the-limit-as-space-drills-show-off-french-military-prowess-aster-x-florence-parly-emmanuel-macron-toulouse.

[15] See Dengg, Part I of this publication.

The scope of the so-called Lunar Gateway MoU between NASA and ESA, effective since October 2020, only concerns the development and operational activities to build and launch the international Lunar Gateway.[16] ESA will receive three flight opportunities for European astronauts to travel to and work on the Lunar Gateway.[17] However, operations beyond the lunar Gateway, such as corporate space mining on the surface of the Moon – fiercely criticised by China, Russia, and some developing countries – are not included in the ESA-NASA Lunar Gateway memorandum. What counts for the side of critical nations, including China: Neither EU authorities nor major EU member states have shown any interest in fully participating in the activity frame of the Artemis Accords. This significantly reduces the enforcement power of the Artemis agreement.

Windows of opportunity

A main objective of this sub-chapter is to analyse which aspects of the existing European space strategy may speak for the continuation of cooperation with China and which ones are conflicting with Chinese interests. The space strategy of the European Union is young and will definitely undergo further amendments and adaptations.

For the time being, an additional window of opportunity has opened for the EU to gain international profile as a space power. This opportunity is closely linked to the current geopolitical dilemma regarding the future of space politics. As of July 2021, all space powers are calling for "rule of law" or "binding uniform code of conduct" in the LEO sphere and Outer Space. Russia and China are in favour of an agreement at the UN level with the involvement and say of the Global South. Countries such as the USA, Canada, Australia, Japan, and England prefer a binding solution without the participation of UN bodies. The world is confronted with an impasse situation of two adverse blocks. Leading Western industrialised nations have no interest whatsoever in seeing themselves being outvoted on key points of

[16] China remains excluded from the Lunar Gateway, whereas Russia declined to participate despite an official NASA invitation.

[17] For details see ESA website, https://www.esa.int/Science_Exploration/Human_and_Robotic_Exploration/Gateway_MoU_and_Artemis_Accords_FAQs.

a new UN space treaty by a majority of developing countries, led by Russia and China. Even though a growing number of countries is urging for the formulation of guidelines on space operations, similar to international traffic rules or the oceanic law, consensus between the major stakeholders US, Russia, China or the EU seems highly unlikely.

Considering this precarious context, a proactive European Union diplomacy could play the role of a game changer. In the report "European Space Strategy in a Global Context" (2020), the Vienna-based European Space Policy Institute (ESPI) voices a strong plea for a daring and self-assertive European space diplomacy. By underlining the necessity of a universal code of conduct in Outer Space and the rapidly growing orbital congestion problem, ESPI points at Europe's role as mediator and facilitator on the global diplomatic stage:

> …Europe does not favour hard force and deterrence to safeguard the strategic objective of ensuring the safety and security of its space infrastructure. The preferred way Europe can square the circle is to leverage its diplomatic channels to push forward practical initiatives aimed at achieving convergence of interests among states and other entities conducting space activities.[18]

In view of the complex geopolitical situation, the question remains whether the European Union has the leverage and diplomatic weight to play an effective role as a mediator, with the overall objective of a universal code of conduct for the LEO sphere and Outer Space.

Competition and rivalry

According to a German SWP research paper, the home countries of leading satellite-producing companies – i.e. the US, followed by China – will have extensive potential for political influence through "internet from space".[19] However, due to financial restrictions at the EU level, European companies

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[18] ESPI (2020), "European Space Strategy in a Global Context," *ESPI Report 75*, 80.

[19] Daniel Voelsen (2021), "Internet from Space - How New Satellite Connections Could Affect Global Internet Governance," *SWP (Stiftung Wissenschaft und Politik)* research paper 3, April 12, 2021, introductory abstract, https://www.swp-berlin.org/publications/products/research_papers/2021RP03_InternetFromSpace.pdf.

have, at present, little chance to be part of such a "global information oligopoly". Within the framework of the oligopoly scenario only the two highly adverse superpowers would control the internet's global infrastructure and the global information flows. For future development the outline of a second scenario, titled "regulated competition", seems to offer more opportunities for European space industry.

Yet, the latter – more promising – scenario should not obscure the fact that China has already penetrated far into the global LEO and the space market, and that European space industry is not in a favourable starting position. It is assumed that Chinese competitors, like the state-owned CASIC (China Aerospace Science and Industry Corporation), CASC (China aerospace Science and Technology Corporation), and Galaxy Space, receive substantial public funding. This is definitely not the case when speaking about European space industry projects.

Most Chinese space technology export destinations are signalling a particular strategic interest in closer geographical neighbourhoods, like Pakistan, Laos, Cambodia, Sri Lanka, or Thailand. However, with a focus on selling all-inclusive "In Orbit Delivery Contracts," the China Great Wall Industry Corporation (CGWIC) has exported communication satellites to Belarus, Bolivia, Nicaragua, and Venezuela.[20] The existing Chinese export destinations like Belarus, Nigeria, Ethiopia or the DR Congo are rather close to European Union geostrategic spheres of influence.

In this particular regard, Brussels is confronted not only with economically competitive Chinese companies, but also geopolitically with robust elements of Chinese objectives of space diplomacy. Systemic rivalry is clearly reflected by a lack of personal data protection and big data transmission via Chinese satellite systems on the basis of bilateral governmental agreements without prior democratic accountability and oversight.

[20] For more details see *ESPI report 75*, 47.