

Statistics in Brief

The Space Sector in Belgium

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Highlights

- 122 ESA funded space actors employed 3153 full time equivalent employees in Belgium in 2015, over 80% of which in commercial enterprises
- In the private sector, for every space employee, an average of 6 employees are employed outside upstream and downstream space activities. Space turnover represents 12% of total turnover
- Over the period 2011-2015, average annual funding of €155 million was granted by the ESA to organisations in Belgium, 78% of which related to economic activities in the private sector.
- Two thirds of ESA funding is concentrated within 15 organisations
- Every €1 of ESA space funding into private organisations generates an additional €2.20 of space turnover and €1.70 of additional R&D expenditures

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Population of space actors in Belgium

This 'Statistics in Brief' presents an overview of the space sector in Belgium. The focus of the study is on the actors involved in space upstream (hardware and software products and services, which enable the launching and operating of systems in space) or downstream (hardware and software producers and service providers which require the use of space systems and/or data for applications used on Earth) space activities. The starting point is private and (semi-)public actors in Belgium who are active in the space sector. The population has been estimated by the Belgian Science Policy Office together with Belgospace, Bruspace, Vlaamse Ruimtevaartindustrie (VRI), and Wallonie Espace.

A population of 219 organizations is identified as being active in space upstream and/or downstream space activities; 176 private firms, 12 universities, and 31 (semi-)public research organizations (Figure 1). Information regarding these entities has been collected by means of an - at ESA level - harmonized electronic survey.

This survey has been supplemented with national account data, and data provided by ESA relating to public funding and space actor characteristics. The survey was carried out in 2016 with the main objectives of compiling a repertory of space actors, and gaining insights into space employment and space turnover. The data collected aims to establish a basis for further evaluation and, in the longer run, to assess the impact of public funding for space activities.

Figure 2 shows that over half of the private space actors to be involved in upstream space activities, and two thirds in downstream activities. One in three private space actors are engaged in space-related activities (i.e. the use of space technology in other industrial activities). Space-related activities can create knowledge spillovers of space activities into sectors outside the space industry in the strict sense. In particular, (semi-)public space-active research organizations are highly involved in technology transfer to other industries. Universities are significantly involved in a broad array of both upstream and downstream space activities.

Box 1. Definitions and data collection method

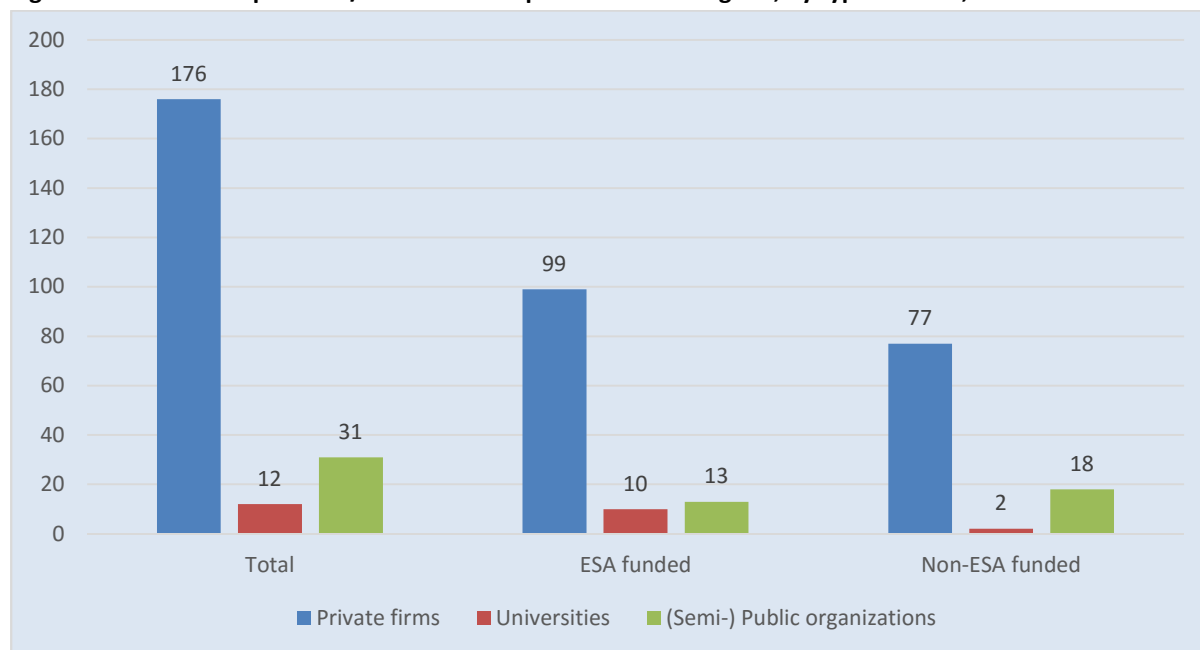
Definitions

- Space (related) activities include all productive, administrative or general operations relative to the production of goods and services having a substantial/important space component.
- Space activities can be classified according to upstream and downstream activities. Space related activities refer to the use of space technology in other industries.
- Upstream activities include: Hardware/software products and service providers, which permit the launching and operating of systems in space: including R&D, Design, Production, Integration and Testing.
- Downstream activities include: Hardware/software producers and service providers, which require the use of space systems and/or data for applications used on earth.
- Space related activities include: Products/services utilising space technology that may include spin-offs or technology transfers from the space sector, e.g. foam developed in space program transferred to the automotive industry.

Data collection method: BELSPO/ESA Survey

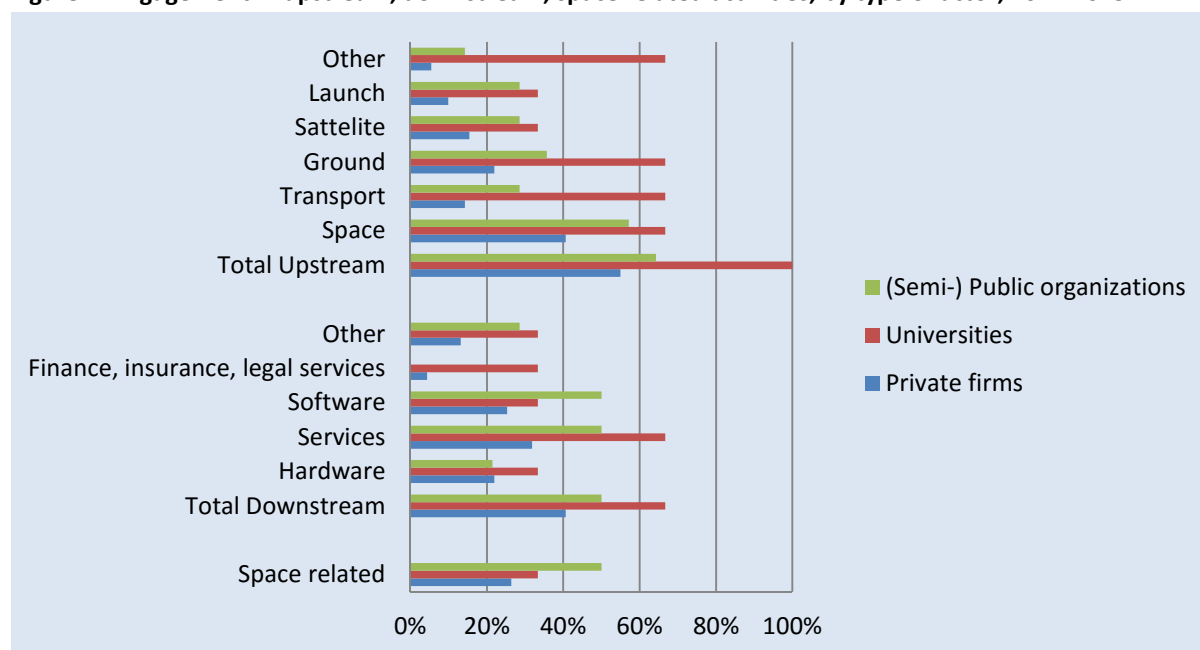
- Harmonized ESA survey to measure space activities in Belgium. Topics covered include involvement in upstream, downstream and space related activities; overall and space employment, turnover, value added; public funding for space activities; internal and external (space) R&D expenditures and networking.
- The electronic survey has been launched February 2016 to private actors and April 2016 to (semi-) public actors. For both target groups 2 reminders have been send. The 35 largest ESA funding beneficiaries have been addressed in September 2016 to carefully check space employment, turnover, funding, and R&D expenditures data for the period 2011-2015.
- The survey has been presented to the representatives from Belgospace, BRUSPACE, VRI, and Wallonie Espace who encouraged their members to participate in the survey.

Figure 1: Number of upstream / downstream space actors in Belgium, by type of actor, 2011-2015



Note: In the period 2011-2015, 120 private firms received ESA funding. However, 21 of these had less than 1 FTE position as a result of ESA funding. Given the small amounts, those 21 firms are considered as non-ESA funded. Note: The population of actors involved in upstream and/or downstream space activities has been estimated based on the repertoires of space actors within Belspo, Belgospace, Bruspace, VRI, and Wallonie Espace. The list of actors has been supplemented by a survey among 764 private and public organizations which have been involved in or applied for funding in the period 2000-2015 for ESA contracts, FP7 space funding, or national space funding programs. Of those lists, only those which were reported in the Belspo survey as being involved in space activities have been included in the population. The entities for which no information was available have been excluded from the population of space actors. All beneficiaries of ESA funding are included in the analysis.

Figure 2: Engagement in upstream, downstream, space related activities, by type of actor, 2011-2015



Source: ESA survey Belgian Science Policy Office (2016). N = 108 (Private firms: 91; Universities: 3; (Semi-)public organizations: 14). Unweighted. Note: Upstream: Hardware/software products and service providers, which enable the launching and operating of systems in space: including R&D, Design, Production, Integration and Testing. Downstream: Hardware/software producers and service providers, which require the use of space systems and/or data for applications used on Earth. Space-related activities: Products/services utilising space technology that may include spin-offs or technology transfers from the space sector.

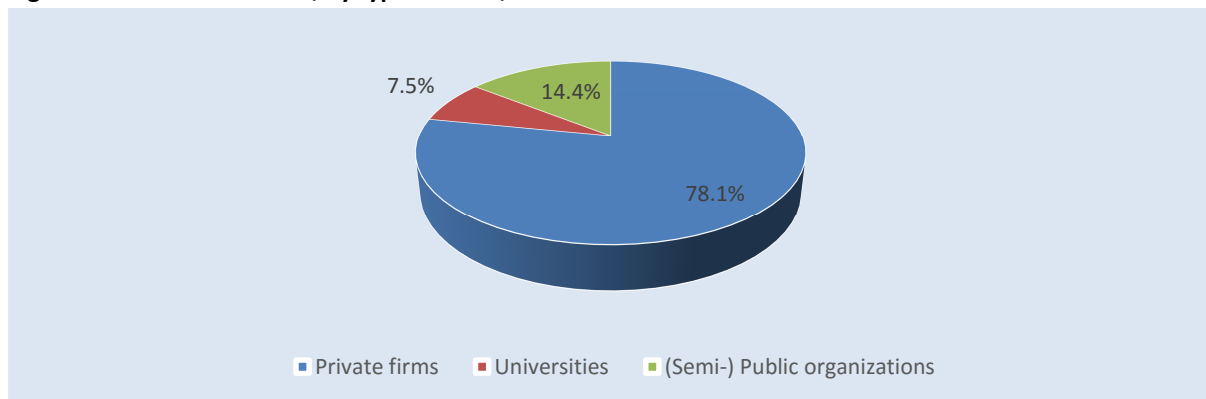
ESA funding

Belgium has no space agency, and during the period 2011-2015 it spent an average of €180 million each year on the European Space Agency (ESA). Accounting for nearly 6% of the total budget, Belgium is the sixth largest contributor to ESA. ESA offers critical mass on a large scale both in terms of technical competence in all space fields and in terms of administrative structure, and it redistributes the funding to its members by means of a "fair return" system. The beneficiaries are both private and (semi-)public space actors. Public investment in the space sector is mainly motivated by economic considerations. Besides funding ESA, Belgium is involved in several national and bilateral space programs representing rather modest (close to 10% of the total space public

funding) budgets. In what follows, the focus is on organizations in Belgium which received funding from ESA during the period 2011-2015.

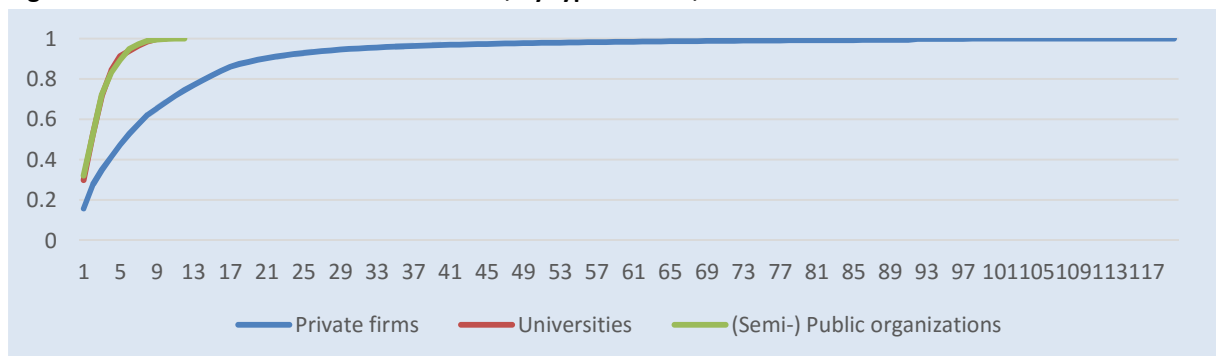
Figure 3 shows that a large majority of the ESA funding is oriented towards private organizations and aims at direct economic benefits, almost one sixth of the budget goes to more application-driven research in (semi-)public research organizations in which the funding also finds its way into space-related applications (Figure 2). A relatively limited amount of ESA funding is oriented towards universities and can be considered as being oriented to more basic research. ESA funding is highly concentrated among a limited number of private and public actors, with the top 15 receiving over two thirds of ESA funding (Figure 4).

Figure 3: ESA commitments, by type of actor, 2011-2015



Source: ESA commitments database (2016). Note: average yearly funding committed: 155 million euro

Figure 4: Concentration of ESA commitments, by type of actor, 2011-2015



Source: ESA commitments database (2016). Note: average yearly funding committed: 155 million euro. Note: for Private firms: all 120 beneficiaries (also the ones with less than 1 funded FTE position) of ESA funding have been included.

Economic indicators

The focus within economic indicators is on employment and turnover in the space sector. The data presented below is restricted to the organizations which received ESA funding (with at least one full time equivalent position funded in the period 2011-2015). Total space employment in full time equivalents (FTE) is estimated to be 3,153 in 2015, over 80% of which is in the private enterprise sector. Universities and semi-public research organizations have more or less equal importance in terms of employment. In the period 2011-2015, the share of space employment slightly increased in the private sector and declined or stagnated in the (semi-) public sector. Space employment represents 14% of total employment in the private sector, meaning that for every space FTE, 6.15 FTEs on average are employed outside upstream and downstream space activities, indicating potential spillover effects in space-related activities within the organization. The strong increase in space employment in the private sector in particular in 2015 is not entirely followed by an increase in non-space employment. It needs to be seen over the coming years what the effects will be of this increase in non-space activities.

Anchor firms are identified as key actors in the space sector. In Belgium, two private firms employ over 250 FTEs in the space sector, and 10 firms and 6 (semi-) public organizations/universities have between 50-249 FTE employees. The median (middle value observation) share of space employment in total employment in the private sector is 22%, the interquartile (middle 50% of observations) ranges between 3.7% and 69%. This means that one quarter of the actors have space activities presenting above 69%, and one quarter of the private actors have space activities presenting below 3.7% of total firm employment. These groups outside the interquartile represent respectively 58% and 7% of total space employment.

In line with the share of space employment in total employment, the share of space turnover in total turnover amounts to 12% in 2015. In contrast with the increased share of space employment in total employment, the share of space turnover is more stable over the period 2011-2015. ESA contracts compared to space turnover not related to ESA contracts remains relatively constant over the period 2011-2015 at a ratio of 1 to 2.2.

Table 1: Space employment: in FTE and as a share of total employment, by type of actor, 2011-2015

	2011	2012	2013	2014	2015
Private firms					
Space employment (FTE)	2 047	2 098	2 119	2 219	2 423
Share of overall employment	12%	12%	13%	13%	14%
Universities					
Space employment (FTE)	301	311	357	337	338
Share of overall employment	1%	1%	2%	1%	1%
(Semi-) Public organizations					
Space employment (FTE)	361	368	376	392	392
Share of overall employment	13%	10%	10%	10%	10%
Total					
Space employment (FTE)	2 709	2 778	2 851	2 948	3 153
Share of overall employment	6%	6%	7%	7%	7%

Source: ESA survey Belgian Science Policy Office (2016), complemented with data from BelFirst, ESA EMITS

Table 2: Turnover of private space actors, million euro, 2011-2015

	2011	2012	2013	2014	2015	Share of total turnover 2011-2015
Non space turnover	2 692	2 846	2 656	2 777	2 953	87,8%
Space turnover (excluding ESA contracts)	262	288	245	252	279	8,4%
ESA contracts (commitments)	106	91	136	149	123	3,8%

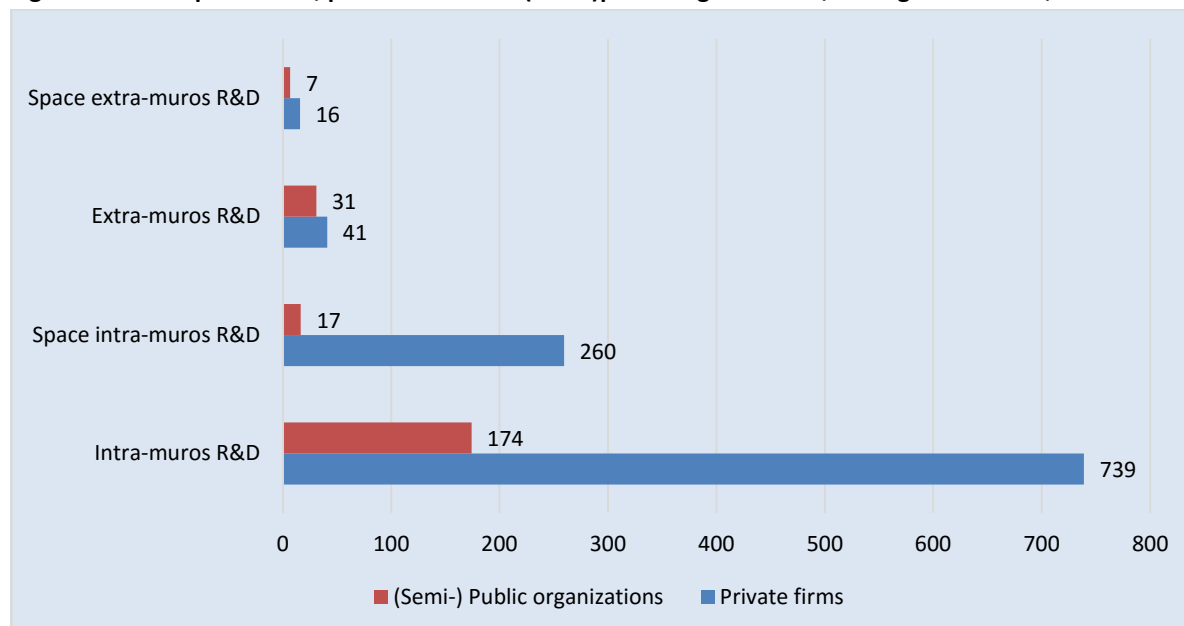
Source: ESA survey Belgian Science Policy Office (2016), complemented with data from BelFirst, ESA EMITS

Research and development: expenditures and networking

Compared to the share of employment and turnover, internally undertaken (intra-muros) R&D expenditures represents a more substantial part of the overall intra-muros R&D activities (over one third of the budget) of space actors. This means that the R&D activities in the space department are of considerable importance for the R&D knowledge base of the population of private space actors. For (semi-) public research organizations, this share is more in line with the share of space employment (about 10

percent). ESA commitments represent less than half of the intra-muros space R&D. Therefore, the investment which private space actors make in terms of space R&D efforts is more substantial than what is expressed in the economic indicators of space employment and turnover. If it is taken into account that private organizations do not consider every euro of ESA funding as R&D expenditure (contrary to the belief of public policy makers who consider all public funding as R&D-related and as defined in the OECD Frascati manual) this amount is even an underestimate.

Figure 5: R&D expenditures, private firms and (semi-)public organizations, average 2011-2015, million euro



Source: ESA survey Belgian Science Policy Office (2016), complemented with data from OECD business R&D survey, ESA EMITS. Note: no accurate data available for universities.

Box 2. R&D expenditures

- Total R&D expenditures: total intramural and extramural expenditures for research and experimental development. Research comprises creative work undertaken on a systematic basis in order to increase the stock of knowledge. Experimental development is systematic effort, based on existing knowledge from research or practical experience, directed towards creating novel or improved materials, products, devices, processes, systems, or services
- Intramural R&D expenditures include all expenditures for R&D performed within the organization in the period, whatever the source of funds. It includes own R&D expenses, R&D funds from external sources and R&D co-funding between the entity and external sources
- Extramural R&D expenditures include the budgets which the organization reports having paid or committed itself to pay to another unit (organization) for the performance of R&D during the period. This includes acquisition of R&D performed by other organizations and grants given to others for performing R&D
- Space R&D expenditures include R&D expenses allocated to space activities. Space R&D measurements include up to TRL7 system and prototype demonstration in space environment. But ordinarily, flying operating systems (i.e. TLC near space orbiting satellites) are out of this perimeter

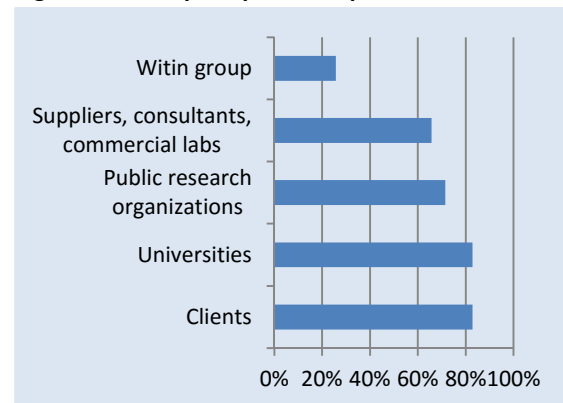
Extra-muros R&D (subcontracting of R&D to outside parties) related to space is almost 6% of the total space R&D budget in the private sector, and approaches one third of the space R&D budget in (semi-) public research organizations. The latter is an indication of important knowledge spillovers.

The Belspo survey revealed that of every euro of public funding by ESA, private enterprises consider 86% to be related to internal space R&D funding, and almost 6% to R&D outsourcing. Therefore, 8% of ESA funding is considered not to be R&D. Taking these elements into account reveals that, on average during the period 2011-2015, every euro of ESA funding resulted in 1.7 euro additional R&D funding in the private enterprise sector.

R&D activities in the space sector are usually joint activities and companies rely significantly on R&D networking (Figure 6). Less than 3% of the firms declared not to be involved in R&D networking. Firms engaging in R&D networking with market partners (clients or suppliers, consultants or commercial labs) do so with more than three such partners at the same time. Collaboration with universities in

over one third of cases is with more than 3 universities at the same time. For (semi-) public research organizations, more than 3 partners is the case for one in four firms. This is an additional indication of important knowledge exchange and spillovers in the sector.

Figure 6: R&D space partners: private actors



Source: ESA survey Belgian Science Policy Office (2016), profile based on 36 responses

Limitations and further research

This study provides information for an initial exercise at the federal level to present economic, ESA public funding and R&D indicators for the space sector in Belgium. The

aim is to create an ESA-level harmonized basis for evaluation and assessment of ESA public funding of space activities.

The focus was firstly on the identification of the population and a description of some key indicators. In the longer term, more attention will be given to knowledge and technology spillovers from space activities into other sectors of the economy.

The focus was on space actors funded by ESA. Both total space activities in terms of employment, turnover, and R&D and their share in overall (including non-space) activities has been highlighted.

On a methodological note, further progress needs to be made to collect information on

space actors which are not ESA-funded. Furthermore, the reporting of space activities at the level of universities should be improved. Additionally, the distinction between ESA funding and R&D activities should be further clarified since from a government point of view ESA funding only includes R&D activities, whereas space actors only consider a share of this funding as R&D.

Finally, additional information, both quantitative and qualitative, needs to be collected to measure and better understand spillovers from space activities to other industries. Therefore, more attention needs to be given to the space-related activities of actors outside the space industry.

Statistics in Brief aims to present relevant data to inform a broad audience, including policy makers. The views expressed in Statistics in Brief are those of the contributors and do not necessarily reflect the opinions of the Belgian Science Policy Office.

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