



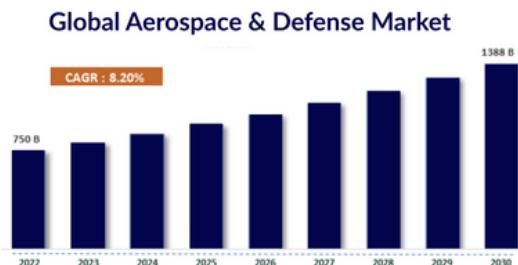
# Aerospace & Defense

Private Investments  
(2019 - 2024)

# PRIVATE AEROSPACE & DEFENSE INVESTMENTS - OVERVIEW

JUN, 2024

The global aerospace and defense market size was valued at around USD 750B in 2022 and is projected to reach USD 1.388T by 2030 and \$1.8T by 2035 (driven by both foundational applications like satellites and launchers, and expansive applications that enhance revenue across various sectors), with a compound annual growth rate (CAGR) of approximately **8.2%** between 2023 and 2030. Comparing that CAGR to multi-cap Aerospace & Defense ETF (**ITA: iShares U.S. Aerospace & Defense ETF**) which has given trailing 5Y performance return of **6.78%**.



Fig

Now juxtaposing against private investments to this sector, it seems during post-COVID period of Oct 2020 to April 2021, total **private investment** into the sector across US & EU has reached to **10B** which, since then, has fallen to **sub-billion (928M)**; CAGR is -38% due to deteriorating global macro at the context of rising interest rates.

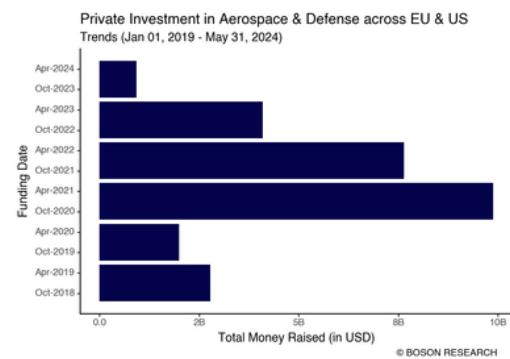


Fig 2

Significant amount of orders in the aerospace & defense sector originates from Government, making military spending (as % of GDP) an important metric for attracting private investments. Ignoring Ukraine's sky-high (>30%) military spending, US leads the world with close to 7% of GDP.

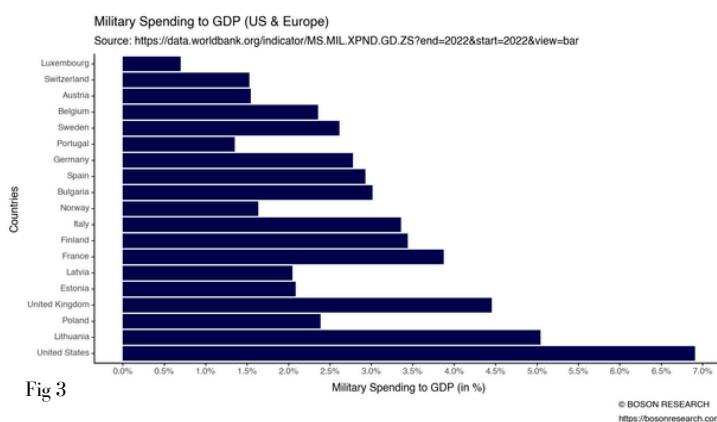


Fig 3

Aligned with military spending and entrepreneurial strength, US, UK (4.5% of Military Spending to GDP) and Germany has attracted most of the private investments since 2019 - USD 20B, 3B & 1B, respectively, with **US and Germany** attracting most of the recent (within last two years) of funding deals. Although Boson Research has primarily investigated private investments across Aerospace and Defense sectors, there are associated or

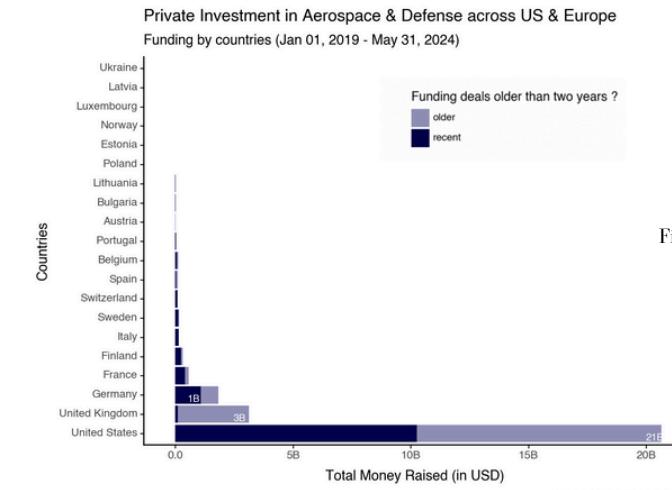
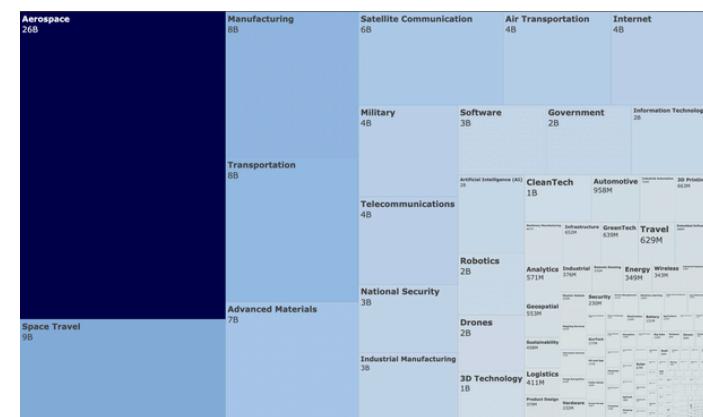


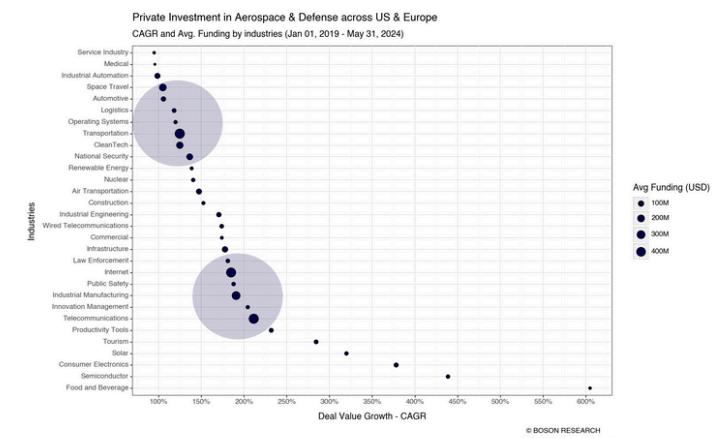
Fig 4

ancillary sub-industries adding an element of thematic diversification. **Space Travel, Manufacturing, Transportation** (also includes sub-sectors such as Urban Air Mobility or UAM), **Advanced Materials** and **Satellite Comms** has attracted cumulative funding of 9B, 8B, 8B, 7B and 6B respectively.



Sub-industries have different CAGR and average funding size. Although few sub-industries like Tourism, Solar, Semiconductor are experiencing high deal growth CAGR (>250%), in terms of avg. funding size, certain sub-industries stood out

- Industrial Manufacturing
  - Internet (ex. **Starlink**!)
  - Telecommunications
  - Transportation / Air Transportation (incl. UAM)
  - CleanTech
  - National Security



Big public companies are already investing rapidly into some of these sub-industries such as **Transportation / UAM** vertical. For example, **Airbus** has developed the **CityAirbus NextGen**, an all-electric, four-seat vertical take-off and landing (eVTOL) multicopter. This innovative aircraft is designed to meet the challenges of urban mobility by offering a quiet, safe, and reliable

mode of transportation. CityAirbus NextGen features an 80-km operational range and a cruise speed of 120 km/h, optimized for urban and suburban environments. This range and speed make it suitable for various missions including passenger transport, medical services, and ecotourism. This is a dual-play of **Aerospace/UAM** and **GreenTech/EV**.



Looking at private investments in the **Transportation** sub-industry (vertical) with >10M funding, funding recency, total cumulative funding, number of follow-up funding rounds etc., these three exciting companies should encourage further due-diligence to a keen private investor - **Elroy Air**, **Firefly Aerospace** and **ZeroAvia**. For ex,

Top Companies in Transportation sub-industry					
Name	Last Deal Year	Total Funding (USD)	Country	Region	Number of Funding Deals
Elroy Air	2024	105M	United States	North America	4
Firefly Aerospace	2023	572M	United States	North America	3
ZeroAvia	2023	260M	United States	North America	6
Portside	2023	67M	United States	North America	2
The Exploration Company	2023	54M	Germany	Europe	3
Whisper Aero	2023	40M	United States	North America	2
Venus Aerospace	2023	39M	United States	North America	3
Ascendance Flight Technologies	2023	39M	France	Europe	2
Vaya Space	2023	36M	United States	North America	3
Starfish Space	2023	34M	United States	North America	4
Agile Space Industries	2023	18M	United States	North America	2
Wilder Systems	2023	16M	United States	North America	2
AeroCloud	2023	14M	United Kingdom	Europe	2

## CLOSE LOOK: ELROY AIR (US)

**Elroy Air's** Chaparral aircraft signifies a leap forward in **autonomous aerial logistics**, catering to diverse cargo transport needs with minimal infrastructure demands. Designed as a **hybrid-electric eVTOL platform**, it excels in middle-mile logistics, humanitarian aid deliveries, and military resupply missions. With impressive specifications including a cruise speed of 143 mph and a range of 300 miles, coupled with a payload capacity of 300 lbs, the Chaparral ensures efficient and versatile operations. Its hybrid-electric powertrain supports long-range flights with flexibility in fueling options, while advanced automation enables safe ground navigation and cargo handling. Featuring distributed electric propulsion for enhanced safety and reliability, the Chaparral accommodates various cargo pod configurations tailored to specific mission requirements. Elroy Air aims to **redefine logistics by offering autonomous delivery solutions** that are independent of traditional charging infrastructure. Notable lead investors across 5 investment rounds (USD 105M of total funding) include

- **Lockheed Martin Ventures**,
- Marlinspike Capital,
- Prosperity7 Ventures
- Catapult Ventures

In the same sub-industry (and filtered by same criteria as above), across **Europe** there are few exciting companies

Name	Last Deal Year	Total Funding (USD)	Country	Region	Number of Funding Deals	Deal CAGR
The Exploration Company	2023	54M	Germany	Europe	3	1026.000000
Ascendance Flight Technologies	2023	39M	France	Europe	2	53.000000
AeroCloud	2023	14M	United Kingdom	Europe	2	204.000000
Volocopter	2022	781M	Germany	Europe	5	46.000000
Wingcopter	2022	110M	Germany	Europe	2	65.000000
Magnax	2022	40M	Belgium	Europe	2	1.000000
Hybrid Air Vehicles	2022	17M	United Kingdom	Europe	2	584.000000

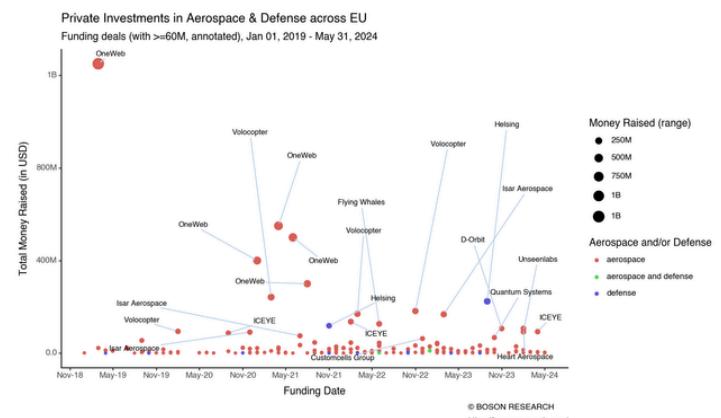
For ex, **Wingcopter**. Unlike Elroy Air, they are specialising in last-mile healthcare logistics. Despite a downturn in VC investments overall, companies in the Drone & Air Transportation sub-industry have received significant financial backing, amounting to USD 1.5B in FY23, spanning over 120 funding rounds.

## CLOSE LOOK: WINGCOPTER (EU)

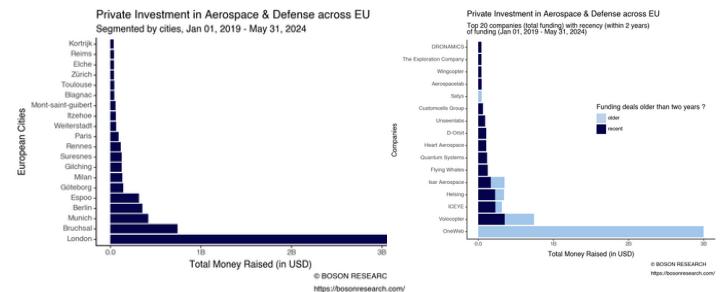
Wingcopter, based in Weiterstadt, Germany, is a manufacturer specializing in **unmanned eVTOL fixed-wing aircraft** for both commercial and humanitarian purposes. Founded in 2017 by Ansgar Kadura, Jonathan Hesselbarth, and Tom Plümmer, the company focuses on drone delivery services that optimize **medical supply chains** and provide **last-mile logistics solutions**. Wingcopter has raised approximately USD 110M through various funding rounds, with its latest in May 2023. The company's innovative products include drones designed for healthcare logistics (**Wingcopter 198**), capable of long-distance flights and adverse weather conditions, and collaborations with partners like Siemens Healthineers to enhance healthcare services in Africa. Notable lead investors across 2 investment rounds (USD 110M of total funding) include Futury Capital & Xplorer Capital



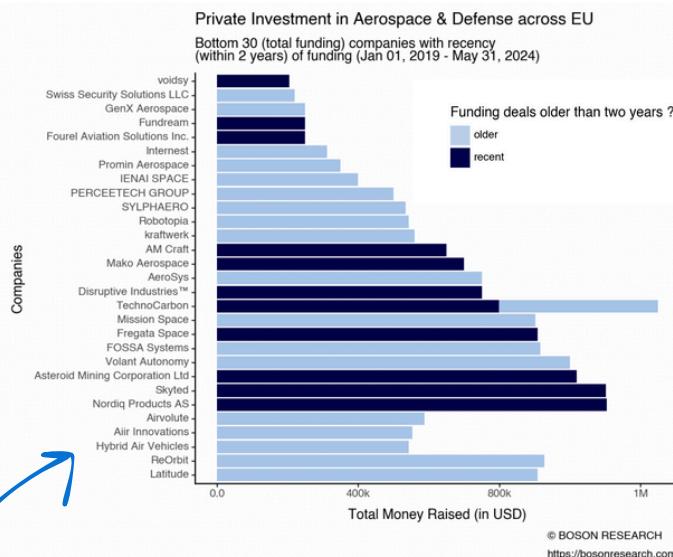
## PRIVATE AEROSPACE & DEFENSE INVESTMENTS - EUROPE



Since 2019, across 204 funding rounds, closer to USD 6B has been privately invested, with median funding amount (per deal) being USD 9M. **UK** (London) and **Germany** (Bruchsal, Munich, Berlin) bagged majority of funding deals. Looking at the top 100 most valued European Upstream space startups, BR sees **Munich** as a key hub for space in Europe for VC-backed startups, home to companies like **Isar Aerospace** and **The Exploration Company**.



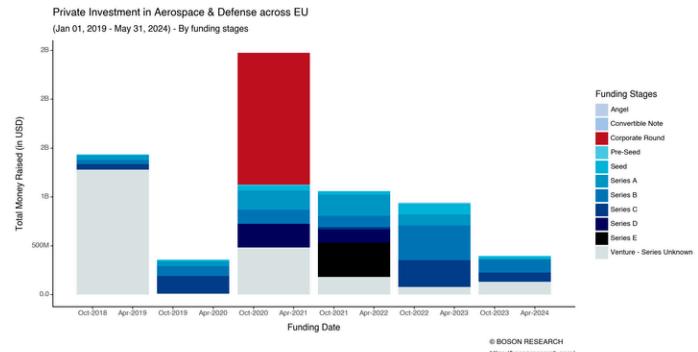
OneWeb (\$3B), **Volocopter** (\$744M), ICEYE (\$), **Helsing** (\$343M), **Isar Aerospace (\$351M)**, Flying Whales (\$127M), Quantum Systems (\$127M), Heart Aerospace (\$142M), **D-Orbit (Italy) \$142M**, Unseenlabs (\$116M), Customcells Group, Satys, Aerospacelab, **Wingcopter, The Exploration Company** are few notable companies



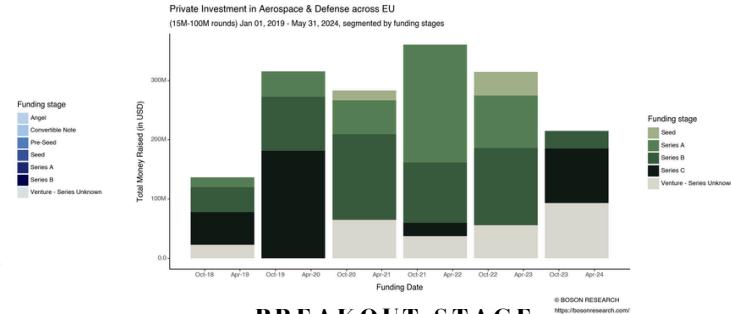
In the **\$1M and sub-\$1M bucket**, Asteroid Mining Corporation Ltd, Skyted, Fregata Space, TechnoCarbon are worthy of mention. In the **mid segment** (>\$9M and <\$27M; 9M being the median funding amount/deal), following companies may be worthy of further due-diligence for new investors.

## Lead Investors

**SoftBank** (\$1B), Eutelsat (\$550M), Bharti Enterprises, **SoftBank Capital** (\$400M), Hanwha Systems, General Catalyst (\$224M), Gly Capital Management & NEOM (\$182M), WP Investment, Seraphim Space, Bpifrance & Gouvernement Monaco (\$127M), Prima Materia, Marubeni, DB Schenker, Solidium, ISALT, Supernova Invest, Unexo, Lakestar, True Ventures, HV Capital, Lombard Odier, Porsche Automobil Holding, DTCP, HV Capital, ABACON CAPITAL, World Fund - are some of the active private investors in this sector across the EU zone.



Since 2021, late stages of funding (Series D/E or Corporate Rounds) have dried out, potentially due to deteriorating macroeconomic situation caused by rising interest rates. However, if we segment the deal rounds to - **Startup stage** (\$0-15M rounds), **Breakout stage** (\$15-100M rounds) and **Scaleup stage** (\$100M+ rounds), it paints a different picture. In the Startup stage & Breakout stage, funding is still pretty good compared to mega-rounds of Scaleup stages.

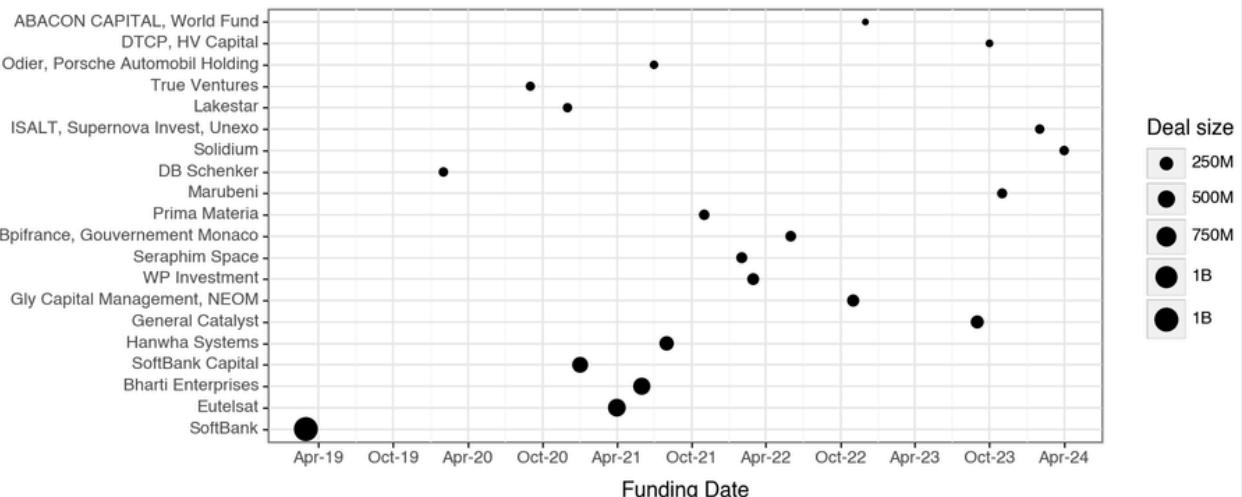


## STARTUP STAGE

## Private Investment in Aerospace & Defense across EU

### Top 20 investors

Investors

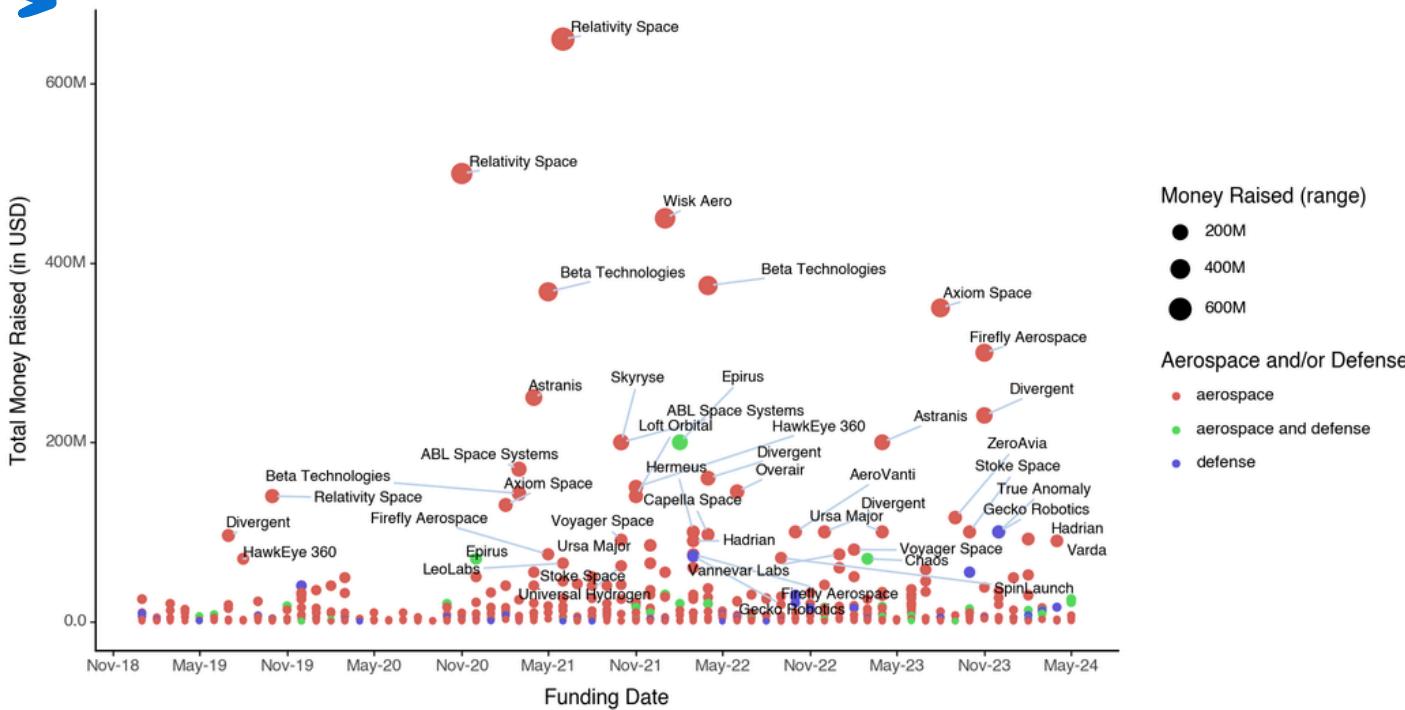


Since 2019, a total of 586 rounds (compared to 204 rounds in EU) of private investments across US, have pumped \$21B (compared to \$7B across EU) into the sector, with median rounds being **\$205M** (compared to \$174M across EU). Aside from outliers such as **SpaceX** (\$4B), **Anduril Industries** (\$2B) and **Sierra Space** (\$2B), rest of the private rounds have been show below (<\$600M / round)

Unsurprisingly, **California** (Costa Mesa, Long Beach, San Francisco, Hawthorne which is home to **SpaceX**) bagged most of the deals amounting to a total of \$13B. **SpaceX** (\$4B), **Anduril Industries** (\$2B), **Sierra Space** (\$2B), Relativity Space (\$1B), Beta Technologies (\$886M), **Divergent** (**\$586M**), **Astranis** (\$490M), Axiom Space (\$487M), Wisk Aero (\$450M), Firefly Aerospace (\$450M), ABL,

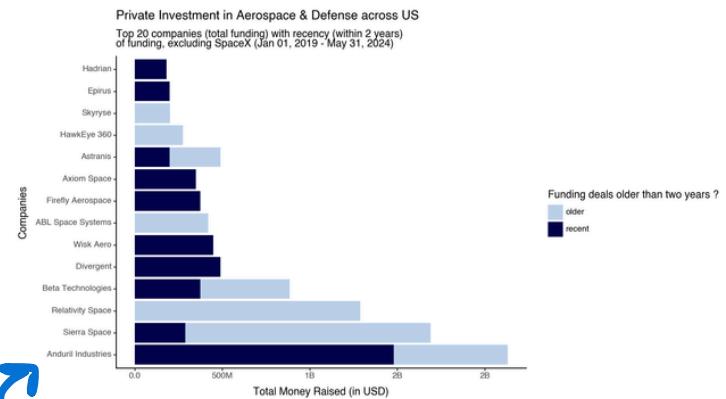
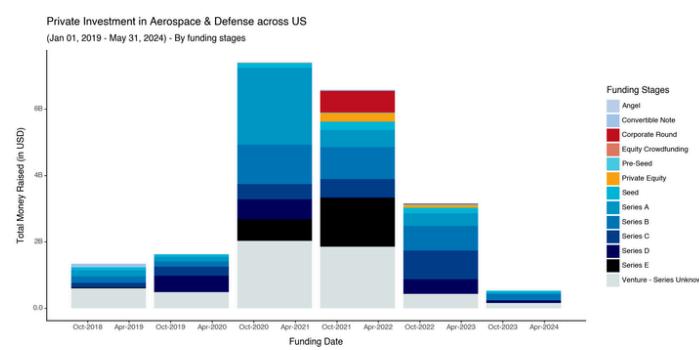
### Private Investments in Aerospace & Defense across US

Funding deals (with >=60M, annotated), Jan 01, 2019 - May 31, 2024

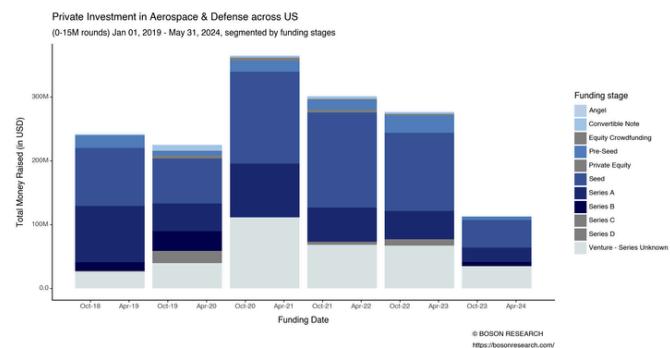


Segmenting by funding stages, BR observes a drop in funding amount per round since 2021. However unlike EU, the drop has been more gradual. Interestingly, the funding in the **Startup** and **Breakout** stages, have decreased since 2021, which is different from the EU where an increasing/non-decreasing trend (reversal) has been observed.

Space Systems (\$419M), HawkEye 360 (\$343M), Epirus (\$287M), Ursa Major (\$264M), ZeroAvia (\$240M) - are few notable companies. In the lower **mid segment** (>\$9M to \$27M), following companies are worth mentioning - JetZero (\$26M), Karman+ (\$26M),



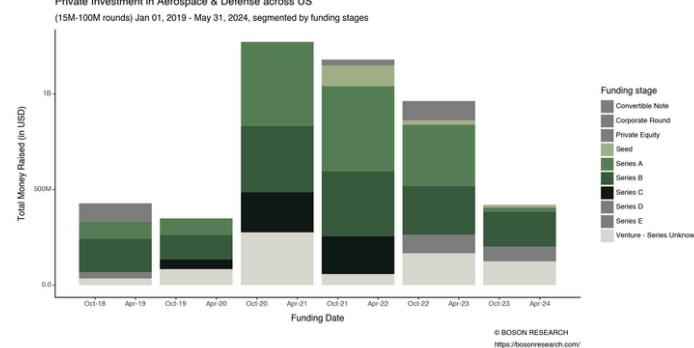
### OVERALL - FUNDING STAGES



### STARTUP STAGE

NOTE: Without explicit attribution all charts are created by the author

### TOP COMPANIES



### BREAKOUT STAGE

Vita Inclinata Technologies (\$26M), Hydrosat (\$25M), World View Enterprises (\$25M), Swarm Technologies (\$25M), Geminus (\$23M), Electric Power Systems (\$22M), General Radar Corp. (\$22M), Zeno Power (\$22M). Looking for companies at **Scaleup** stages with recent funding (2023/2024) and positive Deal Growth (CAGR), BR has screened these 15 companies

Looking at the companies in **Breakout Stage** (\$15M-\$100M), BR has screened following with recent funding (2023/2024) and positive Deal Growth (CAGR) - Vannevar Labs (\$87M), Impulse Space (\$75M), Pixxel (\$71M), Saronic (\$70M), Portside (\$67M), Benchmark Space Systems (\$56M),

Name	Total Funding (USD)	Last Deal	City	# of Deals	Deal Growth (CAGR)	Investors	Industries
Divergent	769M	2023	Torrance	4	22.000000	John L. Thornton, Tom Steyer, Hexagon	3D Printing, Aerospace, Automotive, Embedded Software, GreenTech, Industrial Automation, Industrial Manufacturing, Software
Firefly Aerospace	572M	2023	Cedar Park	3	73.000000	DADA Holdings, AE Industrial Partners, Mitsui & Co., Ltd.	Aerospace, Air Transportation, Satellite Communication
Astranis	553M	2023	San Francisco	3	66.000000	Venrock, BlackRock, Andreessen Horowitz	Aerospace, Internet, Satellite Communication, Telecommunications
Axiom Space	500M	2023	Houston	3	193.000000	C5 Capital, Aljazira Capital, Boryung Pharmaceutical	Advanced Materials, Aerospace, Industrial Manufacturing, Space Travel
Ursa Major	272M	2023	Berthoud	7	23.000000	Alpha Edison, BlackRock, Explorer 1 Fund	Aerospace, National Security, Satellite Communication, Space Travel
ZeroAvia	260M	2023	Hollister	6	84.000000	Breakthrough Energy Ventures, Ecosystem Integrity Fund, British Airways, Horizons Ventures, Alaska Air Group, United Airlines, Airbus, Barclays, NEOM	Aerospace, Air Transportation, CleanTech, Industrial
Capella Space	239M	2023	San Francisco	5	49.000000	Cota Capital, DCVC, NightDragon, US Innovative Technology Fund	Aerospace, Geospatial, Image Recognition, Information Services
Gecko Robotics	222M	2023	Pittsburgh	3	26.000000	Drive Capital, XN, Founders Fund, US Innovative Technology Fund	Industrial Engineering, Information Technology, Infrastructure, Military, Robotics, Software
Hadrian	216M	2024	Hawthorne	3	122.000000	Founders Fund, Lux Capital, Andreessen Horowitz	Aerospace, Machinery Manufacturing, Manufacturing, Supply Chain Management
Voyager Space	178M	2023	Denver	3	125.000000	NewSpace Capital	Aerospace, Infrastructure, Space Travel
Stoke Space	176M	2023	Kent	3	151.000000	MaC Venture Capital, NFX, Breakthrough Energy Ventures, Industrious Ventures	Aerospace, Product Design, Space Travel
True Anomaly	158M	2023	Centennial	3	503.000000	Eclipse Ventures, Riot Ventures	Aerospace, Machinery Manufacturing, Military, Space Travel
Varda	141M	2024	San Francisco	3	100.000000	Founders Fund, Lux Capital, Khosla Ventures, Caffeinated Capital	Aerospace, Manufacturing, Product Design
CesiumAstro	120M	2024	Austin	4	20.000000	Airbus Ventures, Forever Ventures	Aerospace, Drones, Satellite Communication, Space Travel
Elroy Air	105M	2024	San Francisco	4	61.000000	Catapult Ventures, Lockheed Martin Ventures, Marlinspike Capital, Prosperity7 Ventures	Aerospace, Air Transportation, Logistics, Robotics

### CLOSE LOOK: HADRIAN (US)

**Hadrian** is a machine parts (**advanced manufacturing**) startup based in Hawthorne, California, specializing in manufacturing precision components for technology companies. Besides having ecosystem advantages for being **colocated at the same city of SpaceX's HQ**, Hadrian allows an investor to have a diversified proxy-play to Aerospace sector while catering to other sectors such as Advanced Machinery Manufacturing & Supply Chain Management. Hadrian, founded in November 2020, builds autonomous, **software-defined precision component factories**. These facilities cater to customers involved in aerospace, machinery manufacturing, and supply chain management sectors, supporting the production of rockets, satellites, jets, and eVTOLs. They promise delivery of flight-grade parts in 5-21 days, emphasizing reliability, transparency, and scalability. As of the latest funding round in February 2024, Hadrian raised **\$25M** in debt financing, with a total of **\$216M** funding from investors -

- **Andreessen Horowitz (a16z)**
- **Founders Fund**
- Lux Capital

Ramon.Space (\$44M), Orbit Fab (\$42M), Whisper Aero (\$40M), Venus Aerospace (\$39M), Onebrief (\$37M), Biofire (\$37M), Vaya Space (\$36M), **Hydrosat** (\$36M), Starfish Space (\$34M)

### CLOSE LOOK: HYDROSAT (US)

**Hydrosat** is a Washington, DC-based company specializing in **satellite data analytics for agriculture (AgTech)**: advanced irrigation and crop management solutions aimed at enhancing agricultural productivity while **conserving water resources/ESG**, critical infrastructure, and environmental applications. Founded in October 2017, Hydrosat leverages thermal imagery to provide insights that enhance crop production forecasts. Their products include advanced analytics tools like **IrriWatch** for optimizing irrigation management, aimed at reducing costs and increasing yields for farmers. Operating globally, their technologies are **deployed across millions of hectares** daily, supporting governments and farmers alike in optimizing water usage and increasing crop yields. With offices in Luxembourg and the USA, Hydrosat has raised **\$36M** in funding and continues to innovate in geospatial intelligence to support food security and environmental monitoring. Notable investors - **Techstars**, Cultivation Capital, OTB Ventures, Statkraft Ventures