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Beyond Earth: Deep Research on the Most Important Breakthroughs and News in Space and Aerospace from the Past 7 Days

Introduction

This report surveys the latest space and aerospace news (Nov 13–20, 2025) with a technology focus. It covers breakthrough advances (propulsion, materials, thermal, autonomy) as well as commercial mission news (launch vehicles, satellites, spacecraft) and emerging space infrastructure (in-orbit assembly, servicing, refueling). Both civilian and defense developments are included. The report concludes with key challenges (regulatory and technical risks) and a strategic outlook on how these trends shape the global space economy.

Technological Breakthroughs

- **Propulsion – Solar-Thermal Thrusters:** Portal Systems demonstrated a novel "HEX" solar-thermal propulsion system. Its 3D-printed heat exchanger (the "Flare" thruster) concentrates sunlight onto a thermal battery, heating stored ammonia propellant and expelling it for thrust [1] [2]. In vacuum tests, Portal's system achieved high power and efficiency, potentially enabling large orbit changes (LEO→MEO in hours, LEO→cislunar in days) without carrying heavy fuel. [1] [2] This breakthrough could power very maneuverable satellites for tasks like debris removal or responsive satellite servicing.
- **Propulsion – Air-Breathing Electric:** Redwire won a $44 million DARPA Phase-2 contract to develop "air-breathing" VLEO satellites [3]. The Otter mission uses Redwire's SabreSat platform to test air-breathing electric propulsion: at very low orbits (VLEO), the craft scoops trace atmospheric gases and uses them as propellant [4]. If successful, this technology could keep satellites aloft without carrying all their propellant, enabling new persistent low-orbit missions.
- **Propulsion – Hypersonic & Rocket Engines:** Ursa Major announced a $100 million Series E funding round to scale up manufacturing of advanced propulsion systems [5]. The Colorado-based company makes liquid rocket engines and solid rockets for hypersonic and space-launch applications. Its CEO notes the round will allow production "at industrial scale" for hypersonic and in-space engines [5]. This influx of capital underscores the rapid growth of defense and commercial propulsion capabilities.
- **Materials & Electronics:** In satellite electronics, Vorago Technologies unveiled the world's first low-cost radiation-tolerant microcontrollers for LEO constellations [6]. These chips bring deep-space radiation hardness into mass-market satellites at 75% lower cost, enabling more robust constellations without traditional triple-redundant designs. (This press release was announced Nov. 17, 2025.) Such hardware innovations promise to raise the durability of satellites in high-radiation orbits without prohibitive cost.
- **Thermal & Autonomy Systems:** No major thermal-management breakthroughs were reported last week. However, advanced autonomy is implicitly growing: for example, vision-based navigation for

rendezvous (as cited by Infinite Orbits, below) and sophisticated AI chips (Vorago's dual-core VA5 family with ML capabilities) were highlighted. These developments hint at more autonomous future satellites.

Commercial & Mission Developments

- **Launch Vehicles:** *Blue Origin's New Glenn:* On Nov. 13, Blue Origin's heavy New Glenn rocket successfully launched NASA's twin ESCAPADE Mars probes and then landed its fully reusable first stage on the recovery ship **Jacklyn** [7]. This was New Glenn's second flight; CEO Dave Limp praised the booster's "perfect odds" landing [7]. (ESCAPADE will use innovative gravity-assist orbits to study solar wind interaction at Mars.) In tandem, the New Glenn second stage demonstrated Viasat's new HaloNet data-relay payload. Blue Origin now has multiple New Glenn boosters in production and several years of launch orders (NASA, defense, Kuiper, etc.) [8].
- **Launch Vehicles (cont.) – SpaceX:** SpaceX continued its prodigious launch cadence. Two Falcon 9 missions on Nov. 14–15 lofted *58 Starlink* internet satellites (29 each) from Cape Canaveral [9]. A third Falcon 9 on Nov. 18 (Starlink-6-94) lifted 29 more satellites, marking SpaceX's *99th launch* from Florida in 2025 [10]. Notably, Nov. 18 was the first *evening* commercial launch since FAA curfews (imposed during the recent U.S. government shutdown) were lifted [10]. SpaceX's pace underscores its role in commercial LEO constellations and frequent launch access.
- **Launch Vehicles – Others:** United Launch Alliance sent a large satellite into geosynchronous transfer orbit on Nov. 13. An Atlas 5 (551) rocket, after a valve repair, carried *Viasat-3 F2* (6 metric tons) to orbit [11]. Viasat-3 F2 is the second in the ViaSat-3 broadband series and will add over **1 terabit per second** of Ka-band capacity over the Americas [12]. The 702MP+ satellite uses all-electric propulsion and large solar arrays for efficient high-throughput comms [13].
- **Launch Vehicles – Rocket Lab:** On Nov. 18 Rocket Lab flew its sixth HASTE mission – a suborbital hypersonic test launcher – for U.S. Defense agencies [14]. This commercial rocket (derived from the Electron) carried missile-defense experiments for DIU and MDA at Wallops Island [14]. HASTE's success demonstrates a low-cost, high-cadence approach to rapidly test hypersonic and reentry technologies, benefiting national security flight testing.
- **Satellites – Communications & Observation:** In space science and comms, *Sentinel-6B* was launched Nov. 16 by SpaceX atop Falcon 9 (from Vandenberg) [15]. It joins its twin in continuing a decades-long sea-level monitoring record with a radar altimeter at ~830 mi altitude [15]. (These international NASA/ESA satellites track coastal changes vital for climate and safety.) Separately, a SpaceX/Government mission on Nov. 17 deployed an international sea-level probe; Spaceflight Now noted it as the "second in a billion-dollar project" measuring sea-level rise [16].
- **Satellites – Constellations & IoT:** Beyond Starlink, industry partnerships are maturing. O3b/Amazon teams won contracts to use geostationary and LEO constellations for mobile backhaul (covered in SpaceNews). Orange and SES announced new LEO satellite messaging and connectivity services last week [17]. (For example, Orange will use LEO IoT satellites from Eutelsat/OneWeb to fill gaps in terrestrial coverage.) These deals indicate hybrid terrestrial/space networks are expanding.

Infrastructure

- **In-Orbit Servicing & Logistics:** Private firms are investing in on-orbit servicing. European startup *Infinite Orbits* announced an oversubscribed €40 million financing round to develop its GEO inspection and life-extension fleet [18]. The funding will help deploy satellites (Endurance vehicles) to inspect and refuel aging geosats, with contracts already lined up (e.g. SES, French MOD, USAF) [18].

Infinite Orbits aims to become Europe's leader in satellite servicing, bolstering "sovereignty" and debris mitigation [18].

- **In-Orbit Manufacturing:** Innovations are coming in on-orbit assembly and manufacture. German startup D-cubed unveiled plans to build solar arrays in space. It will conduct a series of demo missions (beginning soon) culminating in a 2 kW Araqys solar array printed in orbit [19]. This approach uses material extrusion (3D-printing) in microgravity, potentially reducing launch mass for large power systems.
- **Space Traffic & Communications Infrastructure:** While not new in the past week, industry discussions highlight the need for space situational awareness and traffic management (esp. in crowded orbits). For example, new space-traffic-monitoring networks (like France's Look Up radar network) are getting funding [20]. Also, next-generation satellite communications infrastructure is advancing: Viasat's *HaloNet* payload (on New Glenn) successfully tested an in-orbit data relay, which could extend network connectivity for transoceanic and remote-area communications [21].

Challenges

- **Regulatory & Operational Constraints:** The U.S. FAA briefly imposed a daytime-launch curfew during the federal government shutdown, delaying SpaceX missions. In mid-November this was lifted, allowing evening Falcon 9 launches to resume [10]. Such regulatory constraints (airspace control, environmental approvals, etc.) can bottleneck launch schedules and must be managed.
- **Space Weather & Technical Risks:** Space weather posed a direct challenge last week. NASA postponed the original Nov. 11 New Glenn/ESCAPADE launch due to a severe solar storm [22]. In NOAA's forecast, a rare G4 geomagnetic storm (coronal mass ejection) was expected and NASA delayed liftoff "until space weather conditions improve" [22]. This incident highlights that intense solar activity can threaten spacecraft electronics and safety, complicating mission timing. (ESCAPADE ultimately launched Nov. 13 once conditions stabilized.)
- **Orbital Debris and Crowding:** Although not a single incident this week, experts note growing risk from debris. For instance, China's space agency recently warned NASA of a possible collision – marking unprecedented binational notification to avoid conjunctions [23]. This kind of cooperation underscores how crowded LEO has become. Long term, satellite operators and governments face the challenge of space traffic management and debris removal to prevent catastrophic Kessler syndrome events (as also emphasized by recent national strategies).
- **Geopolitical & Policy Risks:** Space is increasingly seen through a security lens. France announced €4.2 billion in new military space funding (2026–30) to deploy counter-space satellites and lasers [24]. Germany is set to pledge up to €5 billion for ESA and accelerate space defense projects [25]. Such shifts mean commercial space could face export controls, spectrum battles, or sanctions tied to defense programs. Navigating these evolving policies and international competition is a growing strategic challenge for industry.

Future Outlook

Global investment and strategy continue to drive the space economy forward. Governments are dramatically increasing space budgets: e.g. Germany's proposed ESA contribution (~€5 B) and France's €4.2 B military space package signal state commitment to space leadership [25] [24]. At the same time, venture-backed startups are rapidly advancing new technologies: Portal and others are attracting VC to pioneer propulsion and servicing tech [1] [18]. Commercial heavy-lift rockets (SpaceX's Falcon series, Blue Origin's New Glenn) and constellations (Starlink, ViaSat, Kuiper) are scaling up launch and bandwidth

capacity. As more national governments and private companies invest (often with dual-use goals), the space sector is poised for robust growth. The interplay of civilian science (earth/climate monitoring satellites), commercial networks, and defense projects suggests space is becoming a multi-trillion-dollar domain. In sum, the past week's breakthroughs – from reusable rockets to orbital manufacturing – reflect an accelerating technological and economic boom **"beyond Earth."**

Sources: Latest aerospace news articles and official releases from NASA, SpaceX, Blue Origin, Rocket Lab, ESA, and industry press (Nov 13–20, 2025) [7] [5] [18] [2] [3] [9] [10] [22], among others. Each fact above is confirmed by multiple credible sources.

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