

AEROSPACE

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2022 YEAR IN REVIEW

The Pillars of Creation
from the Webb telescope



NASA'S DART MOVES
AN ASTEROID



NASA'S SLS ROCKET
NAILS ITS DEBUT



◀ This photo of the XMAC 0723 galaxy cluster taken by the James Webb Space Telescope and released in July is “the deepest and sharpest infrared image of the distant universe to date,” according to NASA. Dubbed Webb’s First Deep Field, the image contains thousands of galaxies.

NASA, ESA, CSA and STScI

New windows into the universe and new commercial space capabilities

BY MIKE KAPLAN

The **Space Systems Technical Committee** fosters the development, application and operation of space systems, and addresses emerging issues in the area.

This year provided us with some of the most extraordinary accomplishments in the space systems area in recent years. Perhaps nothing demonstrated this more than the flawless launch, deployment and calibration of the **James Webb Space Telescope**. The Webb telescope’s perfect launch on Christmas Day 2021 by an Ariane 5 rocket was so precise that NASA believes the telescope has enough fuel to potentially double its operation lifetime to more than 20 years. In mid-July, NASA released Webb’s first science images, providing a new, more powerful window into our universe.

“It’s a new window into the history of our universe, and today we’ll get a glimpse of the first light to shine through that window,” U.S. President Joe Biden said at the White House briefing where the first image was released. Scientists believe that image and the four released by NASA the following day were only a tantalizing tease of what will come from Webb.

Other programs also broke new ground, paving the way for future progress in space systems and technology. NASA’s **Space Launch System** made its inaugural launch in November. Several new launch vehicles progressed closer to operational status, including SpaceX’s **Starship**; California-based Relativity Space’s **Terran R**, the world’s first 3D-printed

rocket, United Launch Alliance’s Alliance’s **Vulcan Centaur** rocket, now scheduled to make its first flight in 2023; Texas-based Firefly’s **Alpha** rocket; and California-based ABL Space System’s **RS1** rocket.

Throughout the year, the **U.S. Space Development Agency** continued to roll out its new proliferated low-Earth orbit constellation architecture for the National Defense Space Architecture by signing several contracts to begin construction on the first few tranches of its Transport and Tracking Layers. By relying on commoditized small satellite buses mainly developed for commercial purposes by new companies, including **York Satellite Systems** and **Terran Orbital**, SDA is creating a resilient architecture that would move with the speed of technology to support the Defense Department. In May, the **U.S. National Reconnaissance Office** awarded unspecified billions of dollars in new contracts over the next decade — the agency’s largest ever commercial imagery contract awards — to Virginia-based **BlackSky**, Colorado-based **Maxar Technologies** and California-based **Planet Labs** to provide satellite imaging services for U.S. intelligence, defense and civil agencies.

Continuing the trend of leveraging commercial technology, Blue Origin and Sierra Space in August completed the system definition review of their **Orbital Reef** space station concept. In December 2021, NASA awarded contracts to the Orbital Reef team and two other industry teams led by Nanoracks and Northrop Grumman to support the development of privately owned and operated LEO destination space stations from which various customers, including private entities, public institutions, NASA and foreign governments could purchase services. NASA intends for these commercial habitats to succeed the International Space Station, now planned for retirement in 2030.

Commercial human spaceflight continued to mature with three suborbital flights by Blue Origin’s **New Shepard** as of September and three SpaceX **Crew Dragon** flights to ISS as of October. Boeing’s second uncrewed flight test of a **Starliner** capsule in May was also a success, paving the way for a crewed Starliner test flight to ISS in April 2023.

As of September, NASA’s **Ingenuity Mars helicopter** completed 33 flights, supporting the Perseverance rover’s continued science operations. Also in September, NASA’s **Double Asteroid Redirection Test** spacecraft slammed into the asteroid Dimorphos, testing the kinetic impactor method of planetary defense against near-Earth objects on potential collision courses with Earth. NASA confirmed in October that DART had shortened Dimorphos’ orbit around its parent asteroid Didymos by 32 minutes. ★