

Determining atmospheric composition

Commemorating Kitty Hawk

A good precedent for debris mitigation

# AEROSPACE

★ ★ ★ AMERICA ★ ★ ★

2023

# YEAR-IN-REVIEW



## New hybrid rockets prepare for inaugural flights

BY TREVOR S. ELLIOTT AND JOSEPH MAJDALANI

The **Hybrid Rockets Technical Committee** studies techniques applied to the design and testing of rocket motors using hybrid rocket systems.

**T**his was a year characterized by remarkable advancements in hybrid rocket technology across the globe. New space ventures and research institutions pushed boundaries while achieving significant milestones and propelling the industry forward.

German startup **HyImpulse** drew attention with the qualification tests of its **HyPLOX75** hybrid rocket engine. Powered by **paraffin and liquid oxygen**, this engine has a 30-second burn duration and 75 kilonewtons of thrust. In August, the engine passed two vital **qualification tests**, verifying that the technology is ready to power the **SR75** sounding rocket. The SR75 was designed as a suborbital technology demonstrator that would host microgravity payloads. HyImpulse plans to conduct the inaugural launch of an SR75 in early 2024. The company said in November that the inaugural launch would be conducted from Australia, but plans call for at least two future launches from the United Kingdom. In July, the **U.K. Civil Aviation Authority** granted HyImpulse a license to launch an SR75 from **SaxaVord Spaceport** in the Shetland Islands.

In Australia, **Gilmour Space Technologies** prepared for the inaugural launch of its hybrid-powered **Eris** orbital rocket, fueled by the 120-kilonewton **Sirius** hybrid rocket engine. That launch is scheduled to occur from a private site in northern Queensland. The Sirius engine, which completed flight qualification testing last year, is to propel both the first and second stages of the Eris. A **Phoenix** liquid-propellant engine is to power the third stage. During

the unveiling of the Eris at Gilmour's production facility in May, **Australian Prime Minister Anthony Albanese** hailed the rocket as the nation's first domestically produced orbital launch vehicle. Pending regulatory approvals, Gilmour is targeting a launch window that would open in December from the **Bowen Orbital Spaceport**, Australia's commercial orbital launch site.

Taiwan's **National Cheng Kung University**, specifically the **Satellite and Rocket Propulsion Laboratory**, also contributed significantly to global advancements in hybrid rocket technology. Building on their past experience, researchers are targeting late this year or early 2024 for the inaugural launch of a 10.5-meter-tall sounding rocket with a 29-kilonewton thrust first-stage engine and a 14-kilonewton thrust second stage engine. Each engine is to be fueled by a **hydroxyl-terminated polybutadiene, paraffin and nitrous oxide** propellant. Anticipated to weigh around 700 kilograms, this rocket is projected to reach an altitude of 80 kilometers while carrying up to 50 kilograms of suborbital science experiments. To prepare for the inaugural launch, SRPL researchers developed and launched pilot sounding rockets in 2019 and 2022 to validate their two-stage rocket technology.

These milestones demonstrate the breadth of innovation and dedication underlying the field of hybrid rocket technology as well as the continued efforts and ingenuity of engineers driving the field forward. If all goes as planned, we are on an exciting trajectory for the future of space exploration. ★

▼ HyImpulse of Germany fired its HyPLOX75 hybrid rocket motor in August. These qualification tests were in preparation for the inaugural launch of the company's SR75 sounding rocket, targeted for 2024.

HyImpulse Technologies

