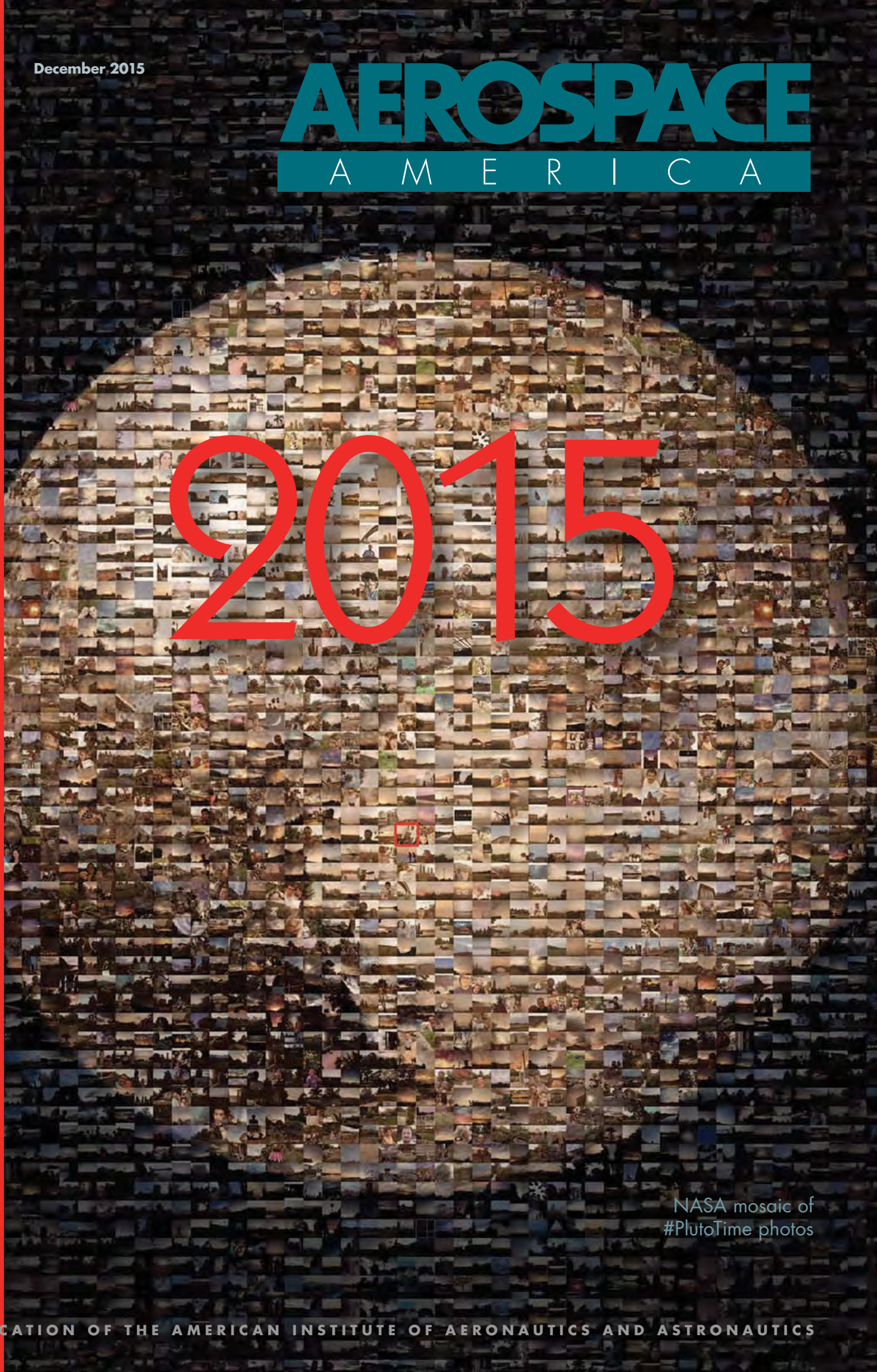
December 2015

# AEROSPACE AMERICA

in review

# 2015



NASA mosaic of #PlutoTime photos

A PUBLICATION OF THE AMERICAN INSTITUTE OF AERONAUTICS AND ASTRONAUTICS

The X-56A in flight at NASA's Armstrong Flight Research Center in Edwards, California.

NASA/Ken Ulbrich

# Advances in space vehicles

**by Jared Grauer and Christopher Karlgaard**

*The **Atmospheric Flight Mechanics Technical Committee** addresses the aerodynamic performance, trajectories and attitude dynamics of aircraft, spacecraft, boosters and entry vehicles.*

NASA took receipt of the **X-56A Multi-Utility Technology Testbed** from the Air Force Research Laboratory and began flight testing the aircraft in April at Armstrong Flight Research Center in California. The X-56A was designed by Lockheed Martin Skunk Works under contract to AFRL as a test bed for active flutter suppression and gust-load alleviation technology. NASA is testing it under the Advanced Air Transport Technology project. The April flight was the first of eight planned flights for envelope clearance using a relatively stiff wing, to be completed before progressing on to wings having less structural stiffness.

The mobile **Airborne Subscale Transport Research team** from NASA Langley Research Center completed flight tests of the Bat-4 portable unmanned aircraft in April at NASA's Wallops Flight Facility in Virginia. The flights were intended to demonstrate flight beyond visual range, which is a new capability for the team, and included a 6 nautical mile flight at 4,000 feet. Research maneuvers were also completed during the flight for efficient air data instrumentation calibration, real-time global aerodynamic modeling, real-time frequency response estimation and real-time fault detection.

In April, **Blue Origin** performed the first developmental flight test of its New Shepard space vehicle. The test included attaining Mach 3 and an altitude of 307,000 feet. The vehicle is designed to be a reusable and cost-effective means of transporting astronauts and researchers into sub-orbital space.


NASA's Low-Density Supersonic Decelerator

The Low-Density Supersonic Decelerator vehicle, developed and tested primarily by the NASA Jet Propulsion Laboratory, completed a flight test on June 8 at the **Pacific Missile Range Facility** on Kauai, Hawaii. The LDSD is designed to enable payloads up to three tons to be landed on Mars and employs an inflatable structure to decelerate the vehicle. The goal was to test two decelerator technologies: A **Supersonic Inflatable Aerodynamic Decelerator** for robotic missions, SIAD-R, and an improved Supersonic Ring Sail parachute. Lessons were incorporated from a 2014 flight test in which the Supersonic Disk Sail parachute was damaged. The SIAD-R deployed and functioned as planned, just as it did in the 2014 test, but again the parachute failed.

The National Transportation Safety Board held a hearing and issued a press release on July 28, regarding the October 2014 in-flight loss of the **Virgin Galactic VSS Enterprise**, or SpaceShipTwo, vehicle. The investigation found that the accident was caused by the co-pilot prematurely unlocking a movable tail section. It was also stressed that considering human factors, assessing safety, and anticipating human errors are critical to the continued success of manned spaceflight.

In August, the FAA granted Nevada approval to conduct flights at its unmanned aircraft systems test site during the night and up to altitudes of 1,200 feet, expanding its current capabilities. The test site is one of six set up around the country by the FAA for research into unmanned aircraft systems.