

# Research and Technology Studies (RATS) on an Asteroid

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The 2012 RATS team prepares for mission start in JSC's Building 9, with the prototype second-generation space exploration vehicle on the left and spectators in the overhead "catwalk." Photo: NASA

This week, NASA's Research And Technology Studies (RATS) team will convene at the Johnson Space Center (JSC) to begin their 15th mission. In the past, RATS missions have been conducted in remote desert locations and dubbed "Desert RATS," but RATS 2012 will be conducted in JSC's Building 9, the Space Vehicle Mockup Facility.

Building 9 offers a medley of tools and simulators that would be difficult to transport to a field test location. For these tests, the combination of hardware and software systems available in Building 9 have been configured and optimized for simulated missions to a near-Earth asteroid.



ARGOS can be used to make spacewalkers feel as though they weigh 1/6 of their weight, as they would on the moon, or 1/3, as on Mars. Photo: NASA

The prototype space exploration vehicle will be powered by a self-generating 3 kilowatt [fuel cell system](#), helping to build the case for fuel cells' viability as a long-term power source in space.

A virtual reality lab will provide an immersive environment for the extravehicular activity (EVA) crewmembers, integrating real-time graphics with crewmember motions and kinesthetic sensations of large objects – an asteroid in this case. The Active Response Gravity Offload System (ARGOS), a crane-based, reduced-gravity system, will allow crews to conduct EVAs in simulated microgravity.



A RATS Crew Member uses a virtual reality lab interface. Photo: NASA.

Throughout the mission, the four crew members will work to identify the most efficient crew distribution between the mock deep-space habitat workstation and the SEV. Throughout the 10-day mission, they will test several different configurations with simulated astronaut activities across the SEV, the deep-space habitat, and EVAs using the ARGOS or virtual reality lab.

In addition to the mission operations team, which will provide logistics and task timeline planning support, a team of scientists from the Astromaterials Research and Exploration Science Directorate will be onsite to ensure proper [scientific methods](#) are applied to asteroid sample collection techniques. Low-gravity environments like asteroids present special obstacles for collecting and containing geologic materials because loose samples could drift away and an astronaut could be propelled away from the surface just by hitting a rock with a hammer.

Provided by NASA

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