

# Exploration Planning and Operations Center Analog Missions

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As NASA embarks on the journey back to the Moon, we see that the execution of human spaceflight missions in the future will differ significantly from current missions. The longer distances and surface operations associated with missions to the Moon and Mars necessitate a change in operations concepts. At Johnson Space Center (JSC), the Advanced Operations Cadre (AOC) of the Mission Operations Directorate is developing “operations concepts” for future programs. We test these concepts here on Earth. An early way to test new operations concepts is through conducting exploration analog missions that mimic some characteristics of the Moon or Mars—landscape and geology, habitation, science operations, and/or engineering testbed. The AOC is especially interested in the planning and execution of space missions. It has constructed the Exploration Planning and Operations Center (ExPOC) as a mini-exploration control center from which to conduct exploration analog missions.

The ExPOC currently supports the following missions:

- NASA Extreme Environment Mission Operations (NEEMO)—During NEEMO, a crew of four dives down to the Aquarius habitat operated by the National Oceanic and Atmospheric Administration and the University of North Carolina, Wilmington. Aquarius is located in a national marine sanctuary off the coast of Florida. While the crew lives inside Aquarius, crewmembers perform many dives similar to crew experiences on the surface of the Moon or Mars. They also conduct many science and engineering experiments. The ExPOC serves as “mission control” during the dives and as a central point for data management. This includes talking with crewmembers during their dives—collecting data, providing instructions—and remotely commanding rovers and cameras.
- Desert Research and Technology Study (RATS)—The landscape and geology of Meteor Crater in Arizona provide

a Mars-like environment to test advanced space suits and other surface mission components such as rovers, robotic assistants, and science trailers. The ExPOC is connected to the remote site via a satellite network and participates in the traverses.

- In the past, the ExPOC has also participated in the NASA Haughton Mars Project at Haughton crater on Devon Island in the Canadian Arctic and in the NASA Oceanographic Analog Mission Activity, a joint film-making and exploration activity at Atlantic and Pacific hydrothermal vent sites coordinated among NASA, Blue Planet Marine Research Foundation, and XTREME Life Productions, Inc.

In the future, the AOC will use the ExPOC to conduct both NEEMO and Desert RATS missions as well as local custom-designed missions using a Mars analog field located on site at JSC. These analog missions will serve to continue to refine operations concepts for NASA missions of the future.