Shenzhou's Experiment Mystery

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The next Chinese astronaut launch is drawing closer. Shenzhou 6 will take off in a few months (probably October) with a two-man crew on board. The mission will stay aloft for roughly five days, representing an approximately tenfold increase in China's total man-hours aloft from the previous mission.

China has stated that the mission will feature easily removable spacesuits, enabling the crew to operate in shirtsleeve comfort for much of the mission. They will also make use of the relatively spacious Orbital Module at the front of the spacecraft, providing extra room for the astronauts and their equipment.

China has indicated that the crew of Shenzhou 6 will perform experiments on this mission, but so far, we have not seen a detailed description of what to expect. More details will probably emerge in the lead-up to the mission, but in the meantime, it's worth speculating on what will be carried up, and carried out on the flight.

China stuffed its first uncrewed Shenzhou test missions with a large variety of experiments, ranging from cosmic ray detectors to the ubiquitous seed packages that China flies on most of its recoverable spacecraft. With no crew on board, and no need to carry much logistics, there was plenty of room to fill. But the experiments were mostly shelved for Shenzhou 5.

Mission planners were understandably focused on the prime objective of the mission, which was to launch Yang Liwei into space and recover him

safely. Excessive payloads would only complicate the mission. Little else was flown apart from a CCD camera on the front of the spacecraft, and more seeds.

But China should now feel more confident about Shenzhou's ability to support its crew, and the presence of two astronauts on an extended mission should allow plenty of tasks to be achieved.

What can we expect to see on Shenzhou 6? It's almost inevitable that seed packages will fly again, stashed inside the descent module. They're light, non-hazardous, and require no intervention by the crew.

But if China is so obsessed with the concept of fusing horticulture with astronautics, it seems reasonable to expect that the crew could try to germinate seeds in space. A plant that sprouts quickly would be needed, as the flight will be rather short. The scientific returns from such a short-term experiment would be somewhat minimal, but the PR value would be high.

China will probably wire the crew of Shenzhou 6 with a variety of sensors to record their metabolic functions. It will also probably subject them to active physiological experiments to test their ability to work on an extended mission. Reflexes will be tested, and blood will probably be drawn.

A flight of several days will be more useful for biomedical studies than the one-day mission of Shenzhou 5, which did not permit much time for its commander to adjust to weightlessness.

Placing animals on board Shenzhou seems to have been a taboo issue in the past. They're unpredictable and messy. It's unlikely that a complex live animal payload will fly on Shenzhou 6, due to space limitations and the difficulties of managing them. But frog or fish eggs could be carried

in a sealed container, cushioned from acceleration by the water around them.

Earth Observation has been a common element of every advanced space program, and China has pursued its own EO activities with vigour. Film cameras have been the primary payload of most of China's bullet-shaped FSW recoverable satellites, and Shenzhou 5 carried a high-resolution electronic camera.

There could be a camera mounted on the orbital module of Shenzhou 6, but there could also be another camera inside. China could elect to carry a high-resolution film camera, possibly similar to the FSW payloads, inside the Shenzhou 6 orbital module.

The crew could operate the camera manually, taking photographs of pre-designated locations, and also possibly examining "targets of opportunity". Film cartridges could be transferred back to the Descent Module for the return to Earth, and the camera itself could be left in orbit.

The Orbital Module will probably carry a few compact experiments fitted into small boxes, some of which may operate autonomously. There could be small fluid cells to document thermal convection or mixing. Some engineering tests of electronics or mechanical components could be done.

It would also be practical to carry another laser reflector on the exterior of the orbital module. Shenzhou 4 carried one such device, and it was used in successful tracking experiments by astronomers in China and elsewhere in the world. The devices are easy to attach to a spacecraft, so China is likely to fly them again in the future.

But not everything flown on Shenzhou 6 will be scientific or technical.

There will be flags and commemorative items. Earlier this year, the Chinese media released a vague call for people to send in trinkets to be flown on the mission, but Chinese authorities rapidly went silent on the matter. It's possible that such plans have been curtailed.

In a few months time, more should be made clear.