

Ambitious Arab mission to explore seven asteroids, including a very red one

Lynette Cook/ W. M. Keck Observatory/ ROOM

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About a year and a half ago, the United Arab Emirates announced an ambitious deep space mission to explore the asteroid belt, with the aim of visiting seven different asteroids.

The Arab country, working with the University of Colorado Boulder, aimed to launch the mission as soon as 2028. It envisioned the probe as a suitable follow-up to the successful launch and flight of the Emirates Mars Mission, which reached orbit around Mars in early 2021 and is continuing to study the red planet's thin atmosphere and seasonal weather variations.

"The new mission we are mounting to explore the asteroid belt takes us to yet another level of complexity and capability development, and represents a quantum leap forward for the development of the Emirates' space sector," Sarah Al Amiri, chair of the UAE Space Agency, said upon announcing the country's second interplanetary mission.

However, what was not detailed back in 2021 was the specific asteroids the mission will visit. But now, thanks to a poster that will be presented next month at the Asteroids, Comets, Meteors Conference in Arizona, we know. After making gravity-

assist flybys of Venus, Earth, and Mars, the spacecraft will visit seven main-belt asteroids, with six of these being high-speed encounters before ultimately a rendezvous with the asteroid 269 Justitia.

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- Flyby: 10253 Westerwald
- Flyby: 623 Chimaera
- Flyby: 13294 Rockox
- Flyby: 88055
- Flyby: 23871
- Flyby: 59980
- Rendezvous: 269 Justitia

The asteroid named 269 Justitia is fairly large, with a diameter of approximately 53 km. Perhaps more intriguingly, the asteroid has a very reddish hue, as discovered just a couple of years ago by astronomers at the Infra-red Telescope Facility and Seoul National University Astronomical Observatory.

This color is likely due to the presence of organic compounds called tholins on its surface. Tholins are abundant on Pluto and other icy bodies in the outer Solar System, and it is therefore likely that 269 Justitia formed beyond Neptune before being captured by the inner Solar System.

“If Justitia indeed formed in the most distant reaches of the Solar System, the mission will provide us with a front row seat to what large objects currently residing beyond Neptune are really like,” the authors of a corresponding paper say.

The current plan calls for the first asteroid flyby to occur in 2030, with five additional flybys before a rendezvous with 269 Justitia in April 2034. At this point, the spacecraft, using its solar-electric propulsion system, will characterize the surface composition, geology, and gravity field of Justitia through multiple orbits of varying altitude.

From a scientific standpoint, the UAE asteroid mission seeks to better explain the origin and evolution of water-rich asteroids, as well as understand their potential as resource depots for future deep space exploration missions.

In addition to conducting science, another goal is public engagement. UAE officials hope that probes like this one, and the previous mission to Mars, inspire a new generation of scientists and engineers in the Middle East.

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