Tracing elusive exomoons

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In news– Scientists have recently formulated a model to trace elusive exo-moons from James Webb Space Telescope (JWST) data.

ABout the model-

- **So far, five thousand exoplanets – planets orbiting stars other than the Sun, have been discovered** by using several **ground-based and space telescopes such as Kepler, CoRoT, Spitzer,** and Hubble space telescopes.
- However, the natural satellites or exomoon around any of these planets still remain untraced.
- **The Solar system is constituted of a large number of natural satellites with various sizes and mass,** and many of them influence the ambient environment of the Solar planets.
- **While most exoplanets are detected through photometric transit methods**, signals from exo-moons are too weak to detect mainly because of their extremely small size.
- **Scientists at the Indian Institute of Astrophysics(IIA), Bangalore**, an autonomous institute of the Department of Science and Technology, **have demonstrated that the newly launched James Webb Space Telescope (JWST) is sufficiently powerful to detect the transit signal of exomoons** in the photometric light curves of moon hosting exoplanets.
- **A professor from IIA developed an analytical model that uses the radius and orbital properties of the host planet** and its moon as parameters to model the photometric transit light curve of moon-hosting exoplanets by incorporating various possible orientations of the moon-planet-star system.
- **The co-alignment or non-coalignment of the orbits of the planet and the moon are used as parameters** (using two angular parameters), and they can be used to model all

the possible orbital alignments for a star-planet-moon system.

- **According to the researchers, an exo-moon around a gas giant planet like Jupiter in the habitable zone of the host star** where temperature is appropriate for water to exist in liquid state may harbour life.
- Under favourable alignment of moon-planet-star, such exomoon may also be detected by JWST.

What is exo-moon?

- An exomoon or extrasolar moon is a natural satellite that orbits an exoplanet or other non-stellar extrasolar body.
- Though exomoons are difficult to detect and confirm using current techniques,observations from missions such as Kepler have observed a number of candidates, including some that may be habitats for extraterrestrial life and one that may be a rogue planet.
- To date there are no confirmed exomoon detections.

Further reading: https://journalsofindia.com/james-webb-telescopes-first-images/