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ALIEN ACTIVITY ON DISTANT PLANETS COULD BE SPOTTED BY THE JAMES WEBB SPACE TELESCOPE

While greenhouse gases cause problems for our climate, their signature could be a tell-tale sign of alien life on other worlds

To any alien beings out there: if you terraform a planet (deliberately modify an environment to make it hospitable for life), we might be able to spot you. That's thanks to a new study from the University of California, Riverside, which has identified the artificial greenhouse gases that would be obvious giveaways of terraforming activity.

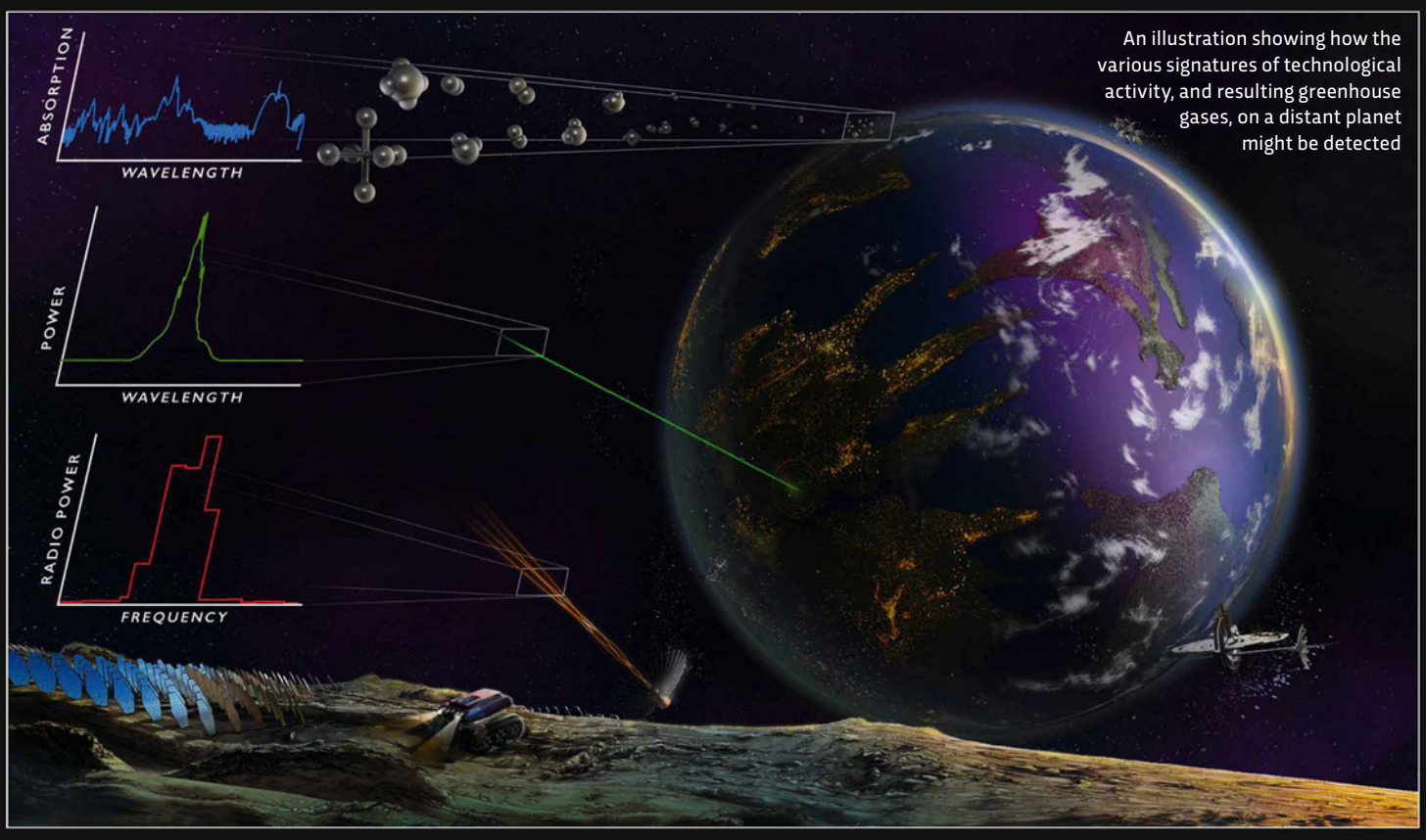
Those gases – fluorinated versions of methane, ethane and propane, along with gases made of nitrogen and fluorine or sulphur – could be detectable in planetary atmospheres outside the Solar System using existing technology. This means the James Webb Space Telescope (JWST) could one day find an alien civilisation.

In large volumes, such gases would act as pollutants on Earth, but there are reasons why extraterrestrials would potentially use them on an exoplanet. Sulphur hexafluoride, for example, has 23,500 times the warming power of carbon dioxide, so a small amount could heat a freezing planet to the stage of creating liquid water persistently.

"[They'd] be good for a civilisation that wanted to forestall an impending ice age or terraform an uninhabitable planet in their system, as humans have proposed for Mars," said Dr Edward Schwieterman, an astrobiologist and lead author of the study published in *The Astrophysical Journal*.

Yet these gases are not known to occur naturally in large quantities. If we were to find them, it would imply a sign of intelligent, technology-using life forms. They're also exceptionally long-lived and would persist in Earth-like atmospheres for up to 50,000 years. This could mean that the JWST picks up their infrared signature on terraformed planets.

While the researchers can't quantify the likelihood of finding these gases, they are confident that, if they're there, they can be detected during currently planned missions. "You wouldn't need extra effort to look for these signs, if your telescope is already characterising the planet," said Schwieterman. "It would be jaw-droppingly amazing to find them."



An illustration showing how the various signatures of technological activity, and resulting greenhouse gases, on a distant planet might be detected