

Atmospheric Beacons of Life from Exoplanets Around G and K Stars

What is the science question?

What are the simplest signs of life on exoplanets and how are they formed?

What were your findings?

- The study used an Earth science model to calculate just how much nitric oxide and hydroxyl would form and how much ozone would be destroyed in an Earth-like atmosphere around an active star.
- Incorporating data from Thermosphere Ionosphere Mesosphere Energetics Dynamics (TIMED), the researchers exposed their model atmosphere to the space weather they'd expect from a cool, active star.
- They found that ozone drops to a minimum and supplies the production of atmospheric beacons of life.

What was the impact?

- Such signatures can form in planetary atmospheres under the onslaught of stellar storms.
- Cooler stars (compared to the sun) bombard exoplanet upper atmospheres with high-energy particles.
- High-energy particles reaching an exoplanet breakdown molecular nitrogen and oxygen – key prerequisites for life as we know it -- into compounds that can be easily detected.
- Detecting such signatures would point to the existence of the original crucial atmospheric gases.

Why does it matter to non-scientists?

Detecting these compounds points to the existence of nitrogen and oxygen – and thus the possibility of a habitable world – one needle in a vast haystack of exoplanets.



Sun-like stars are turbulent in their adolescence, frequently producing powerful storms that fling stellar particles to near-light speeds. Cooler stars may continue to produce strong storms for billions of years, exposing an exoplanet to a long-term particle onslaught.