

Columbia crew catches a mysterious TIGER in the Indian Ocean

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An unprecedented flash observed by the space shuttle Columbia crew in 2003 over the Indian Ocean may be a new type of transient luminous event, like lightning sprites, but one that is not necessarily caused by a thunderstorm. The discharge was observed less than two weeks before the shuttle was lost during its Earth reentry.

The authors describe the discharge as a Transient Ionospheric Glow Emission in Red, or TIGER, event. It was recorded by a video camera in the near-infrared spectrum in the nighttime sky just south of Madagascar on 20 January 2003.

The authors analyzed the video several months later and found what visually looks like a bright flash. They report that the emission did not resemble any known class of luminous events, which typically appear in conjunction with thunderstorm activity.

The space shuttle experiment that observed the unusual discharge was conducted by Israeli astronaut Ilan Ramon as part of the MEIDEX (Mediterranean Israeli Dust Experiment), and is reported by Yoav Yair of the Open University of Israel and an international group of colleagues. The article will be published on 18 January in *Geophysical Research Letters*, a journal of the American Geophysical Union.

The researchers also analyzed ground and satellite measurements of lightning in the region and note that the particular flash was not detected by equipment monitoring the skies for electromagnetic radiation in the very low and extremely low frequency domains usually associated with

strong lightning discharges. In fact, no cloud-to-ground lightning was seen in the area for nearly two seconds around the emission's detection time. They note, however, that meteor trails were observed by the same equipment on another orbit two days later and posit that an extraterrestrial source of the event cannot be discounted.

They note that the TIGER event was delayed from a distant lightning flash far longer than previously observed sprite or ELVES discharges and did not retain the jellyfish like (sprites) or doughnut (ELVES) shape often seen in those emissions. Most sprites, for example, appear within 10 milliseconds or less after strong positive cloud-to-ground flashes, while the observed event was delayed for nearly a quarter of a second and was approximately 1,000 kilometers [600 miles] removed from the closest visible lightning flash. For those reasons and the fact that 17 other luminous emissions detected at other times by the Columbia equipment were easily classified, the authors believe that the unusual event was likely a new type of emission, rather than a delayed sprite.

"The major point of this research, in my mind, is to show that there are some upper atmosphere processes that we do not know enough about," Yair said about the study. "The best way we can monitor or research this properly is from space."

The research team found no errors in its equipment and note that the sky was clear in the direct vicinity of their observations, leading them to discount suppositions that the emission may have been a reflection from another type of flash. They also suggest that meteors--still another possibility--would likely have produced a continuous trail of emissions that would have been seen during the short period when the astronauts observed and recorded the flash.

A third proposed explanation is that electron beams emitted from lightning in thunderstorms believed to be present near Cyprus at around

the same time may have been carried by the Earth's geomagnetic field into the upper atmosphere and created a purple glow near Madagascar, similar to a sprite that would have had nearly equal red and blue intensities. The authors discount that possibility, however, noting that the thunderstorm did not produce strong enough lightning to spark the TIGER event. The researchers indicate that further space-based observations may be able to detect similar instances of such emissions and help to solve the mystery of its cause.

Source: American Geophysical Union

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