

Researchers rendezvous with falling space debris

Jet affords observations of WT1190F as object plummets through Earth's atmosphere.

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Update, 13 November 20:40: This story has been updated with a report from the observing aircraft that pursued WTF1190F.

As his chartered jet flew on and on, astronomer Peter Jenniskens began worrying hard. Clouds filled the sky, threatening to obscure the space debris that he had come halfway around the world to see.

Then the pilots manoeuvred the jet, and “it was like a curtain opened,” says Jenniskens, a senior research scientist at the SETI Institute in Mountain View, California. “The sky turned blue, and then a minute or two later, a white dot appeared and developed into this fragmenting object.”

It was the object the researchers had been pursuing for hours: a piece of space debris, designated WT1190F, plummeting to Earth. Thanks to that hole in the clouds, Jenniskens and the other researchers on the plane watched as the debris self-destructed in the atmosphere at 6:18 a.m. GMT on 13 November.

The object blossomed into a fireball brighter than Venus, then quickly fell apart into small fragments and a debris cloud. That pattern suggests that it was more fragile than the solid chunk of spacecraft that some thought it might be. But Jenniskens declines to speculate.

The object's true identity may lie in the wealth of information obtained by the instruments on the jet. Not all of them collected data, but enough did that they generated “fantastic data ... that will be of interest for a long time to come,” Jenniskens says. The researchers on the jet — from the United States, Germany and the United Arab Emirates — obtained spectra that should help identify the debris, and imagery that will pinpoint the altitude, timing and chronology of the object's demise.

The event was a washout on the ground. Clouds and rain foiled a team that journeyed from France to monitor the re-entry from the Sri Lankan town of Ambalangoda, said team member Auriane Egal of the Paris Observatory. Sri Lankan

IAC/UAE Space Agency/NASA/ESA
The object WT1190F streaked through the sky over the Indian Ocean on 13 November.

observers at several other locations were also clouded out.

Mystery origin

Estimated to measure 1–2 metres across, WT1190F had circled the Earth–Moon system since at least 2009, says independent astronomy-software developer Bill Gray, who has been working with NASA to track the debris. It most likely came off a recent lunar spacecraft, but it is not out of the question that it dates to the Apollo era.

The data gathered will allow researchers to improve models of incoming orbital objects, a rare opportunity because there's so seldom warning that a big object is about to dive into the atmosphere. The successful flight shows that it should be possible to observe a re-entering asteroid with some advance notice, Jenniskens says.

The flight was “a major scientific success,” says physicist Mark Boslough of Sandia National Laboratories in Albuquerque, New Mexico. The research team “has, for the first time, demonstrated that observations of a predicted entry can be made even under difficult conditions”.



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Stefan Loehle and Fabian Zander of the University of Stuttgart, Germany, prepare to observe WT1190F as it plunges to Earth.

Ahead of the impact, researchers transformed a chartered executive jet into an observing platform outfitted with roughly 20 cameras. The jet was slated to monitor the re-entry at an altitude of 12,000 metres from a distance of 100 to 200 kilometres.

The jet's orientation had to be just right, which researchers preparing for the flight regarded as a challenge. “We're working with commercial pilots who've never done this before, so it will be very interesting to see how this comes together,” Jenniskens said before the flight.

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Updates & Corrections

Updated: Updated, 2 p.m. BST: Added confirmation that researchers observed the object from an aeroplane.

Corrected: This story originally misstated the primary affiliation of Peter Jenniskens, who is an employee not of NASA, but of the SETI Institute. The story has been corrected.