

2011 Draconid meteor shower deposited a ton of meteoritic material on Earth

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A study led by researchers from the Spanish National Research Council shows that about a ton of material coming from comet 21P/Giacobini-Zinner was deposited in the Earth's atmosphere on October 8th and 9th 2011 during one of the most intense showers of shooting stars in the last decade, which registered an activity of more than 400 meteors per hour.

Every 6.6 years, the [comet](#) Giacobini-Zinner circulates through the [inner solar system](#) and passes through the perihelion, the closest point to the Sun of its [orbit](#). Then, the comet sublimates the ices and ejects a large number of particles that are distributed in filaments. The oldest of these particles have formed a swarm that the Earth passes through every year in early October. The result is a Draconid meteor shower –meteors from this comet come from the northern constellation Draco–, which hits the Earth's atmosphere at about 75,000 km/h, a relatively slow speed in

comparison with other meteoric swarms.

Josep Maria Trigo, researcher from the CSIC Institute of Space Sciences (ICE), states: "When a comet approaches the Sun, it sublimates part of its superficial ice and the gas pressure drives a huge number of particles that adopt orbits around the Sun, forming authentic swarms. The study shows that in the evening from October 8th to 9th 2011, the Earth intercepted three dense spindles of particles left behind by the comet when it crossed through the perihelion".

The researchers, who published their results in the *Monthly Notices of the Royal Astronomical Society* magazine, have obtained the orbits of twenty meteors in the solar system. Thus, they have confirmed the origin of the particles that caused the outbreak in that [periodic comet](#). For this, they have count on 25 video-detection stations operated by the Spanish Meteor and Firewall Network (SPMN) and the collaboration of [amateur astronomers](#).

Two of those filaments of [meteoroids](#), which had been theoretically predicted already, have been identified by scientists with those left by the comet in 1874, 1894 and 1900. Nevertheless, researchers have confirmed that there was another dense region intercepted by the Earth which had not been predicted and that involves a new challenge for theoretical models.

In a second article, researchers analyze the chemical composition of six fireballs from that swarm of the comet recorded during the outbreak. José María Madiedo, researcher from the University of Huelva and coordinator of this second study, asserts: "One of them, with an initial mass of 6 kg and nearly half a meter in diameter, named Lebrija in honor of the city it over flew, came to compete with the brightness of the moon that night".

The six analyzed fragments have a possibly similar composition to the carbonaceous chondrites (a type of organic-rich meteorites) but they are much more fragile. Trigo emphasizes: "They don't seem to have suffered any chemical alteration during their brief stay in the interplanetary environment, which turns out to be very interesting to confirm the astrobiological role of these particles in the continuous transportation of water and organic material to the Earth".

Provided by Spanish National Research Council

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