Return of the Leonids

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A composite, all-sky image of the 2008 Leonid outburst over Colorado. Credit: Chris Peterson, Cloudbait Observatory.

Astronomers from Caltech and NASA say a strong shower of Leonid meteors is coming in 2009. Their prediction follows an outburst on Nov. 17, 2008, that broke several years of "Leonid quiet" and heralds even more intense activity next November.

"On Nov. 17, 2009, we expect the Leonids to produce upwards of 500 meteors per hour," says Bill Cooke of the NASA Marshall Space Flight Center. "That's a very strong display."

Forecasters define a meteor storm as 1000 or more meteors per hour. That would make the 2009 Leonids "a half-storm," says Jeremie Vaubaillon of Caltech, who successfully predicted a related outburst just

a few weeks ago.

On Nov. 17, 2008, Earth passed through a stream of debris from comet 55P/Tempel-Tuttle. The gritty, dusty debris stream was laid down by the Leonids' parent comet more than five hundred years ago in 1466. Almost no one expected the old stream to produce a very strong shower, but it did. Observers in Asia and Europe counted as many as 100 meteors per hour.

Vaubaillon predicted the crossing with one-hour precision. "I have a computer program that calculates the orbits of Leonid debris streams," he explains. "It does a good job anticipating encounters even with very old streams like this one."

The Nov. 17, 2008 outburst proved that the 1466 stream is rich in meteor-producing debris, setting the stage for an even better display in 2009.

On Nov. 17, 2009, Earth will pass through the 1466 stream again, but this time closer to the center. Based on the number of meteors observed in 2008, Vaubaillon can estimate the strength of the coming display: five hundred or more Leonids per hour during a few-hour peak centered on 21:43 UT.

"Our own independent model of the debris stream agrees," says Cooke. "We predict a sub-storm level outburst on Nov. 17, 2009, peaking sometime between 21:34 and 21:44 UT."

The timing favors observers in Asia, although Cooke won't rule out a nice show over North America when darkness falls hours after the peak. "I hope so," he says. "It's a long way to Mongolia."

Many readers will remember the great Leonid showers of 1998-2002.

The best years (1999 and 2001) produced storms of up to 3000 Leonids per hour. The 2009 display won't be so intense. Instead, if predictions are correct, next year's shower could resemble the 1998 Leonids, a "half-storm"-level event caused by a stream dating from 1333. That old stream turned out to be rich in nugget-sized debris that produced an abundance of fireballs. Many observers consider the 1998 Leonids to be the best they've ever seen.

Could 2009 be the same? Vaubaillon expects a similar number of meteors but fewer fireballs. If the models are correct, the 1466 stream in Earth's path contains plenty of dust but not so many nuggets, thus reducing the fireball count. On the bright side, the Moon will be new next Nov. 17th so nothing will stand in the way of the shower reaching its full potential.

Provided by Dr. Tony Phillips, Science@NASA