

Are the Leonid Meteor Storms Coming?

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On Nov. 17, 1966, one and a half years after the return of comet 55P/Tempel-Tuttle, an extraordinary Leonid meteor storm (144,000 per hour) was witnessed by startled observers in the central and western United States. With an orbital period of 33 years, the next return to perihelion will be Feb. 28, 1998 and the potential exists for strong meteor showers or storms from the constellation Leo in November of 1998 and 1999.

Using astrometric observations made in 1965, 1865-66, and 1699, an improved cometary orbit has been computed. Although not included in the orbit determination process, observations recorded by the Chinese in 1366 are also well represented. In an effort to identify earlier observations, the comet's motion was integrated backwards for 2400 years. Apart from a possible Chinese sighting in Jan. 1035, no additional observations were located in the literature. Using the predicted orbital elements for the 1998 return of the parent comet, we conducted an investigation into the circumstances of the Leonid meteor showers in the coming years. Assuming the Leonid meteor particles closely follow the motion of the parent comet, the Earth will pass 0.008 AU outside the point where the comet passes through its descending node. The times at which the Earth passes nearest this point (predicted shower maxima) are 1998 Nov. 17.822 and 1999 Nov. 18.075 UTC. Because the distribution of the particles flying in formation with the parent comet is poorly known, no secure predictions can be made for Leonid meteor storms in the coming years. The 1998-99 circumstances are similar to those in 1866-67 when hourly rates of up to 5,000 were reported but also similar to the 1931-32 circumstances when the rate was only 200. In the coming years, meteor observers will be monitoring the mid-November skies for any indication that the Leonid meteors, after laying dormant for 33 years, will once again roar out of Leo.