

# RECENT VISUAL OBSERVATIONS OF THE LEONID METEOR SHOWER

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## 1. Introduction

We know the Leonid shower primarily from its record of visual appearances over the last millenium. The period of the stream and its status as a cosmic phenomenon are all intimately linked to historical visual observations of the stream. The advent of modern observational techniques in meteor astronomy such as radar and photography has not decreased the value of visual recordings of the stream; on the contrary, visual observations form our primary means of long-term monitoring of the shower.

Over the last decade, the organized legions of amateur visual meteor observers have provided a near continuous global record of the activity of the Leonids. Interest in the shower by amateur visual observers over the next few years will certainly increase and this ensures that reliable measures of the flux and particle makeup in the stream will be taken.

## 2. Recent Activity

The last major outburst recorded from the Leonids occurred in 1969. Since then the shower has been quiescent, with no indications of any unusual activity detected by visual observations. It is important to note that global, nearly continuous coverage of the shower did not begin until the late 1980's and hence unusual activity might have been missed in earlier years.

From 1988–1993 intensive visual observations of the shower revealed no significant change from year to year. The average peak ZHR over this interval was 10 and the mean population index for the stream was near 2.0.

In 1994 the first outburst of the current Leonid epoch occurred, with peak ZHRs nearly an order of magnitude larger than had been recorded in the previous 6 year interval. The outburst was of long duration, but computation of the population index in order to yield the particle composition throughout the stream and precise quantification of the ZHR profile was not possible due to a full moon and a very small number of contributing visual observers.

In 1995 and 1996, similar outbursts were detected, but with shorter duration than in 1994 and possibly containing a narrow component of higher activity and fainter meteors. The peak flux for the 1996 shower was found to be  $0.012 \pm 0.004$  meteoroids  $\text{km}^{-2}\text{hour}^{-1}$  for meteoroids producing meteors brighter than absolute magnitude +6.5. The following tables summarize visual results obtained from the International Leonid Watch of the International Meteor Organization over the last 8 years.

TABLE 1. Visual observations of the Leonid shower from 1988–1996. The duration gives the interval in solar longitude over which the ZHR was greater than 0.5 of its peak value, which is shown in column 3. All solar longitudes are J2000.0

Year(s)	Solar Longitude Location of Peak	Maximum ZHR	Duration (HWHM)
1988–1993	$235^{\circ}5 \pm 0^{\circ}3$	$\sim 10$	$2^{\circ} \pm 1^{\circ}$
1994	$235^{\circ}8 \pm 0^{\circ}5$	$\approx 100$	$0^{\circ}6 \pm 0^{\circ}4$
1995	$234^{\circ}9 \pm 0^{\circ}2$	$50 \pm 20$	$0^{\circ}2 \pm 0^{\circ}1$
	$235^{\circ}5 \pm 0^{\circ}2$	$35 \pm 10$	$0^{\circ}3 \pm 0^{\circ}1$
1996	$235^{\circ}17 \pm 0^{\circ}05$	$90 \pm 25$	$0^{\circ}07 \pm 0^{\circ}02$
	$235^{\circ}4 \pm 0^{\circ}1$	$45 \pm 5$	$0^{\circ}6 \pm 0^{\circ}2$

TABLE 2. Number of contributing observers, recorded Leonids and total observation hours for each interval listed in Table 1.

Year(s)	Number of Observers	Number of Leonids	Total Observation Hours
1988–1993	182	2697	1100
1994	25	398	61
1995	137	3117	404
1996	109	4449	440