***Leonids Made Easy***

**What are the Leonids?**

The Leonids are a meteor shower. They are called the Leonids because they appear to radiate out of the constellation Leo. A Meteor, also known as a "shooting star," is a particle from space. Its typical size ranges from that of a grain of sand to that of a pea. A meteor appears when it enters Earth's atmosphere and burns up high overhead. Meteors can be seen on any night, but Earth enters clouds of particles several times each year and the result is a meteor shower.

**What Do the Leonids Look Like?**

All meteors appear as brief streaks of light moving a short distance across the sky. Some meteors move slow and some move fast. Here is a video of a bright, slow meteor. Note that a streak persisted for a little while after the meteor vanished. This "streak" is called the train and is basically a trail of glowing dust left in the wake of the meteor.

The Leonids are fast meteors and they leave lots of trains. They enter Earth's atmosphere traveling at speeds of over 158,000 miles per hour (mph). For comparison an Indy race car can reach a top speed of about 250 mph, the fastest jet has a top speed of 2190 mph, and an orbiting spacecraft has an average speed of 20,000 mph.

Besides being fast, the Leonids usually contain a large number of very bright meteors. The trains of these bright meteors can last from several seconds to several minutes.

**Where Do the Leonids Come From?**

Most if not all meteor showers are produced by comets. In the case of the Leonids the parent comet is named Tempel-Tuttle and it makes an appearance in our skies every 33 years. Comets are composed of ice and dust. Every time a comet approaches the sun the ice melts and dust is released. Eventually the dust spreads completely around a comet's orbit, but most of the dust stays close to the comet. When Earth passes through the dense cloud of dust the result is a spectacular meteor shower or a meteor storm. Meteor storms produce several thousand meteors per hour.

**When Do the Leonids Occur?**

Every November 17-18 Earth crosses the orbit of comet Tempel-Tuttle and the Leonids become visible. An observer with clear, dark skies can see 10 or 15 Leonid meteors every hour on that morning. Unless an observer is living at a very high northern latitude (generally within the Arctic Circle), the Leonids are only visible during the morning hours.

Since Tempel-Tuttle passed closest to the sun in February of 1998, the years 1998 and 1999 were expected to produce very strong displays. During 1998 the Leonids peaked over Europe with hourly rates of 250-300, while in 1999 astronomers are predicting an even better display over western Europe and the Atlantic. During the mornings of November 17 and 18 observers anywhere in the Northern Hemisphere should see greater than normal displays. Start watching sometime after about 11:30 p.m. local time (because of Earth's rotation, local time literally means "your time"). The radiant will still be about an hour from rising, but you will have the opportunity to see the "Grazers". These are Leonids that are not dropping down into Earth's atmosphere, but are instead grazing the atmosphere. These appear as reddish meteors that advance from east to west across a large part of the sky. In 1998 there were reports that several east coast television stations were receiving calls that rockets were seen crossing the sky. These "rockets" were in fact the Leonid grazers. As the radiant rises near 12:30 a.m. local time, the Leonids will travel shorter distances across the sky as they drop down into the atmosphere. Their color will also change to white and blue-white. Some of the brightest will actually appear slightly greenish. As the morning progresses, meteor rates should generally increase. Keep watching until morning twilight begins.

**How Do You Observe the Leonids?**

The point from where the Leonid meteors appear to radiate is located within the constellation Leo and is referred to as the radiant. The radiant is located in the western portion of that constellation in what is commonly referred to as the "sickle" or "backwards question mark." The radiant location with respect to the horizon is shown below.

(Image produced by the Author using Starry Night 2.0 and Adobe Photoshop 5.0. It represents the view from mid-northern latitudes at about 3:00 a.m. local time.)

To best observe the Leonids wear appropriate clothing for the weather. Lie outside in a reclining lawn chair with your feet pointing towards the east (the general direction of the radiant). Do not look directly at the radiant, but at the area above and around it. The Leonids can be observed into morning twilight. Other minor meteor showers will be going on at the time and stray meteors, more commonly called sporadics, will frequently be seen that do not belong to a meteor shower. When you see a meteor mentally trace it backwards and if you arrive at the "sickle" of Leo it is probably a Leonid.