

Geminids!

By: Germán Morales Chávez

The Geminids are a **meteor shower**, specifically, the meteors are very small particles commonly detached from a comet in its successive passages by the proximity to the Sun in its orbit (Perihelion) that ingress in our atmosphere. Sometimes, the progenitors of these streams of particles are asteroids, as in the present case where the asteroid 3200 Paheton is responsible for this "rain".

What is a Shooting Star?

Generally, the public and sometimes amateurs, and even some professionals in astronomy, speak of *stars shower*. This term derives from the very old belief that those fleeting luminous phenomena that were seen were small stars "falling" from the sky. Of course, it is an incorrect term, which usage is discouraged, especially if people who are supposed to know about the subject employ it. The proper term is **meteor shower**¹.

What is a Meteor Shower?

As we indicated in the introduction to this note, in its orbit around the Sun, there are bodies (such as comets) from which gigantic amounts of particles are released. These are very small, generally with masses less than 2 grams, about the size of a grain of rice. These particles are distributed along a widened stream that is associated with the orbit of the comet (or asteroid in this case), and that the Earth passes through annually.

It is called *rain* because on certain occasions, there have been streams that produced thousands and hundreds of thousands of meteors per hour giving the impression of a shower of luminous strokes. The perspective effect (since when they reach the Earth, these particles are moving parallel to each other) makes us perceive that all these meteors come from a small sector of the sky, called radiant.

Usually, the activity that can be seen ranges from 40 to 200 meteors per hour in optimal visibility conditions and during the maximum; this depends on various factors.

From the city (due to the light pollution), and if the radiant is not at the highest point in the sky (Zenith), then that number is lower.



Fig. 1 Photograph of a Meteor Shower; It is a composition of several shots over an hour, where it can be seen that most of the meteors seem to come from a region of the sky, except for some sporadic ones that do not belong to the radiant, as one can see in the image.

¹ Meteor is the name given to a phenomenon produced in the atmosphere (winds, lightning, rains, etc., they are meteors). In the case of astronomy, the name refers to the light phenomenon produced by the ionization of atoms or molecules in the atmosphere due to the entry of a meteoroid. There are other terms such as *bolide* or *fireball* for meteors much brighter than the usual ones. It is a very extensive subject to explain, as the reader can infer.

How long can meteor showers be seen?

Depending on the age of the stream, the activity of a meteoric radiant can sometimes last for several weeks. For younger streams, it is usually reduced to a couple of weeks. Of course, the initially observed activity is minimal and increases to a maximum to decline again.

Activity can vary over the years, sometimes presenting spectacular increases, which today can be better predicted due to the detailed study of these streams, which is achieved thanks to the contribution of thousands of world observers who report their records.

How to observe the Geminids?

The observation schedule depends on when the radiant is above the horizon.

The Geminids are active from December 4 to December 20. Its maximum commonly occurs between December 13 and 14; being able to exceed 100 meteors per hour under ideal observation conditions (which do not correspond to our latitude and less if it is observed from cities). The maximum activity is estimated to occur around 9 pm (Bolivian time) on Sunday the 13th. At that time, the radiant is still below the horizon for us. We will have to wait a half hour for said radiant to begin to be visible (Gemini will be seen at that time towards the northeast horizon).

Of course, the lower the radiant above the horizon, the fewer meteors it is possible to observe, so the probability of seeing more meteors coming from the radiant increases as the hours go by. By 22 to 23 hours, the radiant is high enough above the horizon to appreciate a good number of meteors.

In a practical way, just look to the northeast, looking at about 45° above the horizon, and our visual field will cover a wide region of the sky, where we can see the meteors “appear”. You have to provide yourself with comfort to sit, and be patient by observing for an hour or two (a little more or a little less) depending on interest.

In recent years, the Geminids have shown a considerable increase compared to past decades, and they present bright meteors, which gives us hope of being able to appreciate something from our city. It is best, however, to try to observe them from a place away from the disturbing city lights.

There is no reason to focus exclusively on the night of December 13 to 14; you can try to observe the Geminids from about two nights before and up to two nights after.

Of course, the number of meteors observed will be less than at night of the maximum, but that helps to appreciate the increase and decrease of activity (of course, this is a tip for those more interested). Amateurs commonly carry out an observational activity of a week (at least) of data collection, focused on the maximum to have a more complete record of the evolution of meteoric activity of the current, which is an indication of the distribution and density of particles in said stream.

The graph at the end of this note shows the appearance of the sky at 23 hours from Cochabamba, with the constellations visible towards the region of the sky centred in the northeast, which can be useful to recognize one section of the sky and know where to look.

This year, the Moon will be in a new phase on the 14th, so it will not produce light disturbance that would cloud the observation of the Geminids.

Of course, if it is cloudy, we will not be able to appreciate the meteor shower (in that case, there is the possibility of a real shower -but of water-). The advance with which these articles are written does not allow us to give a more complete forecast of cloudiness, but given the time of year and the

long-term forecasts, we should expect cloudy skies in much of Bolivia. In these cases, our recommendation is to attempt observation.

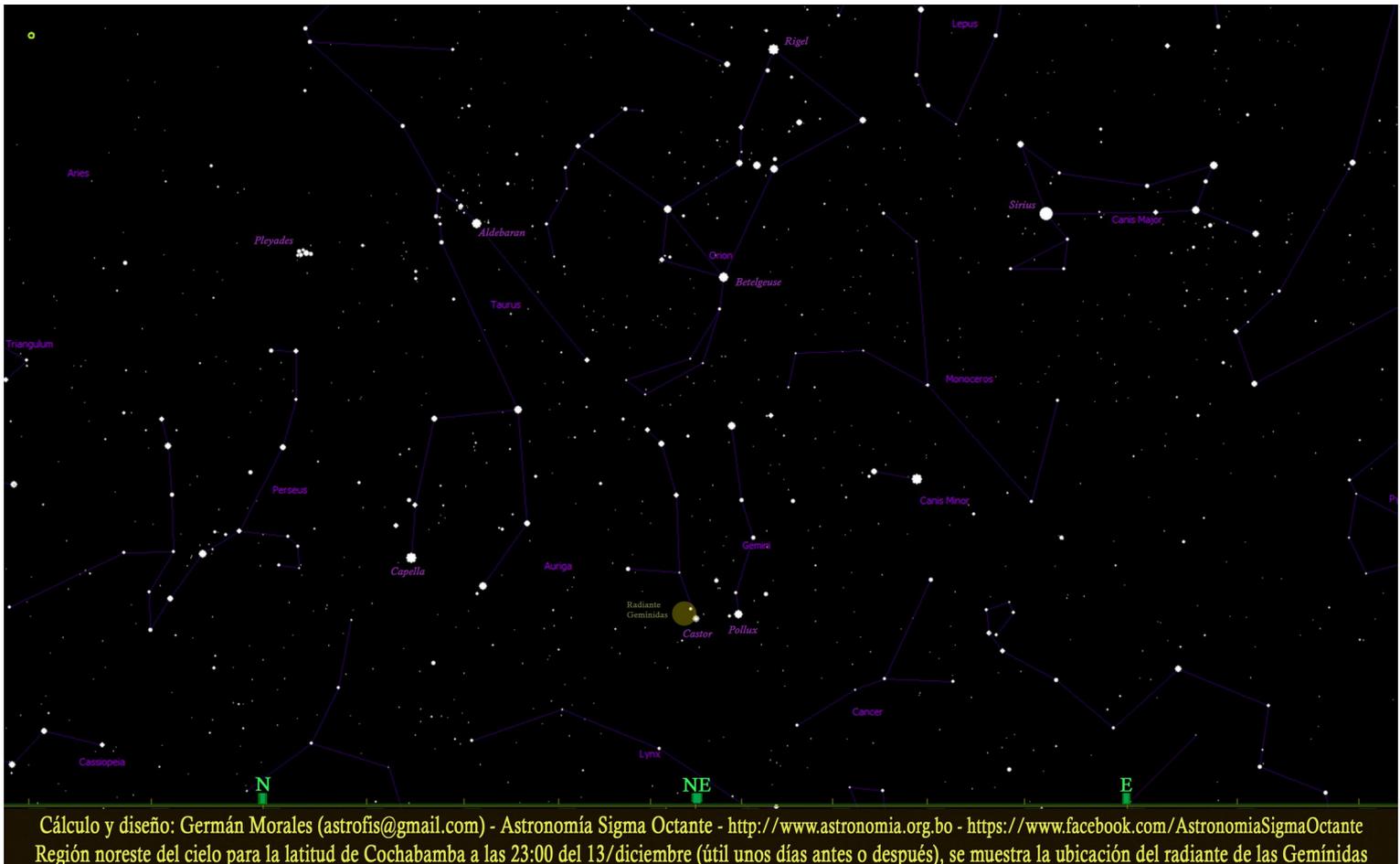


Fig. 2 – This celestial chart of the northeastern sky at 11 p.m. is for dates around December 13. The field of view is centred in the northeast and 45 ° above the horizon; It will be useful to identify the constellations and stars in the northeast region of the sky at 11 p.m. A few hours later, the aspect of the sky will have changed and they will appear rotated with respect to the north, with other constellations appearing to the east. Geminid meteors will look like they were coming from a region of the sky that has been marked on this chart as a faint yellow circle, which is near the star Castor (α of Gemini).

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Translated from Spanish by: Micaela Morales



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