Search for Past Signs of October Ursae Majorids

Štefan Gajdoš

Abstract A new meteroid stream—October Ursae Majorids—was announced by Japanese observers on Oct. 14–16, 2006 (Uehara et al. 2006). Its weak manifestation was detected among coincidental major meteor showers (N/S Taurids, Orionids), as its meteors radiated from a higher placed radiant on the northern sky. We have tried to find out previous displays of the stream throughout available meteor orbits databases, and among ancient celestial phenomena records. Although we got no obvious identification, there are some indications that it could be a meteor shower of cometary origin with weak/irregular activity, mostly overlayed by regular coincidental meteor showers. With a procedure based on D-criterion (Southworth and Hawkins 1963) we found a few records in IAU MDC database of meteor photographic orbits which fulfill common similarity limits, for October Ursae Majorids. However, their real association cannot be established, yet. With respect to the mean orbit of this stream, we suggest for its parent body a long-period comet.

Keywords Meteor streams · October Ursae Majorids · New meteor stream identification

1 Introduction

October Ursae Majorids (OUM) is a new meteor stream whose weak (but clear) manifestation was reported by Japanese observers within their video network observations on Oct. 14–16, 2006 (Uehara et al. 2006). Meteors of the stream radiated from a position R.A. = 144.8° and Dec. = 64.5°, with the geocentric velocity $V_g = 54.1$ km s$^{-1}$. Simultaneously observed meteors yield the mean orbit (read: average of individual meteors elements) of the stream with parameters $a = 5.9$ AU, $q = 0.979$ AU, $e = 0.875$, $\omega = 163.7^\circ$, $\Omega = 202.1^\circ$, and $i = 99.7^\circ$ (J2000.0). With respect to the renewed meteor
stream nomenclature rules (Task Group for Meteor Shower Nomenclature, IAU Commission 22), we will use a correct name for this stream: October Ursae Majorids (OUM).

In a searching for past displays of OUM, we examined sources of meteor orbits and meteor phenomena (second section). In third section, we are looking for an admissible type of a parent body which could either fit orbital characteristics of the new meteor shower or, in assumed specific circumstances resulted in formation of the meteoroid stream. All data we used are in Equinox (J2000.0).

2 Survey of Common Sources

2.1 Established Showers in a Vicinity of OUM

In a search for coincidental streams, we firstly had look at the summary tables published by Jenniskens (2006), which besides of his own results encompass a compilation of meteor streams from many authors. The tables list basic orbital data of cometary and suspected asteroidal streams, their major apparition peaks, as well as bibliographic sources of the data.

Working list of cometary meteor showers therein (Table 7), presents two streams exactly in the time of the OUM apparition. Daytime phi-Virginids (DFV, #240, ecliptic helion source) have its peak on Oct. 15 at the solar longitude $\lambda_\odot = 202.0^\circ$ while the gamma-Puppids (GPU, #239) peak on Oct. 16 at the solar longitude $\lambda_\odot = 202.7^\circ$. DFV is a broad daytime stream and GPU do not match Oct. Ursae Majorids radiant at all (Dec. = $-44.0^\circ$). There are two other well-known showers in a week intervals before and after the OUM: Oct. Draconids (DRA, #9) on Oct. 8 ($\lambda_\odot = 195.1^\circ$) and Oct. Ursae Minorids (OUI, #241) on Oct. 21 at $\lambda_\odot = 208.0^\circ$. Having in mind some analogy with OUM detection, we shouldn’t omit recent case of the October Camelopardalids (OCT, #281) on Oct. 5, 2005 (Jenniskens 2005).

In the Working list of possible asteroidal meteor showers therein (Table 9), we identified a single shower in the mid of October with a few members only—delta-Cygnids (DCY, #282). Again, radiant coordinates differ more than allowed, and both do not fulfill the coordinates of the OUM.

Besides of highlighted streams, there are many minor meteor showers with low or irregular activity in a period from mid of September to the end of October (corresponding solar longitudes $\lambda_\odot = \sim 170^\circ$–$220^\circ$). We point out that OUMa displayed on a background of approaching Orionids, as well as ongoing long-lasting Taurid meteor complex, in 2006. As mentioned by Uehara et al. (2006) already, if we should search for the OUMa pattern we have to do it over a miscellaneous background activity. Therein, a percentage of detected OUMa meteors was at the level up to 9%, the lowest among above mentioned streams in the period Oct. 10–20, considering other minor streams activity as sporadic. We ascertained in this survey that no hitherto known meteoroid stream could be associated with the OUMa, as none has suitable orbital and/or geophysical parameters.

2.2 A Search for Ancient OUMa Activity

Jenniskens (2006) presents historic meteor phenomena reports in his Table 1, also, originally collected by many authors. Looking at the solar longitudes, there are listed two timely lagged sightings around 202°: on Oct. 9.7, 1798 at $\lambda_\odot = 199.4^\circ$, and second one identified with