

Two Virginid bolides recorded by the Spanish Meteor Network

Maxime Maurice (1, 2), J.M. Trigo-Rodríguez (1), J.M. Madiedo (3, 4), P. Pujols (5)

(1) Instituto de Ciencias del Espacio (CSIC-IEEC), Campus UAB, Fac. Ciencias C5, Bellaterra, Barcelona, (2) Institut Supérieur del'Aéronautique et de l'Espace, 31000 Toulouse, France, (Maxime.MAURICE@supaero.isae.fr) (3) Facultad de Ciencias Experimentales, Universidad de Huelva, 21071 Huelva, Spain, (4) Facultad de Física, Universidad de Sevilla, Departamento de Física Atómica, Molecular y Nuclear, 41012 Sevilla, Spain. (5) Agrupació Astronómica d'Osona, Osona, Barcelona, Spain.

Abstract

The Spanish Meteor Network (SPMN) is performing a continuous monitoring of meteor and fireball activity over Spain and neighboring countries. Nowadays our network operates 30 meteor observing stations located in different areas in Spain. Most of them are endowed with high-sensitivity CCD video cameras. We present here the results of the analysis of two Virginid fireballs imaged on 2007 and 2012.

1. Introduction

From the end of February to early May, meteor activity from the Virginid complex can be noticed. This complex is composed of a dozen of mainly sporadic streams. There is no certainty yet concerning parent bodies of these different streams, although most of them have one or more concurrent for the place. Each new fireball analysed adds quantitative clues (radiant data and orbital parameters) that enable sorting and choosing among them.

We perform a continuous monitoring of the night sky from 30 meteor observing stations all over the Spanish territory. In this context, we have imaged two double-station fireballs on March 25, 2007 and March 9, 2012, from the Virginid complex. The results obtained from the analysis of these fireballs are discussed here.

2. Instrumentation

The stations involved in the detection of the Virginid bolides analysed here employ high-sensitivity 1/2" b&w CCD video cameras (Watec, Japan) endowed with fast aspherical optics. A detailed description of these systems has been done elsewhere [1, 2].

3. Data reduction and results

The two present cases of two extremely bright Virginid bolides appeared over Spain within a five years gap. The first one, SPMN250307 was imaged on March 25, 2007, at 0h48m32.0s UTC from our Sevilla and Cerro Negro meteor stations, with an absolute magnitude of -13 ± 1 . The second one, SPMN090312 was recorded on March 9, 2012, at 5h16m23.8s UTC by the stations of Montseny and Folgueroles in Barcelona, and had an absolute magnitude of -11 ± 1 . The radiant and orbital parameters of the fireballs are shown on table 1. The preatmospheric velocities calculated from the velocities measured at the beginning of both meteors trails were respectively $V_{\infty}=29.0 \pm 0.4$ km/s and $V_{\infty}=33.5 \pm 0.5$ km/s. All the data suggests membership of SPMN090312 to the η -Virginids stream (#11, Table 7 of [3]). SPMN250307 fits better the N. March Virginids stream (#123, Table 7 of [3]).

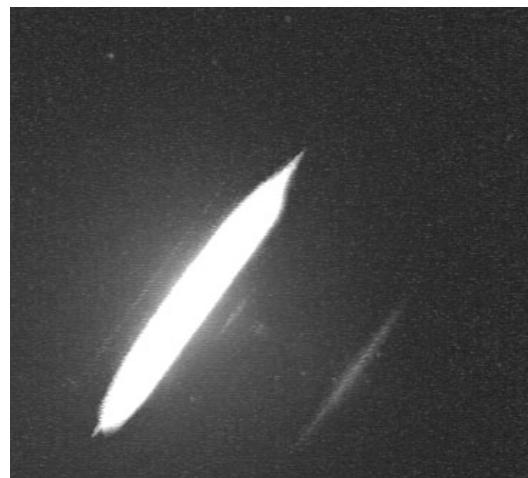


Figure 1: The -13 magnitude SPMN250307 Virginid fireball imaged from Cerro Negro.

SPMN250307			
Radiant data			
	Observed	Geocentric	Heliocentric
R.A. (°)	192.7±0.3	191.6±0.3	135.9±0.5
Dec. (°)	10.1±0.4	9.0±0.4	8.9±0.3
V_∞ (km/s)	29.0±0.4	26.9±0.4	38.8±0.3
Orbital parameters			
a (AU)	3.2±0.3	ω (°)	277.4±0.75
e	0.84±0.01	Ω (°)	3.90±0
q (AU)	0.515±0.006	i (°)	11.86±0.4
Q (AU)	5.89±0.56		

SPMN090312			
Radiant data			
	Observed	Geocentric	Heliocentric
R.A. (°)	186.0±0.5	184.0±0.5	132.9±0.7
Dec. (°)	2.5±0.5	1.0±0.5	2.2±0.4
V_∞ (km/s)	33.5±0.5	31.9±0.4	37.6±0.4
Orbital parameters			
a (AU)	2.38±0.2	ω (°)	290.0±1.1
e	0.88±0.01	Ω (°)	348.88±0
q (AU)	0.29±0.01	i (°)	3.69±0.7
Q (AU)	4.47±0.4		

Table 1: Radiant and orbital data for the two fireballs presented here.

4. Summary and Conclusions

The continuous monitoring of meteor and fireball activity over Spain and neighboring countries we perform provides important information about poorly known meteoroid streams, as is the case for some members of the Virginid complex. The analysis of radiant data and orbital parameters we calculated for these two fireballs are coherent with already known streams, thus enriching our databases. We obtain so more material for searching parent bodies for these particular streams in the Virginid complex.

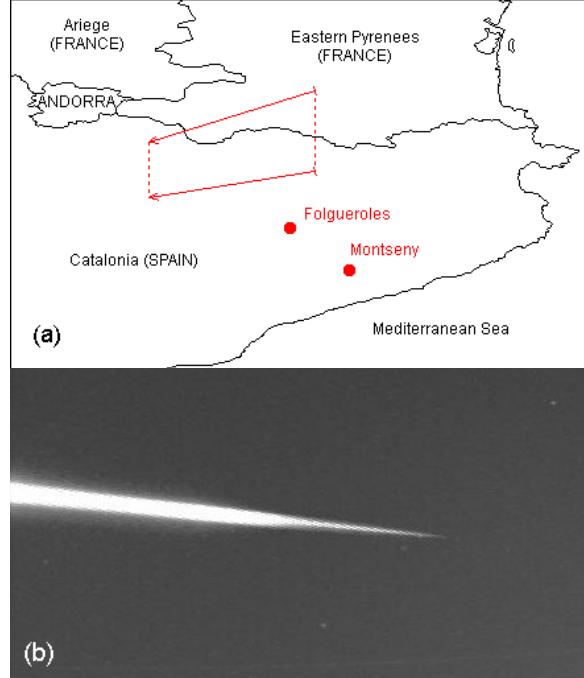


Figure 2: (a) Geographic positions of the meteor observing stations in Montseny and Folgueroles, and the reconstructed trajectory of SPMN090312. (b) Beginning of the -11 magnitude Virginid fireball as imaged from Folgueroles (Barcelona).

References

- [1] Madiedo, J.M. and Trigo-Rodríguez, J.M. Earth, Moon, and Planets 102, pp. 133-139, 2007.
- [2] Madiedo, J.L., Trigo-Rodriguez, J.M., Ortiz, J.L., Morales, N. Advances in Astronomy, Vol. 2010, 1-5, 2010.
- [3] Jenniskens, P., Meteor Showers and their Parent Comets. Cambridge University Press, 2006