

INTRODUCTION

Unlike eclipses, comets and even meteor showers, individual bolides or meteors are local phenomena, and in the context of European medieval research, they are more likely to appear in local sources. The scarcity of records about ancient and medieval meteors is mainly due to its brief duration and the previously stated local character, (the exception are meteor showers), and also because they were usually considered as omens and signs of misfortune, so the chroniclers preferred not to mention them.

In general, in the Eastern world astronomical observations were carried out professionally and systematically, which has made it possible to have catalogs of practically all astronomical phenomena visible to the naked eye. This is not the case for Europe where medieval observational records appear written in historical non-scientific documents such as annals, chronicles and personal diaries in a non-systematic way and are therefore difficult to identify and compile. In the case of the Iberian Peninsula in medieval times, this situation is especially complex due to the historical circumstances between the 5th and 15th centuries and the almost total lack of reports was striking. Some time ago we arranged a compilation of meteoritic phenomena in this area [3] as a result of a broad research into medieval Spanish narrative sources. A typical meteor record may reveal many data, such as date, time, star and end points, brightness, color and sound. Regretfully, it is very rare to find all these data in the same observation, but these sources provide entries that are often incomplete or present wrong dates so a individual study was arranged. In this poster we show one of the most striking and spectacular records from documents from the 10th century.

BACKGROUND

In European sources there are many records of cometary and meteoritic phenomena but they are almost exclusively mentions or vague descriptions that are often used to reinforce some historical event. This is especially so until the 14th-15th century. Regarding to the reports, the main problems that we have had to face is the identification of such celestial phenomena in ancient chronicles. They appear frequently mixed and with a similar nomenclature that sometimes does not allow to distinguish correctly between them. A classic study regarding this problem is that of Dall'Olmo [1]. As this author states, the imaginary and the vocabulary of the authors varies according to the historical context, geographical localization and the cultural and scientific background.



Bolide SPMN230221 from Benicàssim in Eastern Spain (Credit: Vicent Ibañez). Seen on February, 23, 2021 at 20h27m T.U.C. with an estimated absolute magnitude of -13 ± 1 . Source: <http://www.spmn.uji.es/ENG/presentation.html>

This issue is increased because we usually find records regarding to meteors in non-scientific papers, being the authors more interested in giving a supernatural significance to the events than to explain them.

The main point is the ambiguity in the use of the same vocabulary to refer to meteorological events, aurorae, comets and meteors. Sometimes there is no problem in identifying a meteor or a meteor shower or a storm. This is the case when the author uses a statement such as "stellae cecidisse" (stars fell). In general, we will ignore very common expressions like "signum in coelo mirabile appaerunt" (miraculous signs appeared in the sky) unless they provide other data that can be ascribed to a certain phenomenon. For example, it can be determined that something is not an aurora if the author specifies that it was seen at the "hora noctis prima" (first hour of the night), because roughly speaking the best time to see the aurora is when dark is complete and it is very difficult to see it in lower latitudes, which is where many documents that we study come from.

In general, the older the reports, the harder to interpret they are: It is difficult to distinguish among meteors, showers, auroras and meteorological events for records from the tenth century or before. As time advances, the records are clearer, as they untie of the religious interpretation and provide more data, such as the hour of the day.

Throughout the text the years are always AD and we use Julian dates.

DISCUSSION

A first compilation of possible meteoric phenomena on the Iberian Peninsula in medieval times was published [4] and later extended to the entire European territory.

For the 10th century there are few but extremely interesting phenomena, as the rain of stars collected in an Arab-Andalusian chronicle [5, 3]:

Stars were shooting from the fall of darkness until the end of the night.

Which refers to a shower seen presumably in Cordoba.

Or the fireball observed during a meteor shower on October 15, 934,[5, 3]

There was a rain of shooting stars (...) Among them fell a great star that looked like a column that came from the eastern side and it softened against the Moon in such a way that, with the naked eye, it split it

Even a bolide observed during a lunar eclipse on November 6, 998 [3]:

When there was a eclipse of the Moon (...) suddenly (it) fell to the ground with great light

Or the possible fall of a meteorite sometime in the late 10th century [5, 3]

A big fiery stone fell down in Corduba on a calm day

Among all these phenomena, there is one that deserves special attention for its spectacular nature and its detailed description. It is a beautiful record of a bolide reported in the Annales Compostelanos, the Chronicon Burgense and the Chronicon de Cardeña [2], the three of them compiled after the 12th century and being possibly copies of a more ancient document now regretfully lost. The paragraph is as follows:

Era DCCCCLXXVII, Kalendas Iunii, Saturday, at the ninth hour, a flame went out the sea and burned many villages and cities and men and beasts and in this sea there were wings of fire: and burnt in Zamora a neighborhood, and in Carrion and Castro Xeriz, and in Burgos [burnt] a hundred of houses and in Briviesca, and in Calzada and in Pancorvo and in Buradon and in many other villas

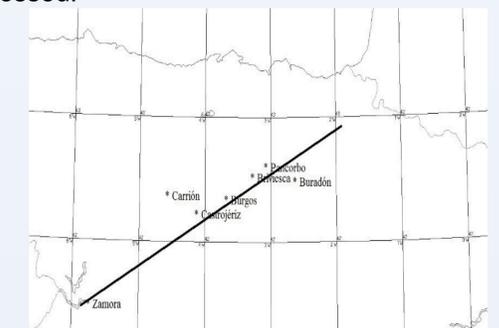
The word "Era" refers to the Spanish era. To translate the date to the AD, we subtract 38 years. The meteor was visible at three in the afternoon on Saturday AD939 June 1.

The path (see Figure below) can be reconstructed from the medieval names of the cities and villages, all of them may be identified in the present time. The author states that it came from the sea, so an observer would have seen it coming from the W to the NE. The list of sites and damages suggest that the meteor exploded and left fragments along its path. The detailed route indicated by the document, as well as the record of the time of day in which it occurred should allow us to calculate a tentative and rough trajectory for the meteor. Furthermore, a comparative and historical analysis of meteor showers could even propose its attribution to the daytime Arietids.

In addition, it is tempting to associate this record with another one dating from the year of the battle of Hacinas [4].

they saw that night come flying through the air a very big and very impressive dragon, giving very great shouts: and it looked like it came all filled with blood (...) And it opened its mouth and threw flames of fire across them, seeming that it wanted to burn the whole host

This narration corresponds on the day before the legendary battle of Hacinas (supposedly in AD939). Hacinas is a location near the towns where the fireball of June 1 caused damage. Historians quite agree that this battle never happened, but it is very tempting to think that the narrator is, in fact, telling about the very bright meteor that he actually witnessed.



Suggested path for the Bolide of June 1, AD939. Using [4]

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