

### A 10<sup>th</sup> CENTURY BALL OF FIRE OVER SPAIN

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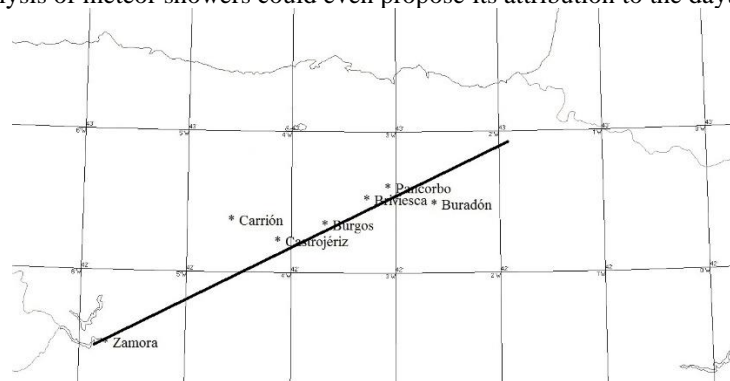
**Introduction:** In the context of medieval research, unlike eclipses, comets and even meteor showers, individual bolides or meteors are local phenomena, and they are more likely to appear in local sources. The scarcity of records about ancient and medieval meteors is mainly due to its brief duration and the previously stated local character, with the exception of meteor showers, and also because they were usually considered as omens and signs of misfortune.

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 archives 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 clear due to the historical circumstances that took place in it between the 5th and 15th centuries. For this reason, some time ago we arranged a compilation of meteoritic phenomena in this area [1] 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 required.

**Results and Discussion:** Among all the phenomena considered in the aforementioned paper, 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* (ESP SAG, 23, p. 318), the *Chronicon Burgense* (ESP SAG, 23 p. 308) and the *Chronicon de Cardeña* (ESP SAG, 23 p. 370) [2], the three of them compiled after the 12<sup>th</sup> 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” that appears next to the year, refers to the Spanish era. In order to translate the date to the *Anno Domini*, we must subtract 38 years to the year provided. The meteor was visible at three in the afternoon on Saturday AD939 June 1 (Julian Date). The year assigned in the *Annales Compostelanos* is AD949, but the first of June was not Saturday that year. The path (see Figure 1) 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.



**Figure 1:** Trajectory of AD949 June 1 bolide. (Using Chris Marriott’s SkyMap Pro)

**References:** [1] Martínez M.J, Marco F.J (2016) *Journal for the History of Astronomy*. 47:168–193. [2] Enrique Florez, Ed. *España Sagrada. Teatro geográfico histórico de la Iglesia de España*. (51 Vols, Flores etc. Madrid. 1747-1957) [3] Chris Marriott’s SkyMap Pro. V11, <http://www.skymap.com/>