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Martínez Uso, MJ.; Marco Castillo, FJ. (2014). New Astronomical References in Two Catalanian Late Medieval Documents. *Early Science and Medicine*. 19(2):174-185. doi:10.1163/15733823-00192P03.



The final publication is available at

<http://dx.doi.org/10.1163/15733823-00192P03>

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Additional Information

Astronomical references in the first volume of the *Dietaris de la Generalitat de Catalunya* (1411-1539) and the *the Dietari o llibre de Jornades de Jaume Safont* (1411-1484)

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Summary

In the year 2008 the Generalitat of Catalunya finished the publication of the 10 volumes of the *Dietaris de la Generalitat de Catalunya*, after a work that took 13 years. The Catalan word “Dietari” refers to a historiographical genre that provides news with more extension and more frequently than annals and chronicles¹. In the case we are concerned, the *Dietaris* are transcriptions of diaries that include military, political, religious and social events in Catalonia from 1411 to 1714, giving special attention to those events that happened in Barcelona.

The *Dietaris* soon became a document where every remarkable phenomenon was reported. Especially in the first volume we find several examples of earthquakes, unusual meteorological phenomena and also astronomical references: eclipses of Sun, Moon, comets and others.

Our aim is to present in this paper the astronomical references contained in the first volume of the *Dietaris* published by the *Generalitat* covering a period of more than a century, from 1411 to 1539. In addition, we also consider a contemporary source deeply related to the *Dietaris*: the *llibre de Jornades 1411/1484 de Jaume Safont*. This second source provides more astronomical references and helps to conform the historical context in which both documents were written. Some of the astronomical references were observed in other parts of the world, as the famous approximation of the Halley comet in 1456; but for most of them we have not found any reference in the astronomical literature. It is worth pointing out that relatively few astronomical records are accessible in Spanish medieval and early modern history and our paper pretends to partially fill this gap. However, it is not our goal to make an extensive review of all the astronomical literature related with these events around the world. Instead, we will only mention those reports particularly interesting or lesser known.

Keywords: History of Astronomy, Medieval Astronomy, Astronomical Sources.

¹See, for example, the Diccionari de la Llengua Catalana (Institut d'estudis catalans, <http://dlc.iec.cat/>) In our case, we are going to deal with an official diary, linked to an institution, the *Generalitat*. In a wider meaning, a dietary is simply a document where daily facts are recorded. Most of them are written by particulars: people from the nobility, clergy, but also commoners. According to Antoni Simon, Professor of Modern History in the Universitat Autònoma de Barcelona, in his inaugural speech of the international meeting *Construcción y proyección de la memoria personal en la Europa moderna*, held in Barcelona in November 2011, Catalonia is one of the places, together with England and the north of Italy, where we can find these kind of documents. An interesting web (still under construction and regrettably only in Catalan and Spanish) that pretends to collect and digitalize most of this documents for the area of Catalonia is <http://www.memoriapersonal.eu>

INTRODUCTION

The search and study of ancient astronomical sources is one of the aims of the IAU (International Astronomical Union), included in the objectives of Division C: Educational Outreach and Heritage. There are several authors who have devoted their work to this research (See, for example in the case of ancient eclipses Goldstein (1979) and specially Stephenson (1997) and (2010)) and today it is quite difficult to find new sources, including reports from the Late Middle Age and the Early Modern Period. New primary sources are expected to appear in local documents, sometimes written in vernacular languages, as the case that we are going to study along this paper.

In the year 2008 the *Generalitat de Catalunya* finished the publication of the 10 volumes of the *Dietaris de la Generalitat de Catalunya* (*Dietaris* henceforth), after a work that took 13 years. They are transcriptions of diaries that include military, political, religious and social events in Catalonia from 1411 to 1714, specially those events that happened in Barcelona.

Previously to this complete edition there were only partial publications, such as the one by Josep Coroleu² for the subscribers of the newspaper *La Vanguardia* in 1889. There were some other precedents before the full edition was finally accomplished: In the year 1950 the *Associació de Bibliòfils de Barcelona* edited the *dietaris* covering the period 1454-1472, being Jaume Safont *l'escrivà*. As we see later, Jaume Safont is a crucial figure in the written of the *Dietaris*. It is very fortunate that we have other manuscript belonging to this same author: the *Dietari o llibre de Jornades 1411/1484 de Jaume Safont* (*Llibre* henceforth), also published in 1992 by the *Fundació Noguera* under the direction of Josep Maria Sans i Travé (Sans i Travé, 1992). It is not an official, but a particular document and it complements the *Dietaris* in some senses. The writer seems to have felt more free to express himself and so we find more astronomical events together with some clues to understand why he reports some astronomical events and not others.

The final edition of the *Dietaris* was in charge of the *Arxiu Nacional de Catalunya* produced by the *Generalitat de Catalunya*, under the direction of Josep Maria Sans i Travé. The full work is available in the web of the *Generalitat de Catalunya*³.

Originally, there were 109 manuscript volumes. Regretfully, the last one, corresponding to the year 1714 was destroyed after the conquest of the city of Barcelona by the Napoleonic army. The remaining manuscripts are considered one of the main primary sources for the study of the late medieval and modern Catalunya.

The writing of the *Dietari* was one of the obligations of the *l'escrivà major de la Generalitat* (a sort of main notary of the ancient institution called *Generalitat*, predecessor of the current *Generalitat*). In some cases, explanations on the margin of the page or even drawings were included.

The *Dietaris* were not only a kind of diary where social, political, economical or religious events were annotated, but also a place where every remarkable phenomenon was reported. In particular, in the first volume we can find several examples such as earthquakes, unusual meteorological phenomena and also astronomical references: eclipses of Sun, Moon, comets and others. Such references

² José Coroleu e Inglada (1839 - 1895) catalan politics and historian. For a complete reference, see Cattini, Giovanni C. *Historiografía i catalanisme. Josep Coroleu i Inglada (1839-1895)*. Editorial Afers. 2007

³ <http://www.gencat.es> (in Catalan), http://www.gencat.es/index_cas.htm (in Spanish)

tend to decrease in the successive volumes, surely according to the advances in the science that explained these phenomena and consequently their assumption as natural facts and not signs of misfortune.

We will study in this paper the astronomical references contained in the first volume of the *Dietari* published by the *Generalitat*, covering a period from 1411 to 1539. Most of these references were observed in other parts of the world, as the famous approximation of the Halley comet in 1456; but for the observations of others we have not found any reference in the astronomical literature.

DESCRIPTION OF THE SOURCE DOCUMENT

The document covers a period of more than a century, starting from the beginning of the XVth century. Catalonia belonged to the kingdom of Aragon, although keeping its own institutions. It was during the XIV century when the Aragon Kingdom reached its maximum extension. With the marriage of *Isabel de Castile* and *Fernando II de Aragon* in 1479 the two kingdoms, Castille and Aragon, unified, although Aragon kept all its own institutions until the *Decretos of Nueva Planta* in the XVII-XVIII century. The Catalonian Courts and the *Generalitat* disappeared in 1714 after the Succession War.

Modern Age in Catalonia was a very turbulent epoch, characterized for the endless fights against the royal power: Catalonia civil war (1462-1472), Second rebellion of the *remences* (1485-1486), the revolt of the *Germaníes* (1519-1523), the war of the *Segadors* (1640-1652) and lastly the War of Succession (1700-1714). All these events appear in the *Dietaris*. Four kings reigned in Aragon in the period comprised in the first *Dietari*: Alfonso V (1416-1458), Juan II (1458-1479), Fernando II (1479-1516) and then Carlos I (1516-1556).

The most important Catalonian institutions were the *Corts* and the *Generalitat* or *Diputació del General*, both of them with a Medieval origin. The *Corts* were the meeting of the three stamens (clerical, nobility and popular) together with the king. They had the commitment of making laws and reach agreements about the main political lines.

It seems that the *Generalitat*, has a precedent in the *Corts de Montsó*⁴ in 1289, as an economic organism with the aim of collecting for the king the economical subsidies agreed by the *Corts* (Ferrer i Mallol, 1984). The organism was initially dissolved at the end of its task, but from the *Corts de Cervera*⁵, in 1359, became permanent (Rubio & Cambroner, 1950). As the king remained outside Catalonia for long periods of time and the *Generalitat* soon become the main authority, taking responsibility for the protection of the constitution and laws, the maintenance of public order and even the protection of the territory. It was in the *Corts de Barcelona* (1412-1413) when finally the *Generalitat* obtained a definitive organization and attributions, together with its independency from the *Corts*.

In order to make more efficient the institution, the number of functionaries and employees was progressively increasing. At the same time, several sections or *escrivanies* were created to solve those questions related to the bureaucracy of the *Generalitat*. These departments were designed according to the name of the main

⁴ Montsó or Monzón is a small town in the Autonomous Community of Aragon. It played an important role as a parliamentary centre of the Aragonese crown from the 13th to the 17th centuries.

⁵ Western Catalan city.

official: *l'escrivania major*, whose main official was *l'escrivà major*; *l'escrivania del regent dels comptes* and *l'escrivania del racional* or *Arxiu de la Diputació*.

In particular, we are interested in the *escrivania major*, because one of the tasks assigned to the *escrivà major* was the writing of the *Dietari*. Initially, this book had an administrative character, because it was used to register the designation of the *diputats*, *oidors* and other officials of the institution, together with their travels or absences in order to pay them their corresponding salaries, travelling expenses or reductions in their salaries. (See Figure 1 to observe an original page of the *Dietari*, corresponding to May 1421)

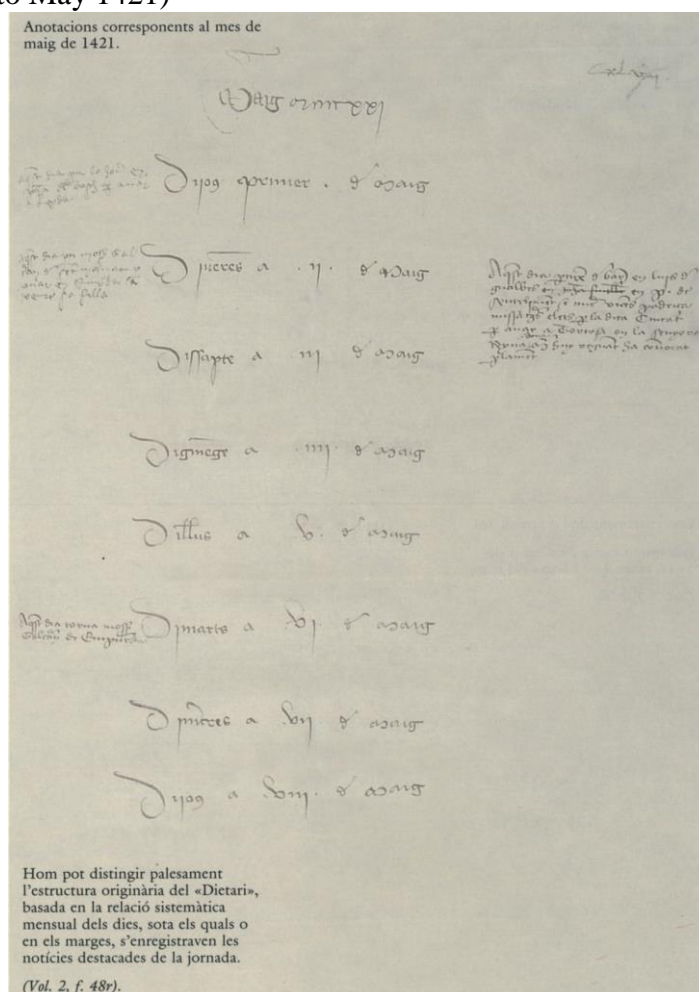


Figure 1: Original page of the *Dietari*. (May 1421). The annotations in printed letter in the upper and lower left corner correspond to modern explanations of the contents of the page. (Reproduced with the permission of the Generalitat de Catalunya, from the *Dietaris de la Generalitat de Catalunya*. Vol. 1)

According to this administrative function, the *Dietaris* were structured in years, months and days. At the beginning, each date was carefully recorded, followed by the fact to remember, but from the middle decades of the XV century Jaume Safont⁶, who

⁶ We have some additional information about Jaume Safont (Barcelona, 1420-1487). He was a poet and a notary and from 1440 he began working for the *Generalitat*. He wrote the *Dietari* from 1454 to 1472 and he made remarks and additions about news that happened after 1412. He wrote also a private dietary named *Dietari de les torbacions del temps del rei don Joan que en Catalunya foren* or *Llibre de Jornades de Jaume Safont* (Dietary of the disorders in Catalonia in the time of King Joan, <http://ddd.uab.cat/record/79957>) In the writing of the *Dietari* he was preceded by Bernat Noves (1437-1454) and succeeded by Antoni Llobard who was, in fact from 1462 to 1494 the *escrivà major*, but most of the time he left Jaume Safont the task to work with the *Dietari*. See *Història de la*

was the notary in which the *escrivà major* had delegated the redaction of the dietary, transformed the *Dietari* in a historical chronicle of the city of Barcelona and surroundings, including all the strange or interesting events that happened. This new approach was never lost in the subsequent volumes of the *Dietari*. Jaume Safont was the main redactor of the *Dietari* from 1454 to 1472, but he was also involved in the drafting of the report of some facts before this period of time. The writing of the *Dietaris* in the XV century is clearly influenced by this charismatic figure. In addition, he was the author of a particular *Dietari o llibre de Jornades 1411/1484* (Sans i Travé, 1992) that is closely related to the *Dietaris de la Generalitat* and, in some sense, complementary. As previously stated, the *llibre de Jornades* is a more personal document, it includes familiar events and also some data that are not included in the *Dietaris*. The writer emphasizes that it has a historical aim and the registers rely on subjective criteria, which go beyond objective aims. The personal comments abound and we can appreciate the hostility of Jaume Safont against Galceran de Requesens⁷, la *Busca*, els *remences*⁸ and King Joan II, among others. We use this document to complement the study of the astronomical data contained in the *Dietaris*.

As the political sympathies of the person in charge of the *Dietari* are reflected in comments and remarks, the selection of the astronomical events included is sometimes used to reinforce a good/bad event or action conducted by a particular person. In this sense, it is especially interesting the way in which the sympathies of Jaume Safont are reflected in his both documents.

It is also obvious that the *Dietaris* had no astronomical purposes, and their aim was not to give scientific data about the observed phenomenon. The astronomical knowledge of the epoch is not clearly reflected and no astronomical comments are provided. For example, the most outstanding astronomer of the epoch, Abraham Zacut (1452-1515) (Chabás, Goldstein 2000) is not mentioned at all, nor any of his predecessors. We are aware (see, for example, the work of Millas, (1931)) that there was a serious concern about Astronomy in Catalonia in the centuries XIV-XV⁹, but the popular wisdom mixed Astronomy and Astrology and related any unusual fact

Generalitat de Catalunya i els seus Presidents. Barcelona: Enciclopèdia Catalana, 2003. And also the *Enciclopèdia Catalana*: <http://www.enciclopedia.cat> (in Catalan)

⁷ Galceran de Requesens y Santa Coloma (before 1426 - 1465) was a Catalan nobleman, enemy of the Barcelona city council (*La Biga* that included the nobility and the principal merchants of the city) He opposed the oligarchs with a pressure group of merchants and artisans known as *La Busca*.

Acting as a royal agent he suppressed the Barcelona Council in November 1453.

⁸ *Remença* (plural: *remences*) was a Catalan mode of serfdom. In the early 14th century, the rise of the Catalan cities and the expansion of Aragon led to a decline in the rural population, incremented with the Black Death epidemics. The nobility began to enforce the rules that tie peasants to the land, together with the seigniorial rights. In the mid-XVth century, the king allowed the peasants to form a *sindicat remença*, a kind of primitive trade union, granted them their liberty and tried to control the abuses. However, the Bishop of Girona, the nobility and the *Generalitat*, opposed and made king Alfonso to retract.

Juan II, got the support of the *remences* against the nobility. In 1462, the *remences* rebelled; this coincided with the Civil War between Juan II and the nobility. After ten years, Juan won the war, but failed to abolish serfdom or even to bring about significant reforms. In 1485, a second rebellion broke out. It ended in 1486 with the *Sentència de Guadalupe*.

⁹ Although the Trastámara dynasty did not support Astronomy as their predecessor did, we can find several astronomical works, almanacs and tables, even translated to Catalan. See (Cifuentes LL. 2005). In addition, there are serious Astronomical works done by native scholars. See, for example, (Chabàs, Roca, 1998)

with the arrival of misfortunes. In fact, in the *Dietaris* the author suggest sometimes that an astronomical event may be the cause or the prelude of some catastrophe. As previously stated, the collection of the *Dietaris de la Generalitat* features an amount of 109 volumes (covering the period from 1411 to 1714), and 40 draft copy from 1611 to 1713. The originals are now at the *Arxiu Reial de Barcelona*, also known as *Arxiu de la Corona d'Aragó*¹⁰.

During the XV and XVI century each original volume of the *Dietaris* contained more than a three years period, which was the time between the start to the conclusion of the period of the person in charge of the institution. This period started the 1 August and ended the 31st July. Subsequently this cadence varied, depending on the amount of notices to be registered.

The particular edition that we are going to study from an Astronomical view was compiled under the patronage of the Generalitat de Catalunya and covers 303 years of the *Generalitat de Catalunya*, from 1411 to 1714. The ten volumes recently published are the following:

Volume I.– Years 1411-1539

Volume II.– Years 1539-1578

Volume III.– Years 1578-1611

Volume IV.– Years 1611-1625

Volume V.– Years 1625-1640

Volume VI.– Years 1640-1649

Volume VII.– Years 1649-1673

Volume VIII.– Years 1673-1689

Volume IX.– Years 1689-1701

Volume X.– Years 1701-1714

We only find astronomical references in the first, second, third and tenth volumes, especially in the first (the 76% of the astronomical records are in this volume, in particular between 1444 to 1478) maybe due to the personality of the main *escrivà*, Jaume Safont.

ASTRONOMICAL REFERENCES

All the observations were made from the city of Barcelona (Spain), which is sometimes named in the text using its visigothic name, Barchinona. Its geographical information is:

Latitude:	41° 25' 12" N
Longitude:	2° 10' 11" E
Height above sea level:	10 meters
Time zone:	1h ahead of UT

We find three solar eclipses (one in the *Dietari* and two more in the *Llibre*), two total Lunar eclipses, and several observations of other phenomena. The writer does not refer to them again in the text, but it is clear that he links these celestial signs with earthquakes, wars and other disasters. As we will see later, he praises God for protection when the epoch is troubled or there is a coincidence of two natural phenomenons, as an earthquake and a shooting star. However, we can imagine that the popular reaction was different.

All the translations of the original text in Catalan have been undertaken by the authors, with the assistance of the Servei de Traducció from the Jaume I University.

¹⁰ <http://www.mcu.es/archivos/MC/ACA/index.html> (in Spanish)

We present the references in the following way:

- *Dietari General de Catalunya*. Volume I. P. ---.

This line refers to the publication in (Sans i Travé, 1994)

Dietari number. (Initial year-Final year): number v/r (date) *Text in cursive*

In this line we refer to the number of the volume of the original manuscript of the *Dietari*. The initial and final year included in that volume. Then, the number of the page and if it is written in the front (r) or in the back (v)¹¹, the date and the original text in cursive.

The astronomical simulations have been carried out using astronomical programs suitable for the study of the ancient astronomical phenomena (in other words, programs that include the calculation of precession, proper motion and an accurate planetary theory, in our case, VSOP87 (Bretagnon and G. Francou. 1988)), such as Sky Map (Mariott, 2005).

First, we study the solar and lunar eclipses included in the *Dietaris*. Surprisingly, there are not too many of them notice, however, that none of the observations of the solar eclipses is recorded in the astronomical literature of the epoch. Then we will refer to assorted observations, including comets and meteors.

The change of year and religious festivities depending on the ecclesial calendar, as well as carnival, is punctually recorded every year¹².

1. Solar eclipses

In the period from 1411 and 1539, 13 eclipses with magnitude¹³ higher than 0.8 were visible in Barcelona, but only one of them is reported in the *Dietari*. There is no clear explanation why they were not included, because even when the eclipses were partial, some of them had a magnitude of almost 1 (almost like a total eclipse), but we must suppose that personal reasons or meteorological causes were involved.

There is only one annular solar eclipse in these years visible from the city of Barcelona and it is clearly reported:

- *Dietari General de Catalunya*. Volume I. P. 106.

Dietari number 5. (1446-1449): 62v (29 August 1448) *Dijous, a XXVIII^o. Aquest jorn fonch eclipsi de sol, lo qual començà a VIII^o hores, ans de migjorn, e durà fins prop de XI hores.*

- Translation: Monday, 29 August 1448. On this day there was a solar eclipse which began at the 9th hour before midday and lasted until near the 11th hour.

This eclipse was annular in Barcelona, with duration of about 6min. It also appears in the *Llibre de les jornades*, where it is described with almost the same words. The illustration that appears in the *Dietari* (See figure 2) seems to indicate a partial and not annular eclipse. However, this could only be the ideogram that the author uses to indicate an eclipse, since and the same figure appears in the margin of the page in the

¹¹ r and v are abbreviations of “recto” and “verso”, respectively, which are the “front” and the “back” sides of a leaf of paper. In this case, r refers to the right hand page and v to the left hand page. It is a usual notation in paleography.

¹² For example, “Dicmenge, a VIII de abril, en Barchinona. Festum Pasche Resureccionis Domini” : April 1414. 8 april, Sunday, in Barcelona . Easter.

¹³ The magnitude of a solar eclipse is the ratio of the apparent size of the Moon to the apparent size of the Sun during an eclipse (respectively for a lunar eclipse). Notice that the definition presented here differs from that used in the Middle Ages and Early Modern Period, where the eclipsed part of the solar and the lunar disks are given as a function of the linear digits of the diameters of the luminaries, such that 12 linear digits are equal to the diameter of the eclipsed body, or as a function of the area digits, such that 12 area digits are equal to the area of the eclipsed body.

Llibre de les jornades when the author makes reference to any solar eclipse (See figure 4). It is also remarkable that, although the central line of the eclipse almost crosses the city of Barcelona (See figure 3) and thus the eclipse was visible as annular, there is not evidency of this fact in the text. Still, in general annular eclipses are usually so unspectacular that the ring phase is only rarely mentioned in medieval and early modern accounts of solar eclipses.

The author does not relate this eclipse with the great earthquake in Catalonia the night of the 24th-25th May 1448, but there is little doubt that the ordinary people would do. This earthquake caused in Barcelona the fall of buildings and at least seven victims and a great panic among the population (Salicrú i Lluç, 1995). In addition, 1448 was a year of great pestilence (Bascome, 1851) that even forced the *Diputació* to leave Barcelona the 28th October, after the public prayers offered up in Barcelona on account of this pestilence and other calamities, such as earthquakes.

In the XVth century belief, the interior of the Earth could send exhalations capable of producing the death to those who breathe them. These emanations were liberated during earthquakes or other geological phenomena. The eclipses and the appearance of comets, were considered to be also cause of epidemics.. According to Cartwright (1977), the end of the 14th century and the 15th recorded a maximum of the astrology applied to the medicine. As explains Biraben (1975), the eclipses, the comets and the conjunctions of planets were so numerous and the pest was so frequent between the XIV and XVII in Europe that was not difficult for the first ones to become the augury of the second.

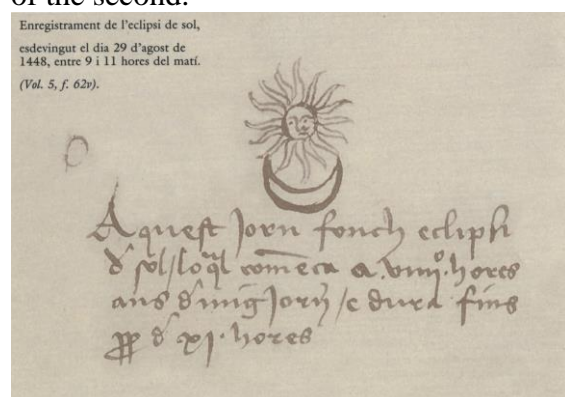


Figure 2: Representation in the Dietari of the annular solar eclipse on 29 August 1448. The upper annotation in printing text is a modern commentary of the figure. (Reproduced with the permission of the Generalitat de Catalunya, from the *Dietaris de la Generalitat de Catalunya*. Vol. 1)

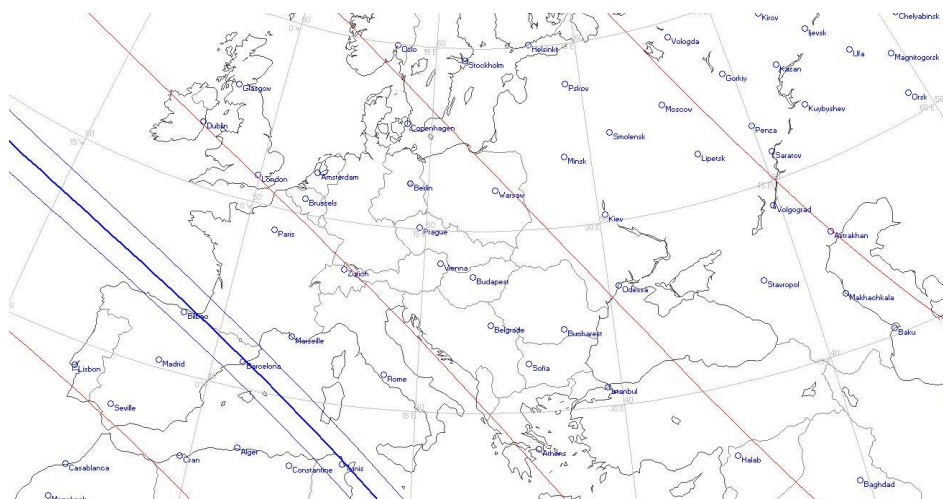


Figure 3: Annular eclipse on 29 August 1448. The band of annularity almost fully crosses the city of Barcelona

The times of the beginning of the partial phase and end of the annular phase of the eclipse are recorded with precision, as it is evident from the next astronomical data in Table 1.

Table 1: Main characteristics of the annular eclipse of 1448 august 29. Magnitude refers to the magnitude of the eclipse.

	Beginning partiality	Beginning annularity	Maximum	End annularity	End partiality
Time	09:18	10:45	10:48	10:51	12:25
Sun's altitude	31.5°	45.3°	45.7°	46.1°	54.2°
Magnitude			0.964		

We have not found in the astronomical literature any other reference to an observation of this solar eclipse and no other solar eclipses were reported in the first volume of the *Dietaris*. However, let us concentrate for a moment in the *Llibre de Jornades*, where we find other records and we can also see some of the motivations that take the *escrivà*, Jaume Safont, to record some punctual astronomical events.

- *Llibre de Jornades*. Volume I. P. 106.

33v (30 November 1453) *Divenres, a XXX de nohembre MCCCCLIII. Die de sent Andreu (...)* E aquesta hora que lo dit Mossen Galceran de Requessens publicà la dessus dita consellaria e trenchà los privilegis de la dita ciutat, hi fores presents (...). E ab tota veritat és cert que aquesta hora per aquesta lo sol s'escurí e fonch fet gran eclipsi, e si no y falgué sinó com no plagué a Deu que tot lo palau dalt e baix sen'n fos entrat, e.y fossen morts a mala mort lo dit mossèn Requesens e //f.34r// tots sos cecassos, qui aquest jorn han deslbiertada la plus nobla ciutat del món.

- Translation: Friday, on 30 November 1453. Day of san Andrew (...) It is at this hour that the above mentioned Mossen Galceran de Requessens published the already mentioned *consellaria* (edict) and broke the privileges of the above mentioned city, they were present (list of names). And with all the truth it is true that at this hour the Sun become dark and it was a great eclipse, and it did not seem but as if God did not like that the whole palace up and down had been entered and that were dead of bad death the saying mossèn Requesens and all his followers, who on this day have removed the freedom to the most noble city of the world.

Jaume Safont is a man of the XV century, he believed in supernatural announcements and sees signs of misfortune in natural events. As we have previously stated, he hates Requesens and in the *Llibre de Jornades* he names his as “malvat” (evil) or “mal nat” (bastard). In the *Dietaris* this feeling is also evident, but is somehow expressed more diplomatically: Requesens is described as a man that has no respect for the laws if these laws interfere with his business. Sometimes the acts of this person are preceded by celestial signs or storms.

On 30 November 1453, Requesens suspends the privilege of the city of Barcelona of choosing its own *consellers*. This fact was considered by Safont as a great offense, up to the point of wishing the death of Requesens and of remarking how the same nature showed its disagreement by means of an eclipse (See figure 4). In this case, it is interesting to remark that this eclipse was not as large as others that happened in other dates and were not registered, showing clearly the interest of Jaume Safont in linking the break of the privileges and the act of Requesens with the bad sign of the eclipse.



Figure 4: Picture on the margin of 33v of the *Llibre de jornades* representing the eclipse of 30 November 1453. Under the picture it states *Trencament de privilegis*, (Break of the Privileges), clearly linking both events.

With respect to the astronomical data (see figure 5), the eclipse was partial in Barcelona and the main characteristics are listed in table 2. We have not found any other reference to the observation of this eclipse in the astronomical literature.

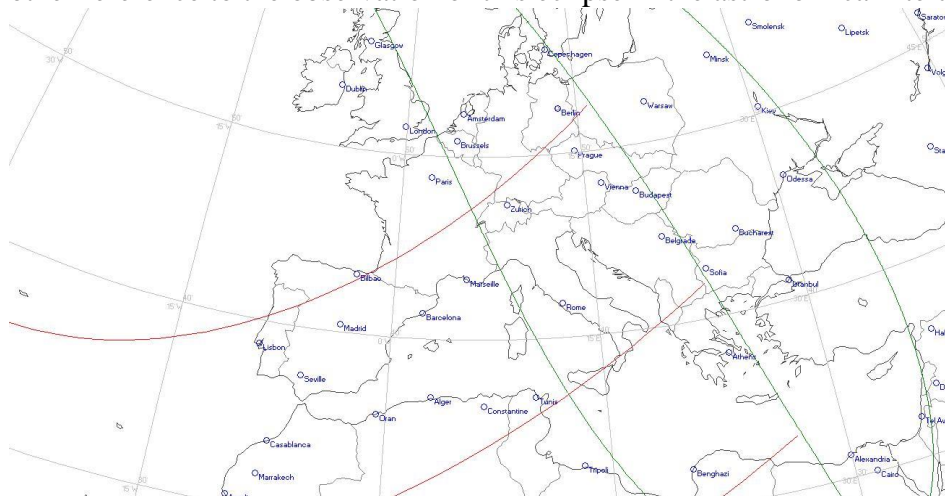


Figure 5: partial eclipse on 30 November 1453.

Table 2: Main characteristics of the partial eclipse on 30 November 1453. Magnitude refers to the magnitude of the eclipse.

	Beginning partiality	Maximum	End partiality
Time	13:20	15:33	16:45
Sun's altitude	22.5°	14.8°	5.0°
Magnitude		0.685	

- *Llibre de Jornades*. Volume I. P. 106.

139v (29 July 1478) *Dimecres, a XXVIII de juliol MCCCCLXXVIII, fonch fet eclipse de sol, qui durà entorn a una hora e mige, ço és, que començà entre XII e una e durà fins a II hores après migjorn; tornà lo sol molt groch e enforquí la terra, no pas tant com la gent deyen ans que fons fet; dien los stròlechs que aquest eclipsi de sol, segons lo signe en lo qual s'es eclipsat, demostré gran morts de reys e de prínceps e destrucció de magnats. Déus ne gart mon señor lo rey en Johan, muy benebenturadement regnant, qui.ns faria gran fretura si moria.*

- Translation: Wednesday, 29 July 1478, there was a solar eclipse, which lasted about one hour and a half, this is, it began between 12 and 1 and lasted until 2 after midday; the Sun became very yellow and the land got dark not so much that the people said that it had not happened in years; the astrologers say that this eclipse of the Sun, according to the sign where it has been eclipsed, shows many deaths of kings and princes and magnates' destruction. God keeps my lord king Juan, who is reigning; he would cause us a great loss if he died.

Safont follows the mentality of his epoch when he sees a sign of death in the eclipse. He was not a supporter of King Juan II to who accuses of a lack of political ability that has caused a civil war whose consequences are catastrophic for the population; so his desire of good health for the king is cynical. However, the prophecy is accomplished with the death of the king next January.

The eclipse was nearly total in Barcelona and the time of the beginning of the partiality is accurately recorded. The Sun was in Leo, which is the sign that the text refers and maybe the one of the astrologers was Juan de Salaya¹⁴, who predicted the eclipse and also “*entre otros males, pestes y muertes de pontífices y de príncipes*” (among other disgraces, pests and deaths of pontifex and princeps). We have not found any other report of the observation of this eclipse in the astronomical literature.

¹⁴ Juan de Salaya got a chair in Astrology in the University of Salamanca (1464-1469). He was the author of comments to the *Fisica* and *De Coelo* of Aristotle and he translated the works of Abraham Zacut.

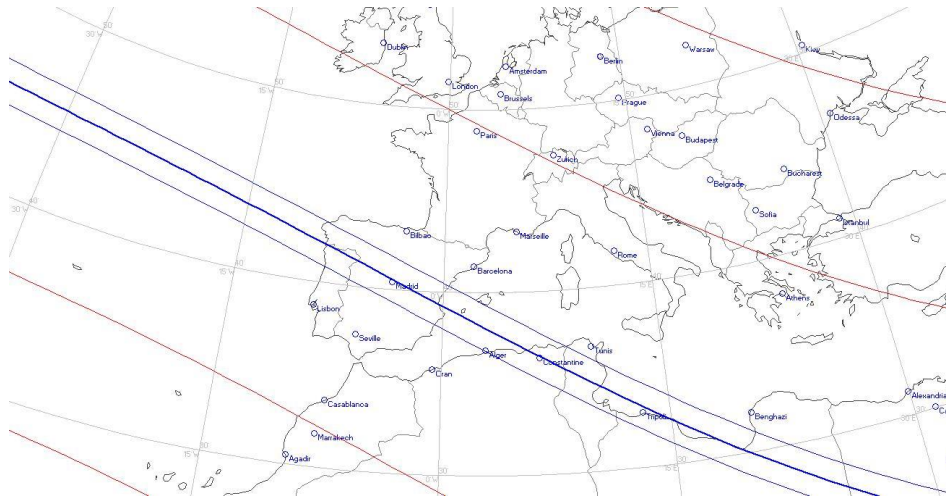


Figure 6: Partial eclipse of 29 July 1478

Table 3: Main characteristics of the partial eclipse of 29 July 1478. Magnitude refers to the magnitude of the eclipse.

	Beginning partiality	Maximum	End partiality
Time	12:51	14:11	15:26
Sun's altitude	65.1°	60.3°	49.2°
Magnitude		0.953	

2. Lunar eclipses

In the period 1411-1539 there were a total amount of 136 lunar eclipses, 84 of them total, visible from Barcelona, in 30 of them the altitude of the Moon was too low to be easily observable and two more had duration under half an hour. Probably the weather conditions also affected in the fact that only two of these appear in the *Dietaris*:

- Dietari General de Catalunya. Volume I. P. 137.
Dietari Number 6 (1455-1458). 57r (3 September 1457) *Dissabte, a III. Aquest dia, a VIII^o hores, ans de mijanit, fonch gran eclipsi de luna. Déu nos faça gràcia per sa mercè que en bon punt se sie ella clipsada, amén.*
- Translation: Saturday the 3rd. This day, at the 9th hour, before midnight, there was a large lunar eclipse. Praise be to God to His Grace for such a timely eclipse (of the Moon). Amen.

The report is very short, but detailed. The last phrase is an invocation to God that appears in similar way three times¹⁵ in the period of the *Dietari* that we are considering. It intends to ask for protection or to make sure that the described natural phenomenon will not bring misfortune to the village. A chain of unfortunate events had happened within the preceding months: Once again, the pest was present in Barcelona from the 15 May 1457 and lasted to January, it was the *glànola* mentioned in the *Dietaris* in the reference on 31 May; From May to January the last day each

¹⁵ This is the first mention, then we find another in the note concerning to and earthquake which occurred on 23 December 1471. The last one is included in "Other astronomical references" section.

month of the *Dietary* includes de number of deaths by pest; The 27 July, Barcelona suffered an attack of Genovese ships and lastly, as a result of the pests, on the 6 of July the *Diputació* was evacuated.

The entire eclipse was visible from Barcelona, the Moon entered into the penumbra at 20:25 and left it at 01:39. The eclipse had the following local characteristics (See Table 4):

Table 4a and 4b: In table 4a we see the main characteristics of the Total Lunar eclipse of 1457 September 3. In table 4b we list the magnitude and duration of each of the phases of the eclipse. The penumbral phase is usually goes unnoticed, but we have included it all the same.

Table 2a	Begin Umbra	Start of Totality	Maximum	End of Totality	End Umbra
Time	21:22	22:27	23:02	23:37	00:42
Moon's altitude	24.8°	34.1°	38.3°	41.5°	44.5°
Table 2b	Umbral	Penumbral	Totality		
Magnitude	1.259	2.232			
Duration	3h20min	5h13min	1h10min		

There are references in European sources of this lunar eclipse. See, in particular the work of Steele (2000), took from Steele and Stephenson (1998) where he translates Schoener's *Scripta Clarissimi Mathematici M. Iojannis Regiomontani* report on this eclipse, which was observed by *Georg Peurbach and Regiomontanus* in Melk. Regiomontanus noticed a considerable error between the observed time and the predicted by the Alphonsine Tables, being surely this one of the causes why Regiomontanus worked on a new set of tables.

- Dietari General de Catalunya. Volume I. P. 206.
Dietari Number 8 (1470-1473) 40v (27 November 1471) *Dimecres, a XXVII. Aquest die, en la nit, fonch fet gran eclipsi de luna, la qual tornà molt negra, e com hac stat axí negra un quart d'ora tornà ten vermella com una sanch, e puy cobrà sa color*
- Translation: Wednesday the 27th. On this day, in the night, there was a large Lunar eclipse. (The Moon) became very black and after remaining that black for a quarter of hour, became as red as blood, and then recovered its color.

1471 was a year particularly full of gloomy predictions: this lunar eclipse, an earthquake on 18 December and a meteor on 19 December. The situation in Catalonia was difficult, with the civil war near to its end, and also the death of Pope Paulo II in June should have caused great concern.

The eclipse took place the day after of the Battle of Santa Coloma de Gramanet, during the civil war (1462-1472) between King Juan II and *Generalitat*. According to the chronicles, Prince Fernando, son of Juan II, had thirty prisoner knights. To liberate them, the *Generalitat* sent 150 knights together with 4.000 men of infantry, and suffered a severe defeat. The definitive capitulation one year later ended the war. The red Moon could then be understood as a sign of the defeat and the spilled blood. The explanation of this reddish color is related with the light scattering: when the Moon passes through the umbra, it is still visible, but looks red instead of its usual white color. This happens because the light from the sun passes through Earth's atmosphere and is scattered by it. The extent of the scattering depends on the wavelength of the light, with shorter wavelengths scattering more. Blue light has the shortest wavelength, so it is scattered the most. Light that reaches the Moon during an eclipse

must cross more atmosphere than usual. As the blue light scatters, red light, which has a longer wavelength, remains. It is therefore mostly red light that illuminates the moon during a lunar eclipse, giving it a red appearance.

The entire eclipse was visible from Barcelona, with the local circumstances listed in table 5.

Table 5a and 5b: In table 6a we see the main characteristics of the Total Lunar eclipse of September 27th 1471AD. In table 6b we list the magnitude and duration of each of the phases of the eclipse.

Table 3a	Begin Umbra	Start of Totality	Maximum	End of Totality	End Umbra
Time	19:50	21:08	21:37	22:05	23:23
Moon's altitude	27.1°	41.2°	46.5°	51.6°	64.2°
Table 3b	Umbral		Penumbral		Totality
Magnitude	1.140		2.233		
Duration	3h32min		5h56min		0h57min

This eclipse is recorded in other European sources that also notice the reddish colour of the Moon. One of the most interesting is the Novgorodsky IV (6979) (Vyssotsky,1949):

During the same autumn, on November 27, the Moon lost its light. About midnight a clear sky appeared as if there was blood over the moon; darkness lasted for quite a time and the gradually lighted up.

3.Comets

- Dietari General de Catalunya. Tome I. P. 131.

Dietari Number 6: (1455-1458) 20v (14 June 1456) *Dilluns, a XIII. Per tant com, entorn VIII o X dies ha passats, que moltes gents van dient que han vista una stela en lo cel qui llança gran claror e de la qual procehexen certs raigs vermells semblants a foch, e que aquesta stela se veu quascun matí de mijanit fins al sol exit, per ço, jo, Jacme Çafont, notari e hu dels scrivans ordinaris de la casa de la Deputació del General de Cathalunya, huy que és dilluns, a XIII de juny M CCCC LVI, volent veure si és ver ço que-s diu de aquesta stela, me són levat entre II e III hores passada mijanit e són muntat alt, en la torra de casa mia. E, de fet, é vista una stela entre grech e tremuntana, de la qual procehien grans raigs de claror qui partien de la dita stela e signaven entre llebeig e migjorn, e podien haver de larcha a bon arbitre de XVIII en XX palms, e d'ample o de gros un bon palm, la qual stela e raigs eran fets en la manera dessus designada. Déus vulla que bon senyal sie, que los hòmens de la buscha¹⁶, qui concorren en aquesta temporada, han tal adobada aquesta ciutat que ab poques males ventures hauríem prou sobre ço que ja havem.*

- Translation: Monday the 14th. Some eight or ten days ago, a lot of people have been saying they have seen a star in the sky with high brilliance and from it came certain red rays similar to fire and this star may be seen each

¹⁶ *Buscha* (The *Busca*) The catalan bourgeoisie in the XV century grouped by political affinity in two main political blocs: *La Biga* and *La Busca*. Roughly speaking, *La Busca* pretended a democratizing access to the public office while *La Biga* tried to rule the government with absolutist ideas. Jaume Safont, was a supporter of *La Biga* and that is why we find such negative comment against the people of *La Busca*, which had come to power two years before.

morning from midnight to the rise of the Sun. That's why me, Jacme Çafont, notary and one of the court clerks of the House of the *Diputació General de Catalunya*, today Monday 14 June 1456, wanting to check if what people say about this star is true, have got up between II and III hours after midnight and have climbed up to the tower of my house. And, as a matter of fact, I have seen a star between Gregal (NE) and Tramuntana (N). From it (this star) came long rays that came from the named star and pointed towards between Llebeig (SW) and Migjorn (S) and they could have a length roughly between XVIII and XX palms and about one palm of width. The star and the rays were in the way it is been reported. Let us hope to God that it is a good sign, because the men of the *buscha*, which are around these times, have so depressed this city that we had already had bad news.

There is a much shorter version of this record in the *Llibre* in the entry corresponding to the 14 June that does not add more information. Some days after, we find another reference in the *Dietari*:

- Dietari General de Catalunya. Tome I. P. 131.

Dietari Number 6: (1455-1458) 21r (21 June 1456) *Dilluns, a XXI. Aquest die, en la nit e algunes nits après següents, de les VIII^o hores fins prop de les XI, ans de mijanit, fonch vista una semblant stela en lo cel, semblant de aquella qui fonch vista a XIII del present mes, e aquesta exia de les parts de mestre e tenia los raigs detraç, ço és, vers les parts de exeloch*

- Translation: Monday, the 21st. This day, in the night and some days after, from 9 to 11 hours before midnight, it was seen a star in the sky, which was similar to the one seen the 14th of this same month, and this one rose from the part of Mestral (NW) and had the rays behind, that is to the part of Xaloc (SE).

We have already mentioned that on 30 November 1453 Requesens suspended the elections of *consellers* and designed a new *conselleria* including people from the *Busca*. The 1953 eclipse was a sign of disapproval from the nature. The following years, the conflict intensified, the *Busca* claimed for protectionist measures, devaluation of the currency, reparation of the municipal administration and trade protectionism, among others. King Alfonso granted a privilege of regulation of the city in 1455: the composition of the organs of municipal government distributed in a fixed way between the diverse estates. The program of changes promoted by the *Busca* was not successful due to the fierce opposition of the *Biga*. The final fragment “Let us hope to God that it is a good sign, because the men of the *buscha*, that are around these times, have so depressed this city that we had already had bad news” must be understood in this context, because the comet was an additional sign of misfortune. Any other remark blaming the comet for any later event is made. Finally, in 1462 the Catalan civil war began (1462-1472) and at its end the *Biga* recovered the power.

These fragments contain two beautiful descriptions of comet 1P/1456 K1, which is best known as Halley comet (See Figure 7). According to Yeomans (1981), the first report of the comet visible as a naked eye object was on 26 May 1456 and then remained visible for 44 days, the date of the perigee was on 9 June 1456, the minimum distance to the Earth was reached on 19 June 1456 and it was 0.45 AU, it reached its maximum brightness on 19 June 1456 with 0 magnitude.

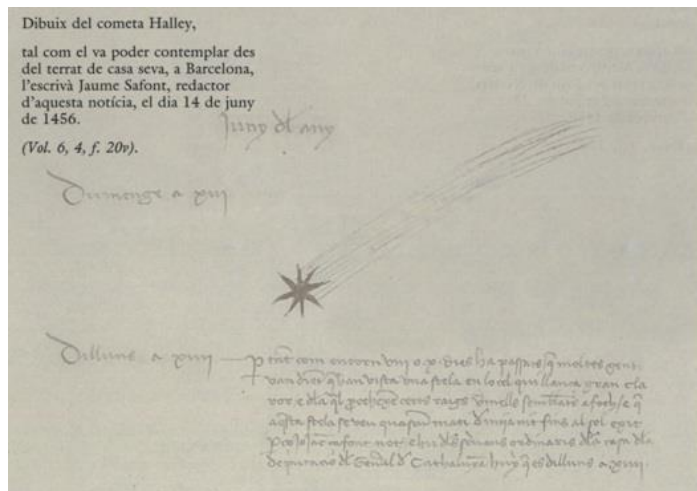


Figure 7: Picture representing Halley's comet as seen from Barcelona on 14 June 1456. The upper annotation in printing text is a modern comentary of the figure. (Reproduced with the permission of the Generalitat de Catalunya, from the *Dietaris de la Generalitat de Catalunya*. Vol. 1)

It was bad weather in Barcelona until the beginning of June, as it is written in the input of 1 June, being this maybe an explanation of why the comet was not detected before:

Dimarts, lo primer de juny. Aquest die fonch celebrada la festa del Corpus Christi, car per pluges no-s era poscuda fer segons apar dalt, sots kalendari de XXVII de maig propassat.

Tuesday, 1st June. On this day was celebrated the feast of Corpus Christi, because of the rain it was not possible to celebrate it according to the calendar, on the 27 of previous May.

The particular night of 14 June 1456, the comet had almost reached its minimum distance to the Earth and its maximum bright. It was visible in the constellation of Auriga and had the following ephemerides for the city of Barcelona:

Right Ascension:	5h 39min
Declination:	+41° 19'
Rise:	2h 37min
Transit:	12h 14min
Set:	21h 55min

Jaume Safont climbed to his tower to observe the comet between II and III hours after midnight, which is about the time of the rise of the comet, and he records carefully that the comet was between Gregal (NE) and Tramuntana (N). In fact, the Hour angle of its rise was 14h 32min. Notice that this is the only case in which Jaume Safont specifically reports to have seen directly the celestial event

The astronomical information for 21 June, when the comet was in Leo is:

Right Ascension:	8h 57min
Declination:	+30° 40'
Rise:	6h 43min
Transit:	15h 8min
Set:	23h 23min

In this case, the writer of the diary has remarked that the comet was visible from 9 to 11 hours before midnight. The observer has only noticed the nocturnal apparition of the comet, while he has not paid attention to the hours from its rise to the dawn, when the comet was also visible. In fact, when the observer says that “(this star) rose from the part of Mestral (NW)...” he does not refer to the actual astronomical rise of the comet, but to the zone of the sky where the comet was visible after dawn (the approximate Hour Angle at 22h was 6h 30min).

It is also very interesting the use of the names of the winds of Catalonia to show the direction of the rays of the comet, (see fig. 8). In addition, it informs us that the rays of the comet were remarkably long, which is in agreement with other well known contemporary registers.

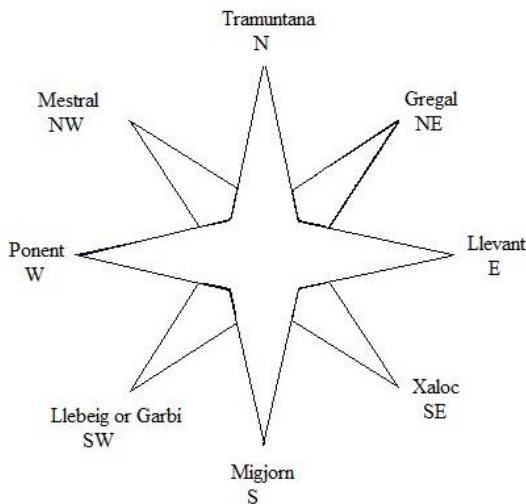


Figure 8: Rose of the winds used in Catalonia.

The comet approached the Sun in the next days and it became more difficult to observe. Surely this is why there are two independent observations for this same comet, one for on the 14th and other on 21st June.

In Figure 9 we can see the trajectory followed by the Halley’s comet for this period of time.

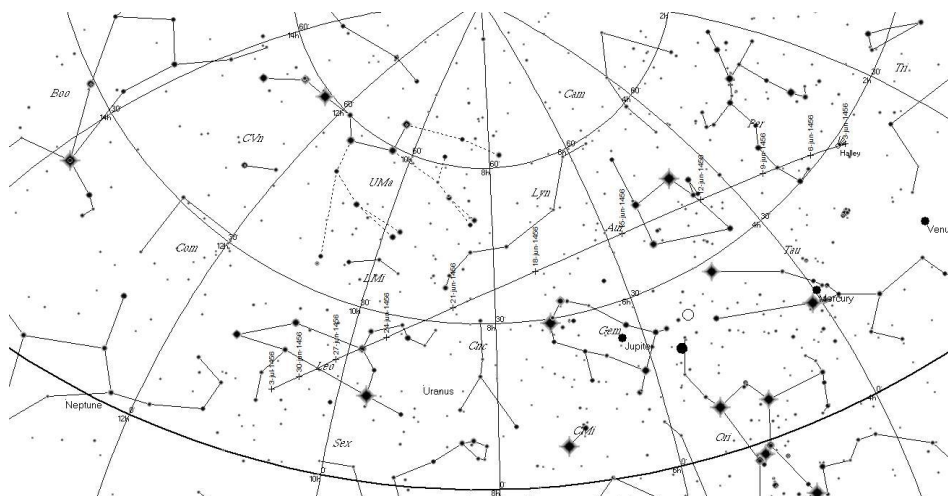


Figure 9: Trajectory followed by Halley’s comet from the 3rd June 1456 to the 25th June 1456

Halley's apparition in 1456 was remarkable in many ways, as it is well-known. For a complete description about theories and observations of comets in the XVth century see (Jervis, 1985). It is not our goal to make an exhaustive list of all the reports of the comet around the world, we will just point out that this year the Ottoman Empire invaded the Balkans, culminating in the Siege of Belgrade in July. In a Papal Bull, Pope Calixtus III ordered special prayers be said for the city's protection. In 1470 the humanist scholar Bartolomeo Platina wrote in his *Lives of the Popes*¹⁷ that

A hairy and fiery star having then made its appearance for several days, the mathematicians declared that there would follow grievous pestilence, death and some great calamity. Calixtus, to avert the wrath of God, ordered supplications that if evils were impending for the human race He would turn all upon the Turks, the enemies of the Christian name. He likewise ordered, to move God by continual entreaty, that notice should be given by the bells to call the faithful at midday to aid by their prayers those engaged in battle with the Turk.

The comet was also observed in Italy by Paolo Toscanelli (see Celoria (1921)), who said its head was *as large as the eye of an ox*, with a tail *fan-shaped like that of a peacock*. Arabs said the tail resembled a Turkish scimitar. The orbital elements of the Halley comet are well known and we are not going to list them here¹⁸.

- Dietari General de Catalunya. Volume I. P. 192.

Dietari Number 8: 35v (8 October 1468) *Dissabte, a VIII. Aquest die, en la nit, e alguns jorns abans e après, se viu en lo cel una stela o cometa feta en la forma que dessus és pintada, ab una gran coha, e exia de les parts de ponent e los seus raigs stenia vers levant; Déus nos do bons senyals.*

- Saturday the 8th. This day, in the night and some days before and after, it was seen in the sky a star or a comet in the way that is drawn below¹⁹, with a long tail, and it came out from the part of Ponent (W) and had the rays towards Llevant (E); May God give us good signs.

This description, that also appears similarly in the *Llibre*, where an illustration is included (See figure 10), corresponds to comet C/1468 SI which, according to Yeomans and Kiang (1981) was first detected the 18 September 1468 and then remained visible for 56 days, the date of the Perigee was on 2 October 1468 and reached the maximum brightness the same day with 1-2 magnitude. (See figure 11 for the apparent trajectory of this comet)

¹⁷ Patina, B. *Lives of the Popes*. Frist published in 1479.

¹⁸ They can be consulted, for example, in <http://cometography.com/orbits.html> took mainly from Marsden (1992)

¹⁹ Note of the authors: Picture of the *Dietari* not included

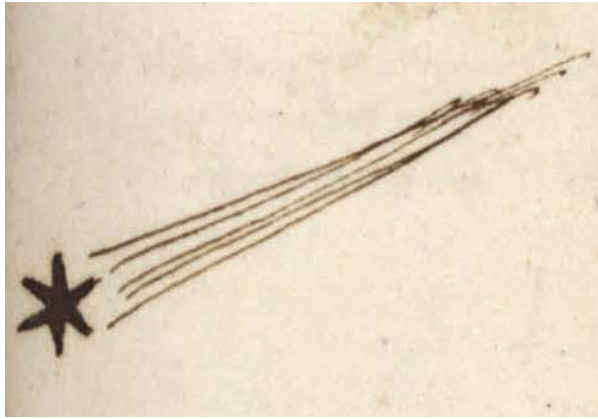


Figure 10: Comet C/1468 SI as drawn in the margin of f. 115r in the *Llibre*.

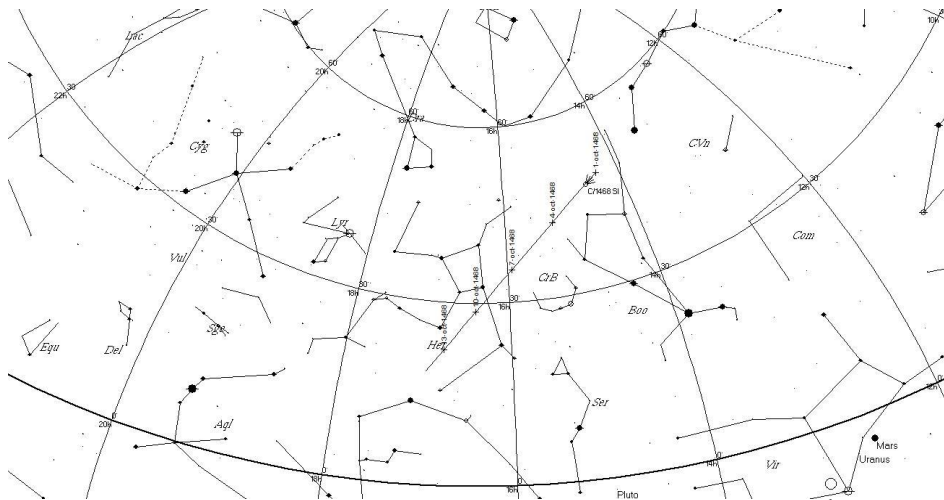


Figure 11: Trajectory of the comet of 1468 from the 1st of October to the 15th October

This year two comets were seen and they were recorded in the chronicles of Gustinsky (6976) (Vyssotsky, 1949) with only a succinct reference:

There appeared two terrible stars, one after another.

The first comet was seen in China in February and the second, the one that refers the *Dietari*, was seen from September to November. We can see in table 6 its orbital elements computed by several authors.

Table 6: Orbital elements of C/1468 SI computed by several authors (Marsden (1992)). The moment when the comet was closest to the Earth was 1468 October 1 (0.6691 AU)

Computer	T (UT)	w	Ω (2000.0)	i	q	e
Laugier	1468 Oct. 7.910	65.30	68.73	135.70	0.85328	1
Valz	1468 Oct. 7.927	69.83	78.58	141.99	0.82972	1
Hasegawa	1468 Oct. 7.3	91	107	138	0.85	1

- *Dietari* General de Catalunya. Tome I. P. 206.

Dietari Number 7: 44v (16 January 1472) *Dijous, a XVI. Aquesta nit, e moltes altres nits proppassades, fonch vista una stela en lo cel, qui exia a X hores de nit e durava fins hora d'alba, lensant grans raigs sobre la ciutat de Barchinona, e exia de la part de levand e signava de ponent, tenint tots los raigs d'una part, car detraç ne per costats no-n tenia, ans los tenia tots*

devant, segons açí dessús és figurada. E en aquests dies stava asetjada per mar e per terra la ciutat de Barchinona per les gents del rey Johan. E après successivament, les altres nits après següents, fonch vista per lo contrari, ço és, que exia de les parts de ponent e lançava sos raigs vers levant.

- Translation: Thursday the 16th. This night and a lot of other past nights was seen a star in the sky, which rose at 10 hour of the night and lasted until dawn, casting great rays over the city of Barcelona, and rose from Llevant (E) to Ponent (W), having all the rays in one part, neither behind nor rays on its side, because it had all its rays in front of it, such as here is figured²⁰. And on these days the city of Barcelona was under siege by the people of King Johan. And afterwards, successively, the next nights, it (the star) was seen inverted, that is, it rose from Ponent (W) and casting its rays to Llevant (E).

The vision of this comet is related to one of the last episodes of the Catalan civil war: the siege of Barcelona from the end of 1471 to the capture of the city by King Juan II in October 1472. The comet was undoubtedly a sign of bad luck.

This is a description of C/1471 Y1 which, according to Yeomans and Kiang (1981), was first detected on 25 December 1471 and then it was visible for 59 days, its perigee was on 23 January 1472 being the minimum distance to the Earth 0.07 AU and reaching magnitude -3. The text points out that the comet was first visible in the East and then, some days after, in the west. This is easily understood if we look at figure 12: in the particular date consigned in the *Dietari* the comet was in Bootes and had the following coordinates:

Right Ascension:	13h 15min
Declination:	+15° 28'
Rise:	22h 49min
Transit:	5h 50min
Set:	12h 45min

Once again, it is accurately reported the hour of the rise (on 16th January the comet rose at about 22h 40min and earlier the precedent days) and the position of the comet. The rise of the comet was in the east and the rays spread to the west. Then the comet crossed quickly the sky towards the west, changing its point of rise and reversing its appearance.

There are plenty references of this comet in the Russian chronicles (Vyssotsky, 1949): Novgorodsky IV (6979) and (6980), Sophiisky II (6980), Pskovsky I (6980) and II (6980) and Gustinsky (6980). We will reproduce only the one from Sophiisky, because of its similitude with the one recorded in the *Diaries*: (The one from Pskovsky I is also very interesting)

During the same winter a spread-shaped star which was called a tailed star appeared in the sky. It was visible in the east and the rays from it spread towards the west. It was there for many days and vanished. And another one appeared in the west spreading its rays towards the east.

This comet was recorded several times in the Western annals and Regiomontanus computed accurate positions of it (Steele, 2000). See figure 12 for the apparent trajectory of the comet.

²⁰ Note of the authors: Picture not included

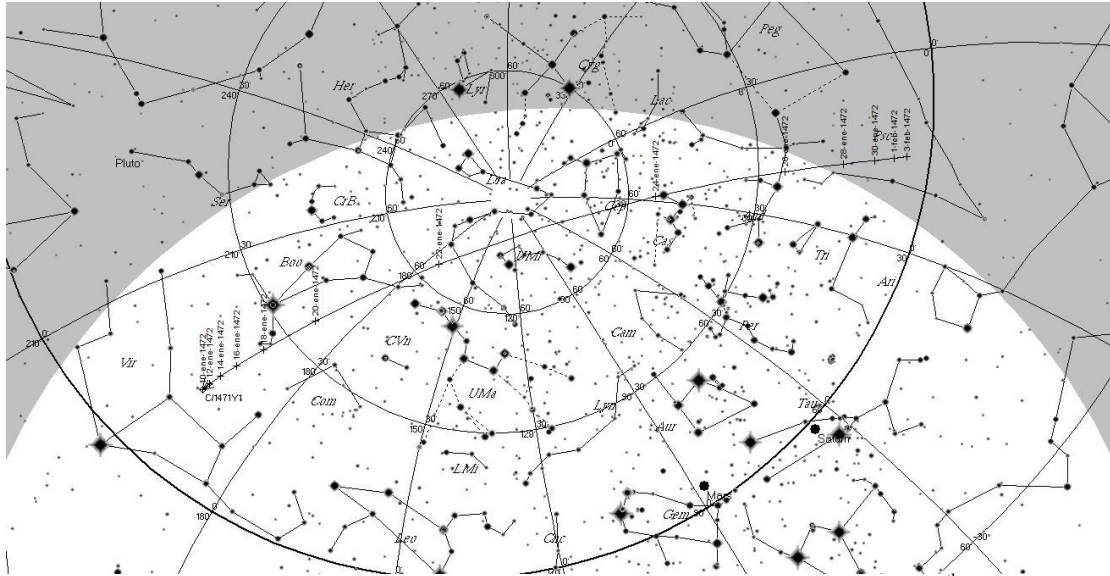


Figure 12: Trajectory of the comet of 1471, as seen from the city of Barcelona from 10th January to the 3rd February

Its computed orbital parameters are in table 7 (Yeomans and Kiang (1981)):

Table 7: Orbital elements of C/1471 Y1 computed by several authors. See table 4 for details. The moment when the comet was closest to the Earth was 22 January 1472 (0.0696 AU)

Computer	T (UT)	<i>W</i>	Ω (2000.0)	<i>i</i>	<i>q</i>	<i>e</i>
Halley	1472 Feb. 29.433	235.525	288.449	174.693	0.54273	1
Laugier	1472 Feb. 28.718	158.22	213.64	178.03	0.56457	1
Celoria	1472 Mar. 1. 4391	245.728	292.873	170.8664	0.48589	1

4. Other Astronomical references

- Dietari General de Catalunya. Volume I. P. 151.

Dietari Number 7 (1458-1461), 38r (28 October 1459) *Dicmenge, a XXVIII. Aquest die, a migjorn e ja alguns jorns abans e aprés diverses hores, per molts fonch vista una molt gran e groça stela ab una gran coha de fonch qui menava gran fum detràs si, exint de les parts de ponent e anant vers lo levant, e per semblant se diu l'an vista en Aragó e en València, de què s'és seguit que molts stròlechs han dit que dins aquest any morrà algun gran príncep e seran grans guerres o morts; Déu per sa misericòrdia nos do ço que sab que havem master.*

- Translation: Sunday the 28th. This day, at midday and already some days before and after at different times, a lot of people saw a big star with a large tail of fire that casted much smoke behind it, from the parts of Ponent (W) and going to Llevant (E). And it seems to have been seen in Aragon and Valencia, from this follows that many astrologers have said that this year will die a great prince and there will be many great wars or deaths. May God, in His mercy give us what He knows we need.

The apparition of this star is recorded in both *Dietari* and *Llibre*. This event was preceded by an earthquake the 1st August and intense storms in September that caused injuries and several material damages, so it is not a surprise that “many astrologers have said that this year will die a great prince and there will be many great wars or

deaths”, the emergence of a whale on 14th November in the mouth of the Llobregat river (*Llibre, 61r*) was also a sign of misfortune. As we have previously stated, these are the previous years to the Catalan civil war and the situation in the city of Barcelona was very unstable, with continuous tensions among the supporters of the *Biga* and the *Busca* and the raising problems with the *remences*. That is why the author claims for “He knows we need”.

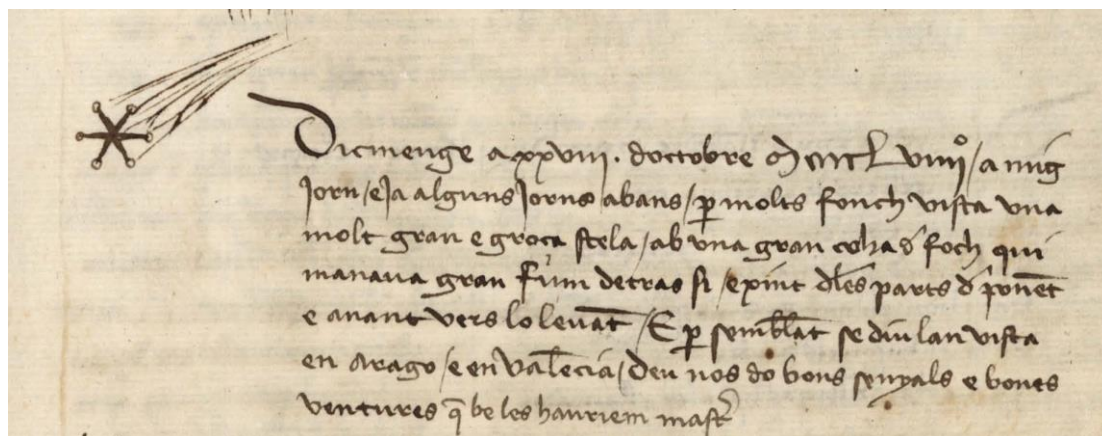


Figure 13: Picture of the meteor in f.61r, in the *Llibre de les jornades*.

At a first sight, the text seems to describe a very bright comet, because it could be seen at midday, and “and already some days before and after” but the only recorded comet for these years was C/1458, which was not visible on this date. This fact and the part “with a large tail of fire that casted much smoke after it, from the parts of Ponent (W) and going to Llevant (E). And it seems to have been seen in Aragon and Valencia” seems to fit with the description of a meteor. In fact, surely the author refers to a especially brilliant meteor among much others, which would explain the comment that the star was also seen “some days before and after”. The date of this entry could suggest that it was a meteor from the Orionids²¹ meteor shower, but it was seen at midday and “from the West to the East”. At this time it was Leo the constellation that was in the West, so the meteor is likely to belong to an early Leonids²². The radiant of this shower was over the horizon from approximately 9a.m. to 9 p.m.. This interval could correspond to the “different times” of sighting reports. However, we have found no corroboration of this fact in other archives of Aragon and Valencia.

- Dietari General de Catalunya. Volume I. P. 183.
Dietari Number 7 (1464-1467), 6v (10 October 1464) *Dimecres, a X. Aquest die, en la nit se viu un gran senyal de foch en lo cel, ten gros com un gran payller, e llançà molta claredat, e fonch entre VI e VII hores, ans de mijanit; Déu, per sa mercè, vulla que de aquest senyal e de tots altres succesque tot bé e repòs en lo principat de Cathalunya.*
- Translation: Wednesday, the 10th. On this day, in the night, a big sign of fire was seen in the sky. (It was) as big as a big pine tree, and casted much

²¹ The Orionids, is a meteor shower associated with Halley's Comet. The radiant of the Orionids is located between the constellations Orion and Gemini, but they can be seen over a large area of the sky. They are visible annually in late-October

²² The Leonids is meteor shower associated with the comet Tempel-Tuttle. Their radiant is in the constellation Leo. They reach their maximum in the month of November.

brightness, and (it was seen) between 6 and 7 hours, before midnight; May God, in His mercy, want that this sign and all others bring successful events and peace to the principality of Catalonia.

At the beginning of the year 1464 and in the context of the civil war, Pedro IV²³ had been enthroned. In this case, the shooting star was not seen as a sign of bad luck, but the writer hopes it to be a sign of hope in the civil war against Juan II.

This record refers to a meteor seen from Barcelona. It was seen between 6 and 7 hours. In this epoch of the year, the sun sets at about 18h 15m and the astronomical twilight ends at about 19h 50m so it was not total darkness and the shooting star should have been a really shining one. In accordance with the date, this meteor could have belong to the Draconids.²⁴

- Dietari General de Catalunya. Tome I. P. 206.

Dietari Number 8: 42r (18 December 1471) *Dimecres, a XVIII. Sancta Maria de Sperança. Aquest die, en la matinada, quasi a punta de jorn, féu terratrèmol, e en la nit après següent se viu al cel una gran stela ab grans raigs, lensant gran claror en forma no acostumada; Dé nos do bons senyals e bona ventura, per sa mercè.*

- Wednesday, the 18th. St. María de Sperança. Today, during the sunrise, almost beginning the day, there was an earthquake and in the night after it was seen in the sky a large star with long rays, casting brightness in an unusual way. May God give us good signs and good fortune, for His grace.

At first, we thought that this could have been the first detection of the comet of 1471 (see previous subsection), but the paragraph seems to refer to a sudden event, so we finally decided that this is the description of a meteor, maybe associated with the Gemidids²⁵.

The author seems to consider that there is a relationship between the earthquake and the vision of the shooting star, even if he did not tell us so explicitly. In the Middle Ages, earthquakes were commonly associated with comets (see, for example, Oeser, 1992).

- Dietari General de Catalunya. Tome I. P. 95.

Dietari Number 7: 17r (16 June 1444) *Dimarts, a XVI. En aquest dia fuit conjunccio lune et conjunccio Saturnus et Jupiter.*

- Tuesday, the 16th. In this day it was conjunction of Moon and conjunction of Saturn and Jupiter.

It mentions a conjunction of the Planets Saturn and Jupiter (See figure 14). In Medieval Astronomy *conjunccio* meant that two or more planets seemed to occupy the same position in the sky. Both planets were in Gemini, together with the Moon. In fact, this is a great conjunction: a conjunction of the planets Jupiter and Saturn. Great Conjunctions take place regularly, every 18–20 years. The conjunctions of planets were adduced commonly as reasons of major disasters. Thus, the great epidemic of

²³ Pedro de Coimbra (c.1429–1466) In 1463, the Catalan institutions, which were in civil war with Juan II of Aragon, offered the crown of Aragon to Pedro. He was proclaimed King of Aragon, Count of Barcelona, and King of Valencia by the *Consell de Cent*, but the territory under his control only included Barcelona, Catalonia and parts of Aragon. After a long series of military defeats (Specially in Calaf in 1465), Pedro died in 1465. After his death, the Catalans offered the crown to René of Anjou.

²⁴ Draconids are a meteor shower linked to the periodic comet 21P/Giacobini-Zinner. Their radiant is in Draco, that is circumpolar in Barcelona.

²⁵ The Geminids are a meteor shower caused by the object 3200 Phaethon. This meteor shower reaches its maximum around the 13th - 14th of December.

pest of 1348 was caused, according to the doctors of the Sorbona, by a conjunction of Saturn, Jupiter (whose meeting was generating mortality and disasters) and with Mars, who, added to the previous conjunction, was provoking pestilence (Bonastra, 2006). The author only makes a description, without any comment, even when the pest did appear in Barcelona four years later.

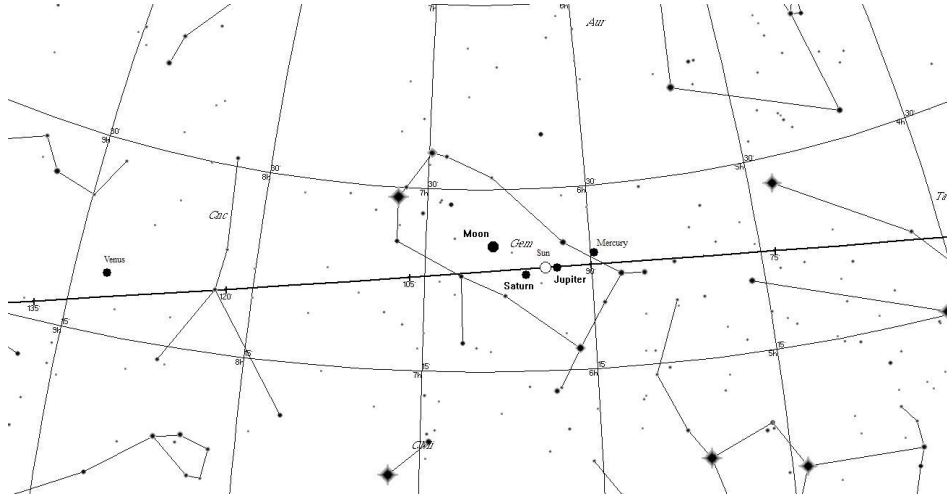


Figure 14: Position of the planets Jupiter and Saturn on 16 June 1444

The local circumstances of this conjunction were the following:

Right ascension:	6h 35m
Declination:	+25° 17'
Rise:	5h 7m
Transit:	13h 4m
Set:	21h 4m

However, it is evident that this conjunction was not visible at naked eye, because all the elements were very near of the Sun. In addition, this paragraph is written in Latin and not in Catalan. That makes us think that the writer has copied this reference from an astronomical book.

CONCLUSIONS:

We have studied a previously non reported source of astronomical reports: the *Dietaris de la Generalitat de Catalunya*, with the help of the *Llibre de Jornades*. In particular, we have studied the astronomical references contained in the first volume of the *Dietari* published by the *Generalitat*, covering a period from 1411 to 1539, and including the first 15 original volumes. The purpose of the *Dietaris* was to leave a written trace of events of general interest, and thus it is not surprising that there is no systematic attempt to record astronomical or geophysical phenomena. The recorded events deal, among others, with solar and lunar eclipses, comets, meteors, earthquakes, and planetary conjunctions. In each case the notary gives a short notice, which, as expected, is far from an astronomical report, with no precise

time, position, or magnitude in the case of eclipses. Almost all records contain an invocation to divinity.

Some of these references were previously reported, but others were scarcely observed or nothing at all. It is remarkable that no observations of the solar eclipses had been previously published.

We have avoided the repetition of well-known reports of the most famous events and we have limited our efforts to show less known reports, such as the ones proceeding from the Russian chronicles (Vyssotsky, 1949). In addition, we have tried to link the observation and subsequent register of the astronomical event to the facts that were actually happening (or the facts that the author of the sources expects to happen) in the city of Barcelona. See Appendix 1 for a historical summary.

ACKNOWLEDGEMENTS:

Part of this work was supported by grant P1-1B2009-07 from Fundació Caixa Castelló BANCAIXA. The authors wish to thank the Generalitat de Catalunya for allowing us the reproduction of part of the artwork contained in the *Dietaris de la Generalitat de Catalunya*; they wish also thank the *Servei de traducció de la universitat Jaume I de Castelló* for their help in translating some of the ancient expressions contained in the *Dietari*.

Appendix 1: Astronomical event included in the *Dietaris* and the *Llibre de Jornades*

Date	Event	Source	Historical events	
16 June 1444	Conjunction	<i>D</i>		
29 August 1448	Annular Solar Eclipse	<i>D, Ll</i>	24-25 May Earthquake	Pest
30 November 1453	Partial Solar Eclipse	<i>Ll</i>	30 Nov Suspension of Privileges	
14 June 1456 21 June 1456	Comet (Halley)	<i>D</i>		
3 September 1457	Total Lunar Eclipse	<i>D</i>		Pest
28 October 1459	Meteor	<i>D</i>	1 Aug: Earthquake	
10 October 1464	Meteor (bolide)	<i>D</i>	30 June 1465: Death of Pedro IV	<i>First Remensa War and Catalanian Civil War (1462-1472)</i>
8 October 1468	Comet (C/1468 S1)	<i>D, Ll</i>		
27 November 1471 19 December 1471	Total Lunar eclipse Meteor	<i>D</i> <i>D</i>	26 Jul Death of Pope Paulo II 26 Nov: Battle of Sta Coloma 18 Dec: Earthquake Siege of Barcelona	
16 January 1472	Comet (C/1471 Y1)	<i>D</i>	October: capitulation of Barcelona	
29 July 1478	Partial Solar Eclipse	<i>Ll</i>	20 Jan 1479: Death of Juan II	

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