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The historicity of the earthquakes occurring in the Iberian Peninsula before the year 881 AD recorded in Spanish and Portuguese seismic catalogues

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Abstract

In this paper, the original accounts of the first 19 earthquakes—occurring before 881 AD—recorded in Martínez-Solares and Mezcua's *Catálogo sísmico de la Península Ibérica* (2002) are reviewed. Their evolution is traced through references to them in the works of Spanish and Portuguese historians and authors published between the 16th and 19th centuries, and it is shown how they subsequently made their way into the main Spanish and Portuguese seismic compilations and catalogues. By identifying the first references to news of historical earthquakes in the Iberian Peninsula in the literary sources, the intention is to gain a better understanding of the context in which this information originated over time and to verify its historicity with greater precision. The review performed here shows that the majority of these accounts lack a firm historical basis.

Introduction

Research on ancient earthquakes and tsunamis in the Iberian Peninsula has progressed by leaps and bounds in recent years. One of the most productive lines of research has been the assessment of the historicity of the information included in the most important Spanish and Portuguese seismic catalogues (Udías, 2015; 2019; Udías *et al.*, 2020; Ces, 2015; Álvarez, 2017a; 2017b; Crespo-Martín *et al*., 2018). In this respect, mention should go to the contributions of Udías (2015; 2019), who has studied the seismic catalogues, their interdependence and the historical sources on which they are based. He has also attempted to identify the origin of the news of historical earthquakes, using as a benchmark the most recent catalogue for the Iberian Peninsula, namely, Martínez-Solares and Mezcua's *Catálogo sísmico de la península Ibérica (880 a.C.-1900)* (Martínez-Solares and Mezcua, 2002; hereinafter, MSM, following the abbreviations employed by Udías (2015)), on whose data the most recent official catalogue of the Spanish National Geographic Institute (Instituto Geográfico Nacional, IGN) for earthquakes before 1900 is based (https://www.ign.es/web/ign/portal/sis-catalogo-terremotos; last accessed May 2020).

The aim of this paper is to perform an analysis from a complementary, but different, approach. To assess the historicity of the earthquakes recorded in seismic catalogues it is essential to bear in mind the chronological, geographical and even cultural proximity of the original source to the narrated events. Specifically, an attempt is made to identify

the origin of the accounts of the first 19 earthquakes recorded in MSM, all occurring before 881 AD. These original accounts will be described in chronological order, while tracing their evolution through the references to them in the works of Spanish and Portuguese historians and authors published between the 16th and 19th centuries. By identifying the first references to historical earthquakes in the Iberian Peninsula in the original sources, the intention is to gain a better understanding of the context in which this information originated over time. This approach also provides an overview of the authors and works from which the information recorded in MSM was ultimately drawn. In this way it is possible to ascertain more precisely how long after the original seismic events these accounts were written and, therefore, to assess their historicity.

It will also be revealed how, before ultimately appearing in MSM, this information made its way into the main Spanish and Portuguese seismic compilations and catalogues: Joachim Joseph Moreira de Mendonça, *Historia Universal dos Terremotos ...* (Moreira, 1758; hereinafter, MM); Manuel Sánchez Navarro-Neumann, 'Bosquejo sísmico de la península Ibérica ...' (Sánchez Navarro-Neumann, 1921; hereinafter, NN); José Galbis Rodríguez, *Catálogo Sísmico ...* (Galbis, 1932; hereinafter, GRI; Galbis, 1940; hereinafter, GRII); J. Mezcua and J. M. Martínez-Solares, *Sismicidad del área Ibero-Mogrebí* (Mezcua and Martínez-Solares, 1983; hereinafter MMS); C. S. Oliveira, *A sismicidade histórica e a revisão do catálogo sísmico* (Oliveira, 1986; hereinafter, CSO); and I. Martins and L. A. Mendes Victor, 'Contribuição para o estudo da sismicidade da região oeste da península Ibérica' (Martins and Mendes Victor, 2001; hereinafter, MMV). The original sources for all earthquakes included in the MSM catalogue before the year 881 are provided in the electronic supplement to this article.

The information on earthquakes occurring after 881 AD recorded in MSM derives from sources chronologically closer to the narrated events and is therefore more reliable. This is the case, for example, with the earthquakes occurring in Cordova in 971, 973 and 974 AD, described by Isa ibn Ahmad al Razi (10th century), and those striking the same city in 881, 944 and 955 AD (Udías, 2015), which Ibn al' Adhari mentions in his *Al-Bayan al-Mughrib* (13th-14th centuries) and to which Ibn Abi Zar (14th century) also refers in his *Rawd al-Qirtas*.

1. *De mirabilibus auscultationibus* (3rd century BC)

The oldest account of earthquakes in the Iberian Peninsula recorded in MSM is drawn from the *De mirabilibus auscultationibus*, an anonymous—although erroneously attributed to Aristotle—compilation of extraordinary and strange events written in the 3rd century BC. The work contains a legendary account of fires in Iberia which had produced rivers of molten silver, which subsequent earthquakes exposed. As the story goes, the Greeks of the city of Massalia (Marseille) would have exploited this silver (Ps. Arist., *Mir. ausc*., 87; Text S1). This account, of a paradoxographical nature, does not mention any specific date or geographical location. Nonetheless, the presence of Massalian Greeks in the Gulf of Roses, in the northeast of the Iberian Peninsula in the vicinity of the Greek colony of Emporion (present-day Ampurias), has been documented as of the 6th century BC.

This account is recorded in Spanish historiography through the work of Florián de Ocampo (1543; 1553; Figures 1a and 1b; *vid. infra*), who combines it with the legend narrated by the Greek historian Diodorus of Sicily (90–30 BC) in his *Bibliotheca*

historica (5.35; Text S2) about certain fires in the Pyrenees that produced rivers of molten silver—but without mentioning any earthquake or specific date.

Combining these two different accounts Ocampo creates a logical sequence. Firstly, he (1553; Text S4) establishes the mountain fire resulting in rivers of molten silver in the Pyrenees—a detail borrowed from Diodorus of Sicily—on an unspecified date, in around 891 BC. He then asserts that the earthquakes—a detail borrowed from *De mirabilibus auscultationibus*—that purportedly unearthed the precious metal occurred in 500 BC (Ocampo, 1553; Text S5), before going on to observe that the entire coast was affected by them, 'where they tend to be more frequent', borrowing a truism from the Roman naturalist Pliny (23/24–79 AD) (*Natural History*, 2.194). He also claims that they occurred in the Cape of Creus (NE Spain) or in Denia (Alicante), while expressing his doubts that they affected Andalusia.

The information provided by Ocampo is erroneously summarised by the historian Esteban de Garibay in his *Compendio Historial* (1571, p. 134), for he asserts that the earthquakes in 500 BC occurred on the coasts of Andalusia. The historian Juan de Mariana, in his *Historia de España* (Mariana, 1601, p. 53), declares that they were felt all over Spain, dating them to the 252nd year since the founding of Rome (which he dates to 752 BC, i.e. 500 BC).

Citing Garibay, MM refers to major earthquakes in Andalusia and on the Spanish seaboard. Based on the same information employed by Ocampo, NN records two different earthquakes, one in Andalusia and the other in the Pyrenees—while mentioning in passing that the volcanoes of Olot (Girona) could not be related to the episode, as they were much older—both occurring in 500 BC, concluding that they were very violent in Spain. Despite citing Ocampo, GRI dates the earthquakes in Andalusia and on the Spanish coasts to 500 BC. Taking a leaf out of NN's work, MMS record two different earthquakes in 500 BC: one to the southwest of Cape St Vincent and the other in Olot (Girona), providing their respective coordinates. And, lastly, MSM also refer to two earthquakes, one in Andalusia and the other in the Pyrenees, in 500 BC.

2. Gregory of Tours (~594 AD): 580 AD

The first account referring to a specific location and date of this earthquake, which has then been included in seismic catalogues, is to be found in the *History of the Franks* (5.33) by Gregory of Tours (538-594 AD) (Text S3). The bishop of Tours describes an earthquake in Bordeaux which he claims was also felt in Spain, and he uses a type of rhetoric common to the ancient Roman tradition of portents. He dates this episode to the fifth year of King Childebert's reign, to wit, 580 AD.

This event is recorded by the Spanish chronicler Ambrosio de Morales (Morales, 1577, p. 84r), who dates it generically to 585 AD. NN incorporates the information provided by Morales—unaware of the fact that Gregory of Tours is the original source—with a reference to '580 or 585' AD, albeit admitting that Milne (1911; without indicating the source) dates it to 579 or 580 AD. Furthermore, he speculates that it must have had an intensity of IX or X on the Forel-Mercalli scale. GRI, who—as with NN—is also unaware of the provenance of this information, reproduces the account offered by Morales and dates the earthquake to 585 AD, while including the information provided by Milne (1911) and NN. Accordingly to MMS, the earthquake occurred in Bordeaux in 580 AD, while MSM establish it in the Central Pyrenees in the same year.

3. Florián de Ocampo (1553): 500, 348, 216, 211 and 210 BC

The next original information on natural disasters in the Iberian Peninsula before 881 AD is not documented until 1000 years later. This, as before, is included in the work of Ocampo (1499-1558), who was the official chronicler of Charles V and the author of an ambitious national history entitled, *Crónica General de España*, which he failed to complete, for it only covers Spain's origins up until the time of the Second Punic War in Iberia (specifically up until the death of the Scipio brothers, which he erroneously dates to 209 BC, the correct date being 211 BC). The information on six of the 19 earthquakes occurring before 881 AD, in addition to the seismic event in 500 BC—based on a reinterpretation of the account appearing in the *De mirabilibus auscultationibus* (*vid. supra*; Text S5)—recorded by MSM, derives from the *Crónica*.

Ocampo describes a period of three consecutive years during which there were floods in the first year (349 BC), earthquakes in the second (348 BC) and sea tempests in the third (347 BC) (Ocampo, 1553; Text S6). According to him, the earthquakes in 348 BC would have affected the Mediterranean seaboard as a whole, in particular the city of Sagunto (Valencia). But he does not mention from where he has obtained this information and there is nothing in the ancient sources substantiating it.

Ocampo's account is echoed by Garibay (1571, p. 139) who dates the first year after the triennial of natural disasters to 346 BC, while Mariana (1601, p. 71) dates the third year marked by sea tempests to the 405th year since the founding of Rome (i.e. 347 BC). This information is recorded by MM, who deduces the date of the earthquake from a note appearing in the margin of Mariana's work, predating these episodes: '398'. Accordingly, he infers that the event occurred in 399 BC, unaware of the fact that Mariana employs a different chronology based on the year of the founding of Rome. This confusion is assumed by MMS, for whom the earthquake struck Sagunto (Valencia) in 399 BC, giving its coordinates. Although he claims to be citing Ocampo, NN dates an earthquake on the Mediterranean coast, 'and especially in Sagunto', to 349 BC, the year also given by GRI. And, for their part, MSM assert that the Sagunto earthquake occurred in 348 BC, while providing the coordinates of the city.

Three of the following four cataclysms described by Ocampo in his *Crónica* are located in ancient Gadir (present-day Cadiz), founded by Tyrian colonists in the 9th century BC. He dates an alleged earthquake and the flooding of part of the island of Cadiz to 241 BC (Ocampo, 1553, p. 216r; Text S7). Although neither in this case does he identify his sources nor is there any mention of this event in the classical tradition.

Although Garibay fails to mention this account, Mariana (1601, p. 79) does indeed refer to it. Nonetheless, he dates the earthquake to the 507th year since the founding of Rome (i.e. 245 BC). Basing his work on Mariana, MM also dates the earthquake to 245 BC, as does NN, but without naming his source, adding that 'there were many violent tremors, submerging part of the island of Cadiz' and establishing its epicentre in the Gulf of Cadiz. According to GRI, the earthquake and flooding of Cadiz also happened in 245 BC, citing Mariana, MM and NN as his sources. MMS date an earthquake in the Gulf of Cadiz to 245 BC, giving its coordinates, while for MSM it occurred in 246 BC, in what seems to be a transcription error.

Ocampo (1553; Text S8) mentions another earthquake and sea flood in Cadiz in the year that Hannibal's expedition departed for Italy, dating it erroneously to 216 BC (the

correct date of its departure being 218 BC). Notwithstanding the account's realism, the sources—'the two Julians'—cited by Ocampo are unreliable to say the least. The first would be Julian, Bishop of Toledo in the 7th century, a historical character, but none of whose works contain any reference to that date. The second character mentioned by Ocampo, Julian of Thessalonica, a purported presbyter of Toledo in the 8th century, is a spurious author invented by the chronicler (Álvarez, 2017a).

Garibay (1571, p. 149) reproduces this news, dating the seismic event to 216 BC, as does Mariana (1601, p. 92), for whom it occurred in the 536th year since the founding of Rome (i.e. 216 BC). MM mentions earthquakes in Spain in the same year, citing Mariana. Borrowing directly from Ocampo (with reference errors), NN also dates the episode to 216 BC. In his catalogue, GRI includes two different entries based on this same information provided by the author of the *Crónica*. On the one hand, and despite literally citing the Spanish chronicler, he states that there was an earthquake in 218 BC, the year in which Hannibal's expedition actually departed for Italy. On the other, Galbis reproduces NN's information, with the original date of 216 BC posited by Ocampo. Stemming from a confusion over the date offered by Mariana, namely the 536th year since the founding of Rome, GRI includes an additional entry in his catalogue, asserting that in 536 AD 'Spain was afflicted by several sicknesses, plagues, earthquakes and storms', citing Mariana. Based on GRI's second entry, MMS date an earthquake in the Gulf of Cadiz to 218 BC, while for MSM it occurred to the southwest of Cape St Vincent in the same year.

Ocampo (1553; Text S9) yet again refers to extraordinary events and earthquakes in 211 BC. This episode bears some resemblance to the description of the seismic event occurring in 216 BC, and includes reports of 'signs' and sounds similar to those 'made by armed people and battles', perceived in both the Pyrenees and Andalusia. However, he only explicitly mentions earthquakes in Africa. Nor in this case is there anything in the ancient sources bearing this out. Neither historians like Garibay or Mariana, nor MM or NN, record this information. It is only mentioned by GRI, who indicates that, according to Ocampo, earthquakes were documented in Africa in 211 BC. As there is no specific reference to earthquakes in Spain, this event has not been included in the most recent seismic catalogues.

Lastly, Ocampo mentions earthquakes in Cadiz in 210 BC (Ocampo, 1553; Text S10). As before, the ancient sources remain silent in this respect. Neither later historians, like Garibay or Mariana, nor MM record them. NN is the first to refer to an earthquake occurring that year, citing Ocampo as his source (with reference errors), but dates it to 209 BC. GRI lists two different earthquakes deriving from the same account contained in the *Crónica*: the first in 210 BC, taken directly from Ocampo, and the second in 209 BC, appearing in NN. MMS record an earthquake to the southwest of Cape St Vincent in 210 BC, while for MSM it occurred in the Gulf of Cadiz in the same year.

Excluding the vague reference in the *De mirabilibus auscultationibus*, the episodes narrated by Ocampo are not mentioned at all in the classical tradition. The chronicler practically never cites his sources and the only time he does, he alludes to an author whose oeuvre is a mystery and to another who is evidently bogus. Nor do any subsequent historians refer independently to the events mentioned by the Spanish chronicler, thus underscoring their lack of historicity.

4. Celio Agostino Curione (1567): 718 AD

The next author to provide information on an earthquake, which has subsequently made its way into the Iberian Peninsula's seismic catalogues, is the Italian humanist Celio Agostino Curione (1538-1567), in his *Sarracenicae Historiae Libri III* (Curione, 1567). This work contains the first reference to an earthquake occurring in Asturias in 718 AD. The account also alludes to the Battle of Covadonga, a tradition according to which the Christian troops led by Don Pelayo miraculously defeated the invading Moorish army in the mountains of Asturias.

The tradition of Don Pelayo and the Battle of Covadonga originated from Hispanic chronicles written in the 9th century, such as the *Chronicon Albeldensis* and the *Chronicon of Alfonso III*, which narrates how the Moorish troops, who had fled after their defeat, were cast into the river Iva (Deva) by a landslide, all thanks to divine intervention. But neither in these early sources nor in the subsequent Spanish historiographical tradition is there any mention of an earthquake, Curione (1567; Text S11) being the first author to do so, although without revealing his sources. Therefore, this news is totally beyond belief.

Curione's account is recorded by Nipho y Cagigal (1755, p. 47) who, claiming that it was a 'formidable earthquake', dates it to 717 AD. GRI echoes Curione's account by citing Nipho, recognising that 'the accuracy of this event has not been confirmed', but nonetheless establishing it in 718 AD. According to GRII, Mariana and Nipho both mention this earthquake, when only the latter actually does so. And, for their part, MMS and MSM contend that there was an earthquake in Asturias in 718 AD.

5. Bernardo de Brito (1609): 216, 63, 55 and 47 BC, and 33 and *ca*. 365 AD

Bernardo de Brito (1569-1617) is, together with Ocampo, the main source of original information on earthquakes and tsunamis in ancient Iberia. Brito was the chronicler of the kingdom of Portugal and author of the *Monarchia Lusytana*, a book covering the kingdom's history from its origins until the 11th century (Brito, 1597; 1609; Figures 2a and 2b). In his history, Brito includes accounts of six earthquakes and tsunamis in ancient Portugal and, in all of them, resorts to the testimonies of Laymundus Ortega and Pedro Aladio, two purported medieval authors who have since been proven to be spurious (Álvarez, 2017b). Curiously enough, Brito does not refer to any of the events contained in Ocampo's *Crónica*.

Brito (1597; Text S12) dates to 216 BC a piece of news relating to the earthquake during the Battle of Lake Trasimene (Umbria, Italy) between the Carthaginians and the Romans. Although this earthquake of Trasimene, which actually took place in 217 BC, appears in several ancient sources (Guidoboni, 1994, pp. 143-145), none of them mention the Iberian Peninsula. Citing Laymundus Ortega as his source, however, Brito declares that the earthquake originated in the Portuguese coast, after some 'exhalations' were drawn into the depths of the earth.

Brito's account is recorded by the Portuguese historian Manuel de Faria y Sousa (1590-1649) in his *Europa Portuguesa* (Faria y Sousa, 1678, p. 112), albeit failing to mention his source. As already observed, MM includes an entry on earthquakes in Spain in 216 BC, citing Mariana as his source, a piece of news deriving from Ocampo's *Crónica*. However, he then goes on to assert that they were also felt in Italy and Lake Trasimene, which appears to be the result of combining Ocampo's and Brito's accounts.

MM's information is recorded by CSO, who refers to a 'period of earthquakes', while listing another with the same description occurring in 207 BC. This is a misapprehension owing to the fact that, in Brito's (1597, p. 167r) work, the date of 207 BC, figuring in the margin of the page, is the next chronological milestone closest to the earthquake.

Brito also describes earthquakes associated with sea floods 'on the coasts of Portugal and Galicia', dating them to around 63 BC (Brito, 1597; Text S13), citing Pedro Aladio as his source, despite the fact that there is no reference to these seismic events in the ancient sources. Faria y Sousa (1678, p. 203) summarises the passage in Brito without mentioning him, and dates them to 60 BC. MM concurs with Faria as to their date, citing him as his source, unaware of the fact that the information is drawn from Brito. The information is recorded by NN, who dates these seismic events to 60 BC, as does GRI. CSO, citing Brito directly, dates them to 63 BC, with the following entry: 'Much ruin; dead people; preventive flight; tsunami (?)' ('Muita ruina; gente morta; fuga preventiva; tsunami (?)'). MMV summarises the information provided by CSO. While, for their part, MMS and MSM follow the tradition initiated by Faria and date the episode to 60 BC, the former situating the earthquake to the southwest of Cape St Vincent and the latter, in Northern Portugal.

According to Brito (1597; Text S14), yet again citing Laymundus Ortega, the following earthquake in Portugal occurred in 55 BC. As before, there is no news of this event in the classical tradition. Neither is this episode subsequently recorded by historians nor in seismic compilations or catalogues until CSO, who lists an earthquake in the city of Sintra in 55 BC, with the entry 'preventive flight'. MMV summarises the information provided by CSO, whereas neither MMS nor MSM record it.

Brito (1597; Text S15) dates the following earthquake to 47 BC. Citing Pedro Aladio as his source, he describes sea floods on the Portuguese seaboard, followed by 'heavy rains and earth tremors'. Nor is this episode recorded in the subsequent tradition until appearing in the catalogue of CSO, who, without alluding to its location, notes, 'Various earthquakes; high tides' ('Sismos variados; grandes marés'). While MMV summarises the information supplied by CSO, as before neither MMS nor MSM mention it.

Brito (1609; Text S16) then includes a reference to the repercussions in Portugal and Spain of an earthquake occurring at the death of Christ in 33 AD, according to the Gospel of St Matthew, resorting to the alleged testimony of Laymundus Ortega, who claims that in his time it was still possible to see 'rocks split asunder' ('rocas abiertas') by that earthquake. Nonetheless, the impact on Portugal of the earthquake in Judea, mentioned by St Matthew, has no historical basis whatsoever.

MM records the news and date provided by Brito. NN notes that it was 'felt all over the world, formidable in Portugal' ('sentido en todo el orbe, formidable en Portugal'), dating it to 33 without clearly specifying if this was BC or AD. As a result of this ambiguity, GRI includes two different entries: one for an earthquake in 33 BC, deriving from NN; and another for an earthquake in 33 AD, recorded in MM. CSO concurs with GRI—rather than with Brito in this case—and dates an earthquake in Portugal to 33 BC. MMV follow in the footsteps of CSO. And according to MMS, there was an earthquake to the southwest of Cape St Vincent in 33 AD, which MSM establish in Portugal in the same year.

The last account that Brito (1609; Text S17) offers of an earthquake in Portugal in Antiquity is to be found in a passage relating to the time of the Roman Emperors Valentinian I (364-375 AD) and Valens (364-378 AD). After recounting the death of the Roman Emperor Valens, which he mistakenly establishes in 382 AD, he reviews the historical facts known in Portugal with respect to the reigns of both emperors, concluding his account with a 'universal earthquake'. Everything seems to indicate that Brito is referring to the famous earthquake in 365 AD, but he does not specify the date, merely indicating that it occurred in the time of the two emperors. He notes 382 AD in the margin, not in relation to the earthquake but to the year to which he—mistakenly—dates the death of the Emperor Valens.

Brito alludes to the Christian historian Paulus Orosius (375–420 AD) (*Hist*. 7.32.5) as his source for that 'universal earthquake'. Notwithstanding this, his main source is yet again Laymundus Ortega who, according to him, elaborates on the words of a certain 'monk Eutropius' (Brito, 1609, p. 124v). As shown by Álvarez (2017b), this 'monk Eutropius' is not Flavius Eutropius, a pagan historian who appeared in around 360 AD, but Paul the Deacon (c. 720-c. 799 AD), the author of a book entitled, *Historia Romana*.

Brito combines the passage in Paul the Deacon (*HR* 11.2) describing the famous earthquake in 356 AD, in which there is no mention of the Iberian Peninsula, with an alleged earthquake described by Laymundus Ortega, in order to contend that it affected the Portuguese seaboard, leading to the disappearance of certain ancient islands off Cape St Vincent (Álvarez, 2017b). As always, Brito's information, in which bogus sources are combined with ancient authors, is historically baseless.

The note '382 AD' in the margin of the page has led to general confusion about the year in which the purported earthquake occurred, for which Brito does not offer any specific date. MM summarises the information provided by Brito, claiming that in 382 AD there was an 'earthquake in most of the world, for which reason the seashores of Portugal suffered a great deal. Some islands were submerged of which there are still some remains off Cape St. Vincent' ('Neste anno houve hum terremoto por cuasi todo o Orbe, no cual padecerão muito as terras maritimas de Portugal. Subverterão-se ilhas de que ainda ao presente apparecem algumas eminencias defronte do Cabo de S. Vicente'). NN seems to agree with MM, maintaining the date of 382 AD, but observing that it was felt in 'Portugal and Andalusia', with the disappearance of the islands off Cape St Vincent and with an epicentre in the Gulf of Cadiz. As with MM and NN, GRI dates the event to 382 AD, while asserting that there was much suffering on the coasts of Portugal. Taking Brito as a reference, CSO also dates the earthquake to the same year, while stating that it occurred to the southwest of Portugal and in the Algarve, before noting the 'disappearance of islands' ('desparecimiento de ilhas'). MMV summarises the information provided by CSO, while for MMS and MSM it occurred to the southwest of Cape St Vincent in 382 AD.

None of the information that Brito provides on earthquakes in Portugal in Antiquity is based on ancient sources. Nor are his accounts mentioned independently by subsequent authors, all of which evinces their total lack of credence.

6. Moreira de Mendoza (1758): 880 BC and 309 AD

MM's work contains the first reference to an earthquake in the Iberian Peninsula in 880 BC. This information is a result of his speculation about the account of the fires

producing rivers of molten silver in the Pyrenees, which Ocampo (see Section 1) fabricated by combining information contained in the *De Mirabilibus auscultationibus* (87; Text S1) and in the work of Diodorus of Sicily (5.35; Text S2). In an attempt to offer an explanation for the Spanish chronicler's account, MM conjectures that the phenomenon producing subterranean fires that, in turn, melted the silver in the Pyrenees must have been an earthquake (Text S18). Despite the fact that Ocampo claims that the event occurred in around 891 BC, MM dates the alleged earthquake to 880 BC.

MM's account then appears in GRI, who situates the event in the Pyrenees and surmises that a sole earthquake or volcanic eruption might have been behind that legend. MMS echo MM's account of the earthquake, pinpointing it in Olot (Girona), with its coordinates, and dating it to 880 BC, while for MSM it occurred in the Pyrenees in the same year.

MM is also the source of another seismic event that has made its way into Spanish and Portuguese seismic catalogues, for he dates a terrible earthquake, which affected Europe as a whole, to 22 February 309 AD (Text S19). MM's source is a work entitled, *Anno historico, Diario portuguez, noticia abreviada de pessoas grandes, e cousas notaveis de Portugal*, whose first volume was published by Francisco de Santa Maria in 1744 (Santa Maria, 1744). But Santa María dates this earthquake to 1309 AD and not to 309 AD. This is therefore a misunderstanding on the part of MM, which is demonstrated by the fact that he repeats the same information for 1309 AD (Text S19.b).

MM's erroneous dating is repeated by NN, who also introduces a new error, for he dates the earthquake to 109 AD, rather than to 309 AD. Although he does not cite his source, his description is identical to MM's: 'Horrible in Portugal, felt all over Europe' ('Espantoso en Portugal, sentido en toda Europa'). GRI, citing MM and NN, dates the earthquake to 309 AD, while offering the same description as NN. While CSO does not record this earthquake, MMV does indeed. As with CSO, neither MMS nor MSM mention it.

7. Francisco Tavares (1810): 377 BC and 370 BC

The following news on earthquakes in the Iberian Peninsula is to be found in *Instrucções e cautelas practicas sobre a natureza, differentes especies, virtudes em geral, e uso legitimo das aguas mineraes, principalmente de Caldas …*, a treatise on the characteristics and properties of Portuguese mineral waters, published by the Portuguese physician Francisco Tavares in 1810. Tavares refers to the lack of information on the historical earthquakes occurring in Lisbon and, in a page note, indicates as exceptions certain seismic events in 377 and 370 BC, among others (Tavares, 1810; Text S20). Neither does this information have any ancient precedents not is it independently mentioned by any other author.

Significantly, MM is not aware of this information. Be that as it may, it is fully reproduced by Balbi (1822, p. 102). Balbi is cited by Von Hoff (1840, p. 144), but only as regards the earthquake in 377 BC, and by Steikhardt (1931). Tavares' information is also repeated by Pereira de Sousa (1928, p. 867), who is in turn cited by GRI (p. 781), who notes that in 370 and 377 BC 'very violent earthquakes occurred in Lisbon'. Neither CSO nor MMV record these episodes. But MMS and MSM do indeed list them, locating both in Lisbon and giving their coordinates.

8. Miguel Lafuente Alcántara (1843): 365 AD

The next original account included in the Iberian Peninsula's seismic catalogues is drawn from the *Historia de Granada …*, by the Spanish historian Miguel Lafuente Alcántara (Lafuente, 1843). Lafuente bases his narrative on Ammianus Marcellinus' (*ca*. 330-*ca*. 391–400 AD) famous account of the earthquake and tsunami that devastated Alexandria in 365 AD, appearing in his *Res Gestae* (*History,* 26.10.15-19), while introducing a fraudulent reference to the Iberian Peninsula, specifically mentioning the coasts of *Malaca* (present-day Malaga), *Exi* (present-day Almuñecar) and *Abdera* (present-day Adra) (Lafuente, 1843; Text S21). In Ammianus' original text (Text S22), there is no mention of these localities in the south of the peninsula.

Lafuente's information is recorded by GRI, who cites him literally, wrongly believing that it is Ammianus' original account. This has also prompted other authors consulting GRI to make the same mistake (Espinar, 1994). Although Udías (1983) drew attention to the fact that in Ammianus' aforementioned passage there is no reference to the Iberian Peninsula, he failed to identify the origin of the interpolation. Although CSO does not record this event, MMV does indeed, dating it, on the basis of the information provided by GRI, to 6 am on 21 July 365 AD. For their part, neither MMS nor MSM mention this event.

9. Pedro Díaz Cassou (1887): 346 and 237 BC

The following information recorded in the Iberian Peninsula's seismic catalogues derives from the Spanish lawyer and writer Pedro Diaz Cassou, who in 1887 published *Topografía, geología, climatología de la huerta de Murcia*, an essay on the orchards of the region of Murcia in which he includes a list of earthquakes. Díaz Cassou conjectures that the earthquakes occurring in Spain in '500, 399, 346, 237 and 218' BC—supposedly—mentioned by Ocampo, Garibay and Mariana, must have also affected the region of Murcia (Diaz Cassou, 1887; Text S23).

The dates of 500 and 218 BC ultimately come from Ocampo and that of 399 BC probably from MM who, as already noted, confuses the date offered by Mariana, namely, the 399th year since the founding of Rome, with the earthquake occurring in 348 BC recorded by the author of the *Crónica*. The dates of 346 and 237 BC appear to be errors in the transcription of the information supplied by previous authors: Garibay dates the year following the catastrophic triennal described by Ocampo to 346 BC.

GRI includes the earthquakes in 399 and 237 BC, mentioned by Díaz Cassou, as addenda. GRII cites this information, but with several errors: 500, 399, 368, 346, 343 (instead of 346), 337 (instead of 237), 237 and 218 BC. Additionally, GRII includes a section under the heading, '346 to 395', referring to the entries Nos. 16, 17 and 18 in GRI, all relating to Portugal (309, 365 and 382 AD). Galbis' reference to a universal earthquake in the times of Teodosius makes it possible to suggest that the section is referring to the chronology of this Roman emperor (347–395 AD).

MMS refer to an earthquake in Lisbon in 346 BC, giving its coordinates, this information possibly deriving from GRII, although confusing BC for AD, plus two earthquakes in the southeastern reaches of Spain in 343 and 237 BC, both the result of GRII's typos when transcribing Díaz Cassou's information. MSM also record these earthquakes in the southeast of Spain in 343 and 237 BC, deriving from GRII and, ultimately, from Díaz Cassou, establishing both in the same region. Furthermore, MSM

include a reference to an earthquake in Portugal in 346 AD, which appears to be result of a misinterpretation of the section '346 to 395 AD' in GRII.

10. Sánchez Navarro-Neumann (1921): 196 BC

An incorrect piece of information appearing in NN has ended up being incorporated into recent seismic catalogues. NN lists an earthquake in Spain in 196 BC, without indicating his source, in a succint entry: '196.- Spain m. g. P.' (Text S24). GRI repeats this, citing NN and MM, despite the fact that this information does not appear in MM. And, for their part, MSM mention an earthquake in Spain in 196 BC, citing MM and GRI.

11. Galbis Rodríguez (1932): 565 AD

The Iberian Peninsula's recent seismic catalogues have also included another erroneous piece of information, in this case recorded by GRII, who mentions seismic events occurring in 565 AD: 'There were earthquakes in Andalucia, with information that they were felt in Andujar, Cordova and Granada' (Text S25). GRII provides two references: one (Amador de los Ríos, 1875) includes information on an earthquake in 472 of the Hegira/1080 AD, while it has been impossible to locate the other ('*Sahibarolo*, págs. 129 y 130').

This entry is due to a misunderstanding on the part of Galbis, who includes a summary of the earthquake in 565 of the Hegira/1169 AD, but establishing it this time in 565 AD: 'There were earthquakes in Andalucia, with information that they were felt in Andujar, Cordova and Granada' (Text S26). This evident confusion has made its way into the catalogues of MMS and MSM, for whom there was an earthquake in Andalusia in 565 AD. This is the only seismic event before 1000 AD, recorded by MSM, which is not included on the list of earthquakes in IGN.

Conclusions

Of all the information assessed in this paper, only two accounts possess a certain degree of historicity. The first is the description of earthquakes in Iberia contained in the *De mirabilibus auscultationibus*, which has a legendary character and lacks chronological and geographical context, although it does derive from ancient sources before the 3rd century BC. Nevertheless, Ocampo's proposal for establishing the event in the northeast of the peninsula in 500 BC, together with its specific details, are speculations on his part. To this should be added that the account in the *De mirabilibus auscultationibus* possibly stems from the collective memory of earthquakes occurring in Iberia before the 3rd century BC.

The second plausible episode is the one narrated by Gregory of Tours and has to do with an earthquake in Bordeaux in 580 AD, whose effects were also felt in the Pyrenees and Spain. The author's chronological and geographical proximity to the narrated event lends credibility to the news, even though his description of the episode, interpreted as a divine portent, seems to have been exaggerated for literary effect.

The majority of the original information on earthquakes occurring before 881 AD in MSM is drawn from the works of Ocampo (1543; 1553) and Brito (1597; 1609). The fact that both authors describe events in the very distant past is the main reason why their accounts should be treated with extreme caution.

Apart from the earthquake in 500 BC, the other five that Ocampo (1553) describes—in 348, 241, 216, 211 and 210 BC—have no ancient precedents and the chronicler does not explicitly name his sources. When he does indirectly mention them—in relation to the earthquake and tsunami in Cadiz in 216 BC—he refers to a certain Julian of Thessalonica—a bogus author. Therefore, these accounts are historically baseless. Nonetheless, Ocampo's habit of repeatedly referring to ancient cataclysms in his *Crónica* may derive from the collective memory of ancient catastrophes in Cadiz, which are impossible to date (Álvarez, 2017a).

None of Brito's (1597; 1609) six accounts of earthquakes in Portugal in Antiquity—216, 63, 55, 47 BC, and 33 and *ca*. 365 AD—are based on ancient sources, but rather are grounded in the testimonies of Laymundus Ortega and Pedro Aladio, both of whom are spurious authors (Álvarez, 2017b). Accordingly, all the information that he provides should be taken with a pinch of salt.

Ocampo's and Brito's news of natural catastrophes are framed in the same historiographical phenomenon, viz. that of writing major national histories of Spain and Portugal in the 16th and 17th centuries, respectively. The incorporation of natural cataclysms inspired by accounts of portents to be found in ancient Roman historiography, spiced with fictitious and invented elements, forms part of the narrative strategy of both (Álvarez, 2017a; 2017b).

The information that Celio Agostino Curione (1567) provides on an earthquake in Asturias in 718 AD is an addendum to the original account, dating back to 9th century AD, of the miraculous landslide following the Battle of Covadonga. The historical tradition of Don Pelayo and the Battle of Covadonga has been mythologised since the beginning and the miraculous landslide has legendary overtones. So, Curione is merely speculating on the existence of this earthquake which, as it is not independently confirmed in any other source, is more than debatable.

The first earthquake to which MSM refer, namely the one occurring in the Pyrenees in 880 BC, corresponds to a baseless speculation made by Mendonça (1758) on the information supplied by Ocampo on the fire in the Pyrenees, inspired by the legendary account offered by Diodorus of Sicily, who does not mention any earthquake.

The information on earthquakes and tsunamis in ancient Iberia contained in the works of 19th-century authors is totally implausible. Francisco Tavares' (1810) brief account of earthquakes in Lisbon in 377 and 370 BC has no ancient or modern precedents. Miguel Lafuente Alcántara's (1843) description of the impact of the cataclysm affecting the coasts of Southern Spain in 365 AD is a flagrant interpolation of Ammianus Marcellinus' account (26.10.15-19). Nor are the purported earthquakes in 346 and 237 BC, which appear for the first time in a brief note in a regional history (Díaz Cassou, 1887), mentioned in the ancient sources. Lastly, the earthquakes in 196 BC and 309 and 565 AD are the result of errors or misunderstandings on the part of Sánchez Navarro-Neumann (1921), Moreira de Mendonça (1758) and Galbis (1932), respectively.

None of the earthquakes mentioned in the historiographical tradition are referred to independently by any other author. There is only one coincidence. Both Ocampo and Brito allude to an earthquake in the Iberian Peninsula in 216 BC, but an analysis of both accounts reveals that they are unrelated. According to the former, it was located in

Cadiz, while the latter attempts to situate the epicentre of the earthquake of Lake Trasimene in 217 BC in Portugal.

In conclusion, except for the earthquake in 580 AD mentioned by Gregory of Tours, none of the first 19 entries in Martínez-Solares and Mezcua's *Catálogo sísmico de la Península Ibérica* (2002), all allegedly occurring before 881 AD, are historically sound. Consequently, even though their dates may coincide with those associated with earthquakes and tsunamis documented in the geological and archaeological records of the Iberian Peninsula (Silva, 2019), the historicity of all of them should be ruled out.

Data and resources

The historical data used in this paper can be found in the references. Supplemental material for this article includes the original sources for the earthquakes occurring before 881 AD included in MSM's catalogue, as well as a number of tables summarising the evolution of this information in Spanish and Portuguese historical sources and seismic catalogues. Figures 1a and 1b are courtesy of the *Biblioteca Nacional de España (Biblioteca Digital Hispánica, BDH)*, and Figures 2a and 2b that of the *Biblioteca Nacional de Portugal* (*Biblioteca Nacional Digital, BND*).

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List of Figure Captions

Figure 1. (a) Title page of Florián de Ocampo, *Los quatro libros primeros de la Cronica General de España* (1543); (b) *Los cinco libros primeros de la Cronica general de España* (1553).

Figure 2.- (a) Title page of Bernardo de Brito, *Monarchia Lusytana… Parte primeira* (1597); (b) *Segunda parte da Monarchia Lusytana* (1609).

The historicity of the earthquakes occurring in the Iberian Peninsula before the year 881 AD recorded in Spanish and Portuguese seismic catalogues (electronic supplement)

Manuel Álvarez-Martí-Aguilar

The original sources and texts containing accounts of historical earthquakes before the year 881 AD included in Martínez-Solares and Mezcua's (2002) catalogue are presented below in chronological order. Some additional information—from Diodorus of Sicily and Ammianus Marcellinus—is also included, insofar as it is necessary for fleshing out the arguments set out here, as are several tables summarising the evolution of those accounts of historical earthquakes in Spanish and Portuguese historical sources and seismic catalogues.

***De mirabilibus auscultationibus* (3rd century BC)**

This anonymous Greek text, transmitted as part of Aristotle's oeuvre, is a compilation devoted to diverse topics, pertaining by and large to the natural world and whose common denominator is their wondrous character. The main core of the work has been dated to the mid- or late 3rd century BC. Section 87 contains one of the scant references to earthquakes in ancient Iberia, but without offering any specific date or location:

> **Text 1.**
> In Iberia they say that, when the coppices were set on fire by certain shepherds, and the earth was heated by the wood, the country visibly flowed with silver; and when, after some time, earthquakes succeeded, and the ground in different places burst asunder, a large quantity of silver was collected, which brought in no ordinary revenue to the Massilians (Ps. Arist., *Mir. ausc*., 87; trans. Dowdall).

	Event	Date/s	Location/s
***De mir. ausc.* (3rd century BC)**	**Earthquake**	**?**	**Iberia**
Ocampo (1543)	Earthquake	500 BC	Pyrenees. Cape of Creus / Denia
Garibay (1571)	Earthquake	500 BC	Coasts of Andalusia
Mariana (1601)	Earthquake	252* [500 BC]	Spain
MM (1758)	Earthquake	500 BC	Andalusia. Spanish seaboard
NN (1921)	Earthquake	500 BC	Andalusia (seaboard)
	Earthquake	500 BC	Pyrenees
GRI (1932)	Earthquake	500 BC	Andalusia. Spanish coasts
MMS (1983)	Earthquake	500 BC	Southwest of Cape St Vincent
	Earthquake	500 BC	Olot (Girona)
MSM (2002)	Earthquake	500 BC	Andalusia
	Earthquake	500 BC	Pyrenees

* Years since the founding of Rome

> **Text 2. Diodorus of Sicily** (c. 90 – c. 30 BC)
> And since they [the Pyrenees] contain many thick and deep forests, in Ancient times, we are told, certain herdsmen left a fire and the whole area of the mountains was entirely consumed; and due to this fire, since it raged continuously day after day, the surface of the earth was also burned and the mountains, because of what had taken place, were called the

Pyrenees; furthermore, the surface of the burned land ran with much silver and, since the elementary substance out of which the silver is worked was melted down, there were formed many streams of pure silver. Now the natives were ignorant of the use of the silver, and the Phoenicians, as they pursued their commercial enterprises and learned of what had taken place, purchased the silver in exchange for other wares of little if any worth (Diod. Sic., 5.35; trans. Oldfather).

Gregory of Tours (~594 AD)

Gregory, Bishop of Tours (538-594), was a Gallo-Roman historian, author of the *Decem Libri Historiarum*, better known as the *Historia Francorum* (*The History of the Franks*). In this work, which is the primary contemporary source for Merovingian history, there is a reference to an earthquake in Bordeaux in 580 AD, which according to the account was also felt in the Pyrenees and Spain.

Text 3. (580 AD)

In this same year [the fifth year of King Childebert's reign (580 AD)] again the city of Bordeaux was sadly shaken by an earthquake. The city walls were in great danger of collapsing. The entire populace was filled with the fear of death, for they imagined that they would be swallowed up with their city unless they fled. Many of them escaped to neighbouring townships. This terrible disaster followed them to the places where they had sought refuge and extended even into Spain, but there it was less serious. Huge rocks came cascading down from the mountain peaks of the Pyrenees, crushing in their wake the local inhabitants and their cattle (Gregory of Tours, *The History of the Franks*, 5.33; trans. Lewis Thorpe).

	Event	Date/s	Location/s
Gregory of Tours (~594 AD)	**Earthquake**	**580 AD**	**Bordeaux. Spain**
Morales (1577)	Earthquake	585 AD	Pyrenees
Milne (1911)	Earthquake	579/580 AD	Pyrenees
NN (1921)	Earthquake	580/585 AD	Pyrenees
GRI (1932)	Earthquake	585 AD	Pyrenees
MMS (1983)	Earthquake	580 AD	Bordeaux
MSM (2002)	Earthquake	580 AD	Central Pyrenees

Florián de Ocampo (1543; 1553)

Florián de Ocampo (c. 1499-c. 1558) was the official chronicler of Charles V and the author of an ambitious national history entitled, *Crónica General de España* (*General Chronicle of Spain*), of which he only managed to complete the part dedicated to the country's origins up until the time of the Second Punic War in Iberia (209 BC). The first four books of this work were published in 1543, before being republished with a fifth book in 1553. All of Ocampo's accounts are taken from the 1553 edition of his work. His *Crónica* contains six references to earthquakes in the Iberian Peninsula in 500, 241, 348, 216, 211 and 210 BC (Álvarez, 2017a). In order to develop the arguments of this paper, the fire in the Pyrenees in *ca*. 891 BC is also transcribed.

According to Ocampo, in around 891 BC there was a 'terrible' fire in the Pyrenees, which purportedly produced rivers of molten silver which were subsequently uncovered by an

earthquake in 500 BC (Text S5). Ocampo—who does not mention any earthquake—draws inspiration from a passage in Diodorus of Sicily (5.35) transcribed above (Text S2).

Text 4. (*ca*. 891 BC)

It came to pass that, when some shepherds driving their flocks through valleys and paths arrived at the Pyrenees, they lit a fire in one of its extremes. They had no idea of the ruinous things that would transpire afterwards, for they only intended to protect themselves from the cold and to supply themselves with those things that shepherds tend to need. But the flames took hold in such a way that most of the mountains burned for many days and the rocks tumbled down because of the heat. Waves of fire emanated from the valleys and hillsides in a terrible and fearsome way […]. And not only the trees, rocks and vegetation blazed, but the veins of metal also melted, producing immense rivers of silver which flowed above and below ground, with marvellous abundance, melted by the heat that penetrated the mines inside the earth […]. As a result of this fire, the Greeks living in Spain and the historians writing in Greek called these mountains the Pyrenees, for *Pyr* means 'fire' in Greek and Pyrenees, 'something alight'.

Esto fue que discurriendo los pastores vezinos al Pyreneo, con sus ganados por las veredas y valles comarcanos: ençendieron fuego sobre lo postrero dellos, no temiendo que sucederia tal mal, qual despues aconteció, sino procurando guareçer de los frios que tendrian, ó bastecerse de las cosas que comunmente tienen menester los pastores. La llama prendio de tal arte que muy grandes trechos de las montañas ardieron muchos dias y las piçarras hendieron con la calor demasiada, los valles y recuestos echauan de si tales ondas y grupadas de fuego, que no se podria declarar cosa mas espantable ni temerosa […] y no solamente se quemaron los arboles, y las piedras islas yeruas y verdura, sino tanbien las venas de los metales derritieron à toda parte con grandes arroyos de plata, que corrieron por lo mas alto y mas baxo de la tierra, con abundançia marauillosa forçados del ardor exçesiuo, que penetro por los mineros à dentro […] por causa del ençendimiento, que dicen también que los Griegos moradores en España con sus historiadores, que después escriuieron en aquella lengua, llamaron estos montes Pyreneos […] porque Pyr, en aquella habla quiere decir fuego, y Pyreneos cosas ençendidas (Ocampo, 1553, pp. 85r-85v).

Ocampo dates the earthquake that uncovered the rivers of silver melted by the fire in the Pyrenees, described in the previous passage, to 500 BC. On this occasion, he very freely draws inspiration from the brief account contained in the *De mirabilibus auscultationibus* (87), which does not refer to any specific location or date, to construct a baroque account rich in details.

Text 5. (500 BC)

During that age, there were arduous and painful times in Spain, with death and famine, because the land produced little food owing to the lack of rain. Particularly during the last years of this period, five hundred years before the birth of the Lord our God, when in addition to the aforementioned adversities, major earthquakes affected all of the seacoast, where they tend to be more frequent than in other places, as asserted by the natural philosophers. And those tremors were so terrible that many houses and walls collapsed in the villages, and many rivers changed their course. Towering mountains and hills were displaced by the force of the movement that flung them from their original place. Large crevices appeared in the earth close to the coast, from some of which flowed new fountains and streams of asphalt and much water never seen before. These crevices featured a mouth that appeared close to the place where, centuries before, the famous fires of the Pyrenees

mountains had raged, when because of their intensity large torrents of silver and metals flowed abundantly […]. It is said that these torrents engulfed much of the land, while others seeped into the interior veins and channels, for which reason it seems that part of the molten silver pooled in a certain cavity in one of these mountains. Once the fires had ceased, this silver solidified in the deepest recesses of the mountains, covered with earth. But, as the earthquakes of that year were, as it was alleged, terrible and continuous, they opened up certain areas of those mountains and, thus exposed, revealed huge mounds of silver […]. At that time, the ships of Massalia frequented the Spanish coasts, doing business to which the peoples living in seaports are accustomed and trading in merchandise. And as a result, they found themselves close to where this silver had been discovered, approached the place and, after performing their verifications and taking samples of the metal, understood that it was silver in great quantities. Thus, they collected much of it […]. Apparently, all this was supposed to have happened in the direction of the Cape of Creus, the Cape of Crosses, in our Mediterranean sea, where the Pyrenees Mountains terminate, the place in which the majority of historians say that the ancient fires raged. This might also have happened towards the mountains of Denia or of Muxácra, which many cosmographers and chroniclers call the Pyrenees and which we know are abundant in metals. In contrast, we do not believe that this occurred in more distant lands, in Andalusia, since the Carthaginians were so well established there that no one could visit that region or carry away anything for their own profit …

En aquel entreualo de dias recudieron por España tienpos trabajosos y de fatigas, con mortandades y hanbres, en que por falta de lluuias la tierra crio pocos mantenimientos, particularmente los años postreros de todo esto, que fueron quinientos cauales antes del aduenimiento de nuestro señor Dios, en que con las aduersidades arriba dichas, huuo grandes terremotos en toda la costa de mar, donde suelen ser mas continos que por otras partes, como lo declaran los Filosofos naturales. Y fueron tan espantosos aquellos tenblores, que muchas casas y çercas de pueblos cayeron, muchos rios corrieron por otras partes diuersas de las que solian: algunos montes y collados bien creçidos se mudaron à diuersos lugares con la fuerça del mouimiento que los arrojaua fuera de su primer sitio: abrieronse grandes hendeduras por la tierra y por çerca de la marina, y en algunas dellas salieron nueuas fuentes, y nueuos arroyos, de betumes y muchas aguas nunca vistas: entre las quales fue grandemente notada vna boca que se hizo çerca de la parte donde los siglos pasados aconteçieron los ençendimientos famosos del monte Pyreneo, de quien ya hablamos en el quinto capitulo deste libro, quando con la fuerça del fuego corrieron los grandes reguerros de plata y de metales en abundançia sobrada. Y como delos tales regueros aya memoria que rebolsaron muchos por ençima de la tierra, y que tanbien otros colaron por las venas y canales de mas adentro, pareçe que gran parte dela tal plata corriente se detuuo sobre cierta concauidad en vna destas montañas: la qual plata despues de pasados los ençendimientos, quedo congelada por lo mas hondo de los collados, cubierta con alguna tierra. Mas como los terremotos del año presente fuesen (como digo) terribles y continos, abriose con ellos vna parte delas tales cunbres: y quitadas afuera, luego pareçieron los montones grandisimos de plata […]. Andauan estos dias por las marinas Españolas galeaças de Marsella, negoçiando sus prouechos, como suelen hazer todas las naçiones que viuen en puertos de mar y tratan mercaderias. Y como por aquella sazon se hallasen çerca de donde fueron estos descubrimientos dela plata, salieron allí luego, y hechos sus toques y calas en el metal, conoçieron ser aquel bulto plata perfetisima: y asi tomaron della muy mucha cantidad […]. Esto pareçe que deuio suçeder contra la punta de Creus, ò de cruzes, sobre nuestro mar Mediterraneo, donde feneçen los montes Pyreneos, en que todas las mas historias dizen auer sido los ençendimientos antiguos.

Pudo tanbien suçeder contra las montañas de Dénia, ó de Muxácra, que muchos Cosmografos y Coronistas llaman Pyreneos: y sabemos çierto ser muy venosos de metales, porque metidos enlas tierras mas adelante sobre la buelta del Andaluzia, no pensamos que tal aconteçiese, pues los Cartagineses andauan tan diligentes alli, que nadie podiera venir ni lleuar en su despacho cosa dela tal prouincia… (Ocampo, 1553, p. 137r-137v).

According to Ocampo, a period of three consecutive years of natural catastrophes began after 350 BC, with heavy rains and floods in the first year (349 BC), earthquakes in the second (349 BC) and sea tempests in the third (347 BC). As he would have us believe, the earthquakes in 348 BC would have affected the Mediterranean seaboard as a whole, especially the city of Sagunto (Valencia). Neither is there any mention of these catastrophes in the classical tradition, nor does the Spanish chronicler cite any source.

Text 6. (348 BC)

The following three years [after 350 BC] are better known in the Spanish chronicles. The first [349 BC] was notable for its heavy rains, which terrified men since they were so abundant and continuous. The rivers swelled in all of our regions, drowning livestock and people and wreaking havoc in the countryside and the villages that the floodwaters reached. In the second year [348 BC] there were terrible earthquakes in most of the coastal areas of our Mediterranean sea, where these tremors occur naturally and more frequently than in other places in Spain. In particular, they affected primarily the city of Saguntum or Monvedre, damage to which, as it was the most powerful and richest coastal city at the time, had graver consequences than that to any other city. The following year [347 BC] the seas were so rough and tempestuous that many ships, both Spanish and those of other foreign nations, sank off the coast due to tempests never seen before, while other ships were driven ashore between the stretch of coast between the Pyrenees mountains and the Straits of Gibraltar. And the storms drove ships from very safe ports and wrecked them, the people being powerless to avoid it.

Los otros tres años adelante son algo mas notables en las coronicas Españolas. El primer año por las muchas aguas del çielo, que pusieron temor alos honbres en verlas caer tan grandes y tan continas, creçieron los ríos por todas nuestras prouinçias, ahogando ganados y gentes, con otros estragos en el campo y en los poblados donde podieron alcançar. El año segundo padeçieron terribles terremotos los mas delos lugares vezinos ala costa de nuestro mar mediterraneo, donde suelen aquellos tenblores de su natural venir mas continos, que por otra parte de España. Señaladamente padeçio gran peligro dellos la çiudad de Sagunto ò Monuedre, que por ser aquellos tienpos mas grande y mas poderosa y mas rica que ninguna dela marina, cualquier daño que le viniese, fue mayor que lo delas otras. El año siguiente las mares anduuieron tan leuantadas y tenpestuosas, que muchos nauios, asi de los Españoles, como de las otras naçiones estrañas, pereçieron en los golfos con tormentas nunca vistas, otros dieron al traues en toda la ribera, que viene desde los montes Pyreneos, hasta el estrecho de Gibraltar, y de puertos bien seguros los arrancaua y hundia sin poderlos nadie remediar (Ocampo, 1553, p. 182r).

	Event	Date/s	Location/s
Ocampo (1553)	**Earthquake**	**348 BC**	**Mediterranean coast of Spain. Sagunto - Monvedre**
Garibay (1571)	Earthquake	348 BC	Sagunto (Valencia)
Mariana (1601)	Earthquake	404* [348 BC]	Sagunto (Valencia)
MM (1758)	Earthquake	399 BC	Sagunto (Valencia)
NN (1921)	Earthquake	349 BC	Mediterranean coast of Spain. Sagunto
GRI (1932)	Earthquake	349 BC	Mediterranean coast of Spain. Sagunto
MMS (1983)	Earthquake	399 BC	Sagunto (Valencia)
MSM (2002)	Earthquake	348 BC	Sagunto (Valencia)

* Years since the founding of Rome

Coinciding with the end of the First Punic War (264-241 BC), Ocampo describes an earthquake and the flooding of part of the island of Cadiz occurring in 241 BC. As before, neither does he identify his sources not is there any mention of this episode in the classical tradition.

Text 7. (241 BC)

I have also discovered some chronicles which indicate that it was a year [241 BC] characterised by the lack of rain in different regions of Spain. Because of this, the pastures dried up and many cattle and people perished. Sea storms were more frequent and violent than in previous years; and close to Cadiz the earth roared and part of the island was flooded, while there were terrible manifestations and portents that struck terror into the hearts of the people living in all the neighbouring lands.

Hallo yo tanbien algunas memorias, que señalan el año sobredicho ser muy faltoso de lluuias por diuersas regiones en España: con mengua de las quales no naçieron yeruas en los canpos, y pereçieron muchos ganados y muchos honbres. En la mar huuo tenpestades mas continas y mayores que los años pasados: y çerca de Caliz bramò la tierra, y anegose parte de la isla, con otras aparençias y señales brauas y terribles que pusieron temor a las gentes en todas las tierras comarcanas (Ocampo, 1553, p. 216r).

	Event	Date/s	Location/s
Ocampo (1553)	**Earthquake and sea flood**	**241 BC**	**Cadiz**
Mariana (1601)	Earthquake and sea flood	507* [245 BC]	Cadiz
MM (1758)	Earthquake and sea flood	245 BC	Cadiz
NN (1921)	Earthquake and sea flood	245 BC	Gulf of Cadiz
GRI (1932)	Earthquake and sea flood	245 BC	Cadiz
MMS (1983)	Earthquake	245 BC	Gulf of Cadiz
MSM (2002)	Earthquake	246 BC	Gulf of Cadiz

* Years since the founding of Rome

Ocampo offers an account of an earthquake and tsunami in Cadiz at the beginning of the First Punic War, which he dates mistakenly to 216 BC (the correct date being 218 BC). His description of the tsunami is very realistic and replete with details. It is the only occasion on which he mentions the sources from which he might have drawn the information, namely, 'the two Julians'. The first—Julian of Toledo—is not known to have written any work containing such information, while the second—Julian of Thessalonica—is a figment of the Spanish chronicler's imagination. There is no mention of this earthquake in the ancient sources.

Text 8. (216 BC)

As to conditions that year [216 BC], the two Julians claim that, judging by the accounts to be found in certain Spanish chronicles, it is known that there was an abundance of food and products of the land, but not so as regards people's health, with plagues and diverse maladies in some Spanish provinces. The island of Cadiz and the entire coast of Andalusia were shaken by major earthquakes or tremors that destroyed buildings and killed people, and wreaked terrible havoc there. The sea flooded many areas that were first exposed and expelled many fish, both common and known and those never seen before. Armed hosts were heard in the air, without knowing from where the din came, all being signs and portents of the dismay and woes that came to pass shortly afterwards, with the wars and savagery that commenced there …

Quanto al estado del año dizen los dos Iulianos hallarse por memorias Españolas que fue bien abundoso de mantenimientos, y de los fructos de la tierra, pero faltoso de salud, con pestilençias y diuersas enfermedades que suçedieron en algunas prouinçias Españolas. La isla de Caliz y toda la marina frontera del Andaluzia padeçio grandes terremotos, ó tenblores, que derrocaron edifiçios, y mataron gentes, y hizieron por allí males terribles: la mar anegò muchos lugares que primero fueron descubiertos: lançò fuera de si multitud de pescados, dellos comunes y conoçidos, y dellos nunca vistos. Oyeronse muestras en el ayre de gentes armadas, sin saber quien lo hiziese, que fueron señales todas y pronosticos de la turbacion y mucho mal que poco despues redundò tanbien por aca, con las guerras y crueldades que por alla se començauan … (Ocampo, 1553, p. 262v).

	Event	Date/s	Location/s
Ocampo (1553)	**Earthquake and sea flood**	**216 BC**	**Cadiz**
Garibay (1571)	Earthquake and sea flood	216 BC	Cadiz
Mariana (1601)	Earthquake and sea flood	536 * [216 BC[	Cadiz
MM (1758)	Earthquakes	216 BC	Spain
NN (1921)	Earthquake and sea flood	216 BC	Cadiz
GRI (1932)	Earthquake and sea flood	218 BC	Cadiz
	Earthquake and sea flood	216 BC	Cadiz
MMS (1983)	Earthquake	218 BC	Gulf of Cadiz
MSM (2002)	Earthquake	218 BC	Southwest of Cape St Vincent

* Years since the founding of Rome

Ocampo yet again refers to portentous events, including strange sounds, earthquakes and perturbations at sea, which he dates to 211 BC. But he only explicitly mentions earthquakes in Africa. This episode belongs to a part of the *Crónica* in which the chronicler draws from Livy, but the Roman historian does not refer to any earthquake in Iberia or Africa in that year.

Text 9. (211 BC)

The army's rank and file spoke of ghosts and signs, which, according to them, they had heard in the air, similar to the sounds made by armed people and battles, in different place for days on end. Some said that they [those sounds] had been heard in the Pyrenees mountains, while others said in Andalusia, and there were people who claimed to have seen and felt them, recounting these things in detail and as they saw fit. There was also news of earthquakes and perturbations in Africa, great movements in the sky and sea tempests, in forms and manners never seen or known before.

La gente comun del exerçito platicauan en fantasmas y señales que dezian auer parecido por el ayre de personas armadas, y batallas que conbatieron algunos dias en diuersas partes: vnos declarauan sobre los montes Pyreneos: otros en el Andaluzia, las quales huuo quien afirmase verlas y sentirlas, y contauan el hecho mayor por menudo, según el antojo les tomaua. Publicauanse tanbien terremotos y mudanças en Africa, grandes mouimientos en el çielo, tenpestades y brauezas en la mar, de formas y manera nunca vistas ni conoçidas (Ocampo, 1553, p. 306r).

Ocampo mentions earthquakes in Gades (present-day Cadiz) in 210 BC. In writing this passage, he combines different portents taken from Livy, his principal source for the period of the Punic Wars. But neither Livy nor any other classical author mentions such an episode in Gades.

Text 10. (210 BC)

We know that those were properous times, the land produced food in abundance, the people and cattle enjoyed good health, except for the inhabitants of Cadiz, who suffered several earthquakes, and the sea was tempertuous for many days on end, with strong storm surges and currents, penetrating beyond their customary limits. In the air, there were signs just as terrible as in previous years. Flaming comets were seen in the western confines of the sky: dangerous lightning bolts struck inhabited places. Some mare mules foaled and two howling wolves approached the chamber of the Scipios and, after biting people and beasts and other things in their way, departed unscathed by the men assembled there …

La sustançia del tenporal sabemos auer sido prospera, criò la tierra mantenimientos en abundançia, tuuieron salud ganados y gente, sino quanto los vezinos de Caliz padeçieron algunos terremotos, y la mar anduuo muchos dias tan gruesa, con brauezas y corrientes eçesiuas que paso harto mas adelante de donde solia. Huuo señales en el ayre, no menos terribles que los otros años. Mostraronse cometas ardientes contra las bueltas Oçidentales del çielo: cayeron rayos peligrosos en lugares poblados. Parieron algunas mulas, y dos lobos aullando vinieron al aposento de los Cipiones: y despues de mordidas gentes y bestias, y cosas que tomauan ante si, pasaron adelante sin reçebir daño de quantos honbres alli se hallaron … (Ocampo, 1553, p. 323r).

	Event	Date/s	Location/s
Ocampo (1553)	**Earthquake**	**210 BC**	**Cadiz**
NN (1921)	Earthquake	209 BC	Cadiz
GRI (1932)	Earthquake	210 BC	Cadiz
	Earthquake	209 BC	Cadiz
MMS (1983)	Earthquake	210 BC	Southwest of Cape St Vincent
MSM (2002)	Earthquake	210 BC	Gulf of Cadiz

Celio Agostino Curione (1567)

The Italian humanist Celio Agostino Curione (1538-1567) was the author of the *Sarracenicae Historiae Libri* III (*History of the Saracens Liber III*; Curione, 1567), which recounts the history of the Moors from their origins up until the 14th century. The passage describing the Battle of Covadonga is based on a long tradition originating in 9th-century Hispanic chronicles, such as the *Crónica Albeldense* and the *Crónica de Alfonso III*, both sources in which a miraculous landslide is mentioned, but no earthquake.

Text 11. (718 AD)

In this battle [of Covadonga], as many as 20,000 Sarracens perished but no Christians, or very few. The writers know nothing in this respect. The Sarracens who manged to escape from the battle took refuge, together with their leader Abraemus, on a mountain peak. But as the result of a divine miracle, an earthquake shook the mountain which, tumbling down, killed them all in the river Deva, which washes the slopes of that mountain.

Ceciderunt in hac pugna Sarracenorum ad uiginti millia: Christianorum uerò uel nulli, uel admodum pauci. nam nihil de eo tradunt scriptores: & qui Sarracenorum ex pugna euasere, cum Abraemo duce in uerticem montis confugerunt: quo uertice terraemotu, diuino miraculo, concusso, ac in Iuam fluuium, qui eius montis radices alluit, corruente, omnes interiêrunt (Curione, 1567, p. 57).

	Event	Date/s	Location/s
Curione (1567)	Earthquake	718 AD	Asturias
Nipho y Cagigal (1755)	'Formidable earthquake'	717 AD	Asturias
GRI (1932)	Earthquake	718 AD	Asturias
MMS (1983)	Earthquake	718 AD	Asturias
MSM (2002)	Earthquake	718 AD	Asturias

Bernardo de Brito (1597; 1609)

Bernardo de Brito (1569-1617), a Cistercian monk belonging to the Alcobaça Monastery, was the chronicler of the kingdom of Portugal as of 1614. Unlike Ocampo, he managed to complete a history of Portugal up until the time of Henry Count of Portugal (1066-1112), which was published in two volumes under the title of *Monarchia Lusytana* (Brito, 1597; 1609). He resorted to a host of spurious sources, prominent among whom, because of their relationship with natural catastrophes occurring in Portugal, are Laymundus Ortega and Pedro Aladio.

Brito offers an account in which, mentioning Laymundus Ortega as his source, he situates the origin of the earthquake that occurred during the famous Battle of Lake Trasimene between the Carthaginians and the Romans in 216 BC (whose correct date is 217 BC) on the Portuguese seaboard. The ancient sources remain silent on this point.

Text 12. (216 BC)
Those exhalations were followed by powerful earth tremors, not only in Portugal but also in most of Europe. As a result of being drawn into the depths of the earth, and being followed by a great calm and heat, that earth tremor which was felt in Italy, where it destroyed many cities on the same day as Hannibal won the Battle of Trasimene, as Titus Livy recorded, was produced naturally, as Aristotle teaches … (Brito, 1597, p. 166v).

Seguirãosse a estas exhalações, grandes tremores da terra, não só em Portugal, mas quasi na mór parte de Europa, porque ficando incluidas nas entranhas da terra, & seguindosse depois grande serenidade, & quentura, geraraõ por ordem natural, como quer Aristoteles […], aquelle tremor da terra, que se sintio em Italia, com ruina de muitas cidades, no proprio dia, que Annibal venceo a batalha de Transimeno, como notou Tito Liuio … (Brito, 1597, p. 166v).

	Event	Date/s	Location/s
Brito (1597)	Earthquake	216 BC	Portugal / Europe/ Lake Trasimene
Faria y Sousa (1678)	Earthquake	216 BC	Lake Trasimene
MM (1758)	Earthquake	216 BC	Iberian Peninsula / Italy - Lake Trasimene
CSO (1986)	'Period of earthquakes'	216 BC	Portugal
	'Period of earthquakes'	207 BC	Portugal

Citing Pedro Aladio as his source, Brito dates earthquakes and sea floods 'on the coasts of Portugal and Galicia' to 63 BC. His describes the effects of a tsunami very dramatically, but as before there is nothing in the ancient sources to substantiate his claim.

Text 13. (*ca.* 63 BC)
At around that time, or a few years before, there was a notable earth tremor on the coasts of Portugal and Galicia, which destroyed many places and killed so many people that the rest (as if beside themselves) fled from the villages to the hills, parents leaving behind their children and husbands abandoning their wives, all believing that they had been very fortunate to save their own lives, without having preserved those of others. And the sea, surpassing its ordinary limits in some places, covered much of the land where it had never shown signs of reaching, while leaving it exposed in other parts. Aladio refers to many other freak occurances during those years, which I will not go into because they seem to me to be very special for such an ancient time, given that otherwise everything that this author writes adds up and appears to me to be very true …

Quasi por estes annos, ou muito poucos antes, succedeo aquelle notauel tremor da terra, na costa de Portugal, & Galiza, com que se arruinarão muitos lugares, & pereceo tanta quantidade de gente, que os mais (como desatinados) se sayão das pouoações fugindo aos montes, esquecidos os filhos dos pays, & os maridos das molheres: tendo cada hum por grande sorte saluar a propria vida, sem curar das alheas. E o mar saindo em algunas partes de seus ordinarios limites, occupou muita parte da terra, deixandoa em outros lugares descuberta, onde nunca mostrara sinaes de a poder auer. Outras muitas

monstruosidades extraordinarias refere Alladio destes annos, que não conto, por me parecerem muy particulares pera tempo tão antigo, dado que tudo o deste author me quadre, & pareça muy verdadeiro… (Brito, 1597, p. 316r–316v).

	Event	Date/s	Location/s
Brito (1597)	**Earthquake and sea floods**	**63 BC**	**Coasts of Portugal and Galicia**
Faria y Sousa (1678)	Earthquake and sea floods	60 BC	Coasts of Portugal and Galicia
MM (1758)	Earthquake and sea floods	60 BC	Coasts of Portugal and Galicia
NN (1921)	Earthquake and sea floods	60 BC	Coasts of Portugal and Galicia
GRI (1932)	Earthquake and sea floods	60 BC	Coasts of Portugal and Galicia
CSO (1986)	Earthquake and Tsunami	63 BC	Portugal
MMV (2001)	Earthquake	63 BC	Portugal
MMS (1983)	Earthquake	60 BC	Southwest of Cape St Vincent
MSM (2002)	Earthquake	60 BC	Northern Portugal

Brito, basing himself on the testimony of Laymundus Ortega, dates the next earthquake in Portugal to 55 BC, establishing it in the *Luna mountain*, an ancient place name employed by the Greek polymath Claudius Ptolemy (*Geogr*. 2.5.4), in the vicinity of the mouth of the river Tagus. But neither Ptolemy nor any other ancient author mentions this episode.

Text 14. (55 BC)
Laymundus states that, around the same time, the inhabitants of the Luna mountains suffered major earth tremors, which were so sudden and intense that, abandoning the places in which they lived, they travelled abroad, where they were neither in danger nor feared that the mountains and hills, collapsing with the tremor, would harm them …

Quasi neste proprio tempo affirma nosso Laimundo, que os moradores dos mõtes da Lûa padecerão grandes tremores da terra, & tão vehementes, & impetuosos, que deixando os lugares em que viuião, se passuão a terras estranhas, onde não corressem perigo, nem temessem os montes, & penedias da serra, que caindo cõ o tremor, fizessem algu dano … (Brito, 1597, p. 334v).

	Event	Date/s	Location/s
Brito (1597)	**Earthquake**	**55 BC**	**Portugal**
CSO (1986)	Earthquake	55 BC	Sintra, Portugal
MMV (2001)	Earthquake	55 BC	Portugal

With Pedro Aladio as his source, Brito recounts sea floods, followed by torrential rain and earthquakes, on the Portuguese seaboard in 47 BC. Nor in this case is there any mention of this episode in the ancient sources.

Text 15. (47 BC)
Aladio says that, at around this time, the coast of Portugal was hit by such extraordinary and adverse sea floods that many coastal villages were levelled. And the people, as if lost, fled to the hills to save their lives. There followed heavy rains and earth tremors, to the point that the world seemed to collapse under the weight of summer.

Neste proprio tempo refere Alladio: que ouue na cósta de Portugal grandes enchentes do mar, tão extraordinarias, & perjudiciaes aos homës, que muitas pouoações maritimas se arruinarão, & a gente, como em perda vniuersal, se subia aos montes por goarecer a vida. Seguirãosse muy grandes chuuas, & tremores da terra, de maneira, que na força do Verão parecia fundirse o mundo (Brito, 1597, p. 351v).

	Event	Date/s	Location/s
Brito (1597)	**Earthquakes**	**47 BC**	**Portugal**
CSO (1986)	Earthquakes	47 BC	Portugal
MMV (2001)	Earthquake	47 BC	Portugal

On the strength of Laymundus Ortega's testimony, Brito claims that the earthquake occurring at the death of Christ affected Portugal, although there is nothing in the classical tradition to substantiate this.

Text 16. (33 AD)
So, returning to the Empire and the life of Tiberius Caesar, Paulus Orosius and Eutropius record that in the sixteenth year of his reign, in March, the world was shaken by a universal earthquake, accompanied by such an extraordinary eclipse of the sun that there was not one sage (there being many great ones at the time) who could explain such a new form of opposition, such as that between the sun and the moon at that moment. It was all due to the general sentiment that nature showed when its creator and our Saviour Jesus Christ died, as narrated in the Holy Gospel. I thought it proper to recall this here because it was such a remarkable thing that it was even perceived in these parts of Portugal and Spain (where, according to Laymundus, there were rocks that had been split asunder by this earthquake), as well as in Asia and Judea, where its cause was to be found.

Tornãdo pois à continuação do imperio & vida de Tyberio Cæsar, conta Paulo Orosio, & Eutropio, que aos annos dezaseis de sua monarchia, no mes de Março ouue hum terremotto vniversal no mundo, acompanhado de hum ecclypse tão extraordinario, que não ouue sabio (com os auer grãdes naquelle tempo) que soubesse dar rezão a tão nouo modo de opposição como então tiuerão o Sol & a Lua: tudo o qual foy aquelle geral sentimento que a Natureza mostrou na morte de seu Criador, & nosso Redemptor Iesu Christo, referido no Euangelho sagrado, & por cousa tão notauel, & que não menos se vio nestas partes de Portugal & Espanha (onde diz Laimundo que se mostrauão rochas abertas deste terremoto) que nas de Asia, & Iudea, donde a causa nacia, me pareceo fazer aquí esta lembrança (Brito, 1609, p. 8r).

	Event	Date/s	Location/s
Brito (1597)	**Earthquake**	**33 AD**	**Portugal and Spain**
MM (1758)	Earthquake	33 AD	Portugal and Spain
NN (1921)	Earthquake	33 AD?	Portugal
GRI (1932)	Earthquake	33 BC	Portugal
	Earthquake	33 AD	Portugal
CSO (1986)	Earthquake	33 BC	Portugal
MMV (2001)	Earthquake	33 BC	Portugal
MMS (1983)	Earthquake	33 AD	Southwest of Cape St Vincent
MSM (2002)	Earthquake	33 AD	Portugal

Brito dates an earthquake in Portugal to the time of the Roman Emperors Valentinian I (364-375 AD) and Valens (364-378 AD). Everything seems to indicate that the Portuguese chronicler is referring to the famous earthquake in 365 AD, but does not explicitly provide any date, merely indicating that it occurred in the time of those emperors. He constructs a convoluted narrative in which he combines information provided by Paulus Orosius, a certain 'monk Eutropius' (actually Paul the Deacon) and the bogus Laymundus Ortega, in order to contend that the famous earthquake and tsunami in 365 AD also affected Portugal (Álvarez, 2017b). Brito's ultimate goal is to employ the 'universal earthquake' occurring in the time of Valentinian I and Valens to explain the disappearance of the island of 'Eritreia', namely, the island of Erytheia located off the coast of Lusitania, according to Pliny (*Naturalis Historia*, 4.120) and Pomponius Mela (*Chorographia*, 3.47).

Text 17. (*ca.* 365 BC)

The things that happened in Portugal in the time of those two emperors [Valentinian I and Valens] have been buried by the silence of authors who, occupied with the developments in the Empire, disregarded everything else. The only thing that can be read is that a certain captain called Venusto was the vicarius of the Empire in Spain in the time of Julian, and through Paulus Orosius and others we know that there was a universal earthquake that destroyed many cities; and the sea, abandoning its natural flow, flooded some formerly inhabited lands and left others hitherto navigable exposed. Laymundo pays considerable attention to this sea flood, practically reproducing, word for word, the description provided by the monk Eutropius and elaborating on it: *Non solum id per Siciliam, Græciam, et Palestinam, sed per multas Hispaniæ oras continentem subuertit, antiquas insulas sub egit, nouas rupes monstrauit diruta vndique terra, quæ visuntur vel iuxta, vel intra Occeanum, præcipuè ad sacrum Promontorium, quo antiquæ insulæ parua vestigia remansere, et discurrente Occeano in septentrionem*. Practically saying that the earthquake not only caused damage in Sicily, Greece and Palestine, but also on the coasts of Spain the sea floods also submerged some parts of the mainland and covered some islands that had been inhabited in ancient times. Only a few rocks, exposed by the sea, remained of these islands, which can be seen close to land or in the ocean, principally off Cape St Vincent, where there were a few small indications of a certain ancient island, plus others on the same coast of the ocean further to the north. From whose words we can surmise that in this destruction the ancient and noted island of Erytheia, of which we have already spoken in the first part of this work and which, according to Pomponius Mela, was located off the coast of Lusitania, disappeared.

As cousas que succederão em Portugal no tempo destes dous emperadores ficarão sepultadas no comû silencio dos scriptores, que occupados nas mudanças do imperio

passão por alto em todas asmais, soo lemos em Ammiano Marcelino, que foi vigairo do imperio em Espanha no tempo de Iuliano, certo capitão chamado Venusto, & de Paulo Orosio & outros sabemos, que ouue hum terremoto vniversal con que se fundirão muitas cidades, & o mar saydo de seu curso natural, alagou algûas terras, que antes se pouoauão, & deixou descubertas outras que soião ser pégo nauegauel. Laymundo faz grande fundamento desta inundação do mar, referindo quasi as formais palauras do monge Eutropio, & acrecenta: Non solum id per Siciliam, Græciam, et Palestinam, sed per multas Hispaniæ oras continentem subuertit, antiquas insulas sub egit, nouas rupes monstrauit diruta vndique terra, quæ visuntur vel iuxta, vel intra Occeanum, præcipuè ad sacrum Promontorium, quo antiquæ insulæ parua vestigia remansere, et discurrente Occeano in septentrionem. *Quasi dizendo, que não foi o dano do terremoto soo em Sicilia, Grecia, & Palestina, mas tambe pellas terras maritimas de Espanha, sobuerteo acrecente do mar algûa terra firme, & cubrio algûas Ilhas, que antigamente se pouoarão, dasquais ficarão no meo do mar algûas rochas, que o mar deixou descarnadas da terra, as quais se ve, ou perto, ou detro do mar Oceano, principalmente no cabo de São Vicete, onde ficarão hus piquenos sinaes de certa Ilha antiga, & outros pella mesma costa do mar Oceano, como vay discorrendo pera o Norte. Das quais palauras podemos conjeiturar que nesta ruyna pereceria a antiga & nomeada Ilha Eritreia, de que já falamos na primeira parte desta obra, que segudo Pomponio Mella, esteue na costa de Lusitania* (Brito, 1609, p. 124v).

	Event	Date/s	Location/s
Brito (1597)	Earthquake. Disappearance of islands	***ca*. 365 AD**	Cape St Vincent
MM (1758)	Earthquake. Disappearance of islands	382 AD	Coast of Portugal. Cape St Vincent
NN (1921)	Earthquake. Disappearance of islands	382 AD	Portugal and Andalucía. Cape St Vincent. Epicentre in the Gulf of Cadiz
GRI (1932)	Earthquake. Disappearance of islands	382 AD	Coast of Portugal. Cape St Vincent
CSO (1986)	Earthquake. Disappearance of islands	382 AD	Southwest of Portugal. Algarve
MMV (2001)	Earthquake	382 AD	Portugal
MMS (1983)	Earthquake	382 AD	Southwest of Cape St Vincent
MSM (2002)	Earthquake	382 AD	Southwest of Cape St Vincent

Joaquim Joseph Moreira de Mendonça (1758)

Three years after the earthquake of Lisbon in 1755, the Portuguese Joachim Joseph Moreira de Mendonça published his *Historia universal dos terremotos …* (*Universal history of earthquakes …*) (Moreira, 1758), which contains the most complete catalogue of earthquakes until then. Albeit an extraordinary information source, it contains speculations and errors that have been reproduced in the subsequent literature.

Text 18. (880 BC)
It is held that a fire lit in the bushes by certain shepherds was the cause of this conflagration. But as a fire above ground cannot penetrate the silver mines that these mountains contain, it is more likely that it was the effect of some or other earthquake, which let loose the subterranean fire in those mountains and melted the metal that they contained, as has occurred in other volcanos.

Dizem, que o incidente do fogo, que puzerão alguns Pastores aos matos, causara este incendio ; porem como o fogo á superficie da terra não podia penetrar as minas de prata, que encerravão os montes, he mais provavel, que por effeito de algum Terremoto rompeu o fogo subterraneo aquellos montes, e liquidou o metal, que encerravão, como tem obrado em outros Volcoens (Moreira de Mendonça, 1758, p. 15).

	Event	Date/s	Location/s
MM (1758)	**Earthquake**	**880 BC**	**Pyrenees**
GRI (1932)	Earthquake or volcanic eruption	880 BC	Pyrenees
MMS (1983)	Earthquake	880 BC	Olot (Girona)
MSM (2002)	Earthquake	880 BC	Pyrenees

Text 19. (309 BC)
309 […] On February 22, before dawn, there was a terrible earthquake in Portugal and throughout Europe …

309 […] A 22 de Fevereiro antes de amanhecer, houve um espantoso Terremoto em Portugal, e em toda Europa (S. Maria. Ann. Histor. T. I. dia 22 de Fever. n. 2.) (Moreira de Mendonça, 1758, p. 24).

Text 19.b. (1309 AD)
1309 […] On 22 February there was a terrible earthquake in Portugal. It affected Europe as a whole. We do not know what devastation it caused, but we assume that because of its magnitude it caused much.

1309 […] Em 22 de Fevereiro houve hum grande Terremoto em Portugal. Propagou-se a toda a Europa. Ignoramos os estragos, que fez ; mas suppomos da sua extençáo, que caufaria muitas ruinas (Moreira de Mendonça, 1758, p. 43).

	Event	Date/s	Location/s
MM (1758)	**Earthquake**	**309 BC**	**Portugal and all Europe**
NN (1921)	Earthquake	109 BC	Portugal and all Europe
GRI (1932)	Earthquake	309 BC	Portugal and all Europe
MMV (2001)	Earthquake	309 BC	Portugal

Francisco Tavares (1810)

Francisco Tavares, a physician and professor of the University of Coimbra, published his *Instrucções e cautelas practicas sobre a natureza, differentes especies, virtudes em geral, e uso legitimo das aguas mineraes, principalmente de Caldas …* (*Instructions and practical advice on the nature, types, qualities and proper use of mineral waters, mainly from Caldas …*) in

1810. In a brief page note there is a reference to earthquakes in Lisbon in 377 and 370 BC, information that does not appear in any other source.

Text 20. (377 and 370 BC)
Besides the two most ancient general earthquakes in memory, in 377 and 370 BC, as well as similar ones occurring in 1009, 1117, 1146, 1183 and 1290 AD, Lisbon has suffered many earthquakes, some of which reduced it to rubble …

Não contando os dois mas antigos terremotos geraes, de que ha memoria, 377 e 370 annos antes de CHRISTO, nem tamben outros semelhantes acontecidos nos annos 1009 – 1117 – 1146 – 1183 – e 1290 da era Chistã, muitos tem flagellado Lisboa, e alguns a reduzirão a montões de ruinas … (Tavares, 1810, p. 126).

	Event	Date/s	Location/s
Tavares (1810)	**Earthquakes**	**377 and 370 BC**	**Lisbon**
Balbi (1822)	Earthquakes	377 and 370 BC	Lisbon
Von Hoff (1840)	Earthquake	377 BC	Lisbon
Pereira de Sousa (1928)	Earthquakes	377 and 370 BC	Lisbon
GRI (1932)	Earthquakes	377 and 370 BC	Lisbon
MMS (1983)	Earthquake	377 BC	Lisbon
	Earthquake	370 BC	Lisbon
MSM (2002)	Earthquake	377 BC	Lisbon
	Earthquake	377 BC	Lisbon

Miguel Lafuente Alcántara (1843)

Miguel Lafuente Alcántara (1817-1950) was a Spanish lawyer, politician and historian. In 1843, he published his *Historia de Granada* ... (*History of Granada …*). While paraphrasing the passage in Ammianus Marcellinus describing the earthquake and tsunami in 365 AD, Lafuente introduces some apocriphal references to the Andalusian coast, which the Roman author does not mention.

Text 21. (365 AD)
At dawn on 21 July 365, in the second year of the reign of Valentinian and Valens, a violent earthquake was felt in the provinces of Granada and in others of the Empire. The waves of the Mediterranean churned as in the most furious of tempests. The beaches, which had always been lapped by the sea, were left dry many yards from Malaca, Exi and Abdera: the fish, outside their natural element, were picked off the sand without the need for nets or hooks. With rapt attention, the inhabitants of the coast saw the depths of the abysms that, full of water perhaps from the beginnings of the world, had allowed them to navegate with ease. After several hours, the sea returned with furious impetus ….

En el año 2.º del reinado de Valentiniano y Valente, al rayar el alba del día 21 de julio de 365, se sintió en las provincias granadinas y en otras del imperio un violento terremoto. Las olas del Mediterráneo hirvieron como en la mas desecha borrasca. Á muchas varas de distancia de Malaca, de Exi, de Abdera, quedaron en seco las playas, que siempre

habían estado bañadas por las aguas: los pescados, faltos de su natural elemento, eran cogidos á mano sobre la arena sin redes ni anzuelo. Absortos los habitantes de la costa, vieron la profundidad de los abismos, que colmados de agua quizá desde el principio del mundo, les habían facilitado navegaciones cómodas. Al cabo de algunas horas retrocedió el mar con ímpetu furioso… (Lafuente, 1843, p. 235–236).

Text 22. Ammianus Marcellinus (~380–392 AD)

While that usurper [Procopius] of whose many deeds and his death we have told, still survived, on the twenty-first of July in the first consulship of Valentinian with his brother, [365] horrible phenomena suddenly spread through the entire extent of the world, such as are related to us neither in fable nor in truthful history. For a little after daybreak, preceded by heavy and repeated thunder and lightning, the whole of the firm and solid earth was shaken and trembled, the sea with its rolling waves was driven back and withdrew from the land, so that in the abyss of the deep thus revealed men saw many kinds of sea-creatures stuck fast in the slime; and vast mountains and deep valleys, which Nature, the creator, had hidden in the unplumbed depths, then, as one might well believe, first saw the beams of the sun. Hence, many ships were stranded as if on dry land, and since many men roamed about without fear in the little that remained of the waters, to gather fish and similar things with their hands, the roaring sea, resenting, as it were, this forced retreat, rose in its turn; and over the boiling shoals it dashed mightily upon islands and broad stretches of the mainland, and levelled innumerable buildings in the cities and wherever else they were found; so that amid the mad discord of the elements the altered face of the earth revealed marvellous sights. For the great mass of waters, returning when it was least expected, killed many thousands of men by drowning; and by the swift recoil of the eddying tides a number of ships, after the swelling of the wet element subsided, were seen to have foundered, and the lifeless bodies of shipwrecked persons lay floating on their backs or on their faces. Other great ships, driven by the mad blasts, landed on the tops of buildings (as happened at Alexandria), and some were driven almost two miles inland, like a Laconian ship which I myself in passing that way saw near the town of Mothone, yawning apart through long decay (Ammianus Marcellinus, *History,* 26.10.15-19; trans. J.C. Rolfe).

	Event	Date/s	Location/s
Lafuente (1843)	**Earthquake Retreat of the sea**	**365 AD**	**Granada / Coast of Malaga, Almuñecar and Adra**
GRI (1932)	Earthquake Retreat of the sea	365 AD	Granada / Coast of Malaga, Almuñecar and Adra
MMV (2001)	Earthquake?	365 AD	Portugal?

Pedro Diaz Cassou (1887)

Pedro Díaz Cassou was a lawyer and writer from Murcia (Spain) interested in the customs of his region. In 1887, he published the book entitled, *Topografía, geología, climatología de la huerta de Murcia* (*Topography, geology, climatology of the orchards of Murcia*), in which he includes a list of earthquakes, speculating that those mentioned by Ocampo, Garibay and Mariana must have also affected the region of Murcia.

Text 23. (343 BC and 237 BC)

Earthquakes in Murcia. 500, 399, 346, 237 and 218 BC – It is more than likely that the major earthquakes that shook Spain as a whole, principally its southern and eastern

seaboards, were also felt in the valley where, years ago, Murcia was established: Garibay, Florián de Ocampo and Mariana all offer news in this respect.

Terremotos en Murcia. 500, 399, 346, 237 y 218, antes de J.C. – Es más que probable alcanzaran al valle donde, andando el tiempo, se fundó Murcia, los grandes terremotos que conmovieron, en las citadas fechas, todo el suelo español, y principalmente su litoral de Mediodía y Este: de ellos dan noticia Garibay, Florián de Ocampo y Mariana (Diaz Cassou, 1887, p. 28).

	Event	Date/s	Location/s
Díaz Cassou (1887)	**Earthquakes**	**346 and 237 BC**	**Spain. Murcia**
GRI (1932)	Earthquakes	346 and 237 BC	Spain. Southern coasts
MMS (1983)	Earthquake	343 BC	Southeast of Spain
	Earthquake	237 BC	Southeast of Spain
MSM (2002)	Earthquake	343 BC	Southeast of Spain
	Earthquake	237 BC	Southeast of Spain

Manuel Mª Sánchez Navarro-Neumann (1921): 196 BC

An incorrect piece of information appearing in Manuel Mª Sánchez Navarro-Neumann's *Bosquejo sísmico de la península Ibérica…* has ended up being incorporated into MSM catalogue.

Text 24. (196 BC)
196.- Spain m. g. P.

196.- España m. g. P

	Event	Date/s	Location/s
NN (1921)	**Earthquake**	**196 BC**	**Spain**
GRI (1932)	Earthquake	196 BC	Spain
MSM (2002)	Earthquake	196 BC	Spain

José Galbis Rodríguez (1932; 1940)

José Galbis Rodríguez (1868-1952), of the Instituto Geográfico, Estadístico y Catastral (Madrid) (currently the Instituto Geográfico Nacional), published his *Catálogo Sísmico …* (*Seismic catalogue …*) in two volumes in 1932 and 1940. This catalogue had been the main reference work on historical seismology in Spain, until the publication of Martínez-Solares and Mezcua's *Catálogo Sísmico …* (2002). The information that this compilation contains is enormously valuable. However, for Antiquity it includes some errors and repetitions due to transcription errors.

Text 25. (565 AD)
565… Earthquakes occurred in Andalusia, and it was reported that they were felt in Andujar, Cordova and Granada.

565… Ocurrieron terremotos en Andalucía, teniéndose noticia de que sintieron en Andújar, Córdoba y Granada (Galbis, 1940, p. 12).

Text 26. (565 H / 1169 AD)
1169 … According to the Chronicle of the Almohades: At the beginning of the year 565 of the Hegira (1169/1170), earthquakes occurred in Andalusia, and it was reported that they were felt in Andujar, Cordova, Granada and Seville in the month of Chumada; in many villages houses and minarets collapsed.

1169 ... Dice la Crónica de los Almohades: A primeros del año 565 de la Hégira (1169 a 1170) ocurrieron terremotos en Andalucía, teniéndose noticia de que se sintieron en Andújar, Córdoba, Granada y Sevilla en el mes de Chumada; en muchos pueblos se derrumbaron casas y torres de mezquitas (Galbis, 1932, p. 11).

	Event	Date/s	Location/s
GRII (1940)	**Earthquake**	**565 AD**	**Andalusia: Andujar, Cordova and Granada**
MMS (1983)	Earthquake	565 AD	Andalusia
MSM (2002)	Earthquake	565 AD	Andalusia

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