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A Note on Historical and Scientific Reassessment of the 1909 Ghomara False Earthquake (Tetouan region, Morocco)

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Abstract: This study provides an update analysis of a significant natural event that occurred in northern Morocco in the early 20th century. Its importance is underscored by its proximity to the city of Tetouan and the estimated magnitude and macroseismic intensity attributed to it. Using testimonies reported by the press of the time, this research clarifies the nature of this event, ultimately classifying it as a landslide.

Keywords: Historical Seismicity, Fake Earthquake, Ghomara, Morocco.

Introduction

Despite the extensive research conducted over the past three decades, the historical seismicity of Morocco still needs to be investigated. Thus, unfortunately, to date, they are no catalogue as accurate and complete as possible of historical seismic of Morocco. Recognizing the insufficient understanding of an increasing number of earthquakes needs further investigation. One significant challenge in historical seismicity is the issue of misidentified events; ancient texts have often, with alarming ease, described geological disasters (such as landslides or ground motions) as earthquakes. This issue pertains to ancient seismic events and recent occurrences, such as the Ghomara (or Romara) event. The expression "it resembled an earthquake," frequently used in witness reports, can be misleadingly interpreted by less informed historians as an actual earthquake.

The Ghomara Catastrophe (21-22 January 1909)

This event presents numerous challenges. It was first reported by Galbis in 1932[1] in his initial catalogue: "Terremoto en Romara (zona de Tetuàn, Marruecos), que produjo desprendimiento de tierra, quedando el poblado completamente destruido. Hubo 100 víctimas entre muertos y heridos. Grado

[1]. José, Galbis Rodríguez, *Catalogo sismico de la zona comprendida entre los meridianos 5°E y 20°W de Greenwich y los paralelos 45° y 25°N,* vol. 1 (Madrid: Instituto Geográfico y Catastral y de Estadistica, 1932); Georges Roux, "Notes sur les tremblements de terre ressentis au Maroc avant 1933," *Mémoires de la Société des sciences naturelles du Maroc* XXXIX (1934): 42-71.

X. E. (R.F.)."[2]

Subsequently, Roux in 1934[3] provided additional details: "Un tremblement de terre de degré 10 – échelle Rossi-Forel[4] –, a détruit les douars de Romara, à 5 km de Tétouan, pendant la nuit du 21 au 22 (janvier), et fait cent victimes, morts ou blessés. Il a été précédé d'un bruit formidable, qui sema la panique dans la population indigène, et accompagné d'un autre bruit souterrain. Tandis que les indigènes terrorisés s'enfuyaient, la montagne qui abritait leur douar s'effondra, ensevelissant une grande partie d'entre eux."[5]

Munuera locates the "earthquake" at 35.6°N and 5.6°W, assigning it an intensity of X (RF) and a macroseismic magnitude of 7.3.[6] While, Kárník,[7] likely referencing the works of Galbis and Roux, mentioned above, places the epicenter at 35.6°N-5.4°W, near Tetouan, with an intensity of IX (MM)[8] and a macroseismic magnitude of 6.2. In contrast, the Spanish catalogue suggests an epicenter at 35.5°N-5.6°W and an intensity of IX (MSK-64).[9]

Nonetheless, this event has drawn our attention for just nearly forty years as we began revising Morocco's seismicity from 1901 to establish a new seismicity database.[10] Ultimately, we excluded it from Morocco's

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2. Transl. to Engl.: "Earthquake in Romara (Tetouan area, Morocco), which caused a landslide, leaving the village completely destroyed. There were 100 victims, including dead and injured. Grade X. E. (R.F.)"

3. Georges Roux, "Notes sur les tremblements de terre ressentis au Maroc avant 1933," *Mémoires de la Société des sciences naturelles du Maroc* XXXIX (1934): 42-71.

4. The Rossi-Forel (R.F.) intensity scale, which dates from 1873, is the first modern macroseismic scale used in Europe to classify earthquakes. It is composed of 10 degrees of intensity.

5. Transl. to Engl.: "An earthquake of degree 10 on the Rossi-Forel scale destroyed the douars of Romara, located 5 km from Tetouan, during the night of January 21-22, resulting in one hundred casualties, both dead and injured. It was preceded by a tremendous noise that caused panic among the local population and was accompanied by subterranean sounds. As the terrified locals fled, the mountain sheltering their douar collapsed, burying a significant portion of them."

6. José María Munuera, "Datos básicos para un estudio de sismicidad en el área de la Península Ibérica," *Memorias del Instituto Geografico y Catastral* XXXII (1963): 1-90.

7. Vít Kárník, *Seismicity of the European area*, Part I. D., (Dordrecht: Reidel publications, 1969).

8. The Mercalli intensity scale, established in 1902, was modified in 1956 (MM) and consists of 12 intensity levels. It is very similar to the Medvedev-Sponheuer-Kárník scale, version 1964 (MSK-64).

9. Julio Mezcua Rodriguez and José Manuel Martínez Solares, *Sismicidad del area Ibero-Mogrebi* (Madrid: Instituto Geográfico Nacional, n° 203,1983).

10. See: Taj-Eddine Cherkaoui, Georges Herquel and Abdelkrim Rimi, "Géophysique," in *La Grande Encyclopédie du Maroc* (Rabat-Bergamo: éd. GEM, Gruppo Walk Over, 1987), Vol. 3: 51-74; Georges Herquel, Taj-Eddine Cherkaoui and Lahcen Asebriy, "Évaluation du risque sismique dans la région détroit de Gibraltar," in *Tremblements de terre. Évaluation du risque, mesures de prévention et d'aide* (Brigue : Ed. Commission suisse de géophysique, 1987): 155-181. Taj-Eddine Cherkaoui, "Fichier des séismes du Maroc et des régions limitrophes*: 1901-1984*," *Travaux de l'Institut scientifique, Série Géologie et Géographie Physique* 17 (1988) http://www.israbat.ac.ma/wp-content/uploads/2016/02/IS_GSSP_17.pdf

seismic hazard assessment.[11] Levret and Vogt raised doubts regarding the nature of this event.[12]

Let us first review the available information concerning the event:

- The Ghomara "earthquake" triggered a significant and deadly landslide during the night of January 20-21, 1909, complicating subsequent assessment efforts.
- None of the three operational Spanish stations at the time, including one located about 110 km away in San Fernando, recorded the event (fig. 1).
- The tremor was not reported as being felt in Tetouan or its surrounding areas.
- This mountainous region is prone to landslides, which can occur even without an earthquake, especially after heavy rains or low-magnitude surface quakes.[13]

Our investigation focused on a reexamination of contemporary archival sources. We reevaluated the position and nature of this event using previously unpublished documentary evidence, which have provided new and deeper insights. We located four newspaper articles published approximately ten days after the disaster:

- **First document**: "Por moros fugitivos llegados á Tetuán se sabe que en el poblado de Romara, situado á 50 kilómetros de dicha plaza, ha ocurrido una catástrofe, causada por un temblor de tierra que produjo el desprendimiento de una montaña, en la que se hallaba situado dicho poblado. Quedaron sepultados un centenar de muertos y heridos.

  Los moros precedentes del aduar donde ocurrió la catástrofe que llegan à Tetuán, están aterrados y no se dan cuenta siquiera de lo que pasó. Creen que el Dios Grande envió el terremoto como castigo, por haber permitido á los infieles entrar en el imperio. Por lo lejano que está el lugar del terremoto se carece de detalles."[14]

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[11]. Taj-Eddine Cherkaoui, "Contribution à l'étude de l'aléa sismique au Maroc ," Thèse de l'Université Joseph Fourier, Grenoble, 1991.

[12]. Agnès Levret, "Les effets au Maroc du séisme de 'Lisbonne' du 1er novembre 1755. Evaluation of historical seismicity," in *European gophysical society*, XIIIe General Assembly (Bologna: Symposium. Multidiscipinary 1988).
https://inis.iaea.org/collection/NCLCollectionStore/_Public/20/005/20005570.pdf; Jean Vogt, "The weight of pseudo-objectivity" *Annali di Geofisica* XXXIX, 5 (1996): 1005-1011. https://doi.org/10.4401/ag-4030

[13]. Herquel et al., "Évaluation du risque sismique."

[14]. Transl. to Engl.: "From fugitive Moors who arrived in Tetouan, it is known that in the village of Romara, located 50 kilometres from the town, a catastrophe occurred caused by an earthquake that

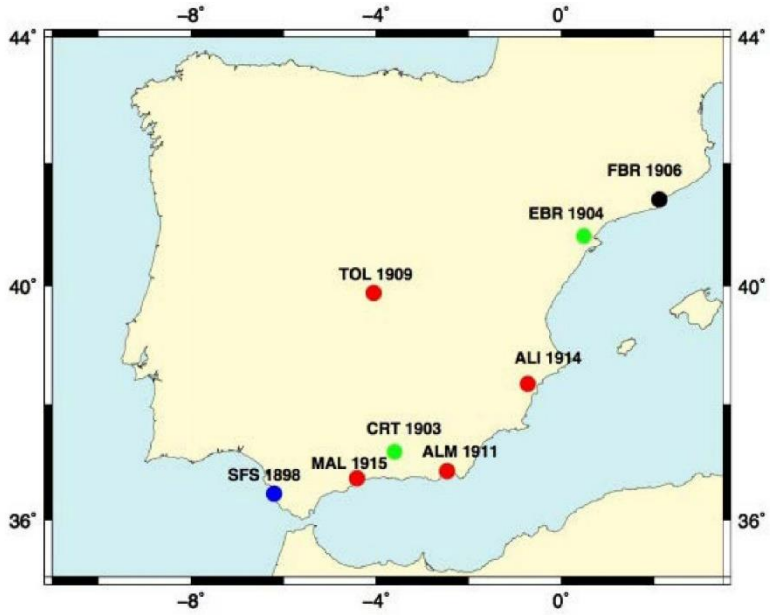


Fig. 1: Location of the first seismic stations of the Spanish network [© Vallina]

- **2nd document**: "Les indigènes arrivés de Tétuan (le journaliste est installé à Sebta, NDLR), rapportent que le village de Romara situé à cinquante kilomètres et bâti sur le flanc d'une montagne a été détruit par un affaissement du sol et une avalanche de terre et de rochers; il y a eu une centaine de morts et de blessés."[15]
- **3rd document**: "A Tétouan (Maroc) plusieurs villages habités par la tribu des Zémaras ont été ensevelis par suite du glissement d'une montagne. Ce sont des troubles sismiques qui ont déterminé la catastrophe. On signale de nombreux morts et blessés."[16]
- **4th document is much more precise**: "Se han recibido más noticias acerca de la catástrofe que destruyo estos días la aldea de Romara, situada, como se sabe, à unos cincuenta kilómetros de aquella plaza. Dicen los moros fugitivos, que llegaron allí pocas horas después del siniestro, que éste ocurrió

caused a landslide of a mountain on which the village was located. A hundred people were buried dead and wounded. The Moors who came from the village where the catastrophe occurred and arrived in Tetouan were terrified and did not even realize what had happened. They believe that the Great God sent the earthquake as punishment for having allowed the infidels to enter the empire. Because the place of the earthquake was so far away, details are lacking," *El Siglo future*, January 30th 1909.

15. Transl. to Engl.: "The natives who arrived from Tetuan (the journalist is based in Sebta, editor's note) report that the village of Romara, located fifty kilometres away and built on the side of a mountain, was destroyed by a subsidence of the ground and an avalanche of earth and rocks; there were a hundred dead and injured," *L'Action française*, January 30th 1909.

16. Transl. to Engl.: "In Tetouan (Morocco), several villages inhabited by the Zemaras tribe were buried as a result of a mountain slide. Seismic disturbances caused the disaster. Many deaths and injuries have been reported," *Le Réveil Ploërmelais*, January 31st 1909.

> de noche, sintiéndose grandes ruidos subterráneos que conmovieron á toda la gente de aquellos lugares, la cual, presa de gran pánico, se echó fuero de sus chozas, prosternándose en suplicante actitud para pedir perdón á Alah, suponiendo á los ínfleles causantes de la desgracia. De repente mientras todos estaban orando, se produjo une espantosa sacudida, acompañada de horrísono ruido, que hizo temblar el suelo, originándose desprendimientos de tierras y enormes peñascos en una montaña próxima que dominaba el poblado, cayendo como nube infernal sobre éste, que quedó sepultado en breves momentos. Con tanta rapidez se produjo la catástrofe, que no dio tiempo á los moradores para á salvo, y sólo los más distantes, que vivían en el llano, pudieron huir, buscando refugio hacia la costa. Esto es lo que cuentan los fugitivos; añadiendo que no comprenden el fenómeno, é ignoran el número de víctimas, si bien suponen que debe ser considerable." [17]

These four notes provide many new elements, among which we will retain the following:

The village concerned by this disaster is located near the Mediterranean coast about fifty kilometers southeast of Tetouan in the territory of Ghomara, not 5 km, as indicated by the various documents cited above. It would, therefore, be near Stehat Village (fig.2).

The building is probably on the side of a mountain; blocks of stone were disconnected from the mountain, and houses, inhabitants, and cattle were buried.

It was common in the past for natural events causing significant damage to be considered earthquakes. Due to its particular tectonic setting, as part of the Alpine chain, the Rif is vulnerable to natural hazards, particularly on its northern edge. The contrasting topography and the hydrological and meteorological conditions of this region mean that the localities of the central Rif do not escape the risks of initiating landslides and falling rocks and

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[17]. Transl. to Engl.*:* "More news has been received about the catastrophe which recently destroyed the village of Romara, situated, as is known, some fifty kilometers from that town. The fugitive Moors, who arrived there a few hours after the disaster, say that it happened at night and that great underground noises were heard, which moved all the people of that place, who seized with great panic, threw themselves out of their huts, prostrating themselves in a supplicant attitude to ask forgiveness from God, supposing that the infidels were the cause of the misfortune. Suddenly, while everyone was praying, there was a frightful shock accompanied by a terrible noise, which made the ground shake, causing landslides and enormous boulders on a nearby mountain which dominated the village, falling like an infernal cloud upon it, which was buried in a few moments. The disaster occurred so quickly that there was no time for the inhabitants to escape, and only those who were farther away, who lived on the plain, were able to flee, seeking refuge towards the coast. This is what the fugitives say, adding that they do not understand the phenomenon and do not know the number of victims, although they suppose it must be considerable," *La Época,* February 1st 1909.

blocks. Almost all steep reliefs, especially cliffs, produce rock falls and landslides that can sometimes be spectacular.[18]

The Ghomara event ultimately turned out to be just a landslide involving the collapse of rocks and blocks, similar to the Amtrasse landslide on March 5, 2008, in the Chefchaouen province (fig. 3).[19] As a result, the unusually high values for speeds and accelerations in the earthquake-resistant building regulations for the Tetouan province need to be reevaluated.

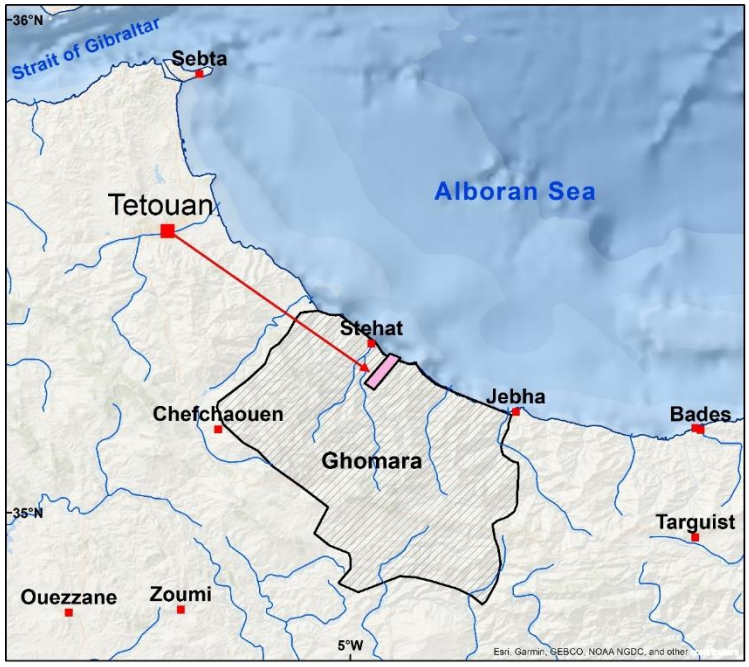


Fig. 2: Due to an error in Galbis' text (5 km instead of 50 km), carried forward by all subsequent catalogues, the false earthquake was incorrectly located near Tetouan rather than in a region within Ghomara [© Cherkaoui].

18. *PAC-Maroc. Programme d'Aménagement Côtier du Rif central*. Activité thématique GIZC, Rapport final de l'action 1: diagnostic (Rabat: Secrétariat d'Etat auprès du ministère de l'Energie, des Mines, de l'Eau et de l'Environnement chargé de l'Eau et de l'Environnement, 2010).
19. PAC-Maroc.



Fig. 3: Landslide and rock flow in Amtrasse (Chefchaouen Province) on the main road N 39, which occurred on March 5, 2008 [© PAC-Maroc, 2010].

Conclusion

In conclusion, this study sheds new light on a notable natural event that has long been misunderstood and misclassified. By carefully analyzing contemporary testimonies from early 20th-century press reports, we have identified that the event near Tetouan was not an earthquake but a landslide. This reclassification highlights the critical challenge of accurately interpreting historical accounts of natural disasters, where misidentifications are common and can distort our understanding of a region's seismic history. Despite three decades of research, the historical seismicity of Morocco remains incompletely documented, and this work emphasizes the necessity of continued, rigorous investigations. Distinguishing between genuine seismic events and geological phenomena mistakenly labeled as earthquakes is vital for constructing a more reliable and comprehensive seismic catalogue. Such

efforts not only refine our knowledge of Morocco's past seismic activity but also enhance the assessment and management of present and future seismic hazards in the region.

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العنوان: مراجعة تاريخية وعلمية " لزلزال" غمارة المفترض سنة 1909 بشمال المغرب

ملخص: تتناول هذه الورقة حدثًا جيولوجيًا هامًا وقع في شمال المغرب خلال مطلع القرن العشرين. وتكمن أهمية هذا الحدث في ارتباطه بمدينة تطوان ذات المكانة التاريخية والاقتصادية، بالإضافة إلى التقديرات المتعلقة بحجمه وشدته الماكروزلزالية. وقد أسهم جمع وتحليل شهادات سكان المنطقة المتضررة، كما نشرتها الصحافة آنذاك، في تسليط الضوء على طبيعة هذا الحدث الجيولوجي وتصنيفه كانزلاق أرضي.

الكلمات المفتاحية: الزلزالية التاريخية، زلزال مفترض، غمارة، المغرب

Titre: Note sur le réexamen historique et scientifique du faux séisme de Ghomara en 1909 (Région de Tétouan, Maroc)

Résumé: Cette note vise à éclaircir les circonstances et la nature d'un phénomène naturel remarquable qui a marqué le nord du Maroc au début du XX^{ème} siècle. Son importance réside à la fois dans sa proximité avec la ville de Tétouan, et dans la magnitude estimée et l'intensité macrosismique qui lui ont été attribuées. L'analyse de témoignages originaux recueillis dans la presse de l'époque a permis de mettre en lumière la nature de cet événement et de le classer désormais comme un glissement de terrain.

Mots-clés: Sismicité historique, faux séisme, Ghomara, Maroc