Earthquake lights in Reggio Calabria and Messina, Italy, one hundred years after the December 28, 1908 quake

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The one hundred anniversary Southern Italy disaster was observed in December 2008. However, the anniversary failed to recall its associated luminous phenomena. These phenomena are important to better understand earthquake physics.

If the Messina Strait disaster is remembered as being among one of the worst disasters to have ever hit Europe, together with that of the Lisbon quake occurring on November 1, 1755, the fact that the electromagnetic phenomena associated with that earthquake is neglected was rather odd. Indeed, as for the eighteenth century Portuguese disaster, it was Immanuel Kant [1] who reported the sighting of lightning at sea along with other bright phenomena, plus the observation of a momentary loss of attractiveness of permanent magnets; also, for the Calabro-Siculo earthquake, our diligent researchers have gathered many interesting first-hand accounts of this event [2]. This silence seems even odder when we examine the observed phenomena related to disastrous events over the past centuries which have struck the same regions. From the strong earthquakes of 1693, 1726 and 1783, to those of lower intensities in 1894 and 1905, there are many reports describing: diffused brightness as auroras, concentrated beams, spheres, lightning, fire, flames, and several other electrical phenomena [2]. With few exceptions [3,4], we must ask: how is it possible that these observations do not form part of research topics in modern Italian science? In other words, we ask today: What are these phenomena? Did they always occur with earthquakes? Could they be used to predict disasters? Regarding the query on what they are, we see that already in the eighteenth century researchers began to formulate responses [5], as they recognized the characteristics of the presence of electric charges and flammable gases.

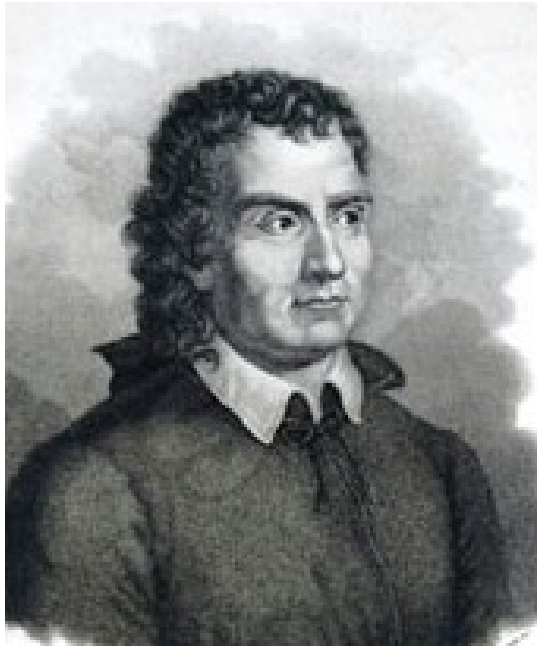

Figura 1 Father Giambattista Beccaria (1716 - 1781), one of the most important scholar in the field of electric phenomena in 18th century. He described some luminous phenomena related to the 1783 earthquake in Calabria, Italy.

Recent studies have shown how rocks subjected to stress are capable of generating various electrical phenomena, as well as currents that can create magnetic fields. In this model the enormous pressures that generate earthquakes is also the source of phenomena, outlined above, by way of the stress applied to the rocks and their eventual breaking [4]. Specifically, the hole created in the rock materials are hypothesized to be able

to ionize the surface air. In another way the emission of radon gas, which is a radioactive gas, is hypothesized to increase the atmospheric electricity on the epicenter region. An excess charge in a vast region of space on the epicenter, concentrated on the asperity locations and moved by atmospheric disturbances, may explain the sparks, lightning and widespread luminosity.
The third question cannot be answered in a positive manner as: if it is true, that even today, such events can be repeatedly observed on the occasion of more violent earthquakes, it is also true that they have been observed in the absence of earthquakes and concomitantly with other phenomena. For instance, during periods of intense solar activity, auroral phenomena even at low latitudes, magnetic field disturbances and also various electrical phenomena can be reported. In the case of solar activity, the cause is the charged particle flow and the ionizing sun radiation, both which vary depending on their source intensities. Thus, a consequential question could be: Do characteristics of the associated earthquake phenomena exist that are distinguishable from either solar or weather associated phenomena? The answer to this query constitutes a research topic.
The answer to the fourth question, regarding electromagnetic studies, is negative. Although many studies are presently underway, none of these has produced data allowing for the profound understanding of the dynamics of such events and their correlation with earthquakes. Seismic lights are studied through electrical signals, magnetic and radio which are supposed to be their associates. On the other hand, the systematic photo archiving of these lights on a large scale has to deal with the problem of the large number of luminous phenomena having a meteorological origin, solar or man-made, that occurred in the atmosphere. Among the studies concerned with electromagnetism we are reminded of the VAN method, that when the electric dipoles are placed in the soil, states that potential differences are kept under control between pairs of points in Greek land and warns of an impending quake. The authors claim to be able to predict seismic phenomena when their instruments reveal electrical impulses taking place with a particular temporal law. Among forecasting attempts using VAN, some have been successful.
The use of instruments to measure geomagnetic fields has evidenced interesting variations in their intensity and direction during some violent earthquakes, but, while in other cases, no disturbances have been reported. There are also the studies of radio waves on a broad spectrum of wavelengths, where signals are attenuated and or disturbed. However, even here, the results need to be further explored.
It should be stressed that, even if we find a way of predicting earthquakes, such forecasts would be un-applicable, since civil protection and the populations are not prepared to accept the selective evacuation of persons considered to be living in structures that are not seismically safe.

Figura 2 Ignazio Galli (1841 - 1920), was a priest who composed the first collection and classification of observed luminous earthquake phenomena.

Going back to the Messina quake of 1908, several documents from that period detailed the recording of luminous phenomena, including: moving balls of light, bright

clouds, fire and falling stars and flashes seen as far away as the island of Malta. Italy has been the birthplace of the most distinguished researchers in the field of electric phenomena, such as Giambattista Beccaria (Figure 1), and radio communications. Therefore, it should not be surprising that Italy was a world leader in the electrical study of earthquakes over the two centuries preceding the 1908 quake. Furthermore, in 1910, the Italian priest Ignazio Galli, in Figure 2, composed the first catalogue of bright phenomena of earthquakes, scientists Giuseppe Mercalli and Mario Baratta made significant contributions to this catalogue by collecting testimonies from the 1908 quake. All of this increases the level of curiosity for a response to the first question.

Figura 3 Father Raffaello Stiattesi (1867 - 1963); starting from 1908 earthquake observations, experimented with earthquake predicting tools in his observatory in Florence, Italy.

From Italian newspapers published right after the event of 1908, we learn that several research projects had already been launched in 1909 in Italy. Specifically, Italian newspapers talk of the construction of detectors, which took their inspiration from the observation of the sudden deviation of a compass needle occurring about twelve hours before the tremendous shock [6]. Four Italian scientists undertook these studies: 1)Father Raffaello Stiattesi of the Fourth – "Castello di Firenze", see Figure 3; 2)Giuseppe Ceramicola from Pergola in the Marche region; 3)Father Atto Maccioni and 4)a chemist from Genoa. The forecasts of the four had little success. Unfortunately, their studies were quickly discontinued because of the high costs related to instrumentation and the negative consequences of the false alarms. The academic world at that time was attracted to the emerging science of seismology that promised to understand the most apparent phenomena, that is, the shaking. Thus, it is likely that further discredit came from the fact that the new science neglected to investigate the causes of earthquakes; reliable predictions were impossible. So, from that moment onward, research was set aside and even blocked, together with all other attempts at predicting. Even today in Italy, where quakes had long been studied in the past, the study of these phenomena has been thoroughly disregarded.
The possibility of creating false alarms and producing more disorder than the earthquake itself leads to unpleasant consequences but not tragic ones. It must be acknowledged however that this decision one hundred years ago to abandon the research on earthquake related phenomena, has also hampered the ability to profoundly understand the phenomena itself. If these studies were performed with a forecast prospective they would not offer more opportunities than other studies in avoiding false alarms. On the other hand, better understanding the earthquake process would be the foundation for reliable quake forecasting. For this, it is very desirable today scholars and young researchers resume the research initiated over two centuries ago in Italy, even if it means forgoing any prospect of immediate success and graded productivity. In conclusion, it is important the search for scientific truth.
Here are some interesting testimonies collected by Galli and others:
1) Perret collected the first evidence of a flash in the direction of Messina as seen from the city of Taormina, Sicily, by fisherman at

the same instant of the 1908 earthquake [7]. He attributed the flash to the reflection of the moon on the sea;

Figure 4 Frank Arvold Perret (1867 - 1943), French volcanologist who predicted a disaster in Sicily at the end of 1908, was one of the first scientists to reach the disaster area.

2) Professor Bruno Occhiuto, assistant observatory of Miletus, annoted that two individuals, one from Lower Sinopoli and the other from Upper Sinopoli, reported seeing an almost identical phenomenon, that is, a cloud of fire in the sky, just before the earthquake; adding that it was not raining, nor was there lightning activity at that time in Sinopoli. The first eye-witness reported that he had seen a cloud of fire in half of the sky and that, while scared, he had admired the phenomenon and had felt the earth tremble. The second witness reported that a moment before the earthquake had struck, the sky opened up and it rained fire [2].
3) Was reported that the priest Giuseppe Caminiti from Messina said that at first glance he thought he saw a fireball appear in the sky that moved slowly from NW to SE, leaving a strip from which it rained sparks, as reported in Sinopoli. If the phenomenon seen in the three places had been truly only one, the bright object would have taken at least a quarter of an hour to travel about thirty kilometers. This would have been unacceptably slow even for a fireball, while explainable if it had been a large globular lightning followed by a glittering tail, as has been sometimes observed [2].

Figura 5 Giuseppe Mercalli (1850 - 1914), compiled evidence of earthquake lights observed during the Reggio and Messina quake.

From earthquake reports from the same places but centuries earlier:
4) For the earthquake of January 1, 1693 in Sicily, a black cloud over Catania and large flames around Mount Etna were observed at the time of the shock, though the volcano remained dormant. And then there is the earthquake of January 9, 1693 in eastern Sicily, where Vincenzo Bonaiuti said that some travelers, at the time of the quake, observed a large fire or light about a mile away. The vision was so vivid that they took it for a fire that had been started by the people in the countryside. And although they moved closer to the blazing vision, it seemed to be always the same distance away. While watching this phenomenon, the earthquake struck [2].
5) On the occasion of the Calabria earthquake of February 5, 1783 we have the testimony of Prof. Andrea Gallo, a physicist in Messina, who concluded his description of that catastrophe using these words: it was seen in that moment a large black cloud furiously rising overhead and running over the zenith,

declining on the other side, then there was an ugly blackening, almost obscure, throughout the hemisphere, while in itself, which above the highest houses and buildings which were falling, suddenly a flaming light passed, like that of whales appearing among the summer clouds, spreading everywhere a slight odor of what seemed to be bitumen, or sulfur or even amber. Flashes of light were also seen in Cosenza, Calabria, Italy on the occasion of the strong shock, while watching the air and clouds, a fleeting thin light was observable among the dispersed clouds [2].

Figure 6 Mario Baratta (1868 - 1935), collected evidence of seismic lights observed during the Calabria earthquake on September 8, 1905.

6) There are testimonies for the September 8, 1905 earthquake in Calabria, Italy. Eye-witnesses stated that they had seen indefinable reddish lights cross over the horizon. Others saw bolts of lightning and heard three thunderclaps. One eye-witness saw a purple colored sun rise among the mountains after the earthquake; while another eye-witness stated having seen a burning cross. Mario Baratta reported that someone, who at the time of shock was in the open countryside of Monte Leone, Calabria, Italy claims to have seen a kind of aurora light and then a strip of fire moving towards the sea. Finally, many persons in Messina claimed to have observed an unusual glow, a large lightning bolt [2].

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