

BALL LIGHTNING AND STRANGE PHENOMENA IN THE PO PLAIN VALLEY, NEAR ROVIGO (ITALY)

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ABSTRACT

For many years in the skies of Polesine, in the Po Valley (Italy), anomalous lights appear in the daytime and at night. Associated with the luminous phenomena in the atmosphere there are also abnormalities, such as the filaments falling in the surrounding areas. In this study, the type of ball lightning which rise from the horizon from 1 to about 30 degrees, for variable colors, size and durability. Case studies, photographed and taken with cameras, are documented for about fifteen years by 45GRU. The light phenomena, usually round in shape, white and red in winter in summer, there are others of a yellowish color and shape resembling also a maple leaf, they replicate for brief moments. The investigation of anomalous phenomena in the atmosphere in the Po Plain Valley has focused on two branch of research: first, establishing possible relations with tectonic and seismic activity for a crustal diagnosis and the search for seismic precursor candidates; second, concerns a possible relations with Lunar cycles.

INTRODUCTION

For many years, after a pioneering period, the study of light phenomena is again arousing interest in the scientific community and creating new knowledge on this unusual phenomenon, thanks to the research of international teams. In Italy, after the observations made in the nineteenth century by researchers, in particular those that relate earthquakes to light phenomena, research has intensified since 1980 ^{[1] [2] [3] [4] [5] [6]}, thanks to the establishment of a many research team, such as the 45 GRU that has as its investigation area the Eastern Po Valley. In addition to the survey area, in Italy the light phenomena in the atmosphere are sighting in Central Italy (Monti Sibillini), Adriatic Sea (Gabicce), Northern Apennines (Sassalbo and Taro Valley), Po Plain Valley, and in Lendinara, where placed the monitoring station of the present study ^{[7] [8]}. The Po Plain Valley, in the Northern Italy, between Rovigo and Venice, has been monitored by the 45 GRU Group for 17 years to detect the balls lightning, where a lot of sightings occur during the year. In the most cases the light phenomena that occur near Lendinara, in the province of Rovigo, and these phenomena are usually detected in the Pradespin area (Lat.45,115446 Long.11,584147) along the Adige River **FIG.1**. Usually the balls lightning are observed in the south direction, towards Emilia Romagna Region, and in some cases, the light phenomena have also occurred in the same area of Lendinara, where the monitoring area is located: the GRU's name is dedicated to the 45th parallel that passes just above the survey area. In all documented cases, no lightning strikes have been observed in order to be able to think of a particular trigger phenomenon. The Lendinara area does not have wetlands to consider any formations of natural gas bubbles that climb to the altitude and encounter an electrostatic trigger so as to create a form of ionized plasma ^{[9] [10]}.

Type of light phenomena sighted

For many years the GRU group has observed 2 types of light phenomena:

- First, the spheroidal shape light phenomena, with yellow-orange coloring and constant luminosity as if it were confined in a sort of "bubble", with sudden appearances and erratic movements, elevation from the ground between 10 °-20 °, without noise and no trail emitted. In this case the dimensions estimated are 2 meters, with a duration of a few seconds that imply difficulties in spectroscopic analysis. **FIG.2**

- Second, the light phenomena are of spheroidal shape but changeable in the time of permanence, with intense fuchsia red color. The luminosity are constant as if confined in a sort of "bubble" but which tends to deform in its movements. The appearances and movements (in one case) are very fast in a linear way or in other cases with very slow movements and with an apparent strange static in the air, elevation from the ground between 2 ° -7 ° from the ground. These luminous phenomena produce no noise and no emitted trail. The ball lightning dimensions are estimated above 2 meters and duration from a few seconds to a few minutes. Only in one case has an anomalous 6Khz signal been recorded in VLF radio waves at the same time as a luminous phenomenon, while in another case of strong electrostatic discharges in the VHF band at 140Mhz simultaneously with a luminous phenomenon that appeared with random movements. In all the cases observed, no anomalies were found in the Geiger counter nor in the EM field detector. **FIG.3**

Filaments

The survey area is also affected by the fall of filaments in the area of Polesella, Arquà Polesine, Grignano, Polesine, Borsea and partly also Rovigo; and other reports came from villages in Adria, near the Po River Delta. The tangles are made up of many thin threads, each of them 5-7 meters long. The filaments come down from the sky and are of an intense white color; they tangled together thanks to the wind and stick to anything: trees, houses, telephone cables, pylons, road signs, walls and cars. **FIG.4**

INSTRUMENTS

The instrumentation used by GRU Group during the monitoring and the sky watch are the following **FIG.5 (unite)**:

- professional digital SLR cameras
- Analog cameras with infrared film
- Infrared / ultraviolet filters
- professional HD camcorders
- spectroscopes applied to cameras
- binoculars

- Infrared viewers
- ELF / VLF radio receivers
- HF / VHF / UHF / SHF radio receivers

- Geiger counters
- field EM detectors
- portable radiometer for measuring the temperature in the antenna

The 45 GRU also has two stations for monitoring the luminous phenomena:

A- a whole focus on radio monitoring on all frequencies and particularly in ELF / VLF bandwidth with directional antennas.

B- the monitoring Station use 4 astronomical cameras with wide angle optics for sky monitoring on the Rovigo area (with a 360 ° coverage and a 30-degree on the horizon), all stations are connected to computers for recording and

data analysis; In parallel with this instruments there are ELF / VLF radio receivers, a radio receiver for meteor scatter (radio meteor interception), a radiometer with directional antennas, a geophony 4 -15Hz.

In the 45 GRU database are considerate all artificial light (aircraft, light, lighting, sky lantern) and natural phenomena that can give rise to misinterpretations can be considered.

METHODS

The research methodology is based on the recording of light phenomena and trying to understand the possible composition, through the technique of spectroscopy with spectroscopes applied to cameras, video cameras, radiometry carried out with directional antennas.

It is a very complex and difficult research, because such phenomena are random and very fast, often difficult to frame to register them. The analysis of the results makes use of the contributions of the astrophysicist Massimo Teodorani and of the physicist Mario Campion.

DISCUSSION

In the presentation of data about anomalous light phenomena in the atmosphere and potential links with the seismic activity, two reports are presented.

The first case concerns the Pradespin Globe of Lendinara, filmed on 6/07/2013 at 22.45. This is a bright sparkling red sphere, shot with video camera and spectroscopy **FIG.6**. The analyzes, carried out by Dr. Massimo Teodorani, have shown strong peaks of oxygen. In the picture here proposed (FIG) show the sphere spectrum of the sphere in comparison with the spectrum of artificial lights in the area.

The BL sighting preceded a 46-day seismic event occurred in the Monte Conero (Ancona) area of magnitude (MI) 4.9 at 03:32:24 Italian time on 21/08/2013. Such an interval time of 45-48 days is also recurring in North Western Apennines, in Italy.

The second case concerns the globe, filmed on 15/08/2016. The slide shows one of the 14 photos taken at Pradespin of Lendinara **FIG.7**. This is a reddish-red sphere appeared on 15/08/2016 at about 3 ° from the ground. The ball was suspended for 32sec. In the photo we notice the sphere spectrum of the sphere in comparison with the light spectra of the area illumination. On 24/08/2016, the strong 6M magnitude earthquake occurred in Amatrice, in Central Italy, which started the seismic sequence, still in progress.

In the next day, a red ball appearing on 18/05/2008, sighted at 23 o'clock local time, over the Adige river at about 100mt from observation post. In this case, at 4.33 pm on 18/05/2008, the event was preceded by an earthquake that occurred at Verona's 3.4M magnitude.

A possible relationship with lunar cycles

The time that elapses between the appearance of earth lights and earthquake in the North-western Apennines is approximately 54 days ^[11]: which corresponds roughly to two lunar months, while in the plain between the Venetian lagoon and the North-western Apennines, the recurrence is more discontinuous and the time intervals are around 60 days. The distribution of the events, as reported in seems far from accidental, since the earth lights become concentrated during the quadrature, on the days of the syzygies and quadratures **FIG.8**. This preliminary experiment led to the hypothesis of a relationship between the "cyclicity" of the lunar movement – and therefore with the tide cycle, and the stresses produced in the rocks below. The earthquakes took place in the days near the Full Moon, i.e. when the tidal sinusoidal oscillations are greatest. At this stage, the stress underlying the rock in the ground can release gas and produce charges and generate plasmas.

Strange filaments

One of the possible phenomena of interference in the observation of light phenomena in the atmosphere is long filaments of intense white color that periodically descend from the sky **FIG.9**: in particular in the last 4 years. Every

tangle is often made up of many thin wires, long each 5-7mt. In the case shown, the sample collection was made with clear sky and the temperature was about 25 °, with a weak wind. For all the time spent collecting filaments there were no anomalies in the sky and no passage of aircraft. The nature of the filaments is probably to be connected to the Spider Ballooning, even if other hypotheses are not excluded, such as a potential relationship with the reorganization matter inside the anomalous luminous phenomena in the atmosphere ^[12].

The observations about the strange filaments have shown that with:

- lighting lamp with U.V. Class A: do not emit any fluorescence
- lighting lamp with U.V. Class C quartz glass: do not emit any kind of fluorescence
- measurement of any EM fields: no output
- measurement of any radio ELF / VLF waves: no output
- measurement with the Geiger counter: no abnormality
- electric voltage application continues 6Volt and 12Volt: perfectly insulating
- Electrolysis: no change
- burn the burner flame to 500 ° C: retracts, assuming a brown color dark, but no strange smell is emitted
- infrared photography to 1 micron post-burn: no strange anomaly was found
- microwave irradiation to 700Watt for 2min. Continuous: no change
- soaking in distilled water: no change
- assault with pure ammonia: no reaction
- assault with chloroform: no reaction
- assault with dilute sulfuric acid: no reaction

CONCLUSION

We can conclude that:

- 1. The Anomalous Luminous phenomena in the Po Valley may be related to tectonic activity;
- 2. The area of investigation can become a natural "lab" for research in Physics and Geophysics;
- 3. Anomalous light phenomena in the atmosphere can be measured;
- 4. In the survey area there are two types of anomalous light phenomena, usually of red colour;
- 5 The light phenomena appear relatively close to the ground.

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FIGURE



Fig. 1. Index map



Fig. 2. Ball lightning, first type

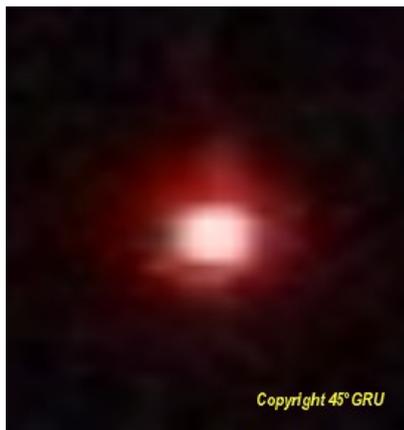


Fig. 3. Ball lightning, second type



Fig. 4. Filaments falling down in the investigated area

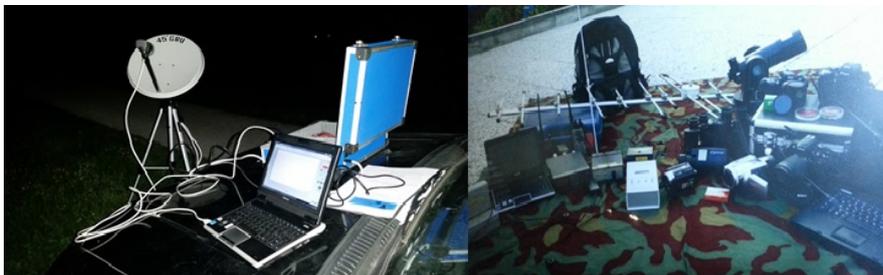


Fig. 5. Instruments used of the GRU'Group



Fig. 6. Luminous phenomenon appeared on 6 July 2013 in the investigated area of Rovigo (I)



Fig. 7. Luminous phenomenon appeared on 15 August 2015 in the investigated area of Rovigo (I)

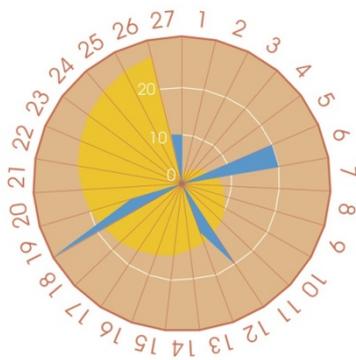


Fig. 8. Monthly distribution of the BL appearance in the investigated zone and lunar cycles



Fig. 9. Detail of the filaments collected in the Polesine area (I)