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"Terrestrial Flares" and presismic monitoring of the Radio Direction Finding network. Results of the experimentation carried out in Italy from 18 to 31 September 2021

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ABSTRACT

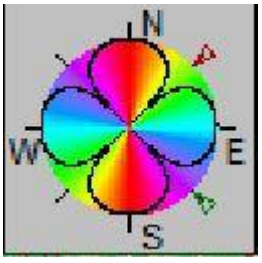
The purpose of this experimentation consists in the instrumental verification between the data detected by the Radio Direction Finding System (RDF) and the seismic events that fall in the directions of the electromagnetic signals. The analysis is based on the assumption that in the preparatory phases of a potentially destructive earthquake, electromagnetic signals are generated capable of reaching the surface and propagating in the ionosphere.

These signals can be defined as local in nature since they are emitted directly from the crustal stress zone. The emission of endogenous radiofrequencies, intercepted by the RDF System in direction and azimuth, lead to the proposal of a new term to describe these phenomena, namely "Terrestrial Glows". The result of the research confirmed that the endogenous radiofrequencies, associated with presismic phenomena, and schematically represented with colorimetric beams, anticipate the seismic event in the time window of about 6 days with the epicenter located within the obtained colorimetric bands. with the method of triangulation.

Keywords**: **RDF, Seismic Electromagnetic Precursors, SEPs, Italy, Terrestrial Flares.

1 - PREMISE

The study of electromagnetic pre-seismic emissions by the Radio Emissions Project has produced, over the years, a series of important results, thanks to the electromagnetic monitoring obtained from various detection stations located on Italian soil. [1] [2] [3] [4] [8] [19] [28] [29]. The analyzes have long since ascertained that earthquakes are preceded by electromagnetic signals capable of being picked up even at long distances [5] [6] [7]. These emissions have different characteristics, some of which can be exploited and used, through the use of specific monitoring systems, to derive the position and origin of the emission [10] [11] [12] [13]. In this study, the group of researchers used the RDF system - Radio Direction Finding, to obtain azimuth data, to highlight the direction of arrival of the electromagnetic signals, with respect to the position of the monitoring stations located in central Italy. These stations, thanks to RDF technology, are able to identify the exact position of the natural radio transmitter on the earth's crust, indicating the azimuth of origin, through a colorimetric scale, in which each color or shade of color indicates a precise azimuth. (in degrees), of provenance [14] [15] [16] [17] [18] [20] [21] [22] [23] [25].



RDF Azimut. On the side (Image 1) you can see the colorimetric compass of the RDF system, developed by the Radio Emissions Project, it provides azimuth indications on the signals received by the Italian RDF stations, considered in this study. For example, in red we can observe the azimuth 90-180 degrees (North-South), in turquoise the signals with azimuth (90-270 degrees (East-West). Each color and each shade of color indicates a precise azimuth of origin of the electromagnetic signals. The maps considered in this study give colorimetric indications relating to these azimuths, making it clear from which direction the recorded electromagnetic signals come from.

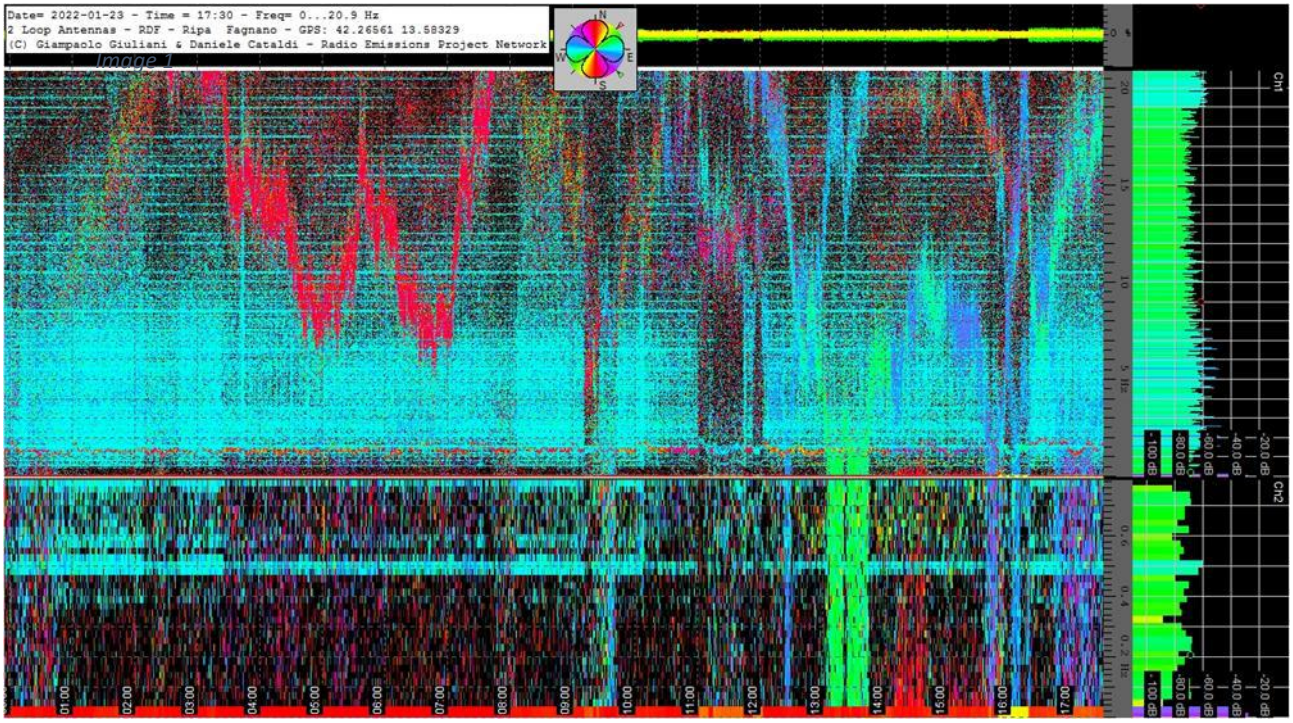


Image 2 – Dynamic spectrogram generated by one of the monitoring stations of the RDF network (Ripa-Fagnano, L'Aquila, Italy). It highlights a myriad of signals from multiple areas of Planet Earth. In this case, the red signals come from the N-S axis with respect to the monitoring station, the turquoise signals come from the peaceful area of the planet, while the green ones come from the NE-SW axis. Each color highlights a direction where these signals are generated (direction of arrival). On the Cartesian axis of the ordinates we have the temporal context in UTC and on the Cartesian axis of the abscissa we have the electromagnetic frequency in Hz. Credits: Radio Emissions Project.

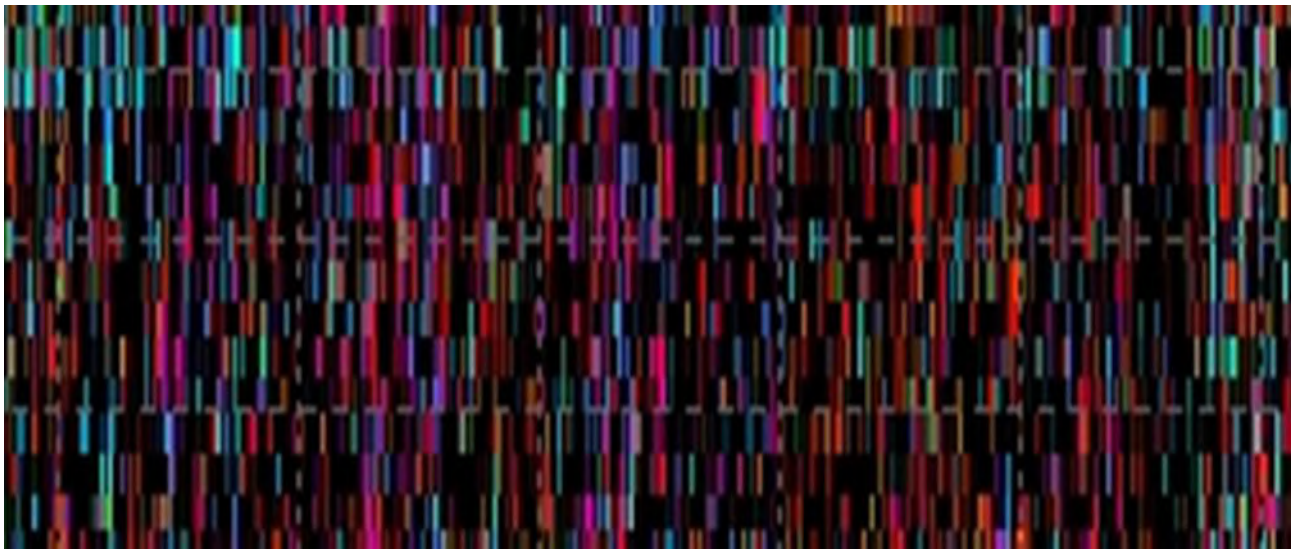


Image 3 – Magnification of Image 2 (Dynamic Spectrogram), where the natural geomagnetic background is highlighted. As is evident, it is constantly perturbed by signals coming from every direction, this indicates the presence of multiple sources of emissions located on every part of the earth's surface. The signals are of natural origin. On the Cartesian axis of the ordinates we have the time context in UTC and on the Cartesian axis of the abscissa we have the electromagnetic frequency in Hz. Credits: Radio Emis-sions Project.

This investigation and experimentation work served to understand the effectiveness of the RDF network, developed by the Radio Emissions Project, in relation to its ability to identify pre-seismic (electromagnetic) emissions from the Italian territory, as already tested. in the past in other areas of the globe [10].

2.0 - METHOD AND DATA

Starting from 18 September 2021, the group of researchers engaged in the study and experimentation of the RDF network - Radio Direction Finding, began to analyze the data on electromagnetic monitoring from the Italian territory by means of the RDF stations, and to superimpose such data of this electromagnetic detection with those of the seismic type. This monitoring then ended on 27 September 2021 (for a total of 10 days considered). The electromagnetic monitoring data (dynamic spectrograms) considered in this study are those recorded around 12:00 UTC every day, starting from 18 September 2021, on which the seismic data, coming from the network, were then superimposed. 'INGV - National Institute of Geophysics and Volcanology with M2 + magnitude. The merger of this information (electromagnetic data and position of the earthquakes that occurred on the Italian territory) made it possible to highlight whether there were direct relationships between the monitoring data of the RDF network and the earthquakes that occurred in the Italian territory (low intensity earthquakes). The seismic data considered are those of the last 7 days compared to the data recorded by the RDF network (which instead start from 18 September 2021), and with magnitude M2 +, located on Italian soil.

The survey stations are as follows:

North of Italy:

1. Stazione RDF di Pontedera, Pisa, Italia.

Center of Italy:

2. RDF Station ofi Lariano, Roma, Italy (1)
3. RDF Station of Lariano, Roma, Italy (2)
4. RDF Station of Ripa-Fagnano, L'Aquila, Italy.

The total of the survey stations is 4, mostly located in Central Italy. The instrumental investigation immediately identified a series of electromagnetic signals that appeared on the dynamic spectrograms, produced by the RDF stations, then followed by a series of earthquakes that it was possible to identify on the map of the Italian territory.

The superposition of these data allowed us to understand whether or not the electromagnetic signals were correlated with the appearance of earthquakes, albeit not intense.

2.1 - THE RELATION

The superimposition of these data allowed to highlight a clear relationship between the colored azimuth, signaled by the RDF monitoring network and the presence of seismic hypocenters, located along a specific geographical area (in this case, the Italian one). liana). The radio emissions that appeared before the earthquakes occurred, indicated a precise direction of arrival of the electromagnetic signals, identified and processed by the detection system. Along these directions (azimuth) of arrival of the radio signals, earthquakes appeared, albeit of low intensity. The radio emissions then continued for several hours until the geographical area indicated no longer presented any earthquake.

This shows that the electromagnetic emissions of crustal origin involve the entire Italian territory, not only before an earthquake occurs there, the radio emissions confirm the increase of a certain degree of mechanical stress within the areas most at seismic risk, i.e. where energy accumulates constantly, and it is there that most of the electromagnetic signals come from.

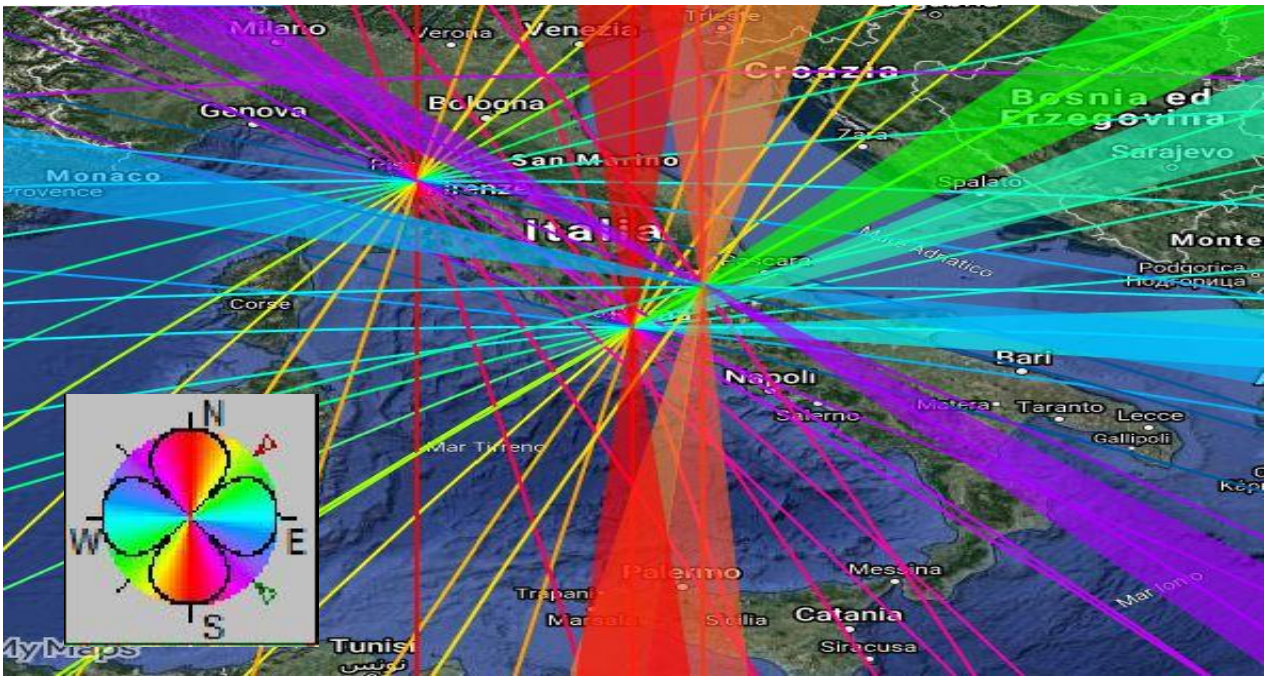


Fig. 1 – Colorimetric map of the Italian RDF network, developed by the Radio Emissions Project. It highlights the presence of signals recorded on 18 September 2021 (colored beams). The colors indicate the azimuth of origin of the signals, with respect to the detection station of the same. Credits: Radio Emissions Project; Google Maps.

The emissions of Terrestrial Flares, coming from a specific crustal area, are believed to be associated with tectonic stress areas, with accumulation of energy, such as to emit radio frequencies, generated by the stress of the minerals placed under stress [30] [31] [32] [33].

In fact, these signals propagate in the ionosphere and can reach (based on their frequency and intensity) even long distances, being identified and recorded by the RDF station..

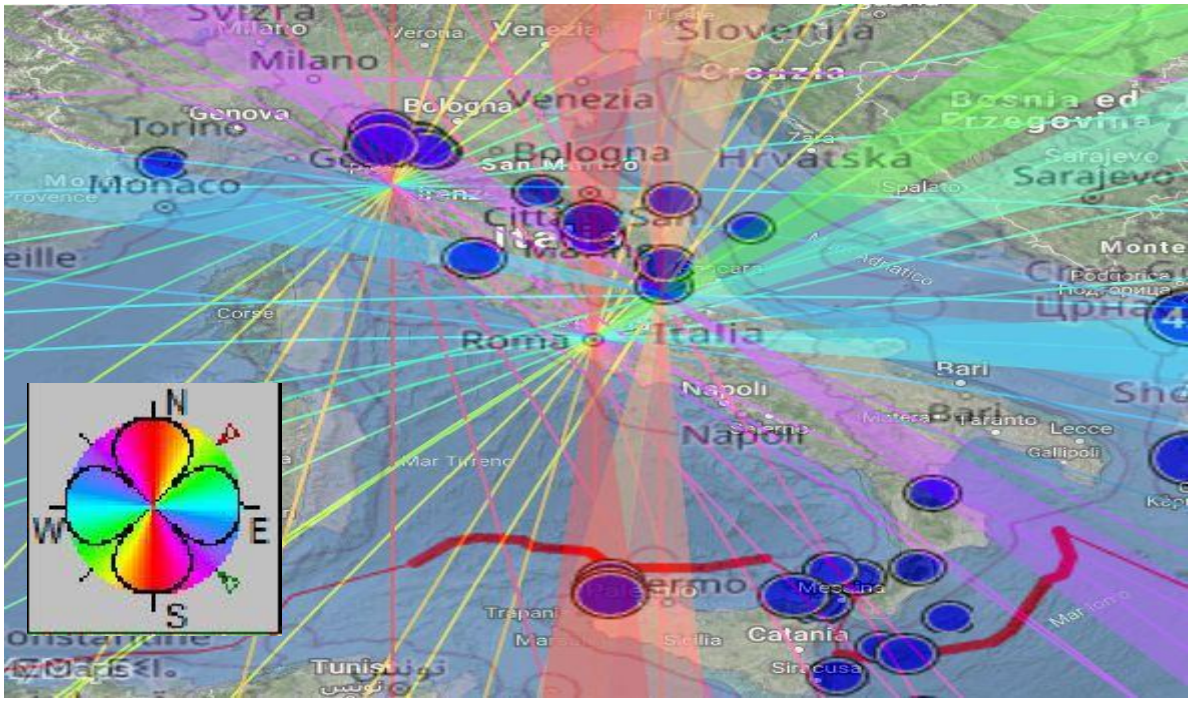


Fig. 2 – Colorimetric map of the Italian RDF network, developed by the Radio Emissions Project. It highlights the presence of signals recorded on 18 September 2021 (colored beams). The colors indicate the azimuth of origin of the signals, with respect to the detection station of the same, with overlapping the seismic data (epicenters) of earthquakes with magnitude M2 +. Credits: Radio Emissions Project; Google Maps; INGV.

The visible colorimetric maps (Fig. 1 and Fig. 3) also provide us with another interesting data: At the intersection of the various colored signals, the RDF network identifies "triangulations", that is, it suggests that in those points the signals they are identified by several stations at the same time, and this increases in motion proportional to the number of such stations, the precision of identification of the geographical area within which these (electro-magnetic) signals are generated. Since these emissions normally propagate isotropically, these signals, which are quite intense) are perceptible from any point of the globe.

The RDF network is therefore able to record them and identify the azimuth of origin with respect to the position of the single station.

When this happens, that is, when these signals are identified by multiple stations, it is possible to identify the geographical area where these signals are emitted, with an error of a few degrees.

This error is smaller (tenths or hundredths of a degree) if the emission is located at a close distance from the detection station, while it can increase if the detection station is further away. This depends on the attenuation of the signal due for example to physical obstacles which decrease the intensity of the signal emitted, or due to the "fading" generated for example by cloudy fronts or weather conditions, especially if between 'natural transmitter and the survey station there are considerable distances (10,000 - 20,000 km) [24] [25] [26].

Below are the other colorimetric maps associated with the seismic evidence of the Italian territory:

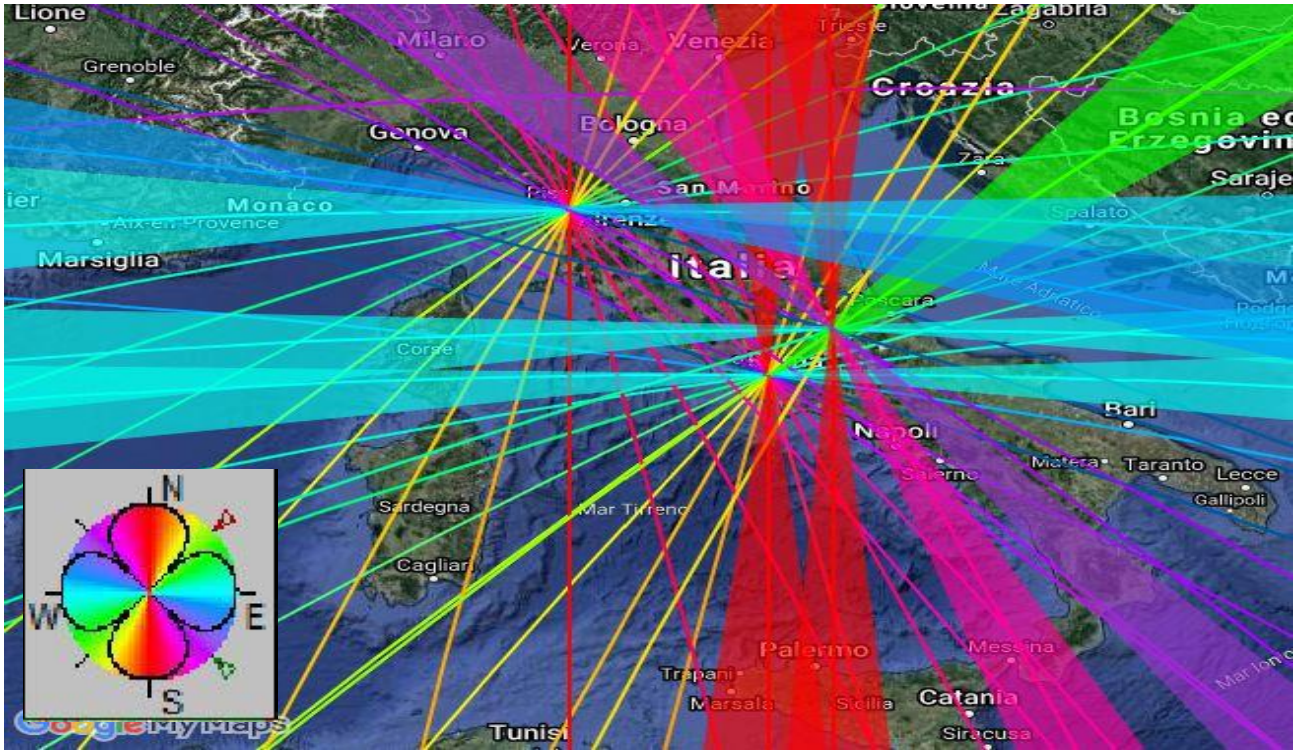


Fig. 3 – Colorimetric map of the Italian RDF network, developed by the Radio Emissions Project. It highlights the presence of signals recorded on 19 September 2021 (colored beams). The colors indicate the azimuth of origin of the signals, with respect to the detection station of the same. Credits: Radio Emissions Project; Google Maps.

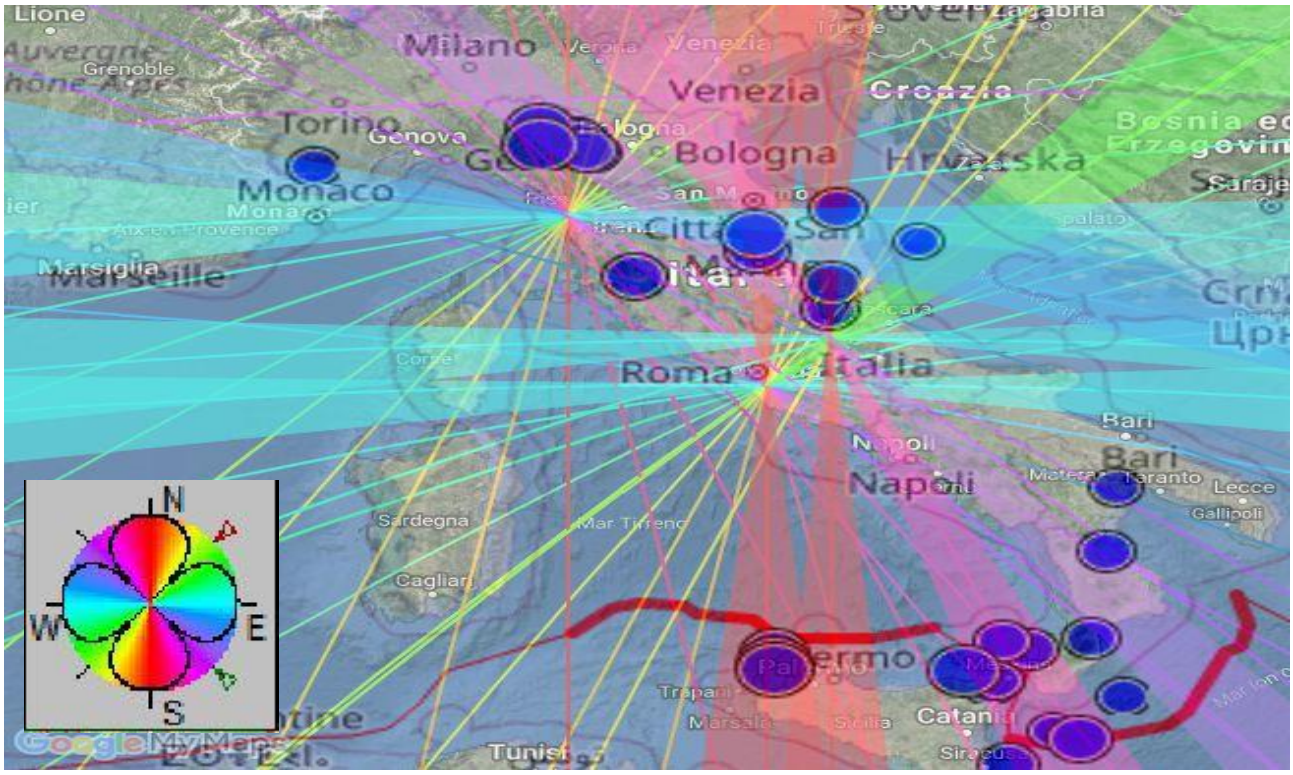


Fig. 4 – Colorimetric map of the Italian RDF network, developed by the Radio Emissions Project. It highlights the presence of signals recorded on 19 September 2021 (colored beams). The colors indicate the azimuth of origin of the signals, with respect to the detection station of the same, with overlapping the seismic data (epicenters) of earthquakes with magnitude M2 +. Credits: Radio Emissions Project; Google Maps; INGV.

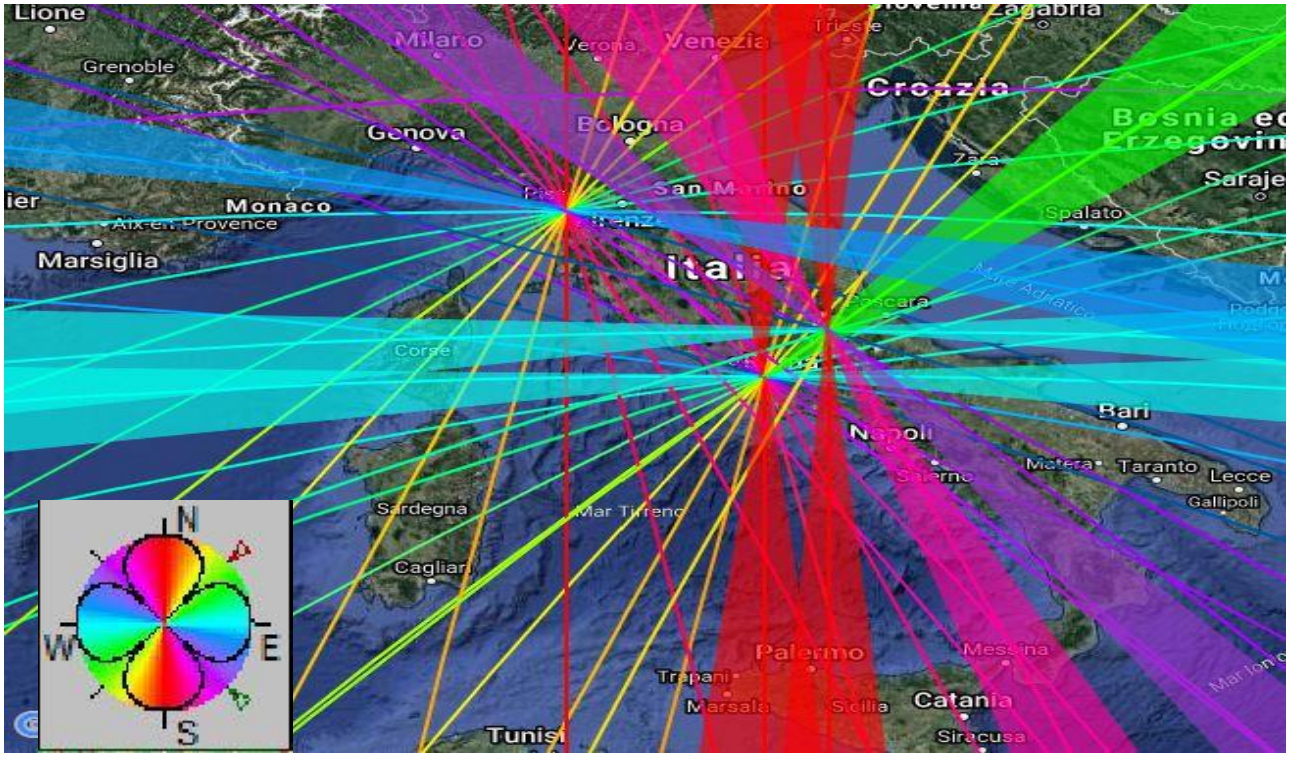


Fig. 5 – Colorimetric map of the Italian RDF network, developed by the Radio Emissions Project. It highlights the presence of signals recorded on 20 September 2021 (colored beams). The colors indicate the azimuth of origin of the signals, with respect to the detection station of the same. Credits: Radio Emissions Project; Google Maps.

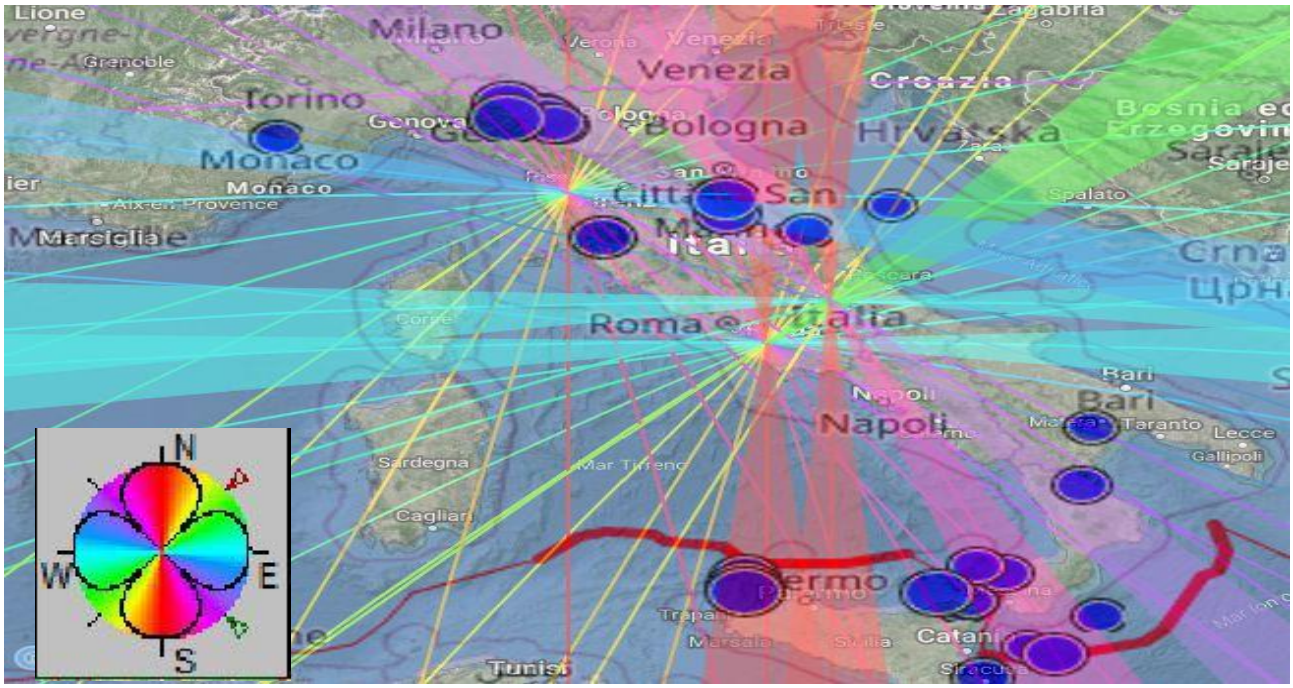


Fig. 6 – Colorimetric map of the Italian RDF network, developed by the Radio Emissions Project. It highlights the presence of signals recorded on 20 September 2021 (colored beams). The colors indicate the azimuth of origin of the signals, with respect to the detection station of the same, with overlapping the seismic data (epicenters) of earthquakes with magnitude M2 +. Credits: Radio Emissions Project; Google Maps; INGV.

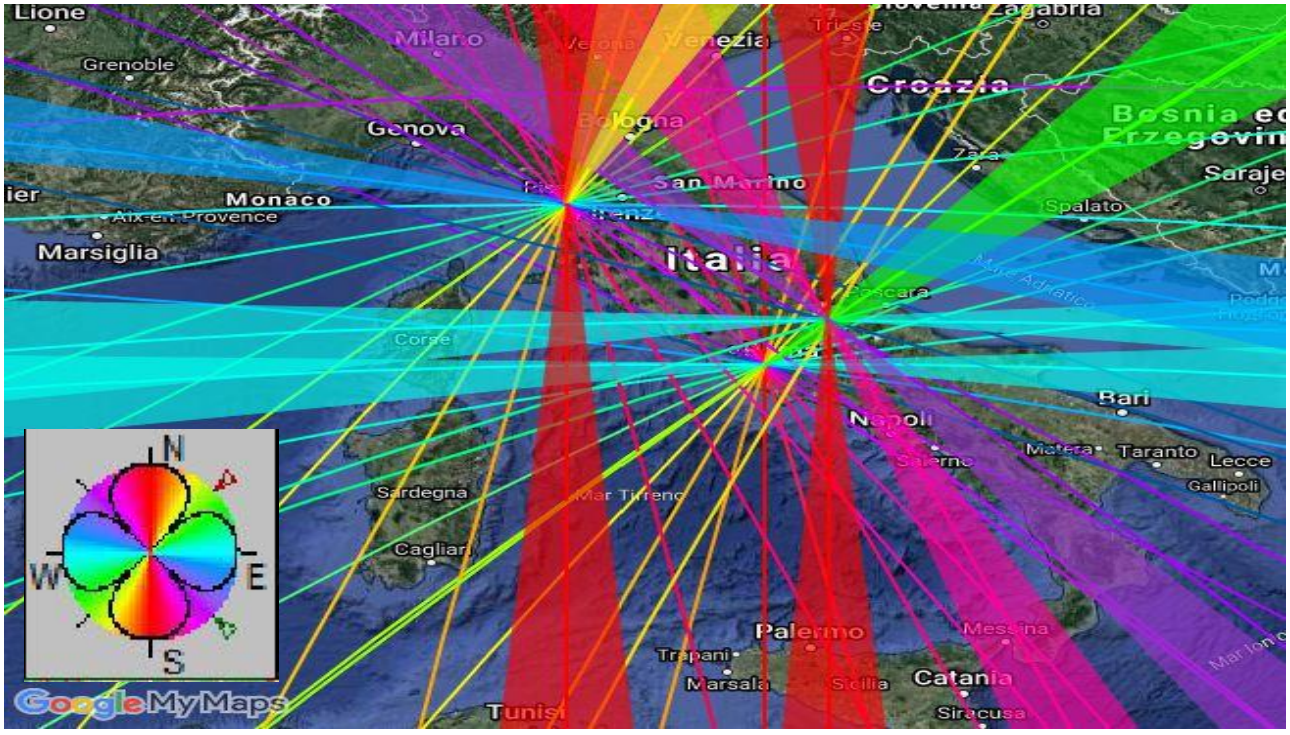


Fig. 7 – Colorimetric map of the Italian RDF network, developed by the Radio Emissions Project. It highlights the presence of signals recorded on 21 September 2021 (colored beams). The colors indicate the azimuth of origin of the signals, with respect to the detection station of the same. Credits: Radio Emissions Project; Google Maps.

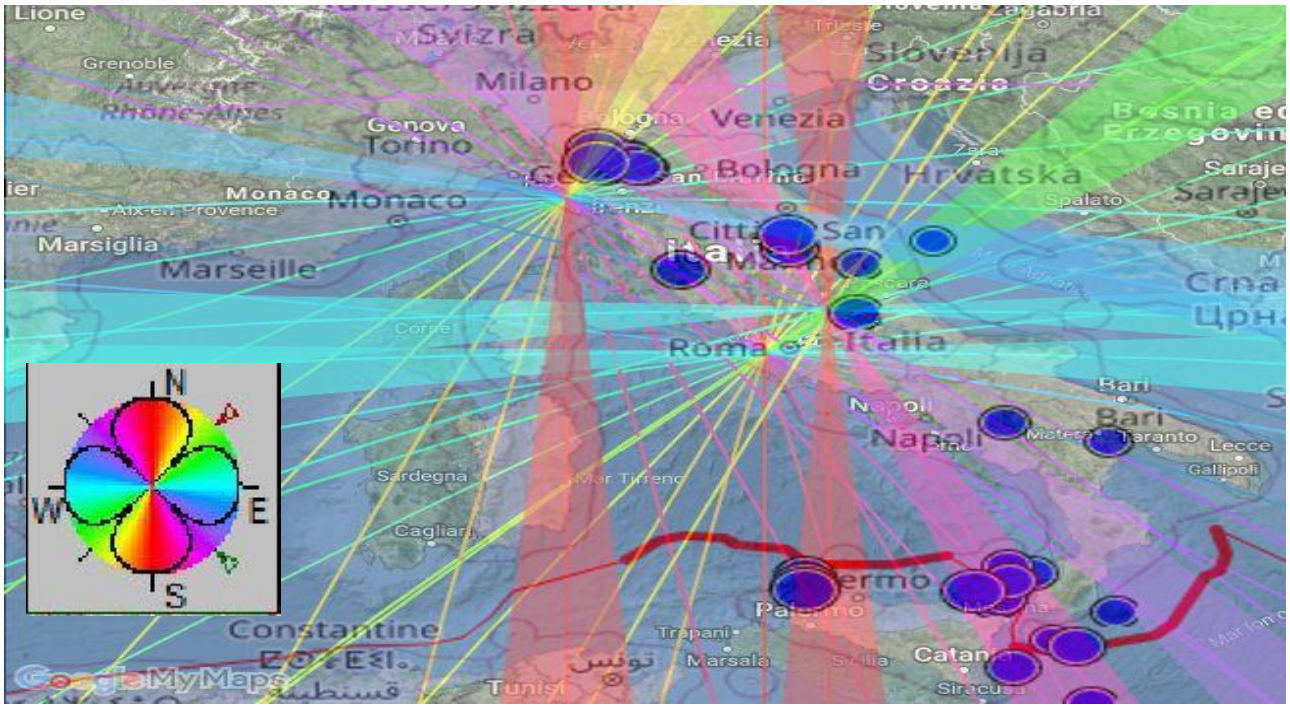


Fig. 8 – Colorimetric map of the Italian RDF network, developed by the Radio Emissions Project. It highlights the presence of signals recorded on 21 September 2021 (colored beams). The colors indicate the azimuth of origin of the signals, with respect to the detection station of the same, with overlapping the seismic data (epicenters) of earthquakes with magnitude M2 +. Credits: Radio Emissions Project; Google Maps; INGV.

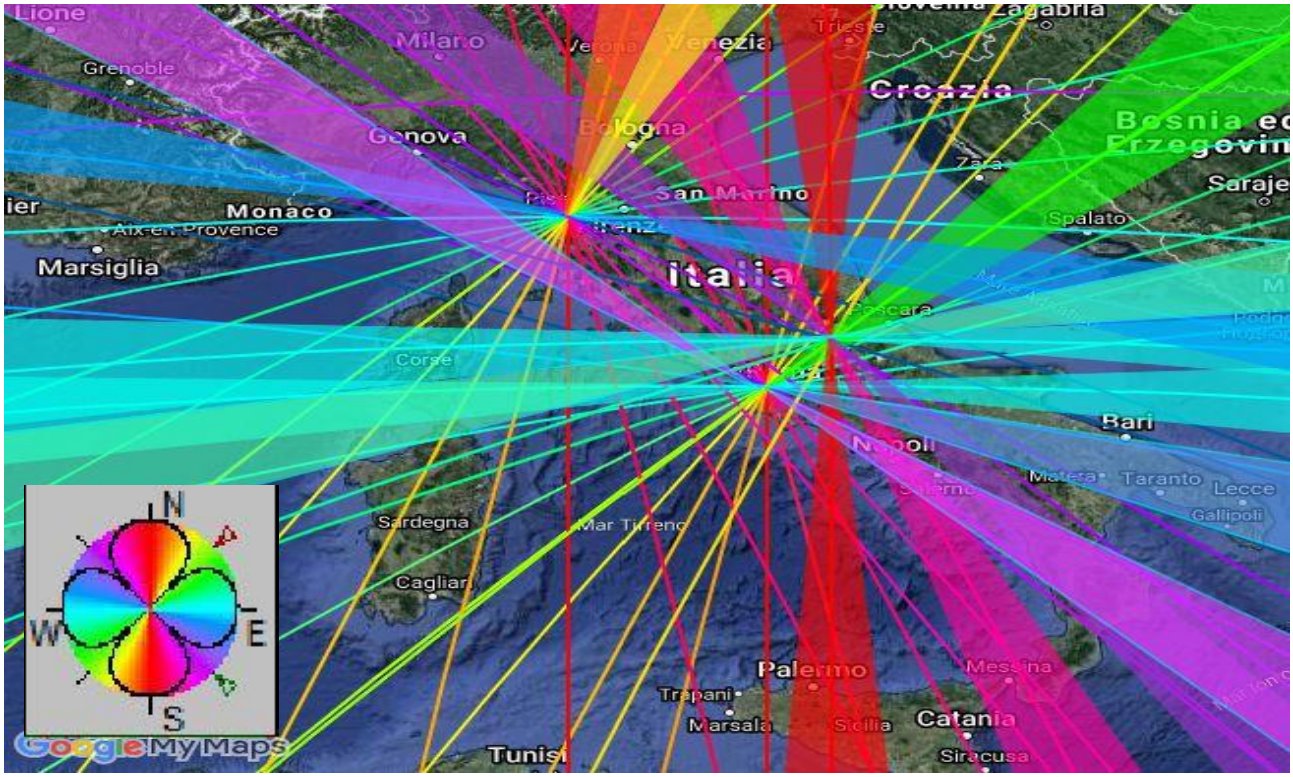


Fig. 9 – Colorimetric map of the Italian RDF network, developed by the Radio Emissions Project. It highlights the presence of signals recorded on 22 September 2021 (colored beams). The colors indicate the azimuth of origin of the signals, with respect to the detection station of the same. Credits: Radio Emissions Project; Google Maps.

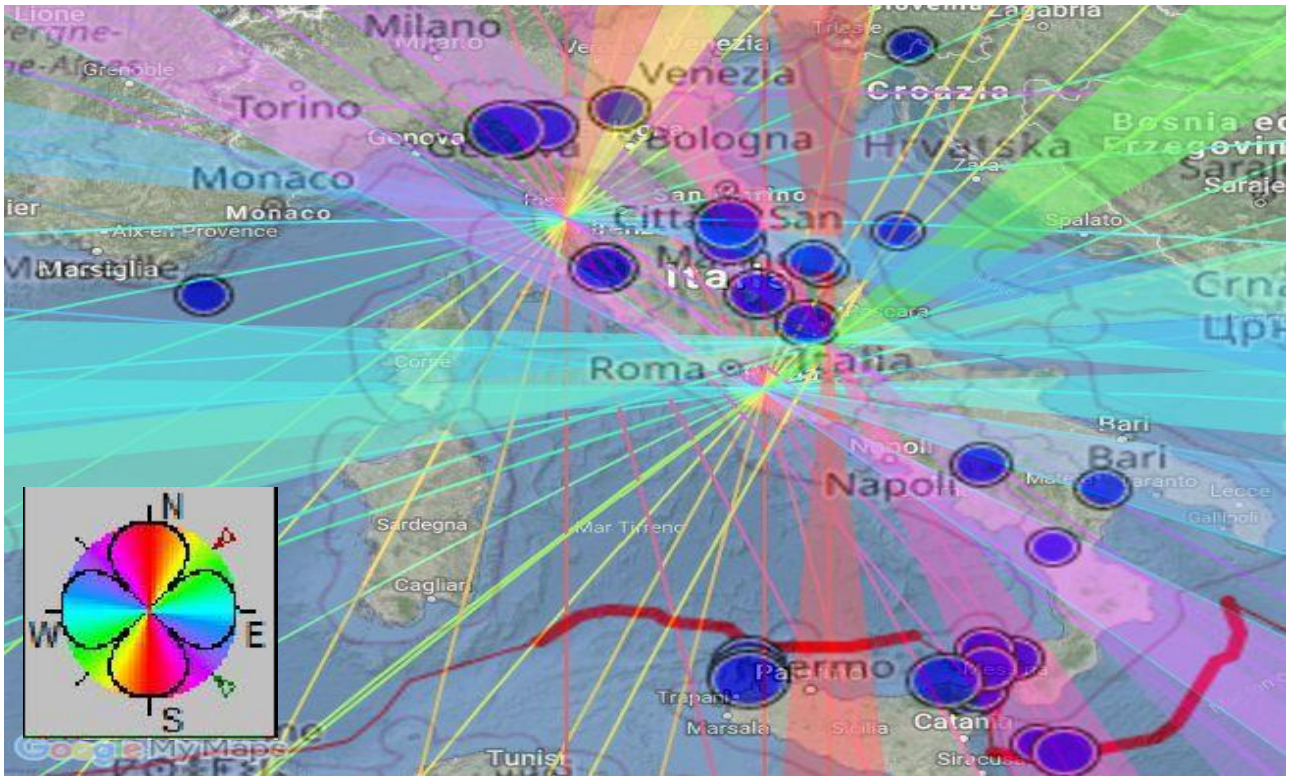


Fig. 10 – Colorimetric map of the Italian RDF network, developed by the Radio Emissions Project. It highlights the presence of signals recorded on 22 September 2021 (colored beams). The colors indicate the azimuth of origin of the signals, with respect to the detection station of the same, with overlapping the seismic data (epicenters) of earthquakes with magnitude M2 +. Credits: Radio Emissions Project; Google Maps; INGV.

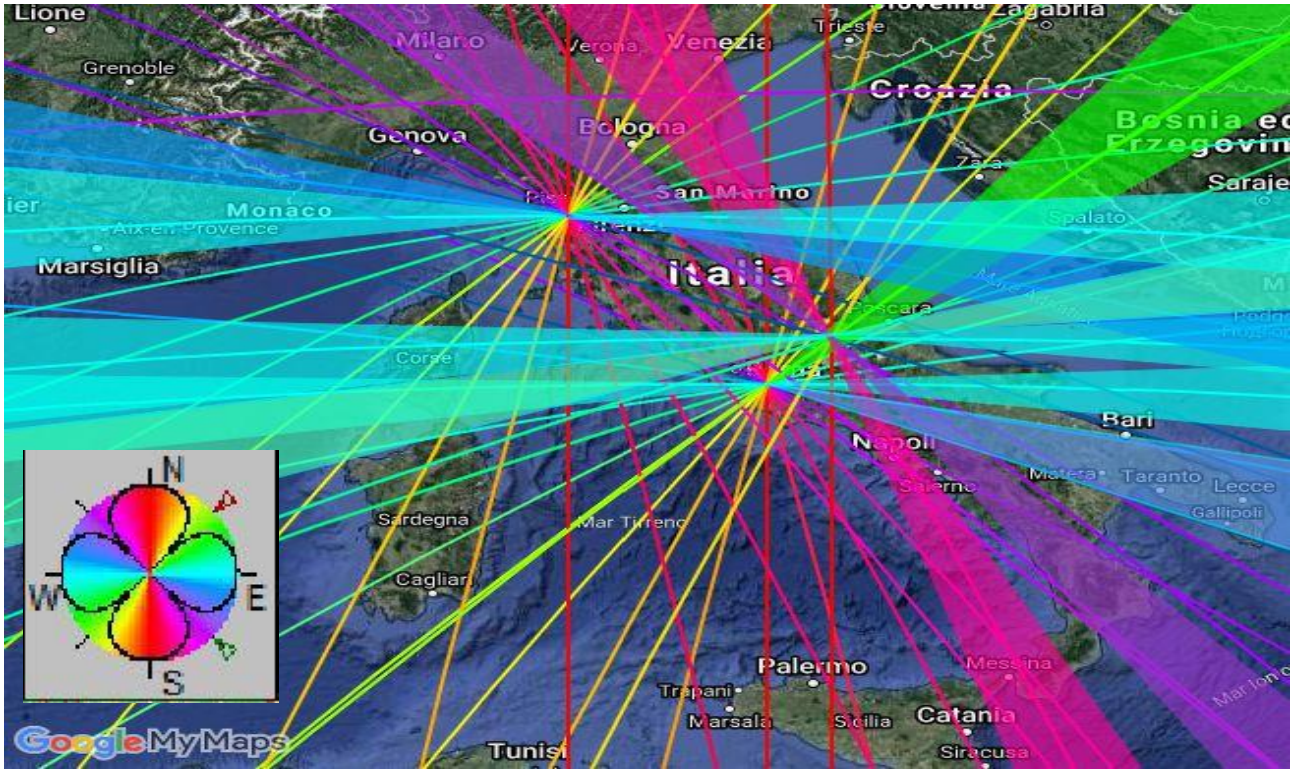
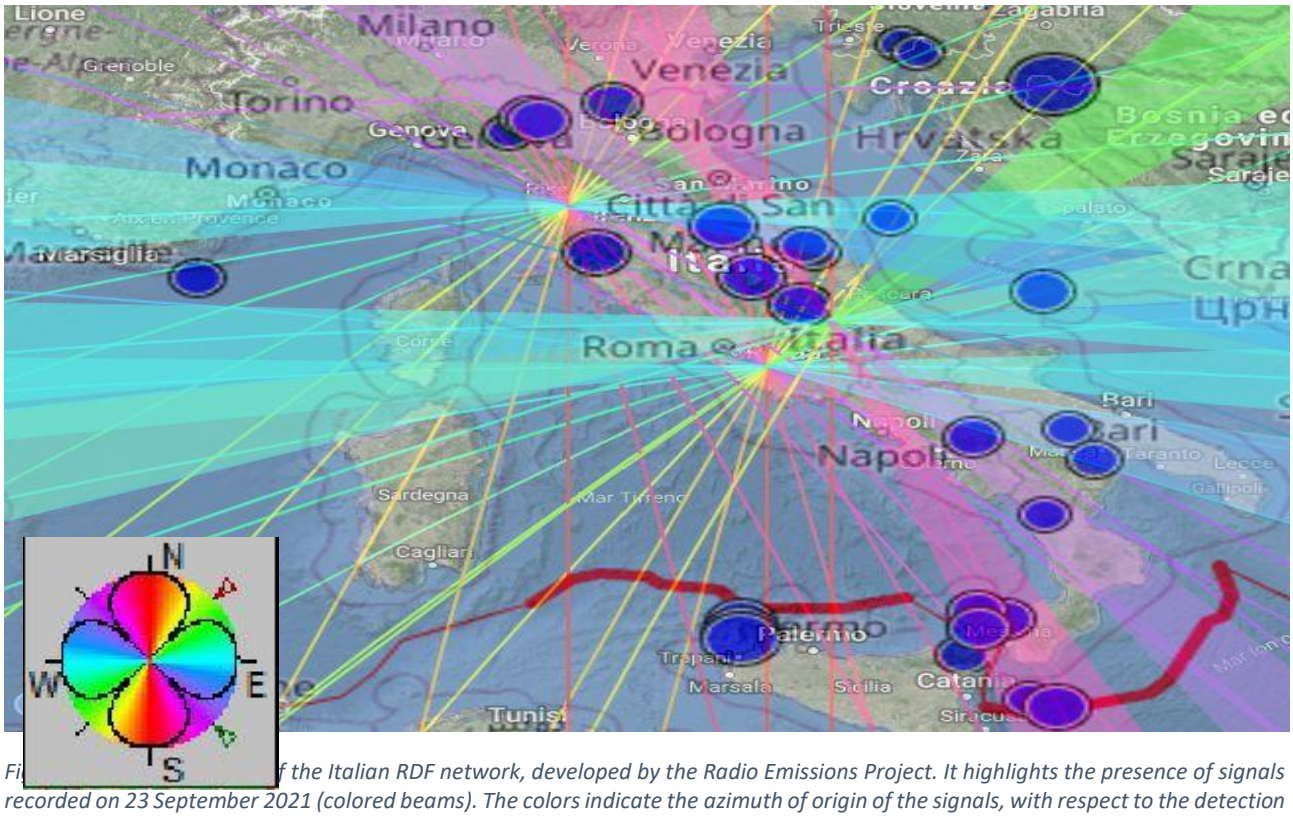


Fig. 11 – Colorimetric map of the Italian RDF network, developed by the Radio Emissions Project. It highlights the presence of signals recorded on 23 September 2021 (colored beams). The colors indicate the azimuth of origin of the signals, with respect to the detection station of the same. Credits: Radio Emissions Project; Google Maps.



Fi f the Italian RDF network, developed by the Radio Emissions Project. It highlights the presence of signals recorded on 23 September 2021 (colored beams). The colors indicate the azimuth of origin of the signals, with respect to the detection station of the same, with overlapping the seismic data (epicenters) of earthquakes with magnitude M2 +. Credits: Radio Emissions Project; Google Maps; INGV.

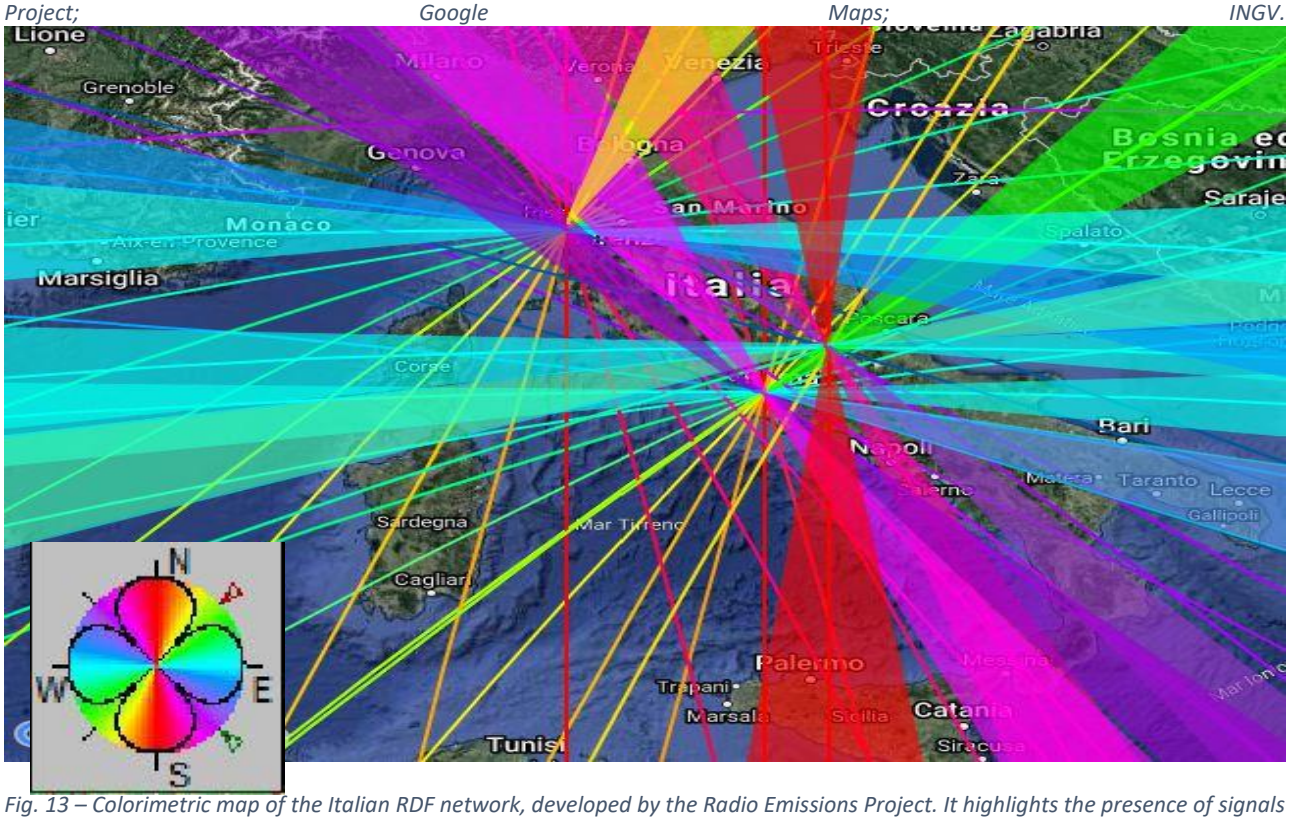


Fig. 13 – Colorimetric map of the Italian RDF network, developed by the Radio Emissions Project. It highlights the presence of signals recorded on 24 September 2021 (colored beams). The colors indicate the azimuth of origin of the signals, with respect to the detection station of the same. Credits: Radio Emissions Project; Google Maps.

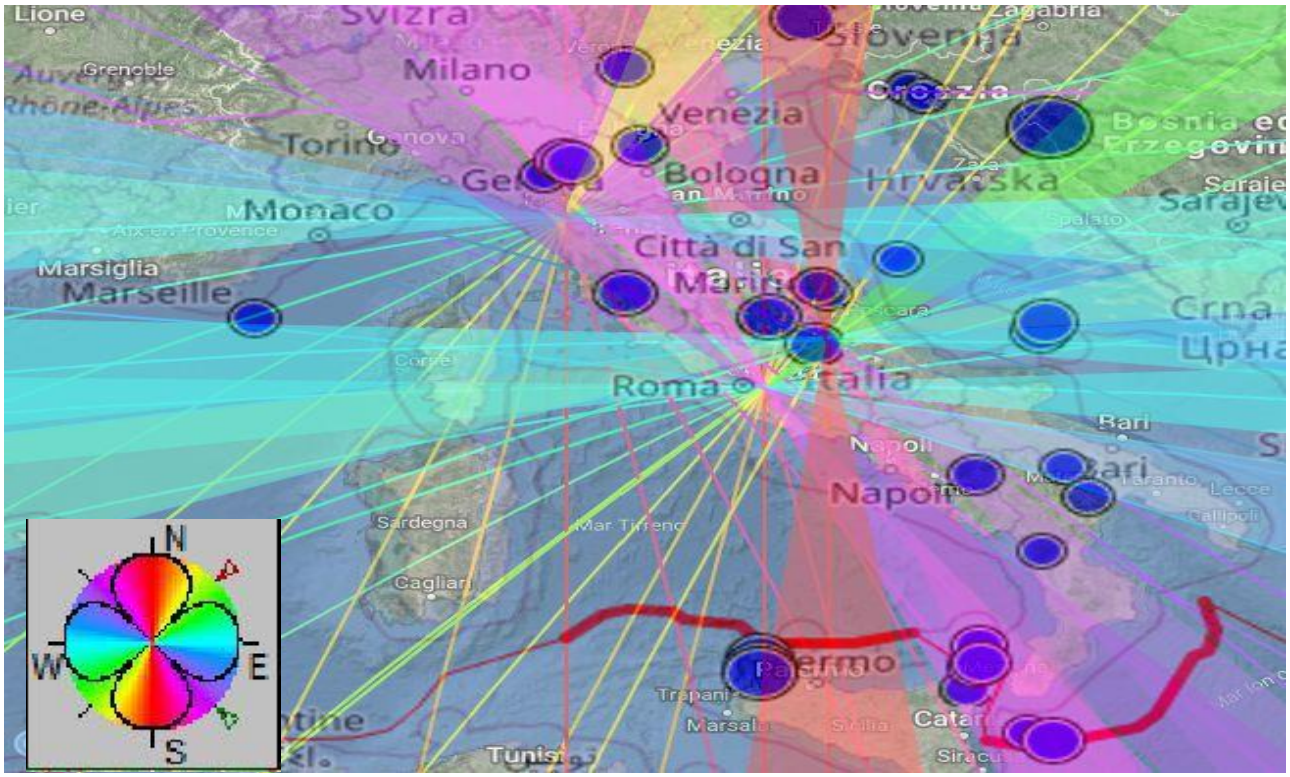


Fig. 14 – Colorimetric map of the Italian RDF network, developed by the Radio Emissions Project. It highlights the presence of signals recorded on 24 September 2021 (colored beams). The colors indicate the azimuth of origin of the signals, with respect to the detection station of the same, with overlapping the seismic data (epicenters) of earthquakes with magnitude M2 +. Credits: Radio Emissions Project; Google Maps; INGV.

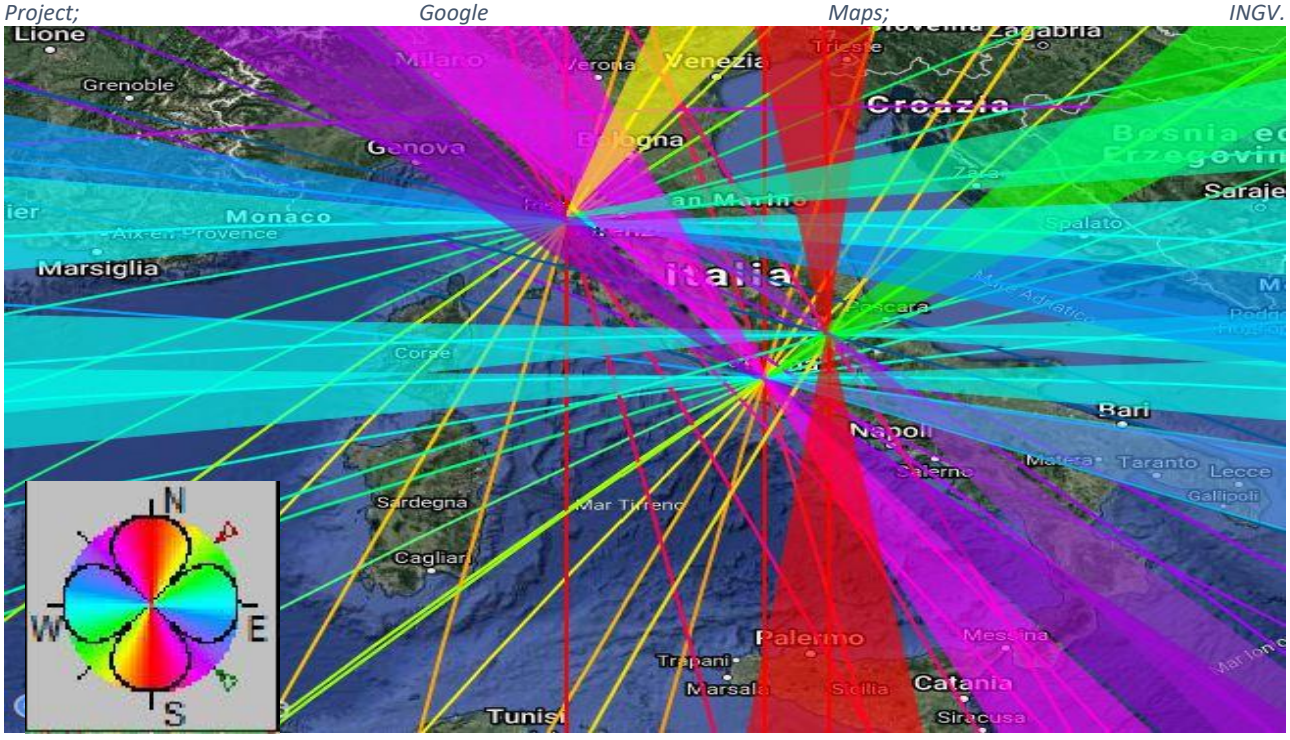


Fig. 15 – Colorimetric map of the Italian RDF network, developed by the Radio Emissions Project. It highlights the presence of signals recorded on 25 September 2021 (colored beams). The colors indicate the azimuth of origin of the signals, with respect to the detection station of the same. Credits: Radio Emissions Project; Google Maps.

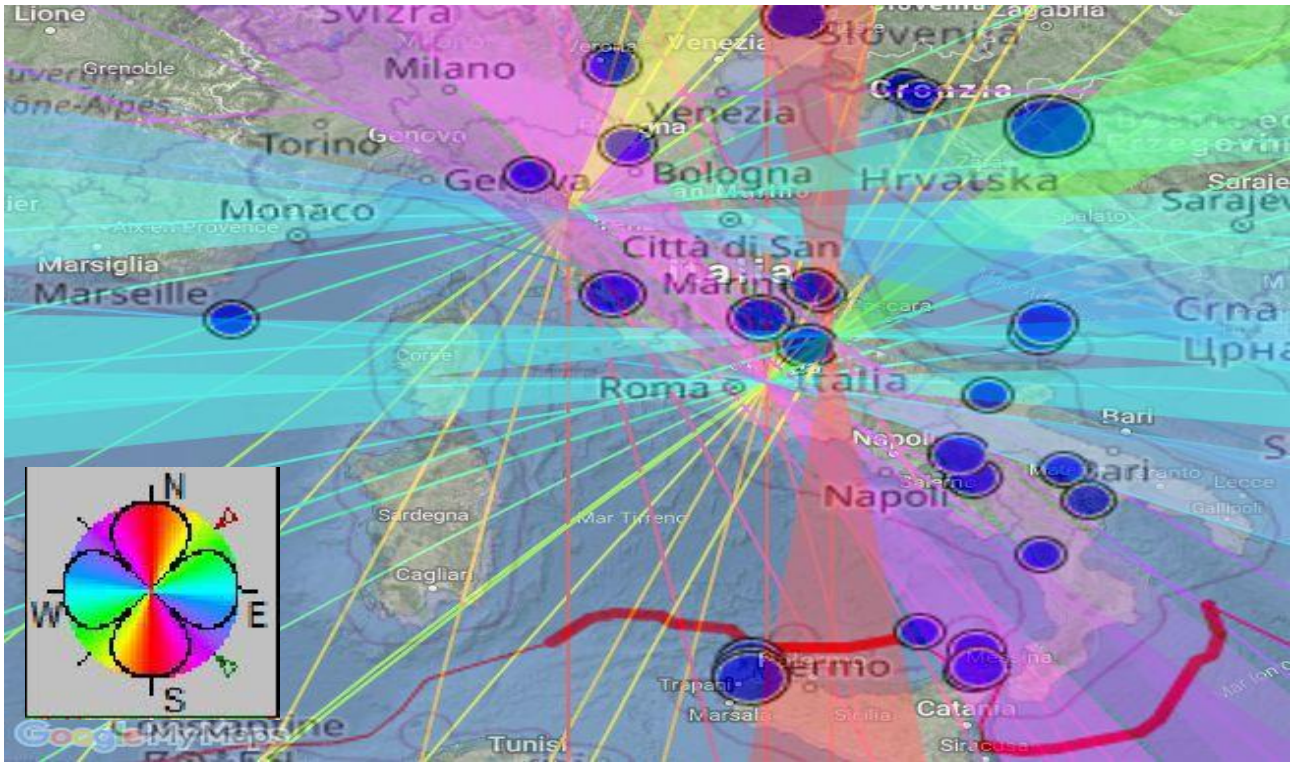


Fig. 16 – Colorimetric map of the Italian RDF network, developed by the Radio Emissions Project. It highlights the presence of signals recorded on 25 September 2021 (colored beams). The colors indicate the azimuth of origin of the signals, with respect to the detection station of the same, with overlapping the seismic data (epicenters) of earthquakes with magnitude M2 +. Credits: Radio Emissions Project; Google Maps; INGV.

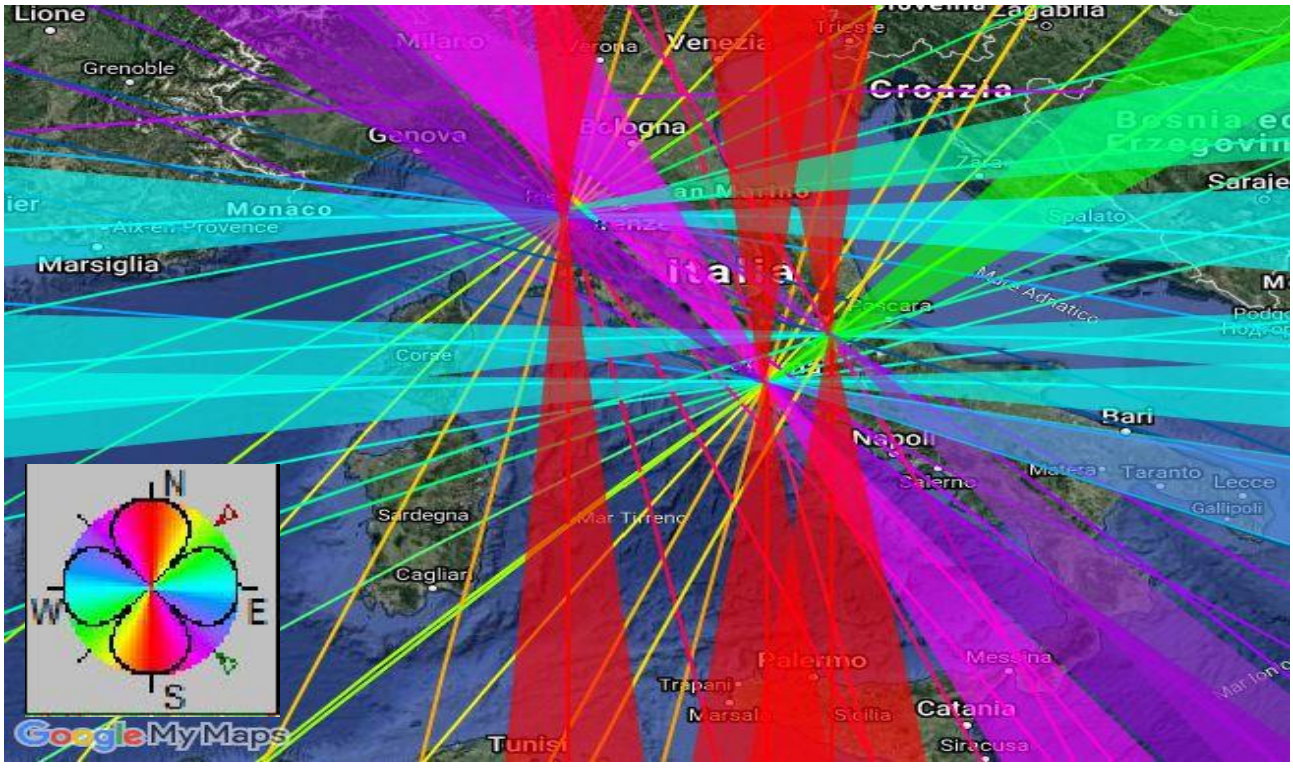


Fig. 17 – Colorimetric map of the Italian RDF network, developed by the Radio Emissions Project. It highlights the presence of signals recorded on September 26, 2021 (colored beams). The colors indicate the azimuth of origin of the signals, with respect to the detection station of the same. Credits: Radio Emissions Project; Google Maps.

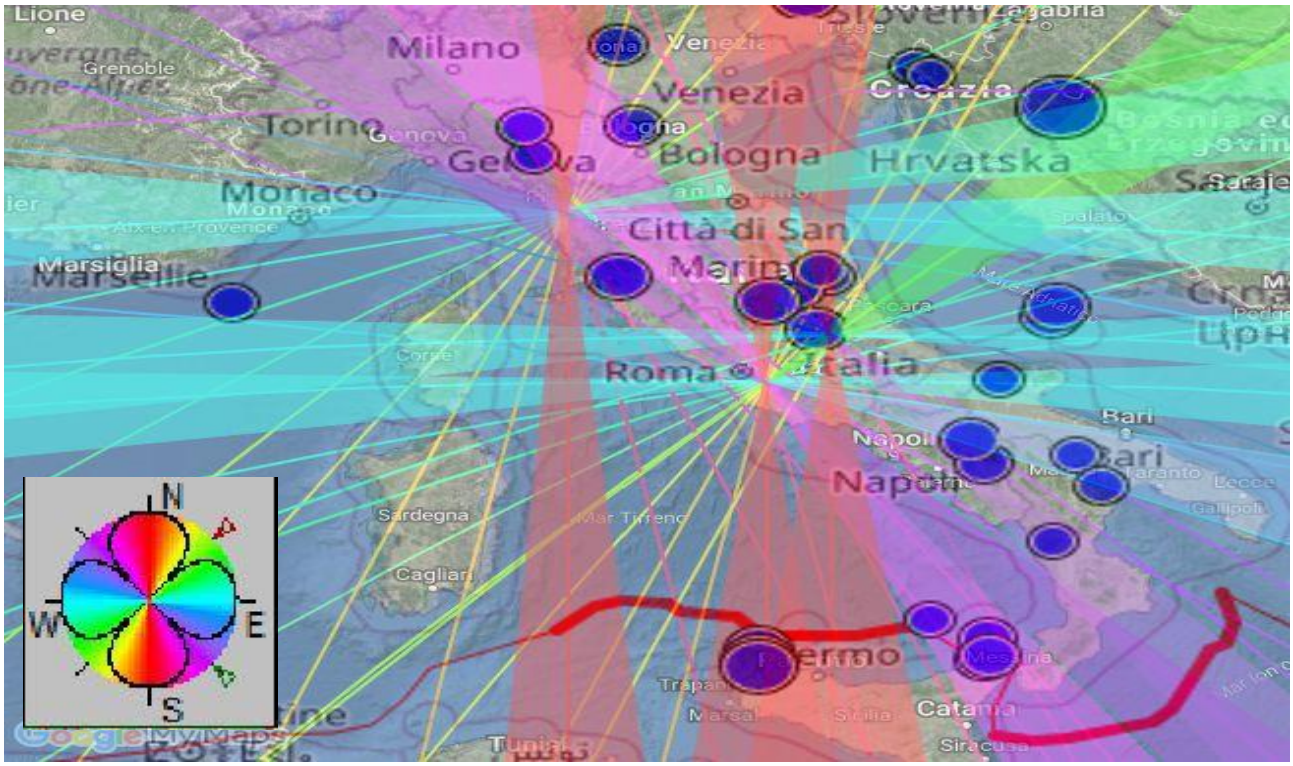


Fig. 18 – Colorimetric map of the Italian RDF network, developed by the Radio Emissions Project. It highlights the presence of signals recorded on September 26, 2021 (colored beams). The colors indicate the azimuth of origin of the signals, with respect to the detection station of the same, with overlapping the seismic data (epicenters) of earthquakes with magnitude M2 +. Credits: Radio Emissions Project; Google Maps; INGV.

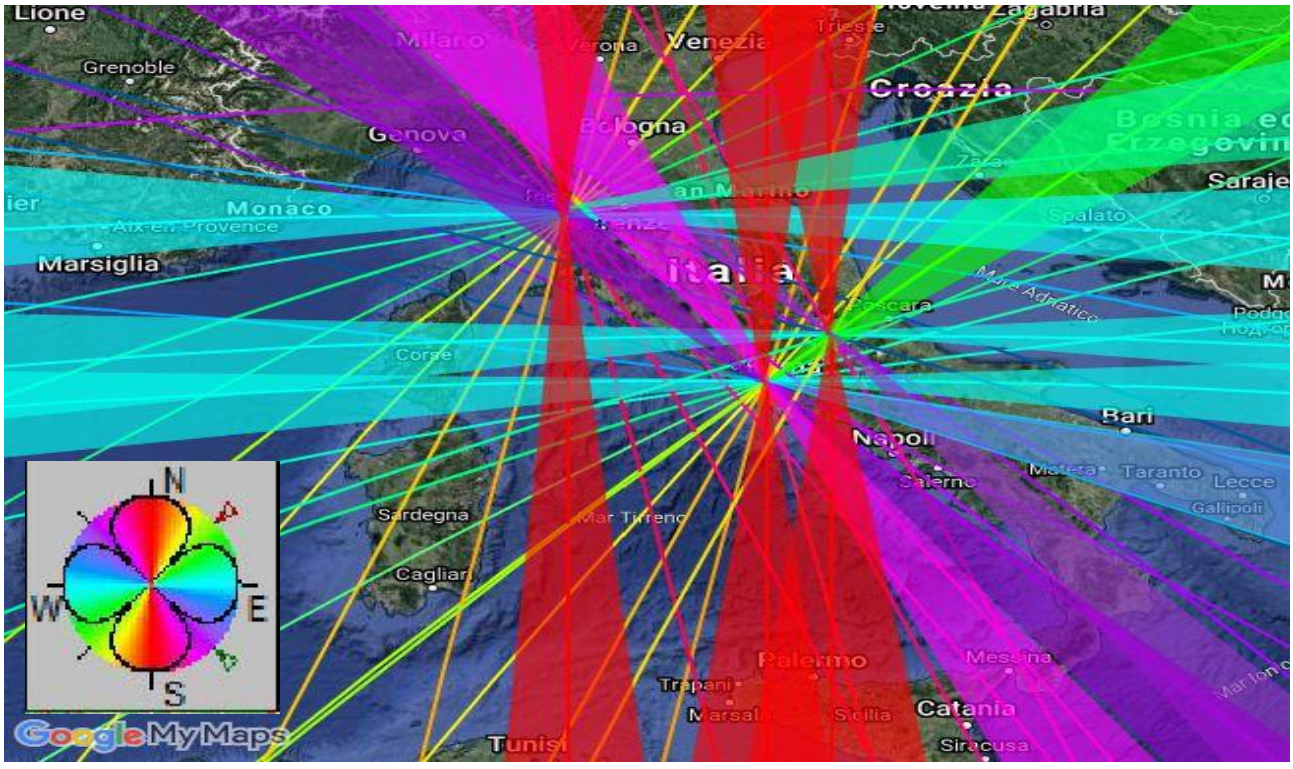


Fig. 19 – Colorimetric map of the Italian RDF network, developed by the Radio Emissions Project. It highlights the presence of signals recorded on 27 September 2021 (colored beams). The colors indicate the azimuth of origin of the signals, with respect to the detection station of the same. Credits: Radio Emissions Project; Google Maps.

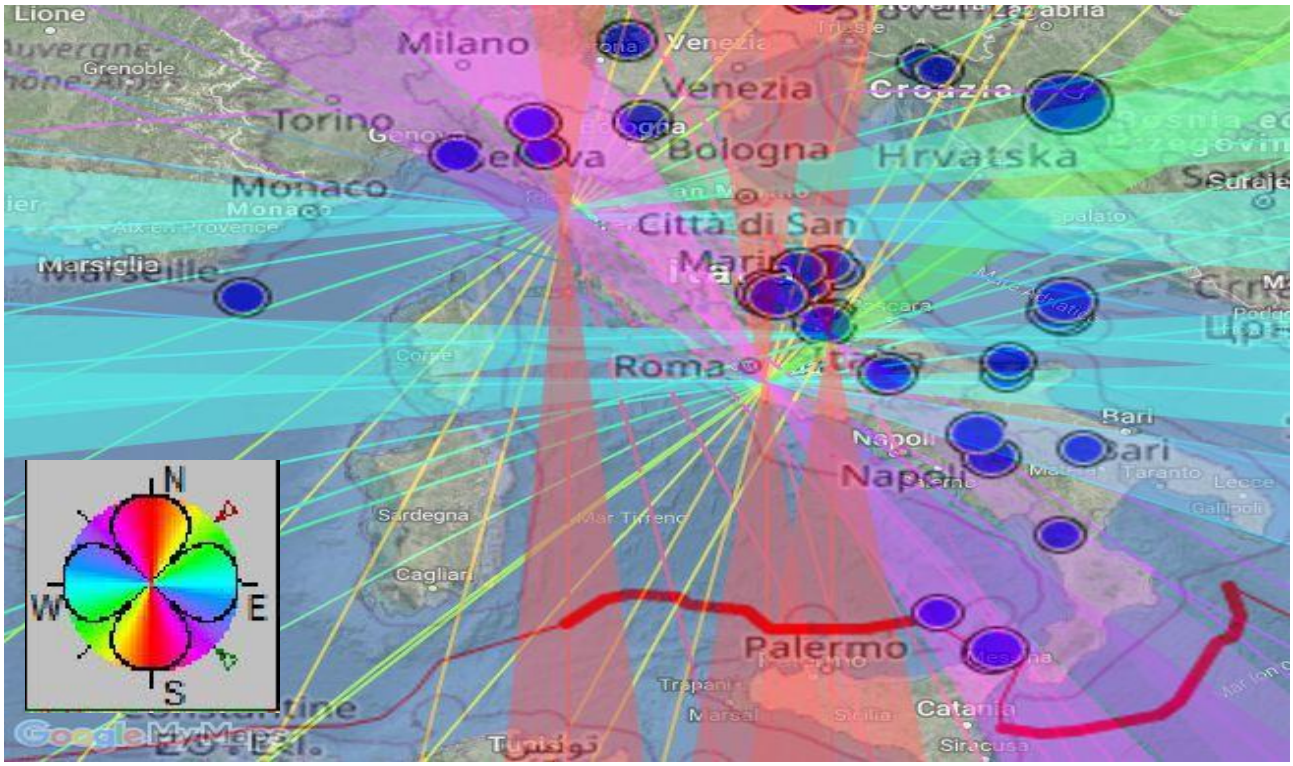


Fig. 20 – Colorimetric map of the Italian RDF network, developed by the Radio Emissions Project. It highlights the presence of signals recorded on 27 September 2021 (colored beams). The colors indicate the azimuth of origin of the signals, with respect to the detection station of the same, with overlapping the seismic data (epicenters) of earthquakes with magnitude M2 +. Credits: Radio Emissions Project; Google Maps; INGV.

3.0 - DISCUSSION

For the first time it is possible to speak, in this field of research, of a new conception of the earth's crust; understood as a planetary body, it is covered by numerous electromagnetic carriers of a natural type, a sort of terrestrial flares (electromagnetic type), which characterize the entire globe (Fig. 21). Radio emissions can also be detected at a considerable distance from the monitoring station and often precede seismic events on a global scale, [1] [3] [5] [6] [7] [9]. These signals are generated by the tectonic stress that accumulates energy and continuously emits radio frequencies that constantly perturb the natural geomagnetic background, characterized by a myriad of radio signals coming from every direction (Image 3).

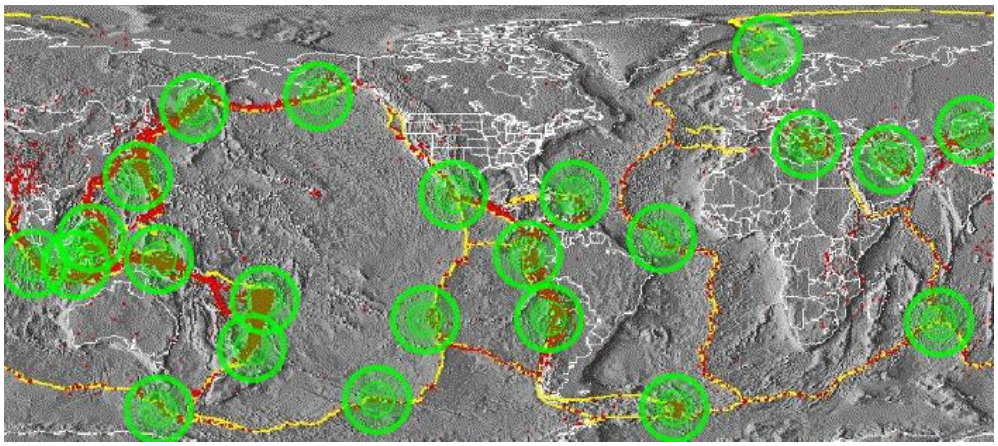


Fig. 21 – Earth tectonics, it highlights the areas of greatest tectonic stress (in yellow), and the main localization of earthquakes (in red). The anthropogenic carriers located in areas with greater tectonic stress, from where electromagnetic signals emanate, are

highlighted in green. In reality, these emissions cover all the faults located on the earth's surface. Therefore in this new vision the terrestrial globe is a continuous emitter of natural signals, which continuously saturate the earth-ionosphere cavity. These signals are visible and highlighted by means of the RDF network, developed by the Radio Emissions Project.

These peculiar endogenous electromagnetic signals have different intensity and duration depending on some characteristics of the matrix that generates them, including:

a) Amount of stress accumulating in the family (mechanical energy).
b) Size and extension of the fault.
c) Sliding speed of the fault.
d) Position in relation to the survey station (distance).
e) Depth of the natural radio source with respect to the ground surface.
f) Physico-chemical characteristics of the rock in which these signals are generated.
g) Presence of water or other elements.

Based on these characteristics, signals with certain characteristics can be emitted. The monitoring of these signals shows us that the majority of the emissions come from the "belt of fire" and "hot spots", and from the oceanic ridges.

In the light of what has been discussed, the introduction of the concept of "Terrestrial Flares" is proposed. An alternative vision that intends to describe our planet as an active celestial body, in which numerous complex phenomena occur, and which emits radiofrequency, not only emissions determined by the action of thunderstorms [34] [35] or by the mechanisms related to formation of polar auroras [36], but of radio emissions that are generated directly from the earth's crust, of our planet.

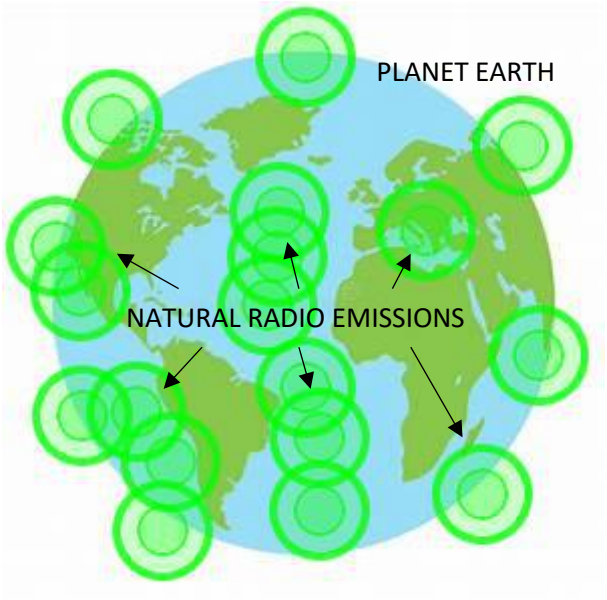


Fig. 22 – A new vision of the earth, covered by natural emitters, determined by tectonic stress, represented by "terrestrial flares", capable of propagating radio emissions over the entire earth's surface and into the Earth-Ionosphere cavity. Credits: Radio Emissions Project.

Since these are emissions that occur in the Earth - Ionosphere cavity, these emissions propagate constantly, generating echoes and resonances, which can therefore be detected, especially at low frequencies because they are less susceptible to distances and natural obstacles [40], as well as attenuation phenomena due to the presence of weather perturbations and scat-tering [39].

The vision of the Earth, characterized by the Ter-restri Flares, advanced by the Radio Emissions Project as early as 2013, bases its foundations on physical and electrical mechanisms known and explainable in the scientific field, of which the main phenomenon called into question would appear being the "semiconducting" of rocks discovered and studied for about 20 years [36]. The rocks, according to the studies carried out by some groups of researchers, would transform into "semiconductors", varying their ability to conduct electricity, if subjected to mechanical pressure (mechanical stress), and increasing this capacity by dozens of times [37], exactly the same phenomenon that is generated along a fault surface.

It is therefore possible to hypothesize that enormous quantities of flowing electrical particles accumulate at the level of the beams, which are arranged in the area under mechanical stress (Fig. 23), before the energy is released with the generation of an earthquake.

Through a radio-receiving system, these flowing particles (electric current) can be detected precisely due to its electromagnetic emission and therefore localized through a technological system equipped with RDF technology.

At the hypocentral level, electromagnetic signals and electrical particles are therefore emitted which then move even above the area in which this stress accumulates. This phenomenon has been classified by the researchers involved in this study as EIE, i.e. Epicentral Ionic Emissions, i.e. emissions of electrically charged particles that move in the area where a ter-remote is being prepared (by accumulation of particles).

These particles are released by the piezoelectricity and accumulate in the lithosphere. Other electrical charges contained in the air move because they are attracted by the accumulation of electrical particles. Due to the local magnetic field lines, the electrical charges flow from the earth's ionosphere after the impact of the solar wind with the earth's magnetosphere, of which the auroras are the main evidence. These flowing currents are distributed in the ionosphere and are then partly attracted to the lithosphere [38].

This flow of electrically charged particles is also evident in volcanoes, where mechanical stress, caused by magmatism, generates important fractions within the cone itself. This energy has shown how even these structures are able to emit radiofrequency before the eruptions, or before the earthquakes generated by the volcano itself within its own slag cone [27].

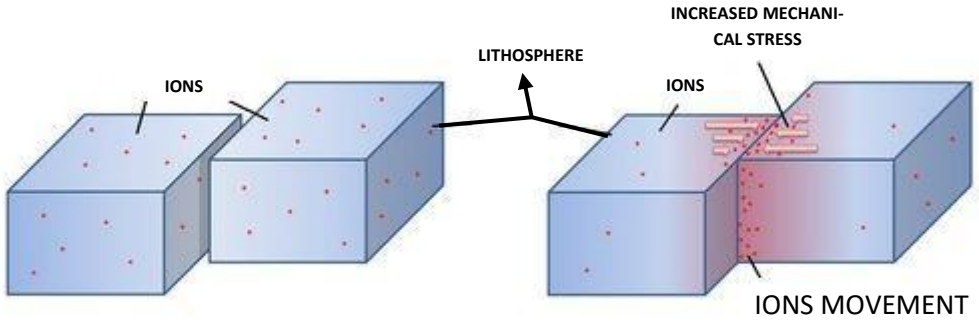


Fig. 23 – Schematic of what happens in rocks subjected to mechanical pressure. In this case the fault allows the movement of ions where the rock is under pressure, before an earthquake. The ions are recalled to the area where the stress is greatest due to the variation in the properties of the rock, which is transformed into a semiconductor. This allows the formation of flowing currents that emit radiofrequency, which then propagates in the Earth-Ionosphere cavity, and here intercepted by the monitoring system. Credits: Radio Emissions Project.

4.0 - CONCLUSION

The outcome of this experiment has shown that the Italian RDF network, developed by the Radio Emissions Project, is able to detect electromagnetic emissions of crustal origin, of pre-seismic and post-seismic type. The data indicate that the areas where an earthquake is being prepared, even of small intensity, emit recordable radio emissions about 6 days in advance of the seismic occurrence. These emissions persist for several days until the mechanical stress of the fault decreases to minimum levels, a symptom of an accumulation of mechanical energy at the crustal level.

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