



Influence of seismic activity in the atmospheric electrical field in Lisbon (Portugal) from 1961 until 1991

Hugo Gonçalves da Silva (1), Cláudia Serrano (1), António Domingos Heitor Silva Reis (1), Mourad Bezzeghoud (1), Rui Namorado Rosa (1), José Fernando Borges (1), Bento Caldeira (1), Mouhaydine Tlemçani (1), and Pier Francesco Biagi (2)

(1) Geophysical Center of Évora and Physics Department, ECT, University of Évora, Portugal, (2) University of Bari and Inter-Department Centre for the Evaluation and Mitigation of the Volcanic and Seismic Risk, Italy

The atmospheric electric field (AEF) can be influenced by different factors like cosmic radiation, radioactivity and aerosols [1]. Two innovative works have shown the possibility of enhanced air ionization, with consequent AEF perturbations, in the preparatory stage of earthquakes (EQ): Freund et al. [2] base their arguments on charge separation generated in the stressed volume followed by positive charges flow that reach surface and ionize the air within the boundary layer; Harrison et al. [3] relate possible AEF anomalies during the EQ preparation with surface air ionization through radon emanations.

It is clear that AEF plays a role in many of the studied electromagnetic seismic precursors, but systematic pre-earthquake AEF measurements are still lacking. There are reports of AEF anomalies [4], but no clear conclusions could yet be drawn. Hence we believe that in near future a deeper inspection of AEF is required since it could be vital for a better comprehension of these phenomena.

Here we consider hourly values of the AEF recorded at Portela-Lisbon meteorological station (38°47'N, 9°08'W) in the period 1961–1991. They were recorded with a Benndorff electrograph at 1m-height probe. The data series was interrupted in 1975–1977 when the electrometer was switched off for maintenance. The continuous and reliable data of AEF observed are used to study the correlation between possible anomalies in AEF and occurrence of eleven EQ with magnitude (M) above three. These verify the condition that the distance between the AEF sensor to the EQ epicentre lies inside the EQ preparation radius, $R = 10^{0.43M}$ [5]. The influences of meteorological variables (relative humidity, precipitation, wind intensity and cloudiness) are considered too.

We also analyze the atmospheric radon concentration in the same period since radon is important to estimate the alteration of the AEF conditions in response to the crustal behaviour. In fact, EQ's originate many fractures in the Earth surface that create many pathways for radon in the crust thus enhancing its migration [6], which may lead to the enormous release into the atmosphere and consequently decrease in the AEF.

We are just starting a very careful study and for the moment we do not have clear proves to confirm or denied an EQ-AEF correlation. Nevertheless, it is important to mention that a previous case study has given interesting results [7].

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