

Wind induced anomalies on the fair weather atmospheric electric field in Lisbon

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In general, atmospheric electric field data are not easy to interpret due to the variety of influences that have to be considered. Together with influences of long period, the local meteorology, e.g. relative humidity, intensity and direction of the wind do influence the atmospheric electric field anomalies significantly. In this work we investigate correlations between relative anomalies of hourly values of atmospheric electric field and relative humidity, and wind intensity for the several wind direction in fair weather. Data of the electric field strength recorded at the Portela meteorological station (Lisbon) in the period 1970-91 together with meteorological synoptic data of humidity and wind from the same station have been used. The component of the atmospheric electric field due to global (planetary) influences was separated from that of local influences through performing the difference between the actual hourly values and the corresponding values averaged over a thirty years period. From the analysis of the hourly anomalies of the vertical component of the fair weather atmospheric electric field at ground level and relative humidity we concluded that these variables are not significantly correlated and that the relative humidity influences upon the electric field should be masked more by the stronger effect of boundary layer convection currents. Therefore, we used the Principal Components Analysis technique to investigate if the wind intensity and relative humidity for the several wind direction really affect the electric field strength in Lisbon and see which of these influences is of major significance. This multivariate method was applied to the data set in order to evaluate the relationship between the electric field strength, wind intensity and relative humidity. Significant correlations were obtained for some wind directions and the pertinent interpretation is provided.