



Physical climatology of diurnal and monthly cloud to ground frequency over an area characterized by complex topography.

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In this work 10 years of data (from 1995 to 2004) are used to analyze the physical climatology of the diurnal and monthly frequency of cloud to ground (hereafter CG) lightning frequency over a region characterized by a complex topography and geography. The region chosen for the study is that of Friuli Venezia Giulia (NE Italy) which, on a relatively small area (i.e. 100 x 100 km²), encompasses a shallow lagoon and a rough orography with an highest peak of 2780 m (Mount Coglians).

In this work, this region is divided into eight sub-zones which are homogeneous according to their climatic and topographic features (Cicogna et al. 2000). The data used, collected by CESI-SIRF, are concerning position, time, date, intensity and polarity of the CG lightning. All these information are used to identify the main features of the monthly and diurnal lightning frequency over the eight sub-zones. Among these features it is shown that the monthly distribution of CG lightning is peaked in July for the Prealpine, Alpine and Danubian sub-areas, it broadens to August for the Plain (both low and high) and Piedmont sub-zones and broadens from June up to September for the Carso and Coastal sub-zones. In this work it is shown that these features can be explained taking into account both the effects of solar radiation and of the moist and warm North Adriatic sea.

The diurnal distribution of CG lightning, in all the eight sub-zones, is clearly bimodal with a first peak around 13 UT (14 solar time) and a second peak around 19 UT (20

solar time). These two relative maxima correspond to analogous maxima in hourly rain intensity and cannot be explained only assuming a shift of pre-existing mesoscale systems. This work is completed stratifying the data according the CG polarity and performing the same analysis of the monthly and diurnal CG lightning frequency distributions in the eight sub-zones.

All the results of this work will be used to improve the risk management related to lightning in the analyzed region.

References

Cicogna A., Nordio S. And Micheletti S., 2000. Diurnal Course of Rainfall in the Plain of Friuli Venezia Giulia: Evaluation of Hourly Measurements. *Theor. Appl. Climatol.*, pp. 175-180.