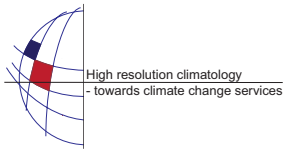
EMS Annual Meeting Abstracts
Vol. 7, EMS2010-247, 2010
10th EMS / 8th ECAC



Lightning frequency over the Italian peninsula

F. Turoldo (1), F. Stel (2), D.B. Giaiotti (2), M. Bernardi (3), C. Adamo (4), C. Rovelli (3), S. Dietrich (4), and D. Goi (1)

(1) Udine University, Dept. of Chemical Sciences and Technologies, (2) ARPA CRMA, Palmanova UD, Italy (fulvio.stel@arpa.fvg.it, +39 0432 922638), (3) CESI (Centro Elettrotecnico Sperimentale Italiano), Milan, Italy, (4) ISAC - CNR Rome Italy

The aim of this work is to analize the spatial frequency of lightning over Italy and to interpret the observed features in relationship with topography and with the climatic characteristics of the area.
The data used to perform this analysis are : i) cloud to ground measurem ents (CG) from 1995 to 2000 given by CESI/SIRF (Sistem a Italiano Rilevamento Fulmini); ii) total flash measurements from 1995 to 2000 obtained trough the OTD system (Optical Transient Detector) given by NASA; iii) topography measurements obtained trough the ETOPO -2 database downloaded from NOAA.
Both the yearly number of positive and negative CG lightning decrease with the increasing of topographic height. The number of positive and negative CG lightning decreases with the same derivative even if it seems that only below 1000 m it is possible to reach ratios between positive over negative CG lightning higher than 1. These values are observed only in the North African area present in the ranges of our analysis , that is from longitude 5 to 11 °E and from latitude 36 to 37 °N. Future studies will confirm if this is a real effect or an observational bias.
The behavior of total lightning activity (IC and CG) in relationship with CG lightning activity and with topography is studied by means of OTD data. Being OTD data retrieved trough satellites, the analysis is done making us e of the flash rate per squared kilometer and per year instead of the number of lightning. Flash rate is computed using data on a re solution of 0.5°x0.5° and keping into account the changes in the surface due to the changes in latitude and longitude.
This work confirms the observation (made even by other authors) that CG lightning frequency decreases as topographic height increases. A similar trend is found in total lightning flash rate, which is essentially due to the contribution of IC lightning. These observations are explained assuming that thunderstorm activity
decreases with the increasing of topographic height, mainly because of the climatic decrease of temperature and moisture with altitude.
The low resolution of the data used in this study can not exclude the existence of other effects acting on a smaller scale. One of these effects is the observed discrepancy between the maxima in the total yearly flash rate and cloud to ground flash rate.
At the end, the observed flash rates are used to supply an estimate of the NOX lightning production in the study area.