EMS Annual Meeting Abstracts
Vol. 11, EMS2014-28, 2014
14th EMS / 10th ECAC

Temperature analysis on the North-Western Italian Alps through the use of ground-based meteorological stations, spatial interpolation and satellite images

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In the present study we analyzed the temperature data of the meteorological stations of high altitude on the north-western Italian Alps with the purpose to perform a thermometric characterization. The data used are the daily values of maximum and minimum air temperature (°C) from approximately 250 automatic meteorological stations of Piedmont and Aosta Valley.
To improve the quantity of the ground-data, we decided to use interpolation data method and comparison with remote sensing data.
The satellite data used are those of the sensors MODIS "land surface temperature" datasets from the NASA satellite "Terra" and "Aqua". The satellite images used are the land surface temperature with 1km definition, already prepared and properly positioned by NASA (level 2) of the collection 5. From the satellite images we have extracted the values of temperature and the satellites time of observation in order to compare the results with the values measured at the same time by ground stations. The acquired data were subjected to a validation process for understanding the accuracy, the analysis was carried out by co-kriging interpolation methods. Co-kriging method is used to take advantage of the covariance between regionalized variables, using existing spatial correlations among altitude and the temperature to be estimated. Particularly are appropriate when the main attribute of interest is sparse (temperature), but related secondary information is abundant (altitude).
The availability of data series from ground-based meteorological stations improved by interpolated data and satellite images allow, in addition to perform the thermometric characterization, other climatological statistical analysis. Will allow to identify and evaluate the extreme events that occurred on north-western Alps in these 10 last years, like the relationship between heat waves and snowpack decreasing or glaciers retreat. With the use of these spatialized data also will be possible to identify the placement or displacement of climatic limits and thresholds such as the snowline or freezing level.