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Assessment of climate change on North-West Italian Alps, through the use of long-term climatic series 1961-2010

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In recent years, national and international scientific organizations, have placed emphasis on the need to find historical weather data in order to perform climatic analysis most reliable possible. Within of this research is also part of the international project MEDARE (Mediterranean Data Rescue) Initiative, under the auspices of WMO, which aims to improve the availability and accessibility of instrumental climate data in the Mediterranean region. In Italy, especially in the western Alps, there is a large amount of data still little explored. In fact, only the snow data are recently been investigated, while there remain gaps on high altitude thermometric historical series. The results obtained from the study of these variables allow direct and indirect correlations with the results in the field of snow and allow the execution of estimates of the impacts due to climate change. Therefore, in order to make a proper climatic analysis to identify the peculiarities of the high altitude stations in the Western Alps, has been selected a common period from 1961 to 2010. The parameters chosen for detailed analysis are the daily values of maximum and minimum air temperature ($^{\circ}\text{C}$), the height of the snow on the ground and the height of the fresh snow. To achieve the climatic analysis was necessary collect and digitize the snow-rain-thermometric data of manuals detection stations and subjecting them to a process of quality control. This has been done using the software RCLimDex (Zhang and Yang, 2004) and other methods that are better suited to processing snow data (Terzago, 2012). In order to analyse the temperatures series a process of homogenization, through SPLIDHOM (Mestre et al., 2011), has been necessary. This activity was carried out with the purpose to remove the possible errors of recording data due, for example, to different measuring instruments, to substitutions of weather stations or their equipment, or even for the different locations of measuring stations during of time. For the analyzed parameters were evaluated trends and climatic indices, using AnClim (Stepanek, 2007) and all values were evaluated using the Mann-Kendall test. The snow cover analysis allows to evaluate the relationship existing between the snow parameters and altitude. The trends show that the climatic changes affect more the high altitude alpine environment. There are in fact significant increases in annual average temperature over the period considered which involve an increase in the permanent snowline. An important object of evaluation are the effects of climate change scenarios on the regime of precipitation (solid and liquid) and temperature, based on the analyzed parameters in climatic development studies of the IPCC (1994) and later. In addition, we will try to assess the impact of these significant changes on alpine natural and economic systems, generally characterized by predominant exploitation to tourist use and therefore in need of appropriate adaptation policies and governance.