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DEFINIZIONE QUANTITATIVA DEI REGIMI PLUVIOMETRICI NELLE ALPI ORIENTALI ITALIANE

ABSTRACT: FAZZINI M., *A new method to quantitatively discriminate the pluviometric regimes of the Eastern Italian Alps.* (IT ISSN 1724-4757, 2005).

A detailed analysis of the precipitation features in the Italian Alpine system, including the Resia Pass (Val Venosta), the Adamello-Presanella group and the eastern margin of Giulie Pre-Alps (Mt. Matajur), has shown that present classifications of pluviometric regimes, though valuable and well structured, are not satisfactory in discriminating the different regimes types. This is mostly due to the physiographic complexity of the area that determines different effects of atmospheric perturbations at both general and local scale. In the study area, about 25,000 km² wide, within relatively short distances both the rainfall and drought peaks of the Italian territory are recorded, with annual values above 3,000 mm in the Giulie Pre-Alps, north of Udine, and 500 mm north-west of Bolzano, respectively. Previous studies have pointed out an absolute precipitation minimum (mostly snow) in winter, a summer maximum in the northernmost watersheds and a bimodal equinoctial regimen in the Pre-Alpine area near the Po Plain.

The previous regimen classifications are mainly qualitative and are not adequate to the complexity of the study area physiography. The quantitative classification proposed in this paper was obtained considering mean monthly, seasonal and annual precipitation data as well as their proportion to the annual value averaged on the 1961-1995 interval for 250 rain-gauges. The aim of this study is to define a new methodology to single out with higher accuracy areas omogeneous in terms of precipitation characteristics and the boundaries among the various precipitation regimes in mountain areas characterized by marked orographic and local precipitation variations. For this purpose K-mean cluster analysis was used.

The study area was subdivided into six classes of stations with similar statistical characteristics. Stations within the same class may be grouped far apart on the study area confirming the irregular distribution of precipitation, irrespective of physiographic similarities, in such complex mountain territory. Through specifically designed quantitative indexes, obtained by normalised precipitation data, microclimatic situations with regimes, hardly identified by the previous methods, particularly where precipitations are constant in the warm semester (transition regimes), were pointed out.

The study area resulted subdivided into six main precipitation types, ranging from the continental summer unimodal to the sub-padan with

modest but constant year round rainfalls, and four sub-continental sub-types. A significant relationship between such pluviometric types and the six clusters obtained by the K-mean clustering resulted. In particular, the clusters characterizing the inner areas of the Alpine chain coincide with the continental regime portions of the territory, while the outer areas generally coincide with those characterized by Pre-Alpine and Sub-Alpine equinoctial regimes.

The procedure developed allowed to identify a distinctive transition regime, including the stations located in intermediate areas or on cluster boundaries, characterised by similar spring, summer and autumn totals, capable of clearly discriminate between the continental and sub-mediterranean dominions. A particular situation, given by the geographic position, is that of the subcontinental type 4, occurring in the valleys of the southern portion of Ortles-Cevedale group (western Trentino) and characterized by a peak in May followed by a constant decline of precipitation, down to minimum in December-January.

The location of the area, downwind of the mostly perturbed flows, determines scarce precipitations. Moreover, the occurrence of wide areas covered with vedrettes and valley glaciers markedly limitates the diurnal heating of highly elevated basins and in the summer contrasts the formation of convective cells and the thunderstorms associated. The subcontinental type 4 is supposed not to derive from a less rainy than normal in the summer transition regime, but to represent a continental regimen with a summer peak, truncated by the above mentioned synoptic and thermodynamic factors.

KEY WORDS: Eastern Alps, Pluviometric regimes, Cluster analysis, Topoclimates.

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Nel presente lavoro sono stati utilizzati i dati pluviometrici giornalieri, relativi al periodo 1961-1995, di circa 250 stazioni pluviometriche ubicate all'interno dell'arco alpino orientale italiano. Lo scopo di tale ricerca è stato quello di definire, con criteri quantitativi, i diversi regimi pluviometrici esistenti. Dall'applicazione di numerose analisi statistiche (*cluster analysis*) ai dati pluviometrici medi mensili e stagionali normalizzati, si sono evidenziate le differenze tra i relativi apporti medi; sono stati di conseguenza ricavati sei tipi di distribuzione delle precipitazioni che differiscono gradualmente dal tipo *continentale* ad Estate piovosa ed Inverno secco sino a quello *sub-padano*, caratterizzato da una notevole uniformità nella distribuzione delle piogge, passando per condizioni caratterizzate da una notevole uniformità meteorica nel periodo Aprile-Ottobre (regime di *transizione*) e da stagioni intermedie via via più piovose man mano che ci si allontana dalla linea spartiacque principale (regimi *prealpino* e *subalpino*). Nell'ambito di alcuni regimi sono state evidenziate ulteriori differenzia-

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