



## Analysis of strong rainfall events at Cividale del Friuli (Northeastern Italy) from 1920 to 2007

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Strong rainfall events have been selected from a detailed statistical investigation of the rainfall regime recorded at Cividale del Friuli (which is a town situated in the piedmont area of the Italian Prealpi Giulie), by applying suitable thresholds on the set of monthly and daily rainfall. On the basis of these data the following aspects as been explored:

Time evolution of the location of the most rainy month, for each year, in the meteorological seasons;  
Return period, in years, of the maximum monthly precipitation, for each year;  
Return period, in years, of the maximum daily precipitation, for each year; Return period, in years, of the maximum precipitation during two consecutive days, for each year;  
Trend of the series of rainy days above a given thresholds, for different thresholds;  
Long term evolution of the infra-annual precipitation by averaging four 21-years cycles of rainfall for the periods 1924-44, 1945-65, 1966-86, 1987-2007;

Comparison of the above rainfall series with that of Trieste which is a coastal town situated at the north-eastern most part of the Adriatic sea, about 70 km far from Cividale del Friuli (which is usually much more rainy than Trieste). Unlike the almost constant linear trend for Trieste, that of Cividale del Friuli is markedly decreasing in the whole period 1920-2007. This phenomenon is ascribed to a recent climatic change in the mesoscale wind regime in which winds from NW-N-NE are more frequent than those zonal. Therefore in the areas more close to the mountains a lesser and lesser quantity of rain is recorded relatively to the areas far enough from the mountains like Trieste. The different behaviour is more evident during spring and summer which are the seasons with the higher occurrence of thunderstorms. Winter period shows a different behaviour between the years before and after 1980; in the last 30 years the decreasing of the differences has been very pronounced.

Further conclusions are the following:

Total yearly rainfalls show a relevant decrease of about -277mm/100y;  
The most rainy month is July for the whole interval 1920-2007, but this month undergoes an important climatic change with the tendency to become a typical late summer month;  
The soul month in which rainfalls has increased is September, on the other hand January, July, October and December do not exhibit significant variations while the remaning months tend to become more dry;  
Total rainfall on September 1965, that is 708 mm, is quite exceptional and probably such values has a return period much longer than those analyzed in this work;  
The number of days with strong rainfalls (50-75 mm/d) is constant in the considered interval and this implies the tendency to less frequent but more intense rainfall events;  
Intense rainfall during two days take placed more frequently from Maj to June and from September to November and 17 cases have been recorded with intensity higher than 150mm/2d;  
In general, the return period of a rainfall with 100mm/2d is 1.5 years, of one with 150mm/2d is about 5 years and of one over 200mm/2d is beyond 30 years;  
The maximum rainfall that has taken placed on two consecutive days reached 210.4 mm;