

# ANALYSIS OF PRECIPITATION PATTERNS ON MOUNT BALDO

G. Poletti, M. de Franceschi, D. Zardi, co-author A. Bellin  
Department of Civil and Environmental Engineering  
- University of Trento, Italy -



Prof. Dino Zardi, presenter



## INTRODUCTION

The mountain chain of Mount Baldo, lies in the southern Prealps, between the Lake Garda and the River Adige Valley (Fig. 1). Ranging from 65 m a.m.s.l. of the mountain feet at the shore of Lake Garda up to about 2200 m a.m.s.l. of its main crests (Fig. 2 and Fig. 3). Its displays a remarkable variety of local microclimates, geographical characters and ecosystems, in particular flora (since it received the name of Hortus Europae, i.e. Europe's Garden).

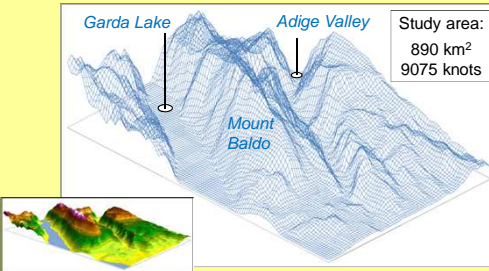


Fig. 1 – DEM of Mount Baldo with the grid used for kriging (0°.20" Lat, 0°.30" Long). View from South-West

Fig. 2 – Mount Baldo and Garda Lake. View from North



Fig. 3 – Geographic position of the 16 rain gauges (yellow points) were considered in the study

## DATASET

We considered 16 weather stations disseminated on the mountain, in order to produce a climatological analysis of precipitation in the area. They cover an overall timespan of 90 years (1919-2008), although the various stations have been operated very discontinuously in it. The 12 most representative time series are analyzed. Correlation analysis between total monthly precipitation data, shows that stations located on the same side of the mountain are better correlated with respect to other lying closer, but on the opposite side.

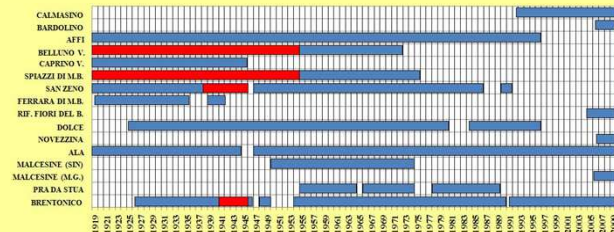


Fig. 4 – Operating stations, period 1919 – 2008; in red, data not utilized

	AL	BV	BR	CA	CV	DO	FE	MA	PS	SZ	SP
AF	0,805	0,783	0,744	0,947	0,897	0,784	0,790	0,713	0,797	0,770	0,787
AL	0,854	0,860	0,818	0,854	0,738	0,847	0,876	0,893	0,783	0,813	
BV	0,795	-	0,853	0,712	0,889	0,824	0,855	0,855	0,762	0,794	
BR	0,795	0,805	0,731	0,792	0,794	0,901	0,901	0,728	0,774		
CA	-	0,870	-	-	-	-	-	-	-	-	-
CV	-	0,840	0,848	-	-	-	-	0,746	0,826		
DO	-	0,750	0,624	0,624	0,745	0,637	0,753	0,690	0,797		
FE	-	-	-	-	-	-	-	0,856	0,736	0,774	
MA	-	-	-	-	-	-	-	0,823	0,776		
PS	-	-	-	-	-	-	-	-	0,759		
SZ	-	-	-	-	-	-	-	-	-	0,759	

Fig. 5 – Correlation coefficient (r) between total monthly precipitation data (in the 12 most representative stations), period 1919 – 2008. Legend :  
AF Affi AL Ala BR Brentonico BV Belluno V.  
CA Calmasino CV Caprino V. DO Dolcè FE Ferrara M.B.  
MA Malcesine PS Prà da Stua SZ San Zeno SP Spiazzi

## SYNOPTIC SCENARIOS, NORMALIZED PRECIPITATION AND TOPOGRAPHY

Precipitation over Mount Baldo originates both from evaporation and up-slope advection of water vapour, especially from the side of Lake Garda, and from the lifting of moist airflows, especially from south. However these effect may variously occur under different meteorological scenarios.

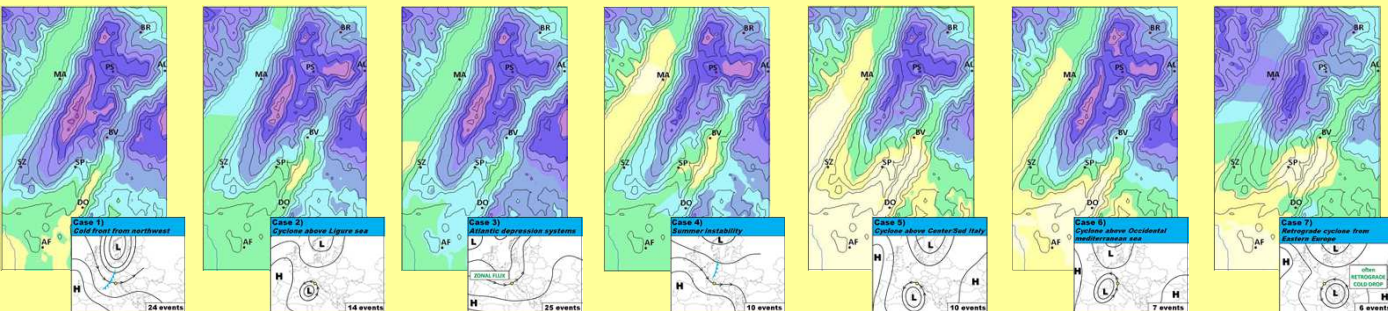


Fig. 6 – Fields of normalized precipitation relating to 7 synoptic scenarios, identified on the basis of patterns from ECMWF reanalysis

Suitable mapping through Kriging techniques allows to infer the spatial distribution of precipitation under various seasonal and typical weather patterns. Then 100 precipitation events are classified into 7 typical meteorological scenarios, identified on the basis of patterns from ECMWF reanalysis (Fig. 6). Another classification divide the 100 events according to wind direction in the middle troposphere (Fig. 7). The results provide an example of the appropriate scale required for climatological analysis and mapping of precipitation distribution in the alpine area.

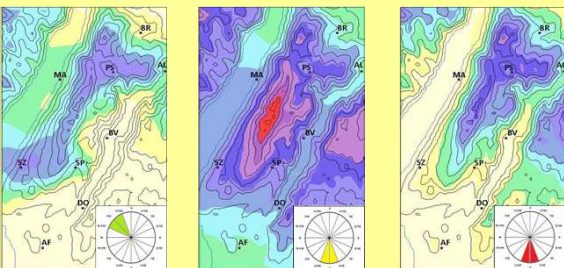


Fig. 7 – Fields of normalized precipitation for 13 events with wind from North/West (on the left) and 8 events with wind from South, respectively moderate (5, in the middle) and intense (3, on the right) . Level 850 hPa

### Contacts:

✓ Eng. Giacomo Poletti  
giacomo.poletti@ing.unitn.it

✓ Prof. Dino Zardi  
Dino.Zardi@unitn.it