

# FOG WATER COLLECTION AT THE MOUNTAIN VELEBIT NEAR THE ADRIATIC SEA

MARINA MILETA  
METEOROLOGICAL and HYDROLOGICAL SERVICE  
of CROATIA  
ZAGREB GRIČ 3, CROATIA

Abstract: Zavižan mountain station is placed on the altitude of 1594 m. near the Adriatic sea. This location is chosen for collecting fog water with a standard fog collector (SFC) which was installed in summer 2000. The present paper discusses the fog water amounts obtained by this collector during the period 27 July through 10 November 2000. The highest daily rate was 9.6 L/m<sup>2</sup>.

## 1. INTRODUCTION

On the Zavižan mountain station placed in the Dinaric Alps of Croatia special measurements of rainfall by seven various types of raingauges including water from fog began in 1955. The measurement of fog deposit is performed using Grunow type fog collector. Beside of Zavižan the measurements of fog water in the mountains regions near the Adriatic sea were taken at the stations Vrh Učke (1371 m) and Sveti Jure Biokovo (1673 m), but for shorter period of time. The results of fog water measurement were presented by Mileta (1996).

The interest exist for the fog water collection on the mountain station Zavižan, where the water is at the present transported by cistern (what is rather expensive), and it is used for the purpose of tourism and for

the need of forest especially in those area suffering from forest fires.

This paper presents the first results by standard fog collector (SFC) proposed by Schemenauer and Cereceda (1994), installed in the meteorological courtyard on Zavižan.

## 2. OBSERVATION SITE AND DATE

Zavižan mountain station is placed at an elevation of 1594m (site  $\phi = 44^{\circ} 49'$ ,  $\lambda = 14^{\circ} 59'$ ) on Velebit, the long mountain barrier which divides the inland area from the Adriatic coast (Fig.1). Location of the station is directly exposed to prevailing eastern and western wind flow ( Fig.2).



Figure 1. Geographical position of mountain station Zavižan

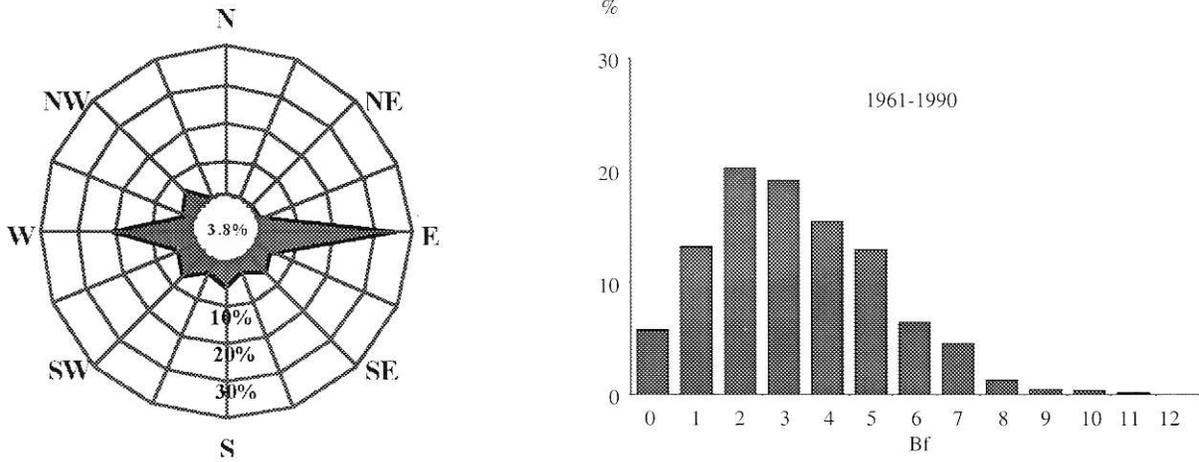


Figure 2. Distribution of wind direction and of wind forced (in Beaufort) for period 1961-1990

**FOG WATER**

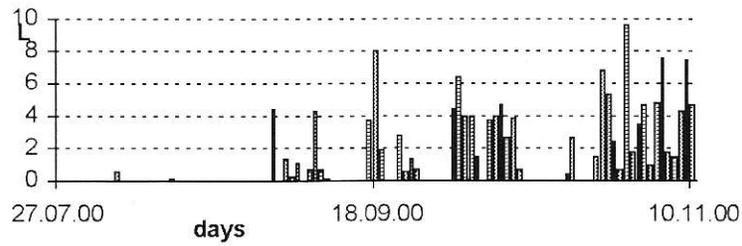


Figure 3. Amounts of water (L/m<sup>2</sup>) collected daily in the SFC during 3.5 months

**FOG WATER**

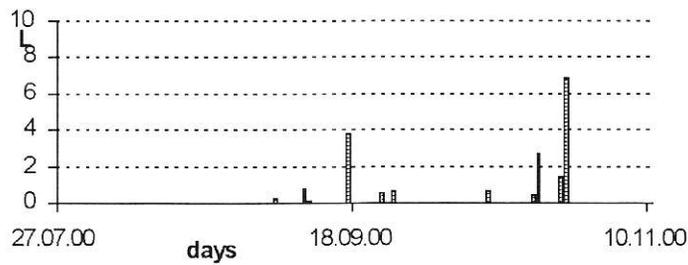


Figure 4. Collected fog water in the SFC in days without rain

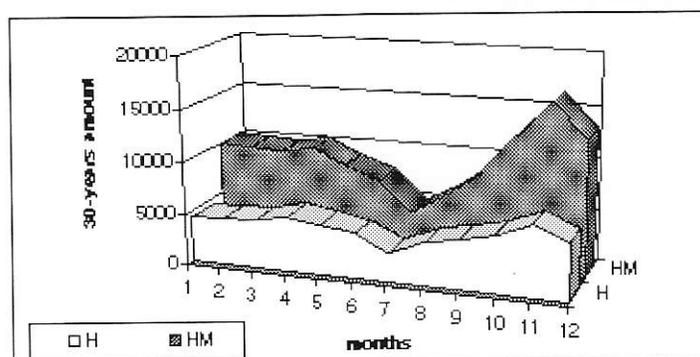


Figure 5. Total amounts of precipitation per months measured by fog collector Grunow type (HM) and standard rain gauge (H) at Zavižan for period of 30 years

The reason for this wind direction is geographical position and orientation of the mountain Velebit. Average annual rainfall is 1858 mm with a pronounced October - November et period. The SFC have been installed in June 24, but during the first 3 weeks the water was lost since the container was not big enough. The monitoring period which have been analysed extend from 27 July through 10 November 2000. until the temperature condition became negative. The output of the standard fog collector is liters of water per day.

**3. CLIMAT ANOMALIES DURING OBSERVED PERIOD**

The main characteristic of the climatic anomalies are established by departures of the mean monthly air temperature and monthly precipitation amounts from the long term means for the 1961-1990 period. According to the temperature and precipitation classification on Mountain Velebit, June was estimated as "extremly warm" and as "extremly dry", July as "cold" and "normal", August as "very warm" and "extremly dry", September as "normal" and "wet", October as "warm" and "wet" and Novembar as "very warm" and "wet". The air temperature in 2000 were significantly higher than the average in the area of Croatia, and the temperature conditions were estimated as "extremly warm" (on Zavižan precipitation conditions were "normal").

**4. RESULTS**

Daily collection of fog water during the study period (3.5 months) is presented on Fig.3. Maximum daily collected fog water was 9.6 L/m<sup>2</sup> observed at the end of October.

Table 1. indicates the fog water collected by SFC in comparison with the rainfall amount during the monitoring period in 2000, by months. The fog water amounts depends on season. Maxima was in November when the amount of rainfall was also highest. This situation were observed also when measured by Grunow type (Fig. 5). The highest daily rate in days without rain was 6.9 L/m<sup>2</sup> as shown in Fig.4.

The wind direction in days with daily amount of fog water larger than 5L was prevailing westerly on Zavižan. Synoptic situation was characterised by southwest upper air current with the advection of moist air from the Mediterranean.

Table 1. Fog water collected by SFC and water collected in the rain gauge

Month	SFC (L/m <sup>2</sup> )	Rain gauge (mm)
July (27-31)	0.12	3.1
August	0.7	7.0
September	32.0	247.4
October	71.0	278.2
November (1-10)	41.0	211.5

**5. CONCLUSION**

The studies have shown that fog constitutes an important water resource in the considered area. In the mountain region of higher altitude, close to the Adriatic sea, fog water represents the water resource during all months in the year. On mountain Velebit

maximum amount of water occurs in autumn (November, October). Together with maximum precipitation amounts, which is caused by the cyclonic activity over the Mediterranean and the Adriatic sea. Although the monitoring period of 3,5 months in this study was relatively short, the results indicate less water from fog measured by SFC in comparison with those measured by fog collector of Grunow type. The largest amount of water collected by SFC during this period was in November when the precipitation amount was also the largest.

## 6. REFERENCES

- Mileta, M.,1996: On the compararison of the precipitation measurements by normal Hellmann rain-gauge and fog collector near the Adriatic sea 24th International Conference on Alpine Meteorology , Bled, Slovenia, 9-13 Sept. 1996, 80-83
- Mileta, M.1998: Fog Precipitation on the mountains in Croatia,1 st International Conference on Fog and Fog collection, Vancouver 20-24 July 1998, 413-416
- Schemenauer, R.S. and Cereceda, 1994: A proposed standard fog collector for use in high elevation region. *Journal of Appl.Meteor.*, Vol.33, 1313-1322