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ADDITIONAL OBSERVATIONS IN THE METEOROLOGICAL RECORDS IN THE NINETEENTH CENTURY IN BELGRADE

Abstract. Vladimir Jakšić and Milan Nedeljković are the founders of Serbian meteorology. Many of their co-workers and meteorological observers have contributed to measuring meteorological parameters and recording development of the weather in the nineteenth century. They also described meteorological phenomena by simple words and sentences in some particular days on the margins of the paper. After doing the job, the observers were signed on the pages of record and so their names are preserved from oblivion. These additional observations and recordings represent the valuable contribution to the development of meteorology in Serbia. Former observers had no idea that their records made on pieces of paper become a historical value.

1 Introduction

The meteorological measurements and observations in Serbia began in the mid-nineteenth century, when Vladimir Jakšić (1824-1899), professor of the Lyceum and member of the „Društvo srbske slovesnosti“ [1, 2], set the thermometer in Belgrade, on his property at Senjak. In that time Senjak was the far suburb. He regularly recorded the air temperature and atmospheric phenomena from January the 1st 1848. The measurements and observations are recorded in the notebooks named Pogodopis [3] which have partitioned in six volumes. Until the today, the five volumes have been preserved. Unfortunately, the fourth notebook is missing. It was containing data of the weather monitoring for the period from December 1865 to November 1875.

Meteorological Observatory in Belgrade began with regular measurements and observations of July 13, 1887 (July 01 according to the Julian calendar) in the southwestern Vračar in the temporary observatory in the backyard of house in Svetozar Marković Street 66, at the corner of today's streets Svetozar Marković and Vojvoda Milenko. At this location, the observation was performed until May 13, 1891 (May 01 according to the Julian calendar), when it was moved to a new location, about 350 meters away from the original, in the newly built building on the present site in the Bulevar oslobođenja 8 street. The founder and first director of the Astronomical and meteorological Observatory [4] was Milan Nedeljković (1857-1950), professor at the Department of astronomy and meteorology at the Velika škola in Belgrade, the forerunner of the University. He made first measurements at this official and representative, today recognizable, home of the Serbian meteorology.

2. Analysis of additional observations and records

The first meteorological measurements and observations at the Observatory were recorded and preserved in the form of notebooks designed and printed by Milan Nedeljković. Beside him, the measurements and observations were carried out by the

students of the Velika škola. The observers were signed on the pages of record and so their names are preserved from oblivion. The measurement data are inscribed by pencil or pen and ink. The words are written by Cyrillic script letters. In those days, a significantly lower number of meteorological parameters in comparison to the present were measured. Over time, more and more meteorological parameters were measured. This led to a change in the look of the form where the measurements were written. Vladimir Jakšić had the urge to additional description of the phenomenon on the side of the form in his records from 1848 to 1900 (Figure 1).

12	138	93	⊖			130	11.6	
13	204	88	⊖	420	70	158	14.0	70
14	218	155	⊖	16		132	12.0	
15	124	107	⊕	60		122	11.0	
16	154	120	⊕	16		134	12.1	
17	142	121	⊕	888	70	131	12.7	
18	140	130	⊖			142	12.6	
19	155	103	⊖	16		125	10.0	
20	95	35	⊖			90	5.2	
21	132	48	⊖			11.5	8.5	
22	188	82	⊖			16.0	12.2	490

Figure 1. Part of the record made by Vladimir Jakšić. Notes are in Serbian. The record of May 13, 1876 means „The hail beat Vračar completely”, and the record of May 21, 1876 means „Frost in Hungary and Germany; hoarfrost in Serbia, destroyed vineyards”.

Vladimir Jakšić and his co-workers, who made measurements instead of him while he was away from Belgrade, written down the measured data at the papers of predicted form. Occasionally, they recorded and described some phenomena on the margins of the paper. Nedeljko and other observers of the Observatory also described the development of the weather and meteorological phenomena by simple words and sentences during some particular days. Usually, these were the records of some extreme events such as summer storms because they were attracted to the attention then as well as now due to their large energy. For example, they wrote down the exact time (hours and minutes) of the beginning of the thunder, its direction of movement, the starting or intensifying of the rain, the duration and intensity of the shower and thunder, the size of hail grains and how many minutes it lasted, damage that it made, determined the trajectory of disasters and eventually recorded when stopped.

Very short additional observations were written on the pages of the record. A longer description, when meteorological phenomena requested, was written on special paper, rather on the slips of paper-cut from a larger paper, perhaps pages of a notebook, or a clean paper that was used for other purposes. These pieces of papers with records were irregular and sometimes did not correspond to the dimensions of the record and it bent and inserted into the page of record (Figures 2, 3, 4).

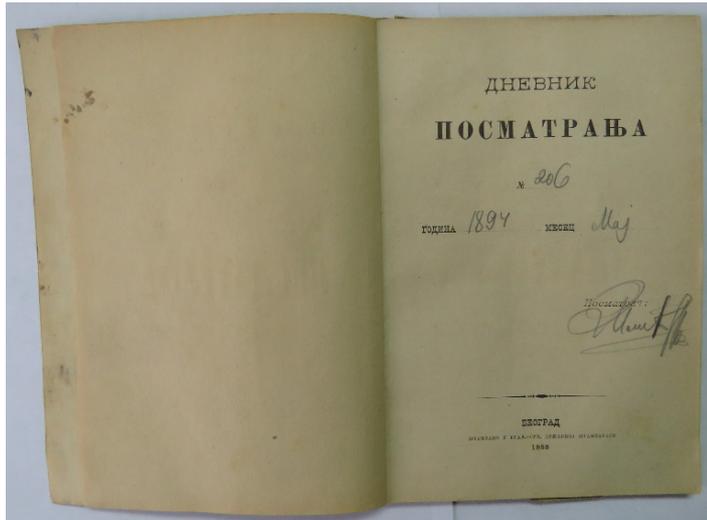


Figure 2. The first page of record, No. 206, May 1894, Observatory Beograd (Vračar).

ГОДИНА 1894		МЕСЕЦ Јуни	
Дан посматрања	Датум	Час посматрања	
Инструмент	Прочитао	Корекција	Поправљена вредност
Барометар	752.60	1.20	752.60
Резервни барометар	3.12		
Сува термометар	29.5	1.20	23.2
Влажан	20.7	12.230	29
Хигрометар од длаке	39.0	1.20	36.7
Максимални термом.	-		
Минимални	-		
Анемометар	16.0		
Облачност	7.0		
Врста облака	-W		
Падели и висина кише	1.4		

ГОДИНА 1894		МЕСЕЦ Јуни	
Дан посматрања	Датум	Час посматрања	
Инструмент	Прочитао	Корекција	Поправљена вредност
Барометар	751.60	1.20	752.10
Резервни барометар	2.86		
Сува термометар	20.0	3.25	16.9
Влажан	18.2	14.5	23
Хигрометар од длаке	33	3.25	34.2
Максимални термом.			
Минимални			
Анемометар	8		
Облачност	10.2		
Врста облака	2.0		
Падели и висина кише	5.1		L=23.30

Figure 3. The page of record of June 25, 1894, Observatory Beograd (Vračar).

Нептунска
 $\frac{25}{13}$ - Јуна 1894 год. Београд

у 2^е и 3^ом задрме на НЕ при хоризонту,
 у 2^е и 3^ом при пошмучо на НЕ,
 у 2^е и 4^ом задрме на НЕ прво слаб
 ја а после јаке.
 Бешар NW NE 4-5.
 у 2^е и 5^ом поре сунта, ам чеља и
 јака клина падаш.
 у 2^е и 5^ом на Е јако задрме, и поре
 мого кривина клина и све јакоше.
 у 2^е и 5^ом суну муча на Е и недреситано

a)

у 2^е и 5^ом суну муча на Е и недреситано
 при јаке и слабше, од НЕ прекошес
 на Е.
 у 3^е суну муча на Е, и гошма јако задрме,
 Бешар NW NE 6-7
 у 3^е и 4^ом кривина и врло јака клина
 у 3^е и 6^ом при пром слабше на Е, јака
 прикљина на Е, елабна клина.
 у 3^е и 10^ом при на Е, елабна клина.
 у 3^е и 11^ом врло сунта клина и при на Е.
 у 3^е и 12^ом суну на Е и јако задрме - суну клина.
 у 3^е и 14^ом јако задрме на Е - клина прекошес.
 у 3^е и 17^ом суну на Е и при, од Е на Е,
 недреситано при на Е на Е.

b)

ниво.
 у 3^о и 23^о суту на 2. при доена јаво
 на СЕ и иреверсе на 2.
 у 3^о и 46^о оде нива изгитије и
кенте лаивуца, ам огна кредо
ге.
 За час време на СЕ, С, Е, N, N^е
 однаво нивус, и \equiv 2^и 3, а цено
 нодо однаво:
 10^и 2 фн, и, н, аз. Срдита и крета
 2 NW.
 13-VI-94.
 Београд
 Драг. Д. Марјановић

c)

Figure 4 (a, b, c). Additional record on a piece of paper inserted between the pages of the observations record of June 25, 1894, Observatory Beograd (Vračar).

The contents of these additional records on the inserted pieces of paper gives a very clear picture of the meteorological phenomena and the today's reader gets the impression as if he himself experienced it. It contributes a great depth analysis of the weather development. It contributes the evaluation of events from the viewpoint of observers from a single point. Additional observations and recordings represent the contribution to the development of meteorology in Serbia.

Figure 4(a, b, c) shows a record of the storm from June 25 1894 (on June 13, Julian calendar; in the nineteenth century, the difference was only 12 days). The manuscript is written in ink, by Cyrillic script letters and it is completely readable. It contributes a brief analysis of meteorological events seen through the eyes of observers Dragiša Marjanović. In addition, the record shows linguistic expressions Serbian language that match today, also the professional terminology. Word directions are written in the Latin alphabet by the initial letters of the English term (the first letters N, S, E, W).

3. Conclusion

This example and many other optional records on paper inserted in the pages of records are a unique contribution to the development of meteorology in Serbia. Vladimir Jakšić and Milan Nedeljković are the founders of Serbian meteorology. They and many of their co-workers and meteorological observers contributed to measuring meteorological parameters and recording weather development in a few first years of observations. In the provisional Observatory, except Milan Nedeljković, observers were his wife Tomanija and brothers Vojislav and Milijan Nedeljković which was students of a high

school, and one of their classmate which name is remain unknown. During the following years, the number of observers increased. The observers were signed on the pages of record and so their names are preserved from oblivion. Additional observations and recordings represent the contribution to the development of meteorology in Serbia. The former observers had no idea that their records on pieces of paper become a historical value.

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