CONSIDERATIONS REGARDING THE LAST 3-5 YEARS HYDRO METEOROLOGICAL CONDITIONS FROM THE BAIA MARE AREA

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Abstract: The present paper is based on the fact that the boundaries of hydrometeorology are not clear-cut and the conceptual delimitation of its characteristics invoke numerous and varied knowledge, specific to environmental sciences as well as statistics, analysis and informatics. Much more, the hydrometeorological problems, on a global view, overlap with those of the climatologist, the hydrologist, the cloud physicist and the weather forecaster, and nowadays, even with those of the informaticians.
Our proposal for this paper is limited to the use of the G.S. Surfer 9.0 software in analyzing the variations of the climatic elements recorded in Baia Mares urban area in the last 3-5 years. Through the use of the modern data processing software, the case study underlines a specific evolution for the air temperature, relative humidity, wind speed, cloud coverage and the solar radiation, the presented results from the 2008-2012 giving the possibility to know better the Baia Mare microclimate.

Keywords: hydrometeorological conditions, Baia Mare microclimate, data processing software

1. INTRODUCTION

The meteorology with its relative applications in different domain of interest has made strong progress over the last decade at the European and worldwide level. In these conditions appear new modelling tools, processing methodologies and observational data, all these being affected by the application of information systems and environmental sciences. The recent European efforts in developing a platform for e-science provide an ideal basis for the sharing of complex meteorological data sets and tools.

Since May 2008 at the North University Centre from Baia Mare is running an Oregon Scientific WMR 100 type weather station which follows continuously the weather conditions from the interurban region of the city [2]. The variables which are measured by this weather station are various, starting from the basic temperature and humidity to a more complex heat index, rain, wind and others [2].

The most important value measured is the temperature because these influences the human condition in the first time and according to this the weather station is set to record automatically this parameter minute by minute. The paper presents the evolution of the temperature during a the period May 2008 December 2012 [3]. We choose this period because of the accuracy of the data's recorded and because this period is the most illustrative since the weather station is functioning.

The data is represented detailed by seasons and the extremes are analyzed according to the cause which determined them, there is also

represented the evolution of this parameter during the whole period and the results are given graphically.

2. METHODOLOGIES, MATERIALS AND EQUIPMENTS USED

The discussion starts with a description of the system, that have been called meteorological station Oregon Scientific WMR-type 100, which operates in the North University Centre of Baia Mare - Technical University of Cluj-Napoca from May 2008, in order to identify and pinpoint the shared attributes of this system and other specific aspects. The weather station considered is used for continuous monitoring of weather conditions and weather data in order to create a specific hydro meteorological database.

Fig. 1. The Oregon Scientific weather station

The purpose of this relative long monitoring activity of 5 years is to continue to issue monthly and annual reports on weather and hydro meteorological conditions, which are useful in environmental and socio-economic projects, or to describe and understand the urban microclimate (for our case, the Baia Mare microclimate).

Regarding the positioning of the weather station, this station was placed on the roof of the North University Centre of Baia Mare and is located at an altitude of 250 m.

The main console is located in an office on the 7th floor of the building and placed in the same proceeding with a PC connection [2].

Oregon Scientific Weather Station WMR 100 is a professional weather station equipped with a rotating central control system which facilitates immediately access to information on the console.

This unique console includes a sensor that registers the temperature and humidity, also the weather station measures a broad spectrum of meteorological variables and allows wireless connection of 10 different types of sensors along the sensors included in the console.
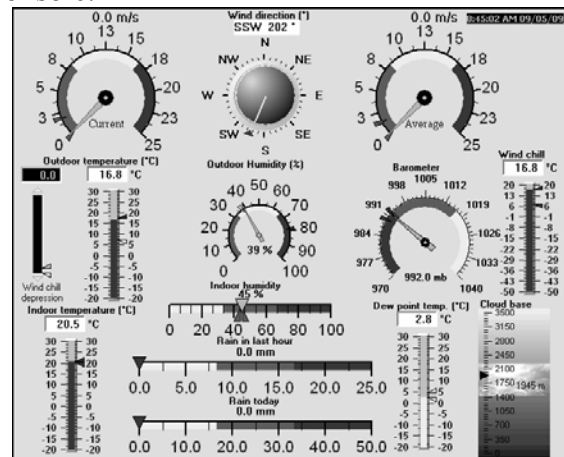

Fig. 2. The Oregon Scientific Weather Display® software interface

Weather station equipment includes a full outdoor sensor consisting of a thermo-hygrometer, an anemometer with vane, a rain gauge and a barometer. Console base is provided with an atomic clock that adjusts itself automatically.

Data processing can be done in several ways, depending on the urgency and need for information [2]; in this case the fastest processing software offers a computer programme which is used for recording data arrays, Weather Display®, besides providing information on current weather conditions and monthly and annual reports. Weather Display Software® files are created in a so-called "diary", containing all the data recorded by the meteorological station in the rough.

3. WORK METHOD, RESULTS AND DISCUSSIONS

Information obtained from the meteorological station is stored as strings of data. These strings of data as type of

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environmental information containing information on atmospheric parameters, with a frequency of one digit per minute, allow their interpretation with high precision and getting a detailed picture of the weather conditions.

Table 1. *The averages for the month in Baia Mare urban area (December 2012)*

Average temperature	3.0°C
Average humidity	66%
Average dew point	3.2°C
Average barometer	1011.0 mb
Average wind speed	0.6 m/s
Average gust speed	0.8 m/s
Average direction	340° (NNW)

Strings of data can be stored in the computer system of gross state indefinitely, given the small size of these files, or can be processed and interpreted. If a clearer picture of the meteorological parameters is needed,

then the data can be processed by using Microsoft Excel.

For a calendar month, a log files containing 43.000 rows of data with values for the following parameters: temperature, relative air humidity, atmospheric pressure, wind speed and precipitations [3].

In the present paper we use Surfer - powerful contouring, gridding, and 3D surface mapping software for scientists and engineers.

Surfer's sophisticated interpolation engine transforms your XYZ data into publication-quality maps. Surfer provides more gridding methods and more control over gridding parameters, including customized variograms, than any other software package on the market. Virtually all aspects of your maps can be customized to produce exactly the presentation you want. Generating publication quality maps has never been quicker or easier; so not only the hydrologists, engineers, geologists, archaeologists, oceanographers, biologists, geophysicists, medical researchers and climatologists see G.S. Surfer as a great potential application in their activities.
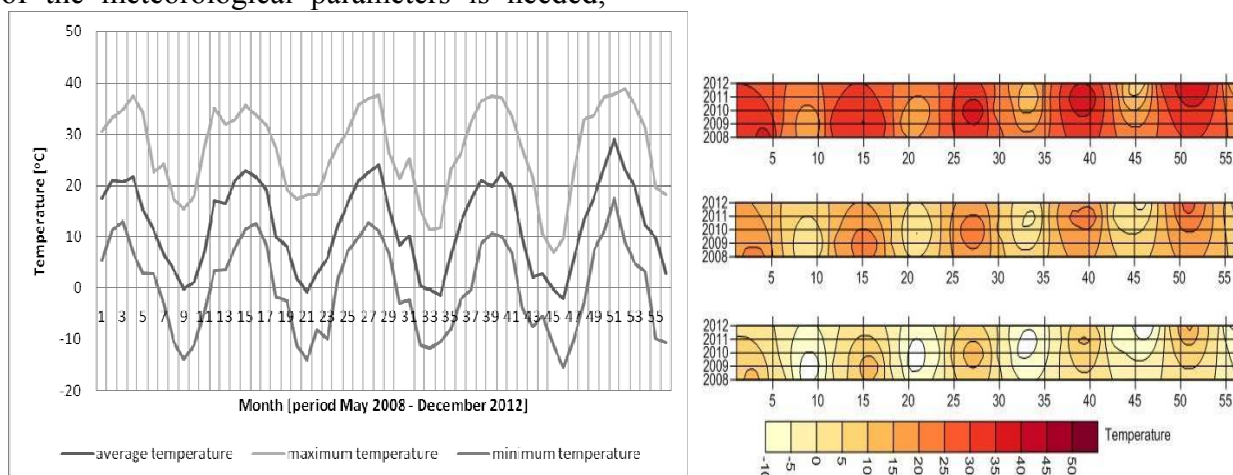

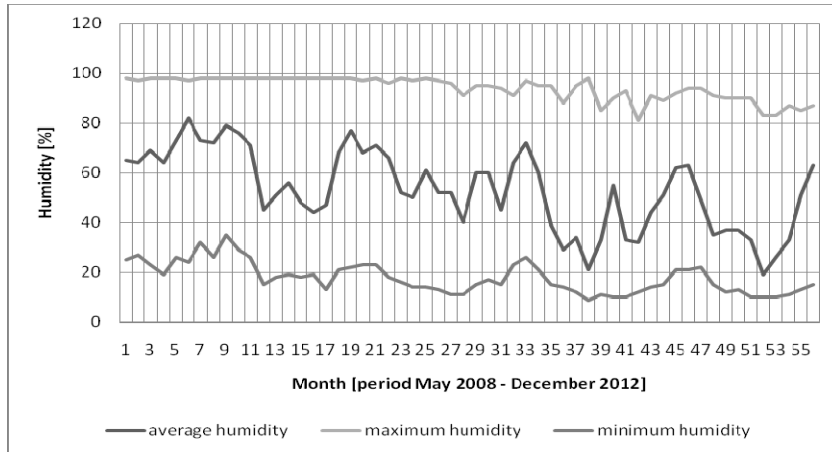**Fig. 3.** *The evolution of Baia Mare urban area temperature (May 2008-December 2012)*

Fig. 4. *The evolution of Baia Mare urban area air humidity (May 2008-December 2012)*
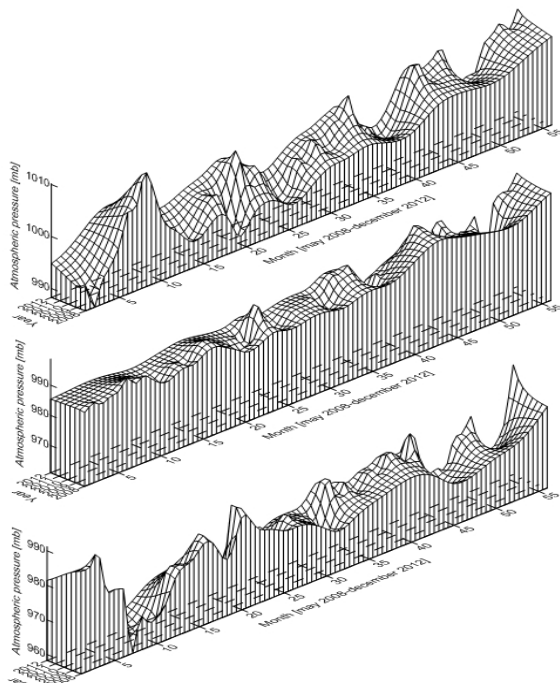

Fig. 5. *The evolution of atmospheric pressure (May 2008-December 2012)*

4. CONCLUSIONS

The perspective of Environmental Information Systems (EISs) especially in solving many environments problems in accordance with this work paper - prediction, prognoses, modeling and simulation models for evolution and dynamics of hydro meteorological conditions presented in Baia Mare urban area, brings the idea that all this aspects must be integrated with the environmental information elements related to sustainable development of local and regional communities. Meteorologists, hydrologists and engineers have long recognized the value of hydro meteorological data [1] and more importantly the application and analysis innovative methods for meteorological data.

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