

Assessment of the seasonal forecast for the summer season 2012 in Bulgaria

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1. Introduction

1.1 Regular seasonal forecast

The National institute of meteorology and hydrology (NIMH) is the national weather service of Bulgaria. We have been producing regular seasonal forecast for our country since 2005. It is updated once a month at the end of the month as soon as all forecast materials become available. It is based on subjective analysis of the map products from the numerical climate prediction models of the following centers:

European center for medium range weather forecast, Reading, UK;

MetOffice, Exeter, UK;

National center for environmental prediction, USA;

International research institute, Columbia University, USA;















Beijing climate center, China;

Tokyo climate center, Japan;

and the statistical prediction models of the Italian institute of biometeorology Ibimet and the Tokyo climate center. All these materials are available on the websites of the centers.

1.2 Explanations

The categories “above normal”, “around normal”, and “below normal” by definition have an equal probability of occurrence of 33.3%. The aim of the seasonal forecast is to favor one or two of the three categories based on the analysis of all available forecast materials and assessment of the evolution of large climate structures for the upcoming months. We consider Bulgaria as a region that is relatively small compared to the spatial uncertainties of the modern seasonal forecasting materials. That is why we give a unique forecast valid for the entire country without detailing for different regions except occasionally and only for the first month based on analysis of the medium range weather forecast. The forecast is summarized in tables with the favored categories in color as follows:

	warm		wet
	warm to normal		wet to normal
	normal		normal
	cold to normal		dry to normal
	cold		dry
	not available		not available
	all categories are likely		all categories are likely

We call “season” any three-month period which corresponds to the way the numerical seasonal forecast products are provided by the centers. The name of a season is constructed by the first letters of the names of the months in the three-month period. For example JJA=June-July-August.

The regular seasonal forecast is available to the public on the website of the institute (<http://info.meteo.bg/>) though only in Bulgarian language.

2. Verification of the most recent summer forecast

In order to quantify the seasonal forecast in terms of categories below, around, and above normal we do the following. Since we give a unique forecast for the expected category for the entire country we need to have a unique assessment of the category of a given month or season. The assessment of the category is based on data from 20 meteorological stations distributed evenly in the country. The data from each of those 20 stations are analyzed. These are records of mean monthly temperature and monthly amount of precipitation from 1950 to present. The percentiles for below, around, and above normal are found for each station based on the latest possible 30-year period 1980-2009. This period is chosen in order to match the base periods of some if not all of the climate centers producing probability map. This reference period is also more suitable to give monthly or seasonal category that would correspond better to the perception of the public. This should be especially true for the thermal category because of the recent overall warming trend. The months and seasons therefore can be attributed a certain category numbered from -2 (below normal) to +2 (above normal). These numbers for all 20 stations and for each individual month or season are then averaged in order to produce a unique category number for the entire country. The forecast itself is also attributed a number that reflects the forecast category. The numbers are -2 (below normal), -1 (below or around normal), 0 (around normal), +1 (above or around normal), and +2 (above normal). In order to assess the skill of our forecast we find the difference between the forecast and the real category. If it is within ± 0.5 we consider that the forecast is excellent (4), within ± 1.0 – very good (3), within ± 1.5 – good (2), and above it is considered to be poor (0). If there is no given preference to any of the three categories we attribute score (1) reasonable, because at least the forecast is not misleading.

Figure 1: Score of the seasonal forecast of mean seasonal temperature for the summer season 2012 in Bulgaria.

2012 г.	Month season	Forecast			Index	Score		
		-1	-2	-3		-1	-2	-3
Temperature	Summer	1	1	1	2.00	3	3	3
	June	1	1	0	2.00	3	3	0
	July	1	0	0	2.00	3	0	0
	August	1	0	0	1.89	3	0	0

Figure 2: Score of the seasonal forecast of seasonal amount of precipitation for the summer season 2010 in Bulgaria.

2012 r.	Month season	Forecast			Index	Score		
		-1	-2	-3		-1	-2	-3
Precipitation	Summer	0	0	0	-1.64	0	0	0
	June	0	0	0	-1.19	2	2	2
	July	0	0	0	-1.48	2	2	2
	August	0	1	0	-0.67	3	0	3

In Fig.1 and 2 we give our regular seasonal forecast for the summer season JJA 2012 issued in March (Month-3), April (Month-2), and May (Month-1) 2012 and for the individual months of the summer season issued back to 3 months before the forecast one. The column “Index” gives the assessment of the month or the season based on real data.

The mean seasonal temperature forecast is very good. The temperature forecast month by month improves as the month approaches and the last-issued monthly forecast is very good too. The seasonal precipitation amount forecast is not good. The summer season 2012 is dry almost everywhere while it was forecast to be near normal. However the month by month precipitation forecast is good because none of the three months was very dry and the countrywide index for precipitation remained above -1.5 which makes the forecast good in most cases. The overall score of the forecast for the summer season is “good”.

However the forecast for Bulgaria as issued in the final statement of the online SEECOF-7 is rather excellent. It says that the summer 2012 in Bulgaria should be warm and dry or with precipitation near normal which is exactly the status of the season.

Figure 3, 4, and 5 provide maps of the departure of the monthly mean temperature from the norm (1961-1990) (left) and monthly amount of precipitation in percent of normal (1961-1990) (right) for the summer months June (Fig.3), July (Fig.4), and August 2012 (Fig.5). The maps are regular operational products of the Bulgarian weather service and are therefore given with reference to norms based on the period 1961-1990 as with the WMO recommendations. The maps for August are more detailed than those for June and July because the production system moved to higher resolution at that month.

Figure 3: Departure of the monthly mean temperature from the norm (1961-1990) (left) and monthly amount of precipitation in percent of normal (1961-1990) (right) for June 2012.

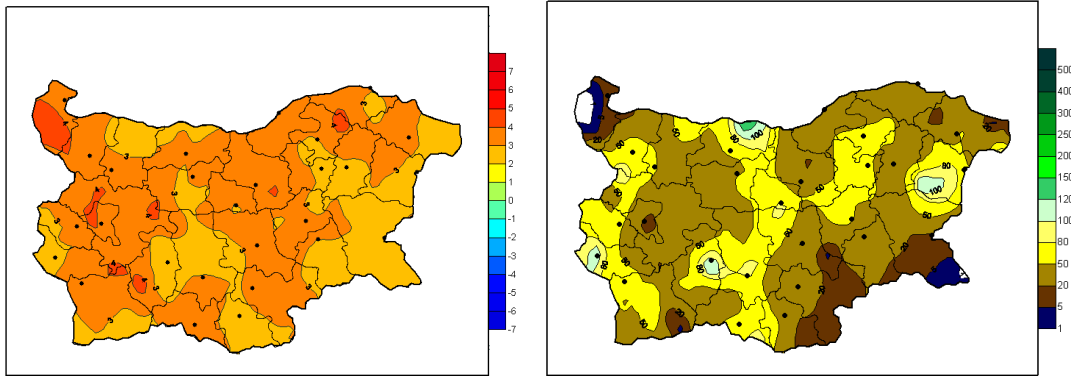


Figure 4: Departure of the monthly mean temperature from the norm (1961-1990) (left) and monthly amount of precipitation in percent of normal (1961-1990) (right) for July 2012.

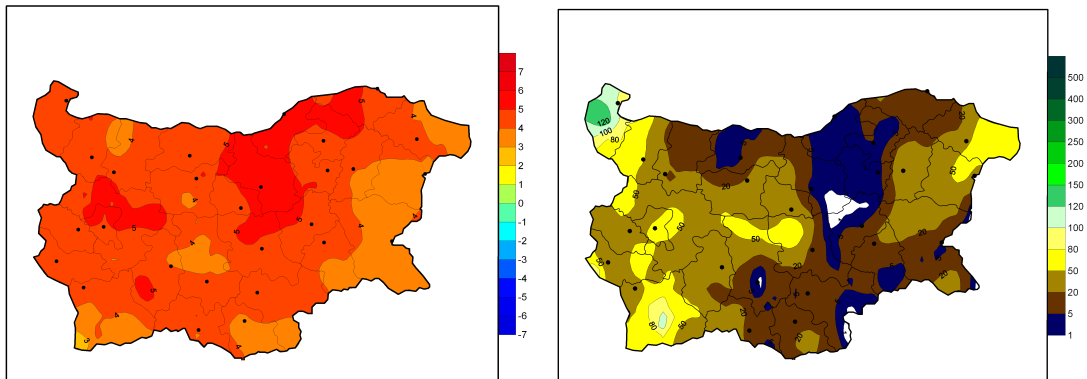
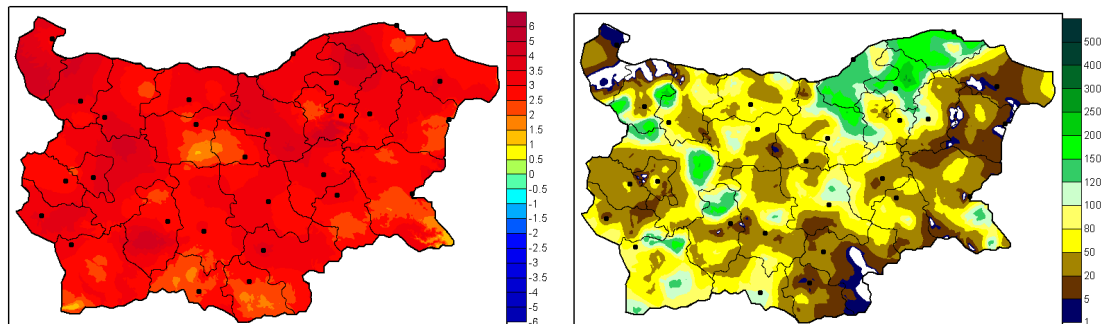


Figure 5: Departure of the monthly mean temperature from the norm (1961-1990) (left) and monthly amount of precipitation in percent of normal (1961-1990) (right) for August 2012.



3. Extreme events

In terms of mean seasonal temperature, summer 2012 is the warmest since 1950. It is valid for most of the 30 stations that are monitored for the purpose of seasonal forecast. For example in Sofia (synoptic station numbered 15614), the previous highest mean seasonal temperature for summer season JJA was in 2003 (22.0°C). This summer it is 23.3°C. For most of the stations, the previous warmest summer was either 2007 or 2003. For example Vidin (15502) in summer 2007 the mean seasonal temperature is 24.3°C and this summer it is 25.0°C. For a very few of the stations, the warmest summer dates back to 1950 or 1952. For example, Blagoevgrad (15611) in 1950 the mean seasonal summer temperature is 24.2°C and this summer it is 24.9°C.

There are no beaten absolute maximum temperature records.

The same analysis is valid for the month of July. For most of the monitored stations in this review, it is the warmest month in terms of mean monthly temperature at least since 1950. In Sofia, the previous warmest month of July was in 2007 with mean monthly temperature 23.7°C while this summer it is 25.0°C.

The month of June was also among the warmest ever measured since 1950. However the mean monthly temperature is record high only in about a third of the monitored stations. In Sofia, the previous warmest month of June was in 2003 with mean monthly temperature 21.3°C while this summer it was 21.8°C.

There are no beaten monthly absolute maximum temperature records for June and July.

The month of August also falls in the top 15%-percentile category for most of the stations but there are no records of mean monthly temperature. There are however beaten monthly absolute maximum temperature records for August in a couple of secondary stations by about 1°C or so on 7 August 2012. For example Sevlievo (43.3°C), Svishtov (41.2°C), Dobrich (38.7°C) in North Bulgaria and Radnevo (41.3°C), Sadovo (41.6°C) in South Bulgaria. In a couple of other stations the monthly absolute maximum temperatures for August have been reached but not exceeded.

References:

Monthly bulletin of the National institute of meteorology and hydrology, Sofia, Bulgaria. Latest issue available online (<http://www.meteo.bg/sites/storm.cfd.meteo.bg.meteo/files/Bulletin.pdf>) and older issues available on demand.

Seasonal forecast fo Bulgaria. Latest issue available online (<http://www.meteo.bg/en/node/58>).