The seasonal forecast for winter 2013/14 in Bulgaria

Ilian Gospodinov
National institute of meteorology and hydrology, Bulgaria
ilian.gospodinov@meteo.bg
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1. Verification of the seasonal forecast for winter 2013/14

Tables 1 and 2 show the regular Bulgarian seasonal forecast for the winter season DJF 2013/14 issued in September (Month-3), October (Month-2), and November (Month-1) 2013 and for the individual months of the winter season issued back up to 3 months prior to the forecast one. The column "Index" gives the assessment of the month or the season based on real data.

Table 1: Scores of the seasonal forecast of mean seasonal temperature for winter 2013/14.

	Forecast				Score		
Temperature	Month-1	Month-2	Month-3	Index	Month-1	Month-2	Month-3
December	-1	1	1	-0.69	4	0	0
January	0	0	-1	1.40	4	2	0
February	0	1	1	1.40	2	4	4
Winter		0	0	1.42	1	2	2

Table 2: Scores of the seasonal forecast of seasonal amount of precipitation for winter 2013/14.

	Forecast				Score		
Precipitation	Month-1	Month-2	Month-3	Index	Month-1	Month-2	Month-3
December	1	-1	-1	-1.90	0	3	3
January	0	-1	0	0.86	3	0	3
February	1	0	0	-1.58	0	0	0
Winter		0	0	-1.31	1	2	2

In average the forecast for temperature scores 2.08 which is good and there are only 3 bad hits out of 12. The seasonal precipitation amount forecast in average scores 1.4 which is reasonable. There are 5 bad hits out of 12.

The national seasonal forecast followed roughly the SEECOF-10 and the MedCOF-1 guidelines and the discussions above apply for the assessment of the regional forecast as far as it concerns Bulgaria. The MedCOF-1 and SEECOF-10 forecast for winter 2013/14 for the region of Bulgaria was for normal or no signal for both mean seasonal temperature and seasonal amount of precipitation.

Since 2012 the forecast contains an additional sentence that presents an attempt to predict how the upcoming season or month is expected to compare to the same one from the previous year. For this winter it was said that the season should be similar to winter

2012/13 or colder and with less precipitation. The winter of 2012/13 was warm or normal (0.69) and wet (1.83). Winter 2013/14 therefore was indeed similar to winter 2012/13 in terms of temperature (1.42) and with less precipitation (-1.31).

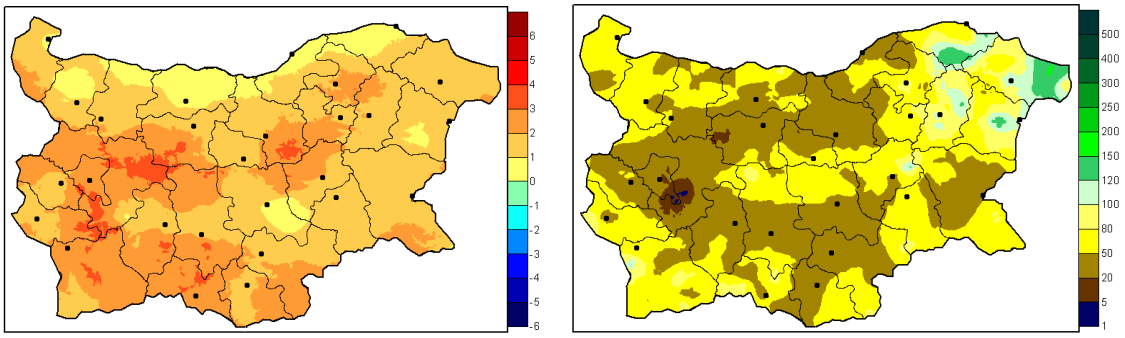

Figure 1: Departure of the seasonal mean temperature from normal (1961-1990) (left) and seasonal amount of precipitation in percent of normal (1961-1990) (right) for winter (December-January-February) 2013/14.

Figure 1, 2, 3, and 4 show maps of the departure from normal (1961-1990) of the seasonal/monthly mean temperature (left) and the seasonal/monthly amount of precipitation in percent of normal (1961-1990) (right) for the winter season as a whole (Fig. 1) and the individual months of December 2013 (Fig.2), January 2014 (Fig.3), and February 2014 (Fig.4). The maps are regular operational products of the Bulgarian weather service and are therefore given with reference to normal based on the period 1961-1990 as with the WMO recommendations.

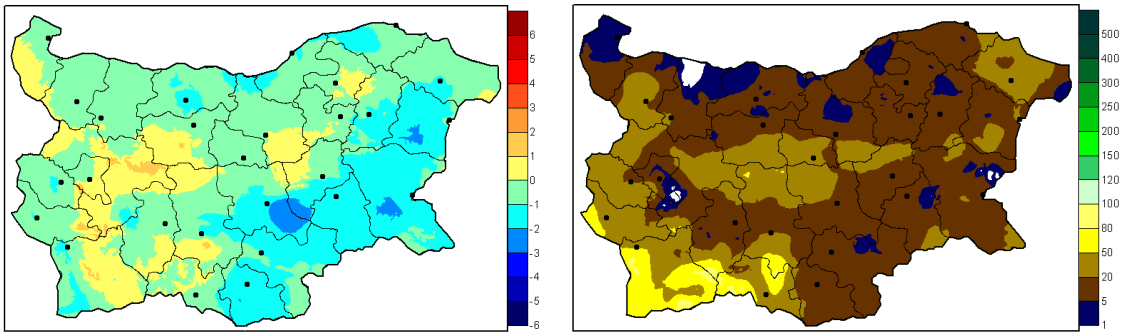

Figure 2: Departure of the monthly mean temperature from normal (1961-1990) (left) and monthly amount of precipitation in percent of normal (1961-1990) (right) for December 2013.

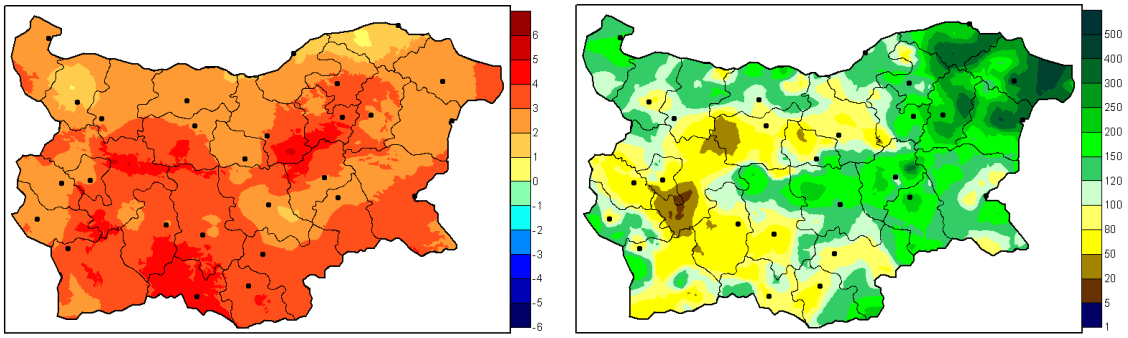

Figure 3: Departure of the monthly mean temperature from normal (1961-1990) (left) and monthly amount of precipitation in percent of normal (1961-1990) (right) for January 2014.

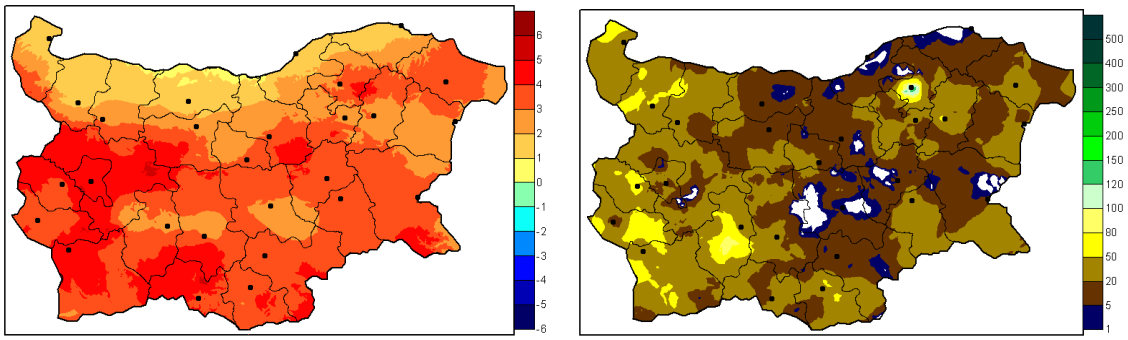

Figure 4: Departure of the monthly mean temperature from normal (1961-1990) (left) and monthly amount of precipitation in percent of normal (1961-1990) (right) for February 2014.

2. Extreme events

Dry weather in December led to fire-likely conditions which are unusual for the month. There were indeed a couple of wild fires in the western part of the country at the end of December. January was twofold. There was dry and foggy weather in the first half of the month. Long-lasting fog in the lowlands led to hazardous conditions on the roads. The last week of the month was marked by dynamic conditions with the passage of two Mediterranean cyclones. Those led to snowfall in almost the entire country. The northeastern region experienced the most severe weather with snow blizzards and snow depth between 30 and 80 cm. A couple of municipalities in the region declared emergency status on 27-30 January. February was rather warm with maximum temperatures in the middle of the month flirting with the highest ever measured in February. Dermantsi, in north-central Bulgaria, reported maximum temperature of 25.2ºC on 17 February. The accumulated snow in the mountains at the end of the season was below normal. However the wet month of March helped to compensate the shortage to some extend.

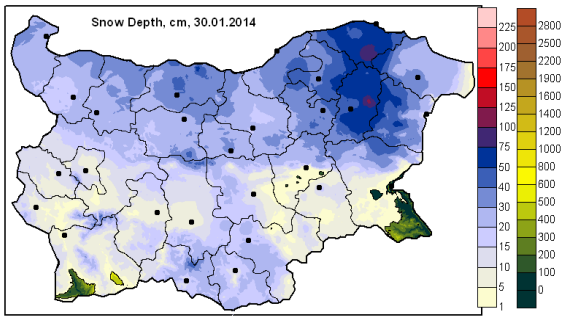

Figure 5: Snow depth, 30 January 2014. Left scale: snow depth (cm); right scale: altitude (m)

3. Explanations

3.1 Regular seasonal forecasting in Bulgaria

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.

3.2 Notation rules

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:

We call “season” any three-month period which corresponds to the way the numerical seasonal forecast products are provided by the centers. However since 2011 the seasonal forecast is published only for the calendar season winter, spring, summer, and autumn.

The regular seasonal forecast is available to the public on the website of the institute though only in Bulgarian language.

3.3 Verification rules

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.

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 for Bulgaria. Latest issue available online (http://www.meteo.bg/en/node/58).