The seasonal forecast for winter 2014/15 in Bulgaria

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20 April 2015, Sofia

1. Verification of the seasonal forecast for winter 2014/15

Tables 1 and 2 show the regular Bulgarian seasonal forecast for the winter season DJF 2014/15 issued in September (Month-3), October (Month-2), and November (Month-1) 2014 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 2014/15.

	Forecast				Score		
Temperature	Month-1	Month-2	Month-3	Index	Month-1	Month-2	Month-3
December	0	1	1	1.00	3	4	4
January	1	1	1	1.44	4	4	4
February	0	1	0	0.60	3	4	3
Winter	1	1	1	1.64	3	3	3

Table 2: Scores of the seasonal forecast of seasonal amount of precipitation for winter 2014/15.

	Forecast				Score		
Precipitation	Month-1	Month-2	Month-3	Index	Month-1	Month-2	Month-3
December	0	-1	0	1.93	0	0	0
January	0	1	0	0.02	4	3	4
February	0	1	-1	1.70	0	3	0
Winter	0	0	0	1.85	0	0	0

In average the forecast for temperature scores 3.5 which is excellent and there are no bad hits. In average the seasonal precipitation amount forecast scores 1.17 which is reasonable. However there are 8 bad hits out of 12.

The national seasonal forecast followed roughly the SEECOF-12 and the MedCOF-3 guidelines and the discussions above apply for the assessment of the regional forecast as far as it concerns Bulgaria. The MedCOF-3 and SEECOF-12 forecast for winter 2014/15 for the region of Bulgaria was for near or above normal mean seasonal temperature and seasonal amount of precipitation near normal or no signal.

The Bulgarian seasonal 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 2013/14 in terms of temperature but with more precipitation. The winter of 2013/14 was warm or normal (1.42) and with precipitation near or below normal (-1.31). Winter 2014/15 therefore was indeed similar to winter 2013/14 in terms of temperature (1.64) and with more precipitation (1.85).

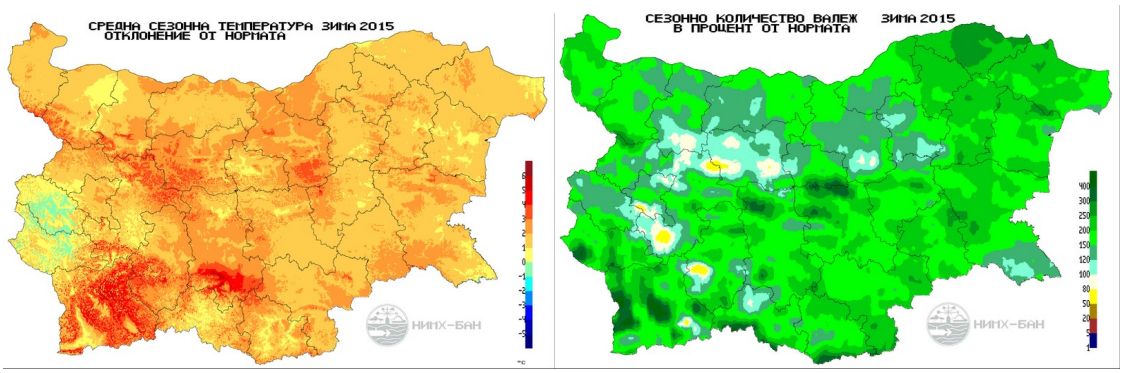


Figure 1: Departure of the seasonal mean temperature from normal (1961-1990) (left) and seasonal amount of precipitation in percent of normal (1961-1990) (right) for winter (December-January-February) 2014/15.

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 2014 (Fig.2), January 2015 (Fig.3), and February 2015 (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.

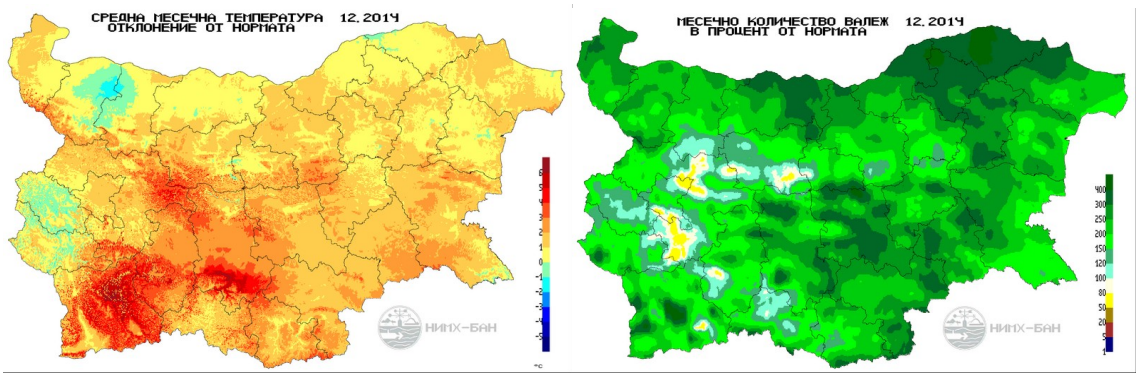


Figure 2: Departure of the monthly mean temperature from normal (1961-1990) (left) and monthly amount of precipitation in percent of normal (1961-1990) (right) for December 2014.

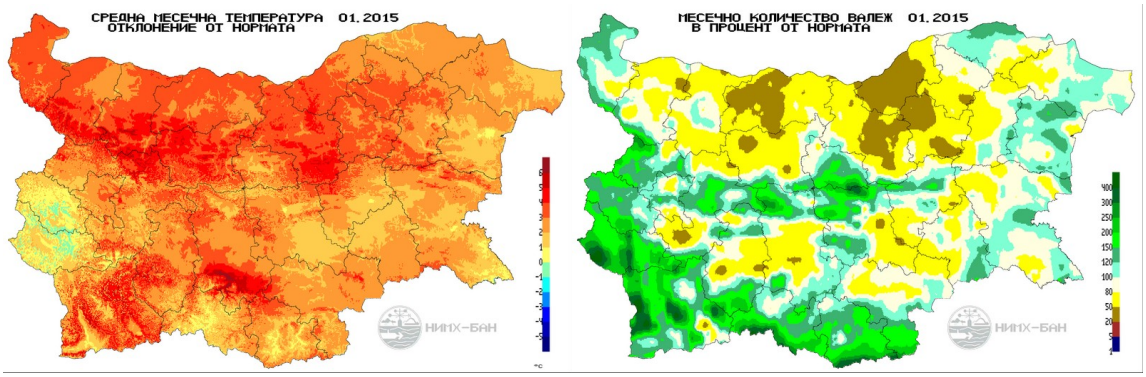


Figure 3: Departure of the monthly mean temperature from normal (1961-1990) (left) and monthly amount of precipitation in percent of normal (1961-1990) (right) for January 2015.

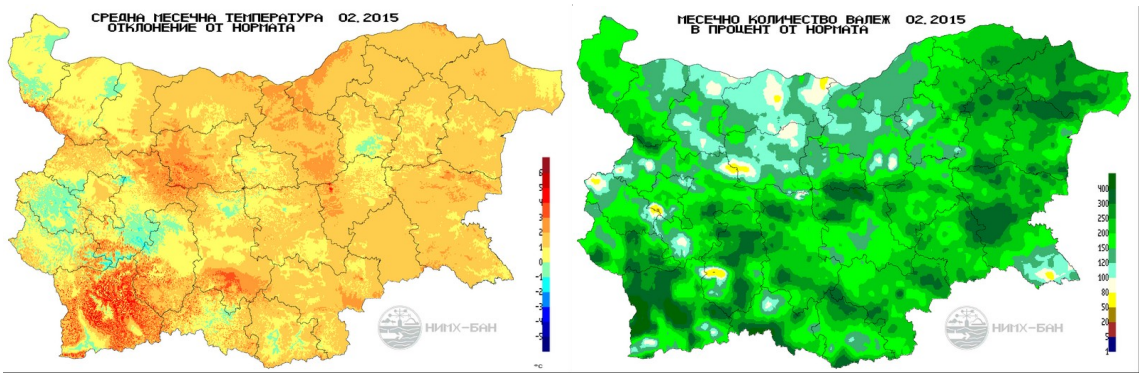


Figure 4: Departure of the monthly mean temperature from normal (1961-1990) (left) and monthly amount of precipitation in percent of normal (1961-1990) (right) for February 2015.

2. Extreme events

1-5.12.2014: Heavy icing grasped the northwestern part of the country due to prolonged period of ground temperature slightly below 0ºC in a thin layer of cold air, trapped in the western bottom of the Danube Plain, and precipitation in the form of rain or sleet. There were damaged electric infrastructure and unusable roads.

5-9.12.2014: Prolonged period of rain in the south and snow in the north bring problems in many part of the country. The rain in the south combined with the water saturated ground led to river overflow near the border with Turkey.

31.01-03.02.2015: Big rain event hit again the south with 24-hour precipitation amounts exceeding 100 mm. Overflow of rivers caused damage.

3. Explanations

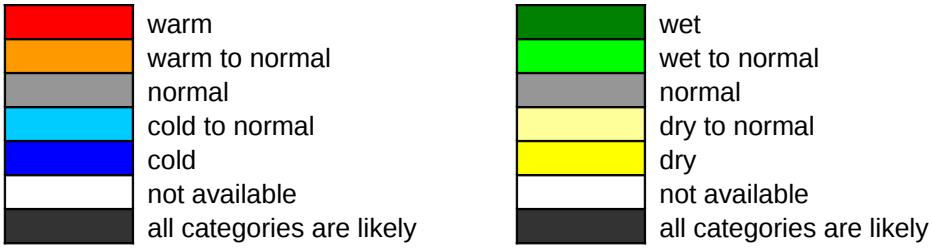
3.1 Regular seasonal forecasting in Bulgaria

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;
MeteoFrance;
Tokyo climate center, Japan.

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).