VERIFICATION OF THE SEECOF -13 WINTER 2015/2016 CLIMATE OUTLOOK FOR REPUBLIC OF REPUBLIC OF MACEDONIA COMPARED TO THE 1981-2010 BASE PERIOD

Hydrometeorological Service of Republic of Macedonia prepares regular seasonal climate analysis, based on the products of SEECOF seasonal forecasts and the forecast from the SEEVCCC. The present analysis is for the winter 2015/2016, December 2015, January and February 2016, and it is based on the means of the climatological period 1981-2010.

➢ WINTER 2015/2016

Overall conditions in Republic of Macedonia this winter season exceed from the long term average 1981-2010. During winter 2015/2016, the mean air temperature ranged between 1.2°C in Mavrovo and 7.4°C in Gevgelija. Spatial distribution of the mean seasonal air temperature is shown on Figure1. The mean air temperatures anomaly was slightly above normal. This anomaly from the normal 1981-2010 base period, during winter 2015/2016 ranged from 0.1°C in Ohrid to 1.7°C in Stip and Demir Kapija (Figure2).

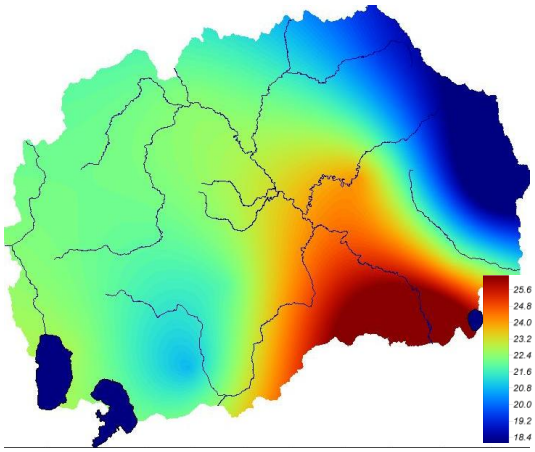

Figure 1: Spatial distribution of the mean seasonal air temperature (°C) during winter 2015/2016

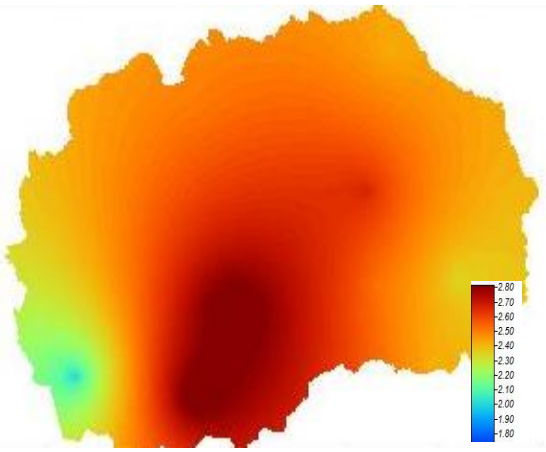

Figure 2: Mean seasonal air temperature anomaly (°C) compared to the period 1981-2010 during winter 2015/2016

According to percentile calculation method, the whole territory was classified as very warm to extremely warm. The south part was classified as very warm, while the rest of the territory was with extremely warm characteristics (Table1). Concerning the percentile method for the maximum temperatures, it is necessary to mention that it was categorized as extremely warm in all parts of the country, while the minimum temperatures were categorized as warm to very warm.

The highest daily air temperature during winter 2015/2016 was measured 24.3°C observed on 15th of February in Skopje. The lowest air temperature during winter 2015/2016 was measured -21.8°C observed on 24th of January in Berovo.

Rainfall totals were very variable for this winter season. Spatial distribution of the precipitation sums is shown on Figure 3 and the anomaly compared to 1981-2010 base period on Figure 4.

The wettest day was 7th of January in Mavrovo with 51.6mm.

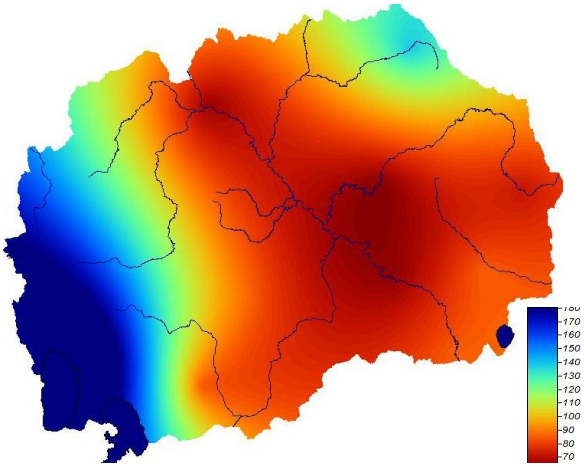

Figure 3: Spatial distribution of the precipitation sums (mm) during winter 2015/2016

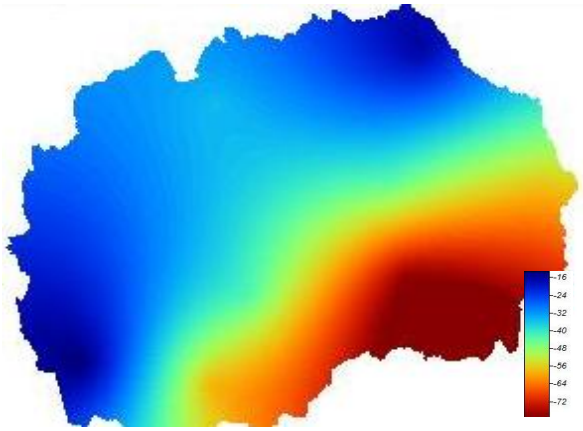

Figure 4: Spatial distribution of the precipitation sums anomaly (mm) during winter 2015/2016

According to percentile calculation method the territory of Republic of Macedonia was classified as very dry to normal (Table1).

Meteorological station	Temperature	Precipitation
Berovo	extremely warm	very dry
Kriva Palanka	extremely warm	normal
Stip	extremely warm	dry
Strumica	very warm	dry
Demir Kapija	very warm	very dry
Gevgelija	extremely warm	dry
Skopje	extremely warm	dry
Prilep	extremely warm	normal
Bitola	very warm	very dry
Ohrid	extremely warm	normal

Table1: Air temperature and precipitation classification in Republic of Macedonia for winter 2015/2016 using percentile method compared to 1981-2010 base period

The values of distribution of tercile for the air temperature and the precipitation sums for this season are shown in table 2 and 3, respectively.

Air Temperature (°C)	2015/2016	1981-2010	
		33	67
Berovo	2.1	-1.2	0.6
Kriva Palanka	3.3	0.4	1.4
Stip	5.1	1.8	3.2
Strumica	4.6	1.4	3.2
Demir Kapija	5.6	2.3	4.1
Gevgelija	7.4	4.5	5.6
Skopje	4.5	1.6	2.7
Prilep	4.3	0.5	2.3
Bitola	3.9	-0.5	2.0
Ohrid	4.6	3.1	3.1

Table 2: Values of distribution of tercile for temperature for period 1981-2010

Precipitation sums (mm)	2015/2016	1981-2010	
		33	67
Berovo	71.4	109.5	662.9
Kriva Palanka	137.5	106.9	665.4
Stip	61.1	71.3	500
Strumica	84.8	120.9	602.8
Demir Kapija	63.3	125.7	597.7
Gevgelija	84.5	111.8	776
Skopje	64.2	87.5	521.6
Prilep	88.8	80.5	531.7
Bitola	84.2	145	675.7
Ohrid	229.6	178.8	749.9

Table 3: Values of distribution of tercile for precipitation for period 1981-2010

The SEECOF-13 forecast for the mean temperatures for winter season put Republic of Macedonia in a zone 1, which means to have higher probability of exceeding the above-average conditions (Figure 5). Forecast for the precipitation for DJF 2015/2016 categorized our country in zone 2 (Figure6). Zone 2 is with high uncertainties, probabilities for below-, near-, or above-average conditions are approximately equal.

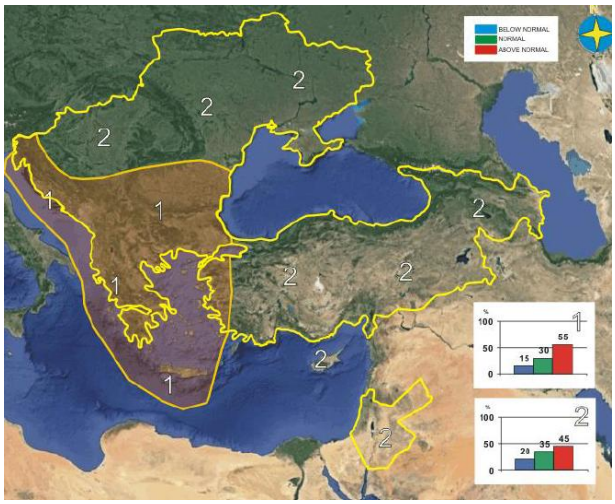

Figure 5: Graphical presentation of the winter 2015/2016 temperature outlook

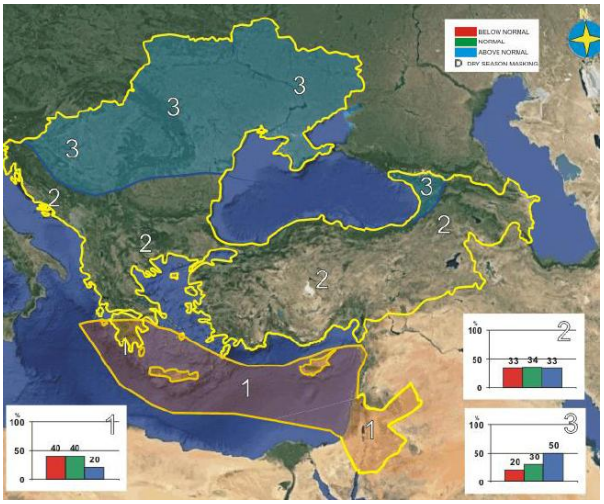

Figure 6: Graphical presentation of the winter 2015/2016 precipitation outlook

➢ DECEMBER 2015

Nearly all stations reported mean temperatures for December above long term average, the majority with differences around 0.8°C. Mean monthly maximum temperatures were measured above long term average for all meteorological stations in Republic of Macedonia, with difference from 0.6°C to 4.4°C. The difference of the mean monthly minimum temperatures from normal value is from -1.3°C to 0.5°C. The absolute temperature range is from -14.1°C in Mavrovo to 18.7°C in Gevgelija.

For the whole December, there were not measured precipitations.

The forecast from the Southeast Europe Virtual Center for Climate Change in Serbia for December 2015 was partly efficient for temperature and it was efficient for the precipitation (Figure 7 and 8).

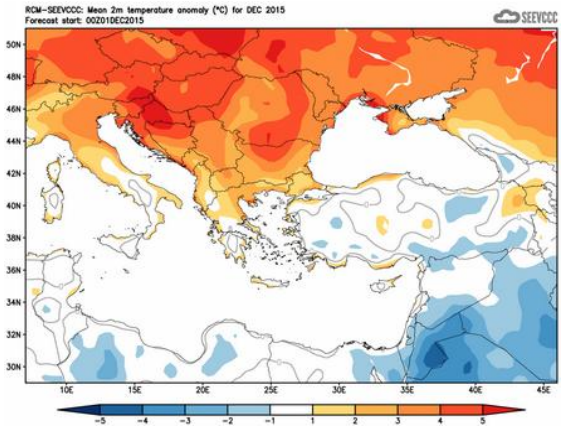

Figure 7: Divergence of the mean monthly temperature (°C) from the normal 1981-2010 in December

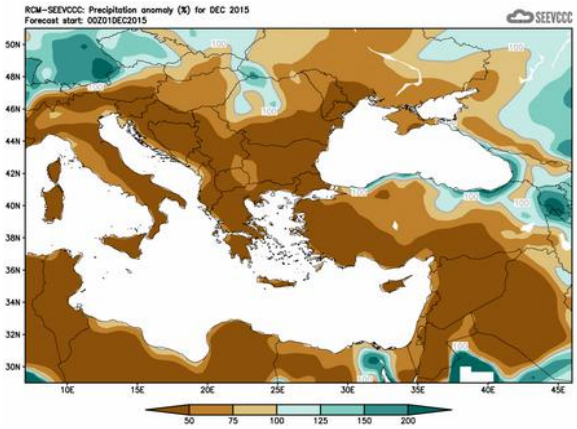

Figure 8: Percentage of the mean monthly precipitation (%) from the normal 1981-2010 in December

➢ JANUARY 2016

January was characterized as month with mean monthly temperature above the long term average from 0°C to 2.4°C. The absolute temperature range was from -21.8°C in Berovo to 20.0° in Gevgelija. Mean monthly maximum temperatures were above long term average from -0.1° to 3.6°C. The highest daily maximum temperatures were recorded at the end of the month. The mean monthly minimum temperatures can not be classified. The anomaly from the base period 1981-2010 was from -1.1°C in Berovo to 1.4° in Bitola. Absolute minimal temperature was measured in Berovo, -21.8°C.

The precipitation regime for the whole month showed amounts slightly above the long term average. Highest amount was 51.6mm measured in Mavrovo on 7th of January, with total

monthly sum precipitation 265.9mm, exceeded the historical value of the precipitation sum for this month.

The forecast from the Southeast Europe Virtual Center for Climate Change in Serbia for the month of January was efficient for temperature and for precipitation (Figure 9 and 10).

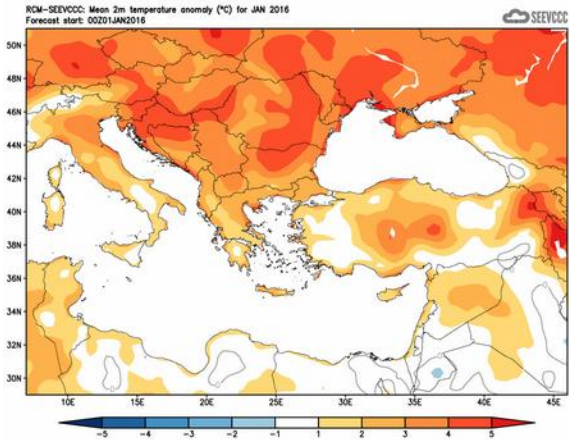

Figure 9: Divergence of the mean monthly temperature (°C) from the normal 1981-2010 in January

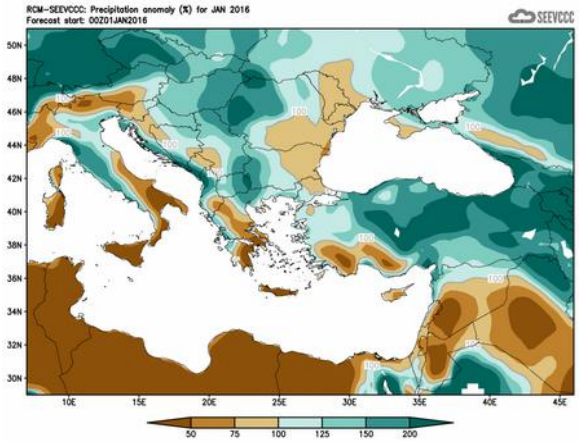

Figure 10: Percentage of the mean monthly precipitation (%) from the normal 1981-2010 in January

➢ FEBRUARY 2016

February was extremely warm month. It is characterized with positive difference from the long term average for the mean, maximum and minimum temperatures. The absolute temperature range was from -10.4°C in Mavrovo to 24.3°C in Skopje. Mean monthly temperature were above normal 1981-2010, from 5.0°C in Ohrid to 6.8°C in Bitola. Mean monthly maximum temperatures were above normal from 4.9°C in Berovo to 8.4°C in Bitola. The mean monthly minimum temperatures were also above the normal from 4.8°C in Strumica to 6.1°C in Mavrovo and Berovo. The temperatures measured in Skopje 24.3°C on 24th, in Kriva Palanka 22.0°C on 17th and in Berovo 21.7°C on 23th exceeded the historical values of the maximal temperatures for this month.

The precipitation regime was variable. Rainfall totals were higher with positive difference, except in the south and southeast part of the Republic. Extreme daily precipitation amount was measured in Mavrovo on 11th of February with 28.5mm.

The forecast from the SEEVCCC for the month of February was not efficient for temperature and partly for precipitation (Figure 11 and 12).

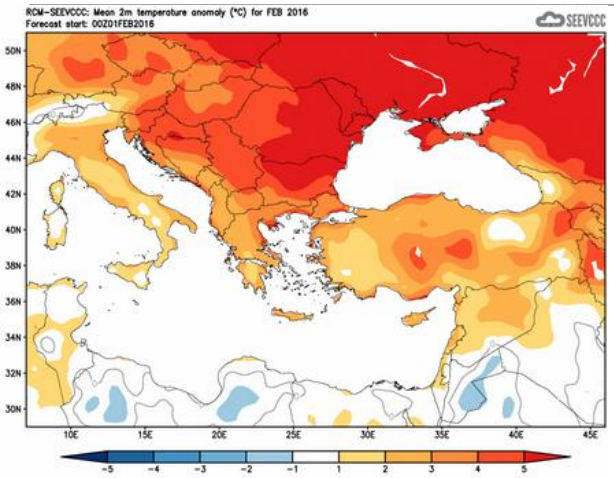

Figure 11: Divergence of the mean monthly temperature (°C) from the normal 1981-2010 in February

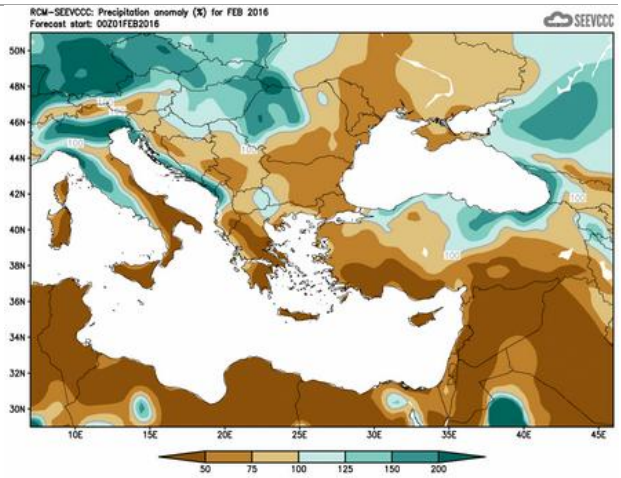

Figure 12: Percentage of the mean monthly precipitation (%) from the normal 1981-2010 in February

Find also below a table presenting the general anomalies of SEECOF products and extreme events of the recorded summer weather.

Country	Seasonal temperature (DJF)		Seasonal precipitation (DJF)		High Impact Events
	Observed	SEEVCCC climate outlook for temperature	Observed	SEEVCCC climate outlook for precipitation	
REPUBLIC OF MACEDONIA	Above normal	Above to near normal (20, 35, 45)	Below normal	No signal (33, 34, 33)	**December** No precipitations **January** Maximal sum of precipitation historically measured in Mavrovo 265.9mm **February** Unusually high air temperatures The maximal temperatures measured in Skopje 24.3°C on 24th, in Kriva Palanka 22.0°C on 17th and in Berovo 21.7°C on 23th exceeded the historical values for this month.