SEASONAL BULLETIN FOR SERBIA

Winter 2014/2015

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Winter 2014/15 was marked by warm and very rainy conditions in most of Serbia. Pozega observed the least number of frost days on record since the measurements began. One heat wave was registered in most of the country.

Analysis of the 2014/15 winter season for Serbia compared to the 1961-1990 base period

Temperature

The mean air temperature ranged from 0.9°C in Pozega to 4.2°C in Belgrade and in the mountainous regions from -3.5°C on Kopaonik to -0.5°C on Zlatibor (Figure 1).

The departure of the mean air temperature from the normal, for the 1961-1990 base period ranged from 0.9°C in Zajecar up to 2.6°C on Palic and Zrenjanin (Figure 2).

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1 Term normal refers to climatological standard normal, that is, the average value of a particular climate element, calculated for the period from January 1, 1961 to December 31, 1990.
According to the percentile method\textsuperscript{2}, the mean air temperature was in the following categories: warm in most of Serbia, normal in parts of eastern and western regions, very warm in northern parts of the country and extremely warm in northeastern Serbia (Figure 3).

According to the tercile method, the mean air temperature was in the warm category in the entire Serbia (Figure 4).

The highest daily air temperature during winter was registered in Zajecar, on December 24, measuring 19.1\textdegree C.

The number of ice days with the maximum daily air temperature below 0\textdegree C varied from 5 in Loznica and Belgrade to 13 days in Dimitrovgrad, and in the mountainous regions from 24 days on Zlatibor to 42 days on Crni Vrh and Kopaonik. The recorded number of ice days was 5 to 13 days less than the average for the winter season (Figure 5).

The lowest air temperature during winter was recorded in Sjenica on January 1, measuring -26.2\textdegree C.

\textsuperscript{2}n\textsuperscript{th} percentile of a variable refers to the value of the observed variable below which there is n percent of data previously arranged in an ascending order.
The number of frost days with the minimum air temperature below 0°C varied from 26 days in Belgrade to 57 days in Zajecar, and in the mountainous regions from 66 days on Zlatibor to 80 days on Kopaonik. The number of frost days was 7 to 28 days less than the average for the winter season (Figure 6). Pozega observed the least number of frost days on record since the measurements on that station began. The recorded number of frost days in Pozega this winter was 56 days compared to the previous record of 58 days registered in 1955.

The mean, maximum and minimum air temperature in Belgrade during winter was above the multiannual average. Below average temperatures were recorded at the end of December, beginning of January and the middle of February (Figure 7).

Three-month course of the mean daily air temperature for Belgrade, Zajecar and Kopaonik during winter 2014/15 is shown in Figures 8, 9 and 10.
Figure 7. Three-month course of the mean, maximum and minimum air temperature in Belgrade during winter 2014/15

Figure 8. Three-month course of the mean daily air temperature in Belgrade during winter 2014/15
Figure 9. Three-month course of the mean daily air temperature in Zajecar during winter 2014/15

Figure 10. Three-month course of the mean daily air temperature on Kopaonik during winter 2014/15
Heat and cold waves during winter 2014/15

During winter season, most of Serbia observed one heat wave\(^3\), whereas two heat waves were registered in Smederevska Palanka and Crni Vrh. At the majority of principal meteorological stations, heat wave was recorded in mid-January 2015. Negotin and Zajecar didn’t observe any heat waves during this winter season. The longest lasting heat wave was registered in Kikinda and Zrenjanin, with the duration of 13 days (Chart 1).

Chart 1.

<table>
<thead>
<tr>
<th>Location</th>
<th>December</th>
<th>January</th>
<th>February</th>
</tr>
</thead>
<tbody>
<tr>
<td>Belgrade</td>
<td>VV</td>
<td>VV</td>
<td>VV</td>
</tr>
<tr>
<td>Veliko Gradiste</td>
<td>VV</td>
<td>VV</td>
<td>VV</td>
</tr>
<tr>
<td>Smederevska Palanka</td>
<td>VV</td>
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<tr>
<td>Kraljevo</td>
<td>VV</td>
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<tr>
<td>Pozega</td>
<td>VV</td>
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<tr>
<td>Zlatibor</td>
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<tr>
<td>Kopaonik</td>
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<tr>
<td>Crni Vrh</td>
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<tr>
<td>Negotin</td>
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<td>VV</td>
<td>VV</td>
</tr>
<tr>
<td>Zajecar</td>
<td>VV</td>
<td>VV</td>
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</tr>
<tr>
<td>Heat wave</td>
<td>VW</td>
<td>EW</td>
<td>VW</td>
</tr>
<tr>
<td>Cold wave</td>
<td>VW</td>
<td>EW</td>
<td>VW</td>
</tr>
</tbody>
</table>

In the period from December 29 to January 2, the several principal meteorological stations (Belgrade, Veliko Gradiste, Smederevska Palanka, Kraljevo, Pozega, Zlatibor, Crni Vrh and Kopaonik) observed one cold spell\(^4\).

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\(^3\) Heat wave, according to the percentile method, is a period during which maximum daily air temperature is in the very warm and extremely warm categories for 5 days or longer

\(^4\) Cold wave, according to the percentile method, is a period during which minimum daily air temperature is in the very cold and extremely cold categories for 5 days or longer
Precipitation

The precipitation totals during winter in Serbia were within and slightly above the average compared to the normal for the 1961-1990 base period, ranging from 139.5 mm in Banatski Karlovac to 292.5 mm on Kopaonik. The precipitation sums compared to the normal were in a range from 103% in Banatski Karlovac up to 175% in Sombor (Figure 11).

According to the percentile method, precipitation sums during winter were in the rainy and very rainy categories in most of Serbia, and extremely rainy on Crni Vrh and Kopaonik (Figure 12).

According to the tercile method, precipitation sums were above the average in most of Serbia and within the average in Belgrade and Veliko Gradiste (Figure 13).

The maximum daily precipitation amount was registered in Vranje on February 7, amounting to 39.8 mm.

Figure 11. Spatial distribution of precipitation sums expressed in the percentages of normal during winter 2014/15

Figure 12. Assessment of the precipitation sums using percentile method during winter 2014/15 compared to the 1961-1990 base period
The number of days with precipitation of 1 mm and above, during winter, ranged from 23 days in Kikinda to 38 days on Kopaonik. The recorded number of days with precipitation of 1 mm and above was 11 days above the average for the winter season (Figure 14).

The number of days with the snow cover, in the low-lying areas, ranged from 12 days on Palic to 36 days in Dimitrovgrad. In the mountainous regions, the number of days with the snow cover ranged from 68 days in Sjenica to 86 days on Crni Vrh. The registered number of days with the snow cover was 10 to 30 days less than the average in most of the country during winter season (Figure 15). The maximum snow depth, reaching 117 cm was observed on Kopaonik on February 11.
Figures 16 and 17 show cumulative precipitation sums for Belgrade and Negotin per month compared to the average cumulative precipitation sums during winter.

Figure 16. Cumulative precipitation sums for Belgrade

Figure 15. Deviations of the number of days with snow cover during winter 2014/15
Figure 17. Cumulative precipitation sums for Negotin
Sunshine duration (insolation)

During winter, sunshine duration was within and slightly above the average in the entire Serbia, ranging from 185.2 in Pozega to 309.9 hours in Smederevska Palanka (Figure 18).

Compared to the normal for the 1961-1990 base period, sunshine duration ranged from 84% in Zajecar up to 152% in Krusevac (Figure 19).

Figure 18. Insolation during winter 2014/15, expressed in hours

Figure 19. Insolation during winter 2014/15 expressed in the percentages of normal
Analysis of the 2014/15 winter season for Serbia compared to the 1971-2000 base period

**Temperature**

Departures of the mean air temperature from the normal for the 1971 – 2000 base period ranged from 0.5°C in Zajecar up to 2.1°C on Palic (Figure 20).

According to the percentile method, the mean air temperature was in the warm category in most of Serbia, very warm in northern areas and Pozega, and normal category in southeastern, parts of eastern and western Serbia (Figure 21).

According to the tercile method, mean air temperature was above the average in most of Serbia and within the average in Sjenica and Crni Vrh.

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**Figure 20.** Seasonal mean air temperature anomaly compared to the 1971-2000 base period during winter 2014/15 in Serbia

**Figure 21.** Assessment of the air temperature in Serbia during winter 2014/15 using percentile method compared to the 1971-2000 base period
**Precipitation**

During winter, in most of Serbia precipitation sums were above the average compared to the normal for the 1971 – 2000 base period. Precipitation sums ranged between 123% in Veliko Gradiste and 185% in Sombor (Figure 22).

According to the percentile method, precipitation sums were in the very rainy and extremely rainy categories in most of Serbia (Figure 23).

According to the tercile method, precipitation sums were above the average in the entire Serbia.

![Figure 22. Spatial distribution of precipitation sums expressed in the percentages of normal during winter 2014/15 compared to the 1971-2000 base period](image)

![Figure 23. Assessment of the precipitation sums using percentile method during winter 2014/15 compared to the 1971-2000 base period](image)
Analysis of the 2014/15 winter season for Serbia compared to the 1981-2010 base period

Temperature

Departures of the mean air temperature from the normal during winter, for the 1981-2010 base period ranged from 0.4°C in Zajecar up to 2.1°C on Palic (Figure 24).

According to the percentile method, the mean air temperature was in the warm category across most of Serbia, normal in parts of western, eastern and southeastern areas and very warm in Palic (Figure 25).

According to the tercile method, mean air temperature was above the average in most of Serbia aside from Zajecar where it was within the average.
Precipitation

During winter, in most of Serbia precipitation sums were above the average compared to the normal for the 1981-2010 base period. The precipitation sums ranged between 115% in Belgrade and 174% in Sombor compared to the normal (Figure 26).

According to the percentile method, precipitation sums were in the very rainy and rainy categories in most of Serbia and extremely rainy in Sombor (Figure 27).

According to the tercile method, precipitation sums were above the average in the entire Serbia.

Figure 26. Spatial distribution of precipitation sums expressed in the percentages of normal during winter 2014/15 compared to the 1981-2010 base period

Figure 27. Assessment of the precipitation sums using percentile method during winter 2014/15 compared to the 1981-2010 base period