



Ninth Session of SOUTHEASTERN EUROPE CLIMATE OUTLOOK FORUM

SEECOF-9 ONLINE MEETING

ANALYSIS AND VERIFICATION OF SEECOF-8 CLIMATE OUTLOOK FOR 2012-2013 WINTER SEASON FOR SOUTHEASTERN EUROPE (SEE)

CLIMATE OUTLOOK FOR 2012-2013 WINTER SEASON FOR SEE REGION

As stated in the SEECOF-8 Seasonal Climate Outlook for the 2012-2013 winter season over Southeastern Europe Consensus Statement (document <http://www.seevccc.rs/SEECOF/SEECOF-8/COF/Consensus%20Statement%20SEECOF%208.pdf>), uncertainty for the temperature prediction is high for inland Turkey; however, the category with the greatest probability is the middle tercile (zone 2 Figure 1). In the rest of the SEECOF region (zone 1 in Figure 1), the winter seasonal mean temperature is likely to be near- or above-average.

In the Pannonia Plain, Western and Central Balkan Peninsula and Carpathian region winter seasonal precipitation totals are likely to be near- or below-average (zone 1 in Figure 2). For the coastal areas of the Black Sea, eastern part of the Aegean Sea and south-eastern Mediterranean Sea winter seasonal precipitation totals are likely to be near- or above-average (zone 2 in Figure 2). In the rest of the SEECOF region (zone 3 in Figure 2) uncertainty is large: probabilities for below-, near- or above-average conditions are approximately equal.

Climate outlook for 2012-2013 winter season for the SEE region is presented in Figure 1.

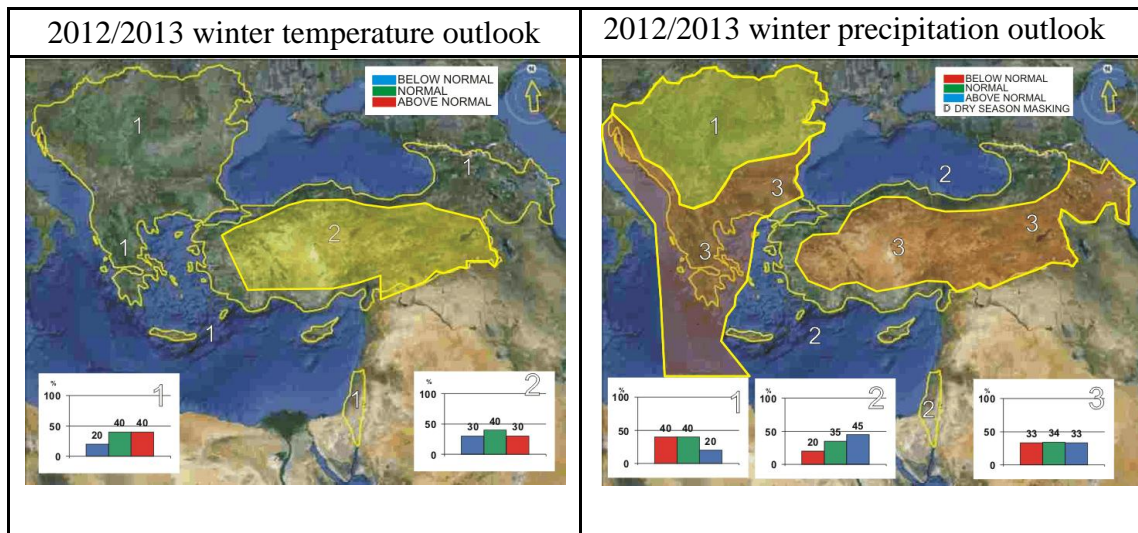


Figure1. Graphical presentation of climate outlook for the 2012-2013 winter season for the SEE region.

SHORT ANALYSIS OF THE 2012-2013 WINTER SEASON FOR SEE REGION

Analyses of the 2012-2013 winter season temperature and precipitation anomalies are based on:

- operational products of the European Climate System Monitoring – ECSM (the ECSM system is a technical platform of the DWD), Lead of the WMO RA VI RCC Node on Climate Monitoring, <http://www.dwd.de/rcc-cm>;
- climate monitoring review of the 2012-2013 winter season, (ECSM, DWD, Lead of the WMO RA VI RCC Node on Climate Monitoring), http://www.seevccc.rs/SEECOF/SEECOF-9/STEP%201/RCC_CM_DWD_SeasonalClimReport_2012_2013_DJF.pdf
- climate monitoring products of the South East European Virtual Climate Change Center - SEEVCCC (Member of the WMO RA VI RCC Node on Climate Monitoring, <http://www.seevccc.rs/?p=6>), and
- National climate monitoring reports of the following SEECOF-8 participating countries: Armenia, Bulgaria, Bosnia and Herzegovina/Federation of Bosnia and Herzegovina, Bosnia and Herzegovina/Republic of Srpska, Croatia, Greece, Georgia, Israel, Former Yugoslav Republic of Macedonia, Republic of Moldova, Montenegro, Serbia, and Turkey (documents available on <http://www.seevccc.rs/SEECOF/SEECOF-9/STEP%201/>).

Mean seasonal temperature of the winter 2012-2013 over the Aegean Sea, Eastern Mediterranean and Israel was between 10°C and 15°C, while along the coast of Israel it was even higher – between 15°C and 20°C; in the south of the Balkan Peninsula, over the Aegean Sea, near the coasts of Turkey, Georgia and Azerbaijan temperature ranged from 5°C to 10°C. In most of the SEECOF region temperature ranged from 0°C to 5°C; in the Carpathian region and in the mountainous region of the Balkan Peninsula, Turkey and Caucasus temperature ranged from -5°C to 0°C, while in the higher mountains of eastern Turkey and Caucasus it was from -5°C to -10°C. Mean seasonal temperatures for the winter 2012-2013 are presented in Figure 2 (left panel).

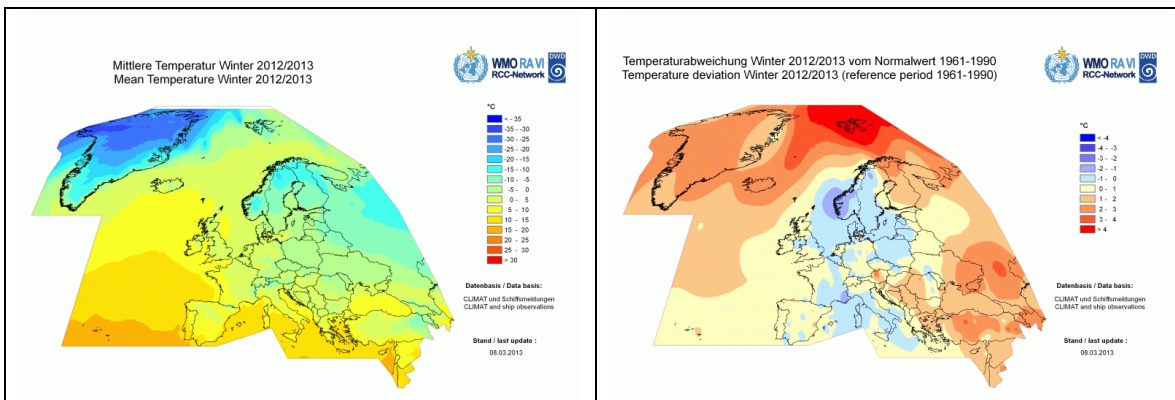


Figure 2. The observed 2012-2013 winter season mean temperatures (left panel) and winter season temperature anomalies (right panel). Source: <http://www.dwd.de/rcc-cm>

The winter was warmer than normal in most of the SEECOF region. In some parts of Turkey mean winter anomalies reached almost 4°C. On the other hand, it was slightly warmer than normal (anomalies were between 0°C and 1°C, 1961-1990 reference period) in the northern and central part of the Pannonia Plain, in the Eastern Balkan, along the Adriatic, Ionian Sea with inlands, in most of Greece and over the southwestern coast of Turkey. It was slightly colder (anomalies were between -1°C and 0°C, 1961-1990 reference period) in some parts of Romania and in the west of Moldova. Remarkable was for instance the negative anomalies of frost days on the Balkan Peninsula (between 10 and 20 days, in some places around 30 days).

December 2012 was warmer than normal in the Eastern Mediterranean with inland and in the central parts of Turkey. It was colder than normal in the Pannonia Plain and the Balkan Peninsula as a result of unexpectedly early and strong cold in the first half of December followed by snowfall and blizzards, partly causing higher snow cover with its depth ranging from 20-50 cm, and in northeastern Bulgaria from 50-80 cm. December 2012 has been the coldest December in the last 11 years in Bulgaria, and one of the two coldest in the last 8 years in the Republic of Srpska, Bosnia and Herzegovina. Traffic was much affected during this period. Numerous accidents occurred due to slippery roads. In almost entire SEECOF area January and February 2013 were warmer than normal. Positive anomalies in January reached more than 3°C in parts of Bosnia and Herzegovina, and Serbia, while in February they were above 4°C in parts of central Turkey and Caucasus.

Positive winter temperature anomalies associated with winter precipitation above normal in almost whole SEECOF region mainly occurred due to frequent depressions with heavy rain and storms in the Mediterranean Sea.

Winter precipitation totals over the SEECOF area ranged from less than 50 mm/per month in the Carpathian region, in the east of the Caucasus and in the central parts of Turkey, up to more than 150 mm/per month in the Western Balkans, in the southern part of Greece and along the coasts of the Adriatic, Ionian, Aegean, Black and Mediterranean Sea with inland. Some areas along the coasts of the Adriatic and Ionian Sea took more than 200 mm/per month of the winter precipitation (Figure 3, left panel).

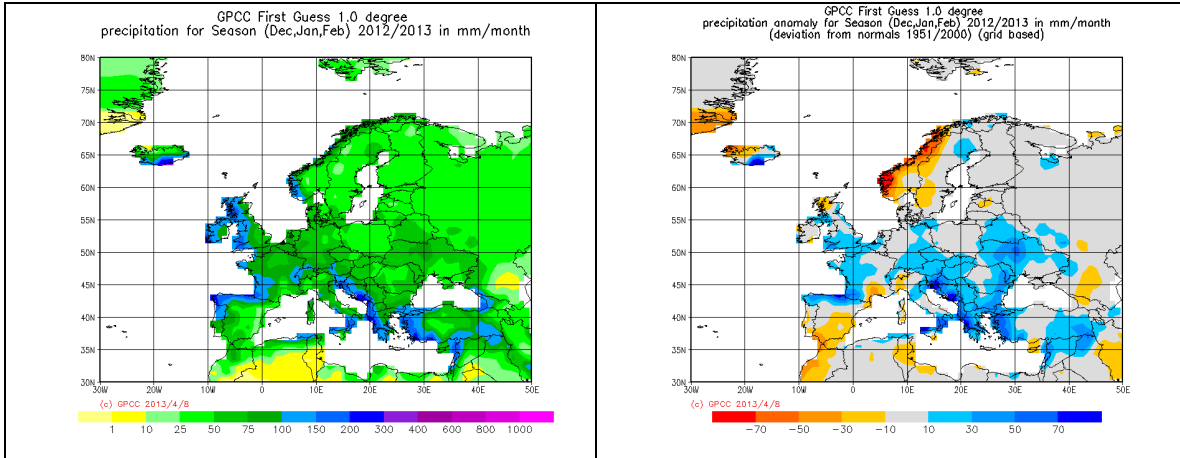


Figure 3. The observed 2012-2013 winter season precipitations in mm per month (left panel) and 2012-2013 winter season precipitation anomalies in mm per month (right panel). Source: <http://www.dwd.de/rcc-cm>

In the winter 2012-2013 most of the Balkan Peninsula, western coasts of Turkey with inland, as well as certain areas in the south and southeast of Turkey received more precipitation than normal (more than 125%). It was, in contrast, drier than normal (less than 75%) in some parts of the coasts of the Caucasus and Black Sea with inland. In other parts of the SEECOF region the values of the winter precipitation anomalies were near normal. The 1951-2000 period was used as a reference period. The 2012-2013 winter season precipitation anomalies are presented in Figure 3 (right panel).

December 2012 was remarkably wetter than normal in the whole SEECOF area. Along the central and southern part of the Adriatic Sea with inland, over the eastern coast of the Aegean Sea, and over the coasts of the Eastern Mediterranean and the Caspian Sea more than 200%, and in the eastern Romania more than 250% of the normal was observed. On the other hand, continental parts of Israel suffered from drought. In January 2013 more precipitation than normal was registered in most of the Balkan Peninsula, in the west and southeast of Turkey and in Israel, as well. Heavy snowfall affected the eastern part of Turkey in January 2013. In some cities snow depth measured about 2 meters, which affected transportation very much. It also could be noted, that during the second decade of January heavy wet snow, storms and lightning caused break of the power supply in the several villages and towns in northern part of Montenegro. Impassable roads with 1 to 2 m snow height and snow covered traffic signs along the roads, made this occasion protracted. On the other hand, Cyprus, parts of central and south Turkey and parts of the

Carpathian region and Macedonia took less precipitation. In February 2013 in most of the Balkans, the western coast of the Aegean Sea and southwestern Caucasus it was remarkably wetter than normal. The Eastern Mediterranean, Israel, parts of the northern coast of Turkey with inland and a part of the Carpathian region suffered from drought.

Heavy precipitation was widespread, in coastal region of the surrounding Seas periodically traced with strong wind, tornados and hail, producing economic losses. One episode of heavy precipitation on December 30th, 2012 in Karditsa (Greece) caused one fatality due to flash flood.

VERIFICATION OF CLIMATE OUTLOOK FOR THE 2012-2013 WINTER SEASON

The SEECOF-8 climate outlook for the 2012-2013 winter season temperature was correct for most of the SEECOF region, having predicted near- or above-normal conditions. In the Consensus statement for the 2012-2013 winter season it was stated that there was higher uncertainty for the winter season temperature in the inland of Turkey, with the greatest probability in the middle tercile, which was correctly predicted only for the eastern part of Turkey.

The Climate outlook for the 2012-2013 winter season gave higher uncertainties for precipitation than for temperature. In the coastal areas of the Black Sea, the eastern part of the Aegean Sea and the southeastern Mediterranean Sea, winter season precipitation totals were above- or near-normal, which was in accordance with the climate outlook for winter season precipitation. The climate outlook for the 2012-2013 winter season precipitation was incorrect in predicting near- or below-normal conditions in the Pannonia Plain, the Western and Central Balkan Peninsula, and the Carpathian region. In the other parts of the SEECOF region, the probabilities for below-, near-, or above-normal conditions were approximately equal, so it is impossible to consider the verification of the climate outlook for the 2012-2013 winter season precipitation.

APPENDIX A: Contributions to Step 1 of SEECOF-9

- World Meteorological Organization
- Met Office, United Kingdom
- International Research Institute for Climate and Society, United States of America
- European Center for Medium Range Weather Forecast
- Meteo France, Republic of France
- Federal Service for Hydrometeorology and Environmental Monitoring, Russian Federation
- Deutscher Wetterdienst, Federal Republic of Germany
- National Centers for Environmental Prediction, United States of America
- South East European Virtual Climate Change Center hosted by Republic Hydrometeorological Service of Serbia, Republic of Serbia
- Armenian State Hydrometeorological and Monitoring Service, Republic of Armenia
- National Institute of Meteorology and Hydrology, Republic of Bulgaria
- Meteorological and Hydrological Service, Republic of Croatia
- Hellenic National Meteorological Service, Greece
- The National Environmental Agency of Georgia, Georgia
- Israel Meteorological Service, State of Israel
- Republic Hydrometeorological Institute, Former Yugoslav Republic of Macedonia
- State Hydrometeorological Service, Republic of Moldova
- Hydrometeorological Institute of Montenegro, Montenegro
- Federal Hydrometeorological Service of the Federation of Bosnia and Herzegovina, Federation of Bosnia and Herzegovina, Bosnia and Herzegovina
- Republic Hydrometeorological Service of the Republic of Srpska, Republic of Srpska, Bosnia and Herzegovina
- Republic Hydrometeorological Service of Serbia, Republic of Serbia
- Turkish State Meteorological Service, Republic of Turkey

APPENDIX B: Analysis and verification of SEECOF-8 climate outlook for the 2012-2013 winter season:

Verification summary based on national reports and contributions of the participants of SEECOF-9 online meeting

Country	Seasonal temperature (DJF)		Seasonal precipitation (DJF)		High Impact Events
	Observed	SEECOF-8 climate outlook for temperature	Observed	SEECOF-8 climate outlook for precipitation	
Armenia (1)	Normal with mostly positive anomalies	Normal to Above normal	Normal with mostly positive anomalies	Normal (No predictive signal)	No comments for high impact events
Bosnia and Herzegovina, Federation of Bosnia and Herzegovina (1)	Normal with mostly positive anomalies	Normal to Above normal	Above normal	Normal (No predictive signal)	No comments for high impact events
Bosnia and Herzegovina, Republic of Srpska, (5,6)		Normal to Above normal	Above normal	Normal to Below normal	<p>December 2012 has been the one of the two coldest in the last eight years. Absolute temperature minimum occurred in Sokolac (-24.3°C) and was below -13°C at the majority of stations.</p> <p>The second maximum Tmean in the period from 2005 to 2013 occurred in January 2013 (the first one occurred in 2007). February 2013 was the warmest one in the last 5 years in the Republic of Srpska, and the third absolute minimum of sunshine in the 50-yrs period was recorded in Banja Luka.</p> <p>Surplus of precipitation in December reached about 30%, in January 70%, in February 100%, in relation to the 1981-2010 climatological normal, which caused floods during the spring. The number of days with precipitation was above average for about 10 days.</p>

Bulgaria (1,5)	Normal to Above normal	Normal to Above normal	Normal	Normal (No predictive signal)	December 2012 has been the coldest one in the last 11 years and the wettest in the last 22 years. The most severe winter time was around December 20 th , 2012 when there was a blizzard in northeastern Bulgaria with snow depth reaching 50-80 cm.
Croatia (1)	Normal with mostly positive anomalies	Normal to Above normal	Above normal	Normal (No predictive signal) along the Adriatic Sea Normal to below normal in the continental part of the country	No comments for high impact events
Georgia (1)	Above normal	Above normal to Normal	Above normal in most of the territory of lowland of West Georgia Normal to below normal in the rest of the country	Above normal	No comments for high impact events

Israel (1,2,5)	Above normal (1,2,5)	Normal to Above normal	Above normal (1,2,5)	Above normal	No comments for high impact events
Greece (1)	Above normal (1)	Normal to Above normal	Above normal (2)	Normal (No predictive signal)	No comments for high impact events
Former Yugoslav Republic of Macedonia (1)	Above normal	Normal to Above normal	Above normal	Normal (No predictive signal)	No comments for high impact events
Republic of Moldova (1,2)	Normal	Normal to Above normal	Above normal	Normal to Below Normal	<p>The rainfall amount over the winter season ranged from 125 to 240 mm, which is recorded in average once in 20-30 years.</p> <p>The largest amount of precipitation fell in December. The December precipitation sum ranged from 75 to 145 mm (200-450% of the norm), which was reported for the first time since the beginning of observations in 85% of the country.</p> <p>There were also elemental hydrometeorological phenomena such as heavy snowfalls with the amount of precipitation up to 20-37 mm during 12 hours (December, January) and blizzards (December). Heavy snowfall, partially accompanied by blizzards, caused the formation of drifts on the roads, which created extremely unfavorable conditions for road traffic.</p>
Montenegro (1)	Normal in the western part of the territory	Normal to Above normal	Above normal in most of the territory Normal	Normal (No predictive signal)	<p>The average temperature in Rožaje (northeastern part of the country) of 0.7°C was the highest ever recorded in Rožaje's station.</p> <p>During the period from 09/12-17/01/2013 Montenegro was exposed to snow falls and strong wind gusts, while temperature decreased rapidly. In accordance with the experience from the winter 2011/2012, all responsible staff for managing emergency situations was ready to act.</p>

	Above normal in the eastern and northeastern part of the country		in the northeastern part of the country		<p>The period from 14th to 18th January was characterized by rain, icing and snow fall. There was a high risk of floods in the southern part of Montenegro. Due to a strong blizzard in the northern region, the main road Podgorica – Kolašin was closed for the tracks, as well as the road Rožaje-Kula and Šavnik –Žabljak.</p> <p>On the 16th January, heavy wet snow, storms and lightning caused breaks in electrodistribution. Because of that, villages and towns in the northern region were longer without electricity. Impassable roads with 1 to 2 m snow height and snow covered traffic signs along the roads, made this occasion protracted.</p>
Serbia (1,2,5)	Above normal (1) Normal in most of the territory, Above normal in some parts of Central and South Serbia(2,5)	Normal to Above normal	Above normal (1,2,5)	Normal to Below normal	<p>Maximum daily precipitation, measuring 53.2 mm, was observed in Vranje (southeastern Serbia) on February 26th 2013, thereby breaking the previous maximum daily precipitation recorded during winter, measuring 43.8 mm (December 15th 1930).</p> <p>A greater deviation in the number of days with precipitation of 1 mm and higher was observed in central Serbia, amounting 18 days.</p> <p>Low-lying areas of Serbia were characterized by a below average number of days with snow cover (negative anomalies from 2 up to 12 days).</p>
Turkey (2)	Normal in the eastern part of Turkey Above normal in almost whole Turkey	Normal in most of the territory Normal to Above normal in the coastal parts of Turkey	Above normal	Normal (no predictive signal) in most of the territory Normal to Above normal in the coastal parts of Turkey	<p>Heavy snowfall affected the eastern part of Turkey in January 2013. In some cities snow depth measured about 2 meters, which affected transportation very much.</p>

- Note:
- 1 - Basic climatological period (1961-1990)
 - 2 - Basic climatological period (1971-2000)
 - 3 - Basic climatological period (1951-2000)
 - 4 - Basic climatological period (1981-2000)
 - 5 - Basic climatological period (1981-2010)
 - 6 - Basic climatological period (1961-2013)
 - 7 – No information about basic climatological period