



SEECOF 4 Monitoring Results for Summer 2010 and Evaluation of SEECOF 3 Outlook

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Part 1: Temperature



Global temperature anomalies JJA 2010





June-August (JJA mean) 2010 was warmer than normal over most parts of the world (continents). Global mean anomaly (HadCrut3 data, land + sea, ref. 1961-1990): +0.51°C.

Especially warm over eastern Europe (up to > +5°C)





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- Globally, JJA 2010 was extremely warm compared to past years (NOAA data):
- 2nd warmest JJA since 1880 behind 1998
- warmest June and August
- 2nd warmest July
- warmest JJA over global land area
- warmest JJA on northern hemisphere





Regional temperature anomalies summer 2010



- Summer was warmer than normal over nearly the whole RA VI Region, including the North Atlantic and most of the Mediterranean.
- Highest anomalies were over central European Russia and adjacent areas.

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Regional monthly temperature anomalies



- June 2010: warm over most of Europe and the Middle East, but colder in northern Europe and parts of the Mediterranean
- → July 2010: warm anomalies became stronger and extended to the north
- August 2010: still high warm anomalies over eastern Europe extended to the south





Temperature anomalies in the SEECOF region



June 2010

July 2010

August 2010

- In June 2010, anomalies were already quite high in the south Caucasus region and in the Middle East, whereas in parts of southeastern Europe they were close to zero, in western Turkey even partly negative.
- In July and especially in August 2010, anomalies increased in many parts of the SEECOF region.





Seasonal temperature anomalies in SEECOF region compared to the SEECOF 3 Outlook





➔ For the whole summer season, mean temperatures were above normal in the whole SEECOF region. This was forecasted by the SEECOF outlook with more or less probability. However, the forecast signal was not very clear just in those areas where the temperature anomalies were particularly strong (south Caucasus, eastern Turkey, Cyprus, Israel)







EUROSIP ensemble mean was predicted higher than normal over SEECOF area, but the extremely high anomalies over Russia were not predicted.



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Part 2: Precipitation







Global precipitation anomalies JJA 2010 (GPCC data)

GPCC Monitoring Product Gauge—Based Analysis 1.0 degree precipitation percentage of normals 1951/2000 for Season (Jun,Jul,Aug) 2010 (grid based)



- Eastern central Europe and southeastern Europe saw a wet summer.
- Large parts of central European Russia were very dry.

reference 1951-2000 for GPCC







Precipitation anomalies in Europe

GPCC Monitoring Product Gauge—Based Analysis 1.0 degree precipitation percentage of normals 1951/2000 for Season (Jun,Jul,Aug) 2010 (grid based)



- Most of northern and central Europe was wet. The wet zone extended far to southeastern Europe and Turkey.
- The dry zone over central Russia extended also over parts of the south Caucasus, particularly Georgia was dry.
- It was also dry near the Adriatic Sea and partly near the eastern Mediterranean.



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Monthly precipitation anomalies



GPCC Monitoring Product Gauge-Based Analysis 1.0 degree precipitation percentage of narmals 1951/2000 for July 2010 (grid based)



GPCC Monitoring Product Gauge-Based Analysis 1.0 degree recipitation percentage of normals 1951/2000 for August 2010 (grid based)



A dry cell centred over central European Russia in June extended to the north in July. In August, however, it became dry especially in the areas around the Black Sea.

Areas near the Adriatic Sea and the eastern Mediterranean were wetter than normal in June but became drier than normal later in the summer.



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Precipitation anomalies in SEECOF region

GPCC Monitoring Product Gauge-Based Analysis 1.0 degree precipitation percentage of normals 1951/2000 for June 2010 (grid based)



GPCC Monitoring Product Gauge-Based Analysis 1.0 degree precipitation percentage of normals 1951/2000 for July 2010 (grid based)



GPCC Monitoring Product Gauge-Based Analysis 1.0 degree precipitation percentage of normals 1951/2000 for August 2010 (orid based)



- June was wetter than normal in nearly whole of southeast Europe and Turkey, but drier than normal in the south Caucasus region
- → July shows a large spatial variability of dry and wet areas
- August was mostly drier than normal except in northern parts of southeast Europe and some small areas
- So this summer showed a transition from mainly wet to mainly dry conditions in most of the SEECOF area.





Seasonal precipitation anomalies in SEECOF region compared to the SEECOF 3 Outlook



✓ The above normal areas over the Carpathian region and over southern Bulgaria were well predicted and also the below normal precipitation over most of the south Caucasus.

X However, there was a lot of rain over the south of the Balkan Peninsula and Turkey which was not predicted.





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Part 3: Circulation







ENSO



Figure 2. Time series of area-averaged sea surface temperature (SST) anomalies (°C) in the Niño regions [Niño-1+2 (0°-10°S, 90°W-80°W), Niño 3 (5°N-5°S, 150°W-90°W), Niño-3.4 (5°N-5°S, 170°W-120°W), Niño-4 (150°W-160°E and 5°N-5°S)]. SST anomalies are departures from the 1971-2000 base period weekly means (Xue et al. 2003, *J. Climate*, **16**, 1601-1612).

- During summer 2010, SST anomalies developed to a La Nina mode.
- → SOI: June: +0.1, July: +2.0, August: +1.7
- This was predicted by both ARPEGE and ECMWF SST anomaly forecasts



fig.4: SSTs anomaly forecasts in the Niño boxes from Météo-France (top) and ECMWF (bottom), issued in May 2010, plumes correspond to 41 membres and monthly means. (<u>http://www.ecmwf.int/</u>)







Sea level pressure and anomalies JJA 2010



- Stronger than normal Azores high, but weaker than normal Icelandic low. NAO was negative during the whole summer.
- Higher than normal pressure over Russia, lower than normal pressure over southeastern Europe









EUROSIP forecasted lower than normal pressure over Russia with higher probability. Long-lasting high pressure situation over Russia was not forecasted!









Forecast issue date: 15/05/2010

CECMWF









Part 4: Extreme events







Significant events in summer 2010 in SEECOF region

- O1-04 June: Heavy rainfall over the northern Balkan peninsula due to a quasistationary upper-tropospheric low
- ➔ First part of June: Severe flooding in Azerbaijan
- → 16-17 June: Severe thunderstorm with hail e.g. in Slovenia, Hungary, Bulgaria
- → 22-25 June: Heavy rain with severe flooding over the Balkan peninsula
- → June/July: Various heavy rainfall events with hail in Moldova, Armenia
- ➔ 10-24 July: Heavy rain in Slovenia
- ➔ July/August: Extreme heat wave over eastern Europe, extending far to the south (Cyprus 45.6°C, highest value for at least about 100 years)
- → 25 August: Extreme local rain in Turkey (Rize)

in general: several heavy rain events in June and July, heat wave in July/August, partly with drought conditions





Conclusions

- → Temperature generally was above normal in summer 2010. Above normal conditions were predicted, but not the extreme heat wave due to high pressure conditions over Russia which took place in July/August.
- Precipitation was above normal over large parts of southeastern Europe and Turkey, but dry over most of the south Caucasus. These anomalies were partly predicted.
- Onset of La Nina took place and was predicted.
- High pressure conditions over Russia not predicted (at least by EUROSIP) ensemble).
- Several heavy rain events took place in June and July which partly influenced the seasonal anomalies considerably.
- The heat wave July/August contributed much to the summer temperature anomalies.











Thank you for your attention

