Thirteenth Session of SOUTHEAST EUROPE CLIMATE OUTLOOK FORUM
SEECOF-13 ONLINE MEETING

Assessment of the current state of climate and its evolution in the next months

Abstract

El Niño conditions have been present since March 2015. There is an approximately 70% chance that El Niño will continue through Northern Hemisphere summer in 2015. According to the composites based on NCEP/NCAR reanalysis, this evolution slightly favors cooler air temperature over Turkey and Caucasus regions. Below normal precipitation rates are more likely than not in the Eastern Europe. On the other hand, the reduced sea ice extent over the Arctic in the spring might favor a southward position of the Jetstream over the Northern Europe leading to conditions which occurred in summers 2007 and 2012. The seasonal forecasts based on dynamical models mainly suggest above normal temperature (almost all models) and slightly above precipitation (Eurosip) from May to July for the Southeast Europe. RCC-LRF node recommends above normal temperature and no signal in the precipitation field for the Southeast Europe in the interval May-July 2015. Hindcast analysis has suggested that the model-provided temperatures for summer (starting one month ahead) have relatively high skill scores over the Southeast European regions.

1. Large scale patterns in the spring of 2015

1.1. Tropical Variability

1.1.1. El Niño –Southern Oscillation (ENSO)

By the end of March 2015, weak El Niño conditions were present due to above-average sea surface temperatures (SST) across the equatorial Pacific, and the expected tropical atmospheric response.

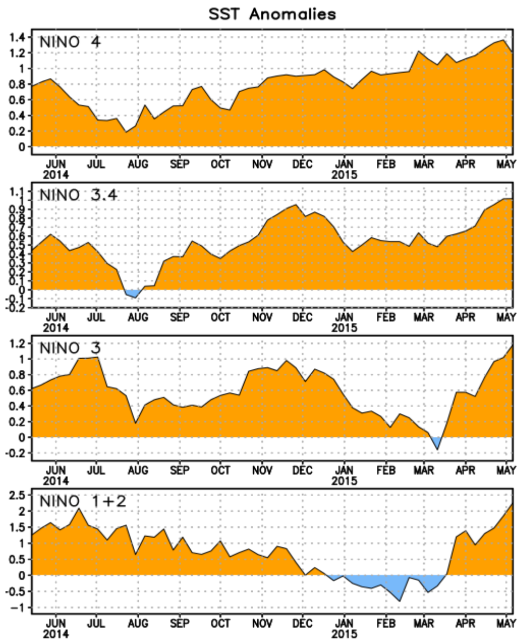

Figure 1. Recent evolution of Niño Region SST anomalies (°C) from the CPC / NCEP (http://www.cpc.ncep.noaa.gov/products/analysis_monitoring/lanina/enso_evolution-status-fcsts-web.pdf)

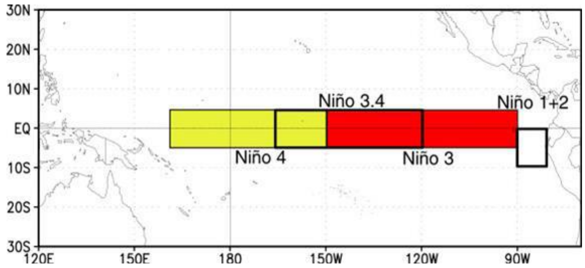

Figure 2. El Niño Regions from the CPC / NCEP (http://www.cpc.ncep.noaa.gov/products/analysis_monitoring/lanina/enso_evolution-status-fcsts-web.pdf)

According to the update prepared by the Climate Prediction Center / NCEP, issued on 11 May 2015, El Niño conditions have been present since then (figure 1 and 2). There is an approximately 70% chance that El Niño will continue through Northern Hemisphere summer 2015, and a greater than 60% chance it will last through autumn.

1.1.2. The Madden Julian Oscillation (MJO)

Over Pacific, the strong upward motion core located near the International Date Line and linked with the SST was enforced by a remarkable episode of MJO which occurred during March 2015. Strong downward motion anomaly over the Maritime Continent, South-eastern Asia and the Indian Ocean simultaneously took place in March 2015.

1.2. Extra-tropical variability

1.2.1. The Arctic/North Atlantic Oscillation (AO/NAO)

The positive phases of NAO and AO modes continued during almost the whole interval from March to April (Figure 3).

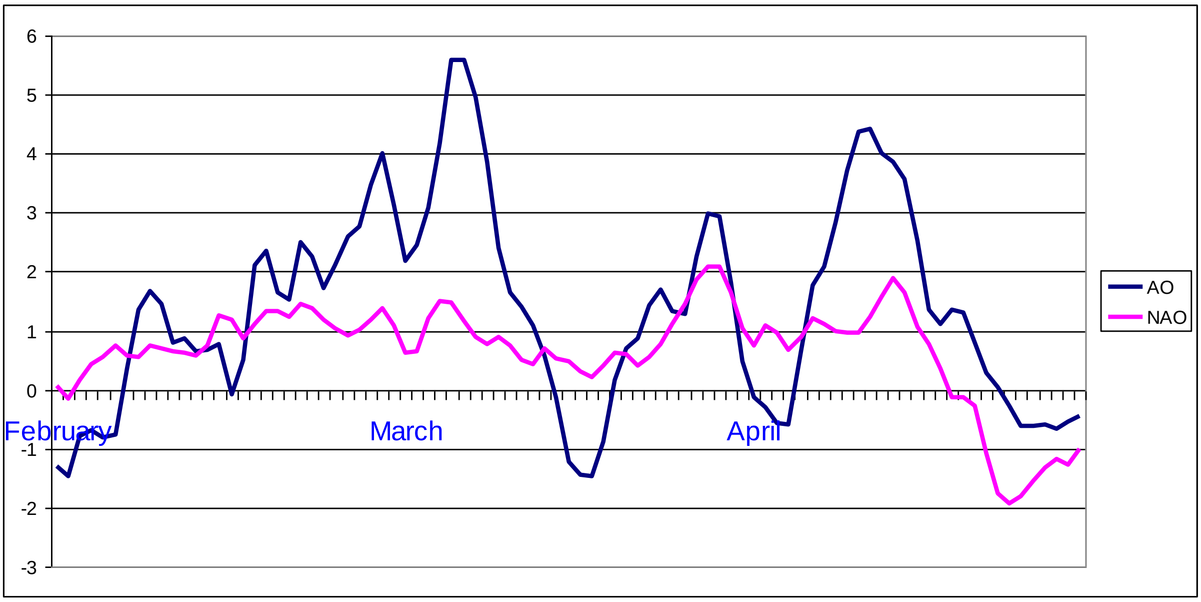

Figure 3. Daily anomalies of North Atlantic Oscillation (NAO, magenta) and Arctic Oscillation (AO, blue) indices (1961-1990 mean). Data are from NOAA CPC: http://www.cpc.ncep.noaa.gov/products/precip/CWlink/daily_ao_index/teleconnections.shtml

1.2.2. Arctic and Antarctic Sea Ice Extent

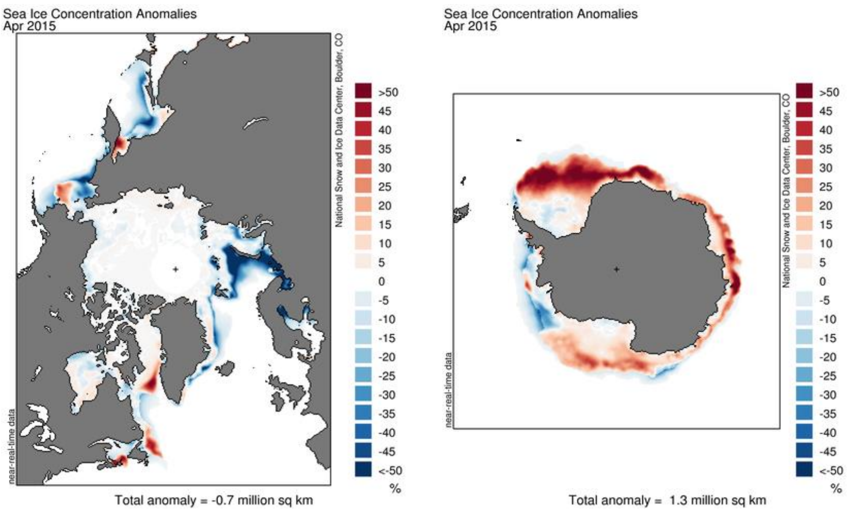

Figure 4. Sea-Ice concentration anomalies in Arctic (left), and in Antarctic (right). The average refer to the period 1979-2000 from NSDIC (http://nsidc.org/data/seaice_index/)

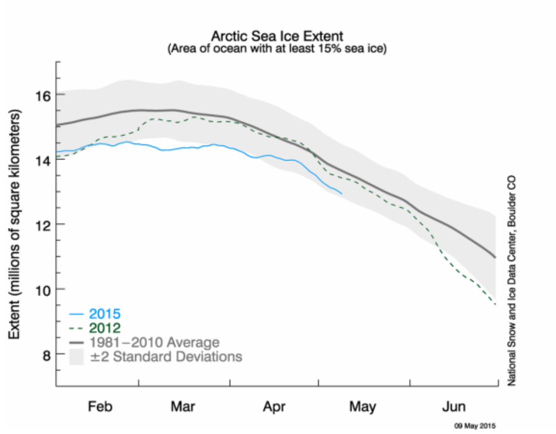

Figure 5. Arctic sea ice extent (2015 is illustrated with blue line, 2012 – the top year with minimum record ice extent in September - with green dotted line, the mean values are represented with grey line) from NSDIC (http://nsidc.org/data/seaice_index/images/daily_images/N_stddev_timeseries.png)

The total Arctic sea ice extent has been below normal and even below the 2012 values from the February 2015 to the beginning of May 2015 (Figure 4 and 5). The year 2012 had the less sea ice extent minimum in September from the beginning of satellite observations in the 70’s. According to Screen (2013) the Arctic sea ice loss may induce a southward shift of the summer jet stream over Europe and increased Northern European precipitation. On the other hand there is a tendency to have lower precipitation in the Balkan regions, when higher precipitation occurs in the Great Britain, due to the summer NAO (sNAO) signal (see figure 6). The sNAO has a strong influence on northern European rainfall, temperature and cloudiness through changes in the position of the North Atlantic storm track. The positive phase of the sNAO, with a northward shifted storm track, favor drier than average summers over Northern Europe and vice versa (Folland et al 2009). Thus, the reduced sea ice extent over the Arctic in the spring might force a southward position of the Jetstream over Northern Europe leading to conditions which occurred in summers 2007 and 2012. Antarctic sea ice extent has been above normal in the interval from March to April (figure 4).

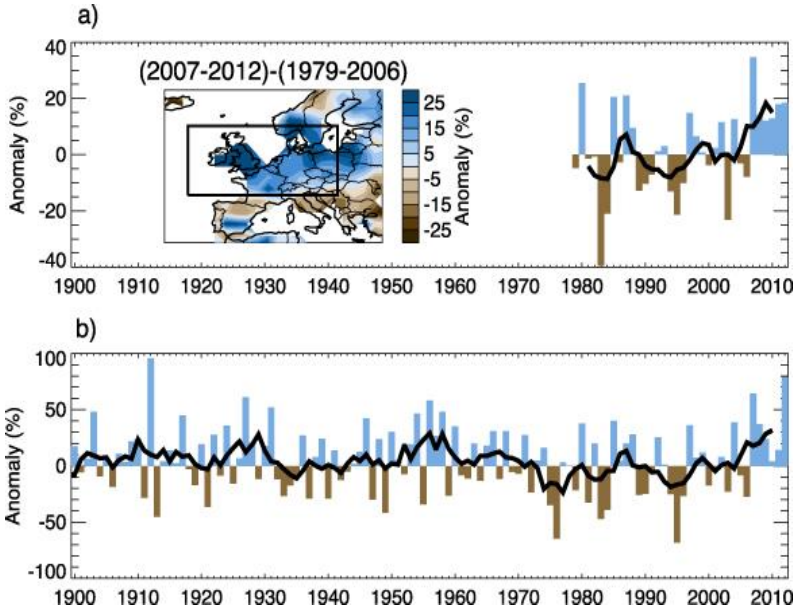

Figure 6. (a) Time-series of observed summer (June–July–August) precipitation anomalies (% from 1981 to 2010 average) averaged over northern Europe (15° W–20° E, 45–60° N; shown by black box on inset map). The inset map shows the precipitation anomalies in the period 2007–2012 relative to the period 1979–2006. (b) Time-series of summer precipitation anomalies (% from 1981 to 2010 average) for England and Wales. The black curves show 5-year running means. From Figure 1 of Screen (2013).

2. Regional patterns in the spring of 2015

2.1. SST near Europe

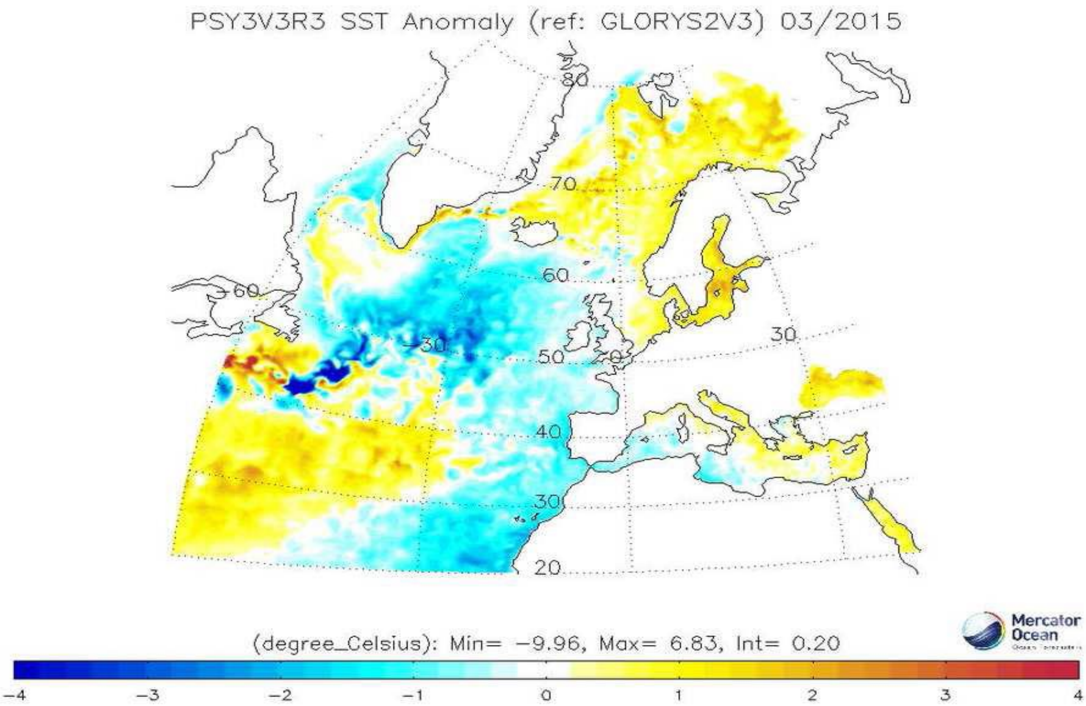

Figure 7. Mean sea surface temperature in the RA VI Region (Europe) and anomaly (reference Glorys 1992-2009) from http://bcg.mercator-ocean.fr/

2.2. Drought index

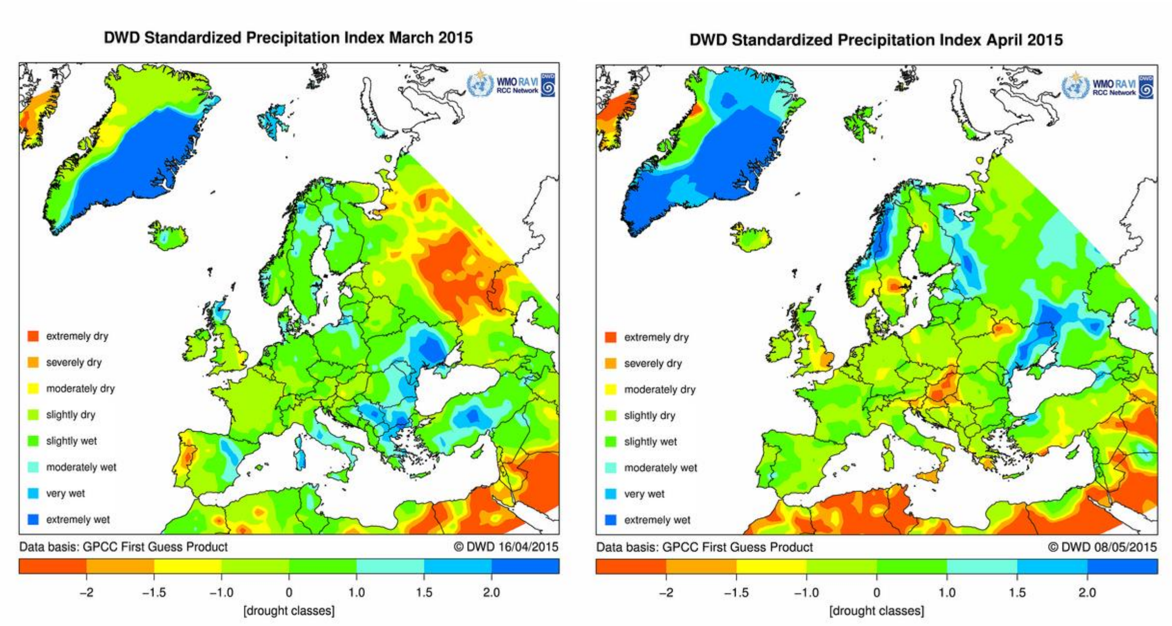

Figure 8 DWD Standardized Precipitation Index over Europe in March and April 2015 from DWD (http://www.dwd.de/rcc-cm).

3. Preliminary predictive assessments based on large scale and regional climate patterns

There is an approximately 70% chance that El Niño will continue through Northern Hemisphere summer 2015. According to the composites based on NCEP/NCAR reanalysis, this evolution slightly favors cooler air temperature over parts of Europe with the exception of South East regions, and diminished precipitation in areas from Eastern Europe (Figure 9). The composites based on NCEP/NCAR reanalysis slightly favor cooler air temperature over Turkey and Caucasus regions. However, one has to take into account the nonlinearities masked by the composite techniques and the intensity of ENSO phase which could disturb the above mentioned picture.

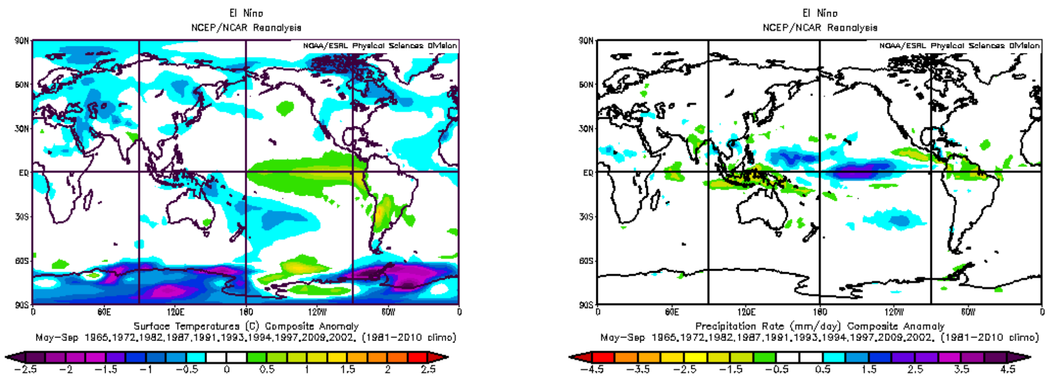

Figure 9. El Niño summer composites of air temperature and precipitation rate anomalies referring to mean values (1981-2010) and computed using NCEP/NCAR reanalysis, from http://www.esrl.noaa.gov/psd/cgi-bin/enso/enso.pl?output=3&variable=prate&region=all&event=e&season=sum&type=a

For instance, slightly cooler than normal temperature over large parts of Europe are also present in the La Nina anomaly composites (referring to mean values of the same interval 1981-2010) but again with some exception (Scandinavia and Southeast Europe regions).

4. Seasonal forecasts from dynamical models

The seasonal forecasts based on dynamical models mainly suggest above normal temperature (almost all models) and slightly above precipitation (Eurosip) for the Southeast Europe in the next interval from May to July.

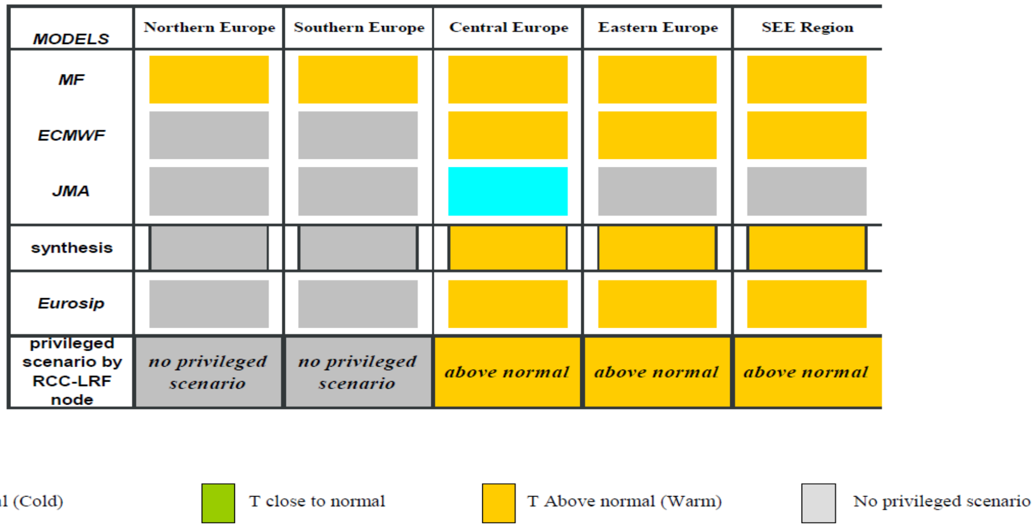

Figure 10. Synthesis of temperature forecasts for May-June-July 2015 for European regions. Eurosip is presently built using 4 models - ECMWF, Météo-France, NCEP and UK Met Office. MF stands for Météo-France, ECMWF for European Centre for Medium Weather Forecast, JMA for Japan Meteorological Agency, *NCEP for National centre for Environmental Prediction). The synthesis is made by the RCC-LRF Node of the RCC Network (Co-Led by Météo-France).*

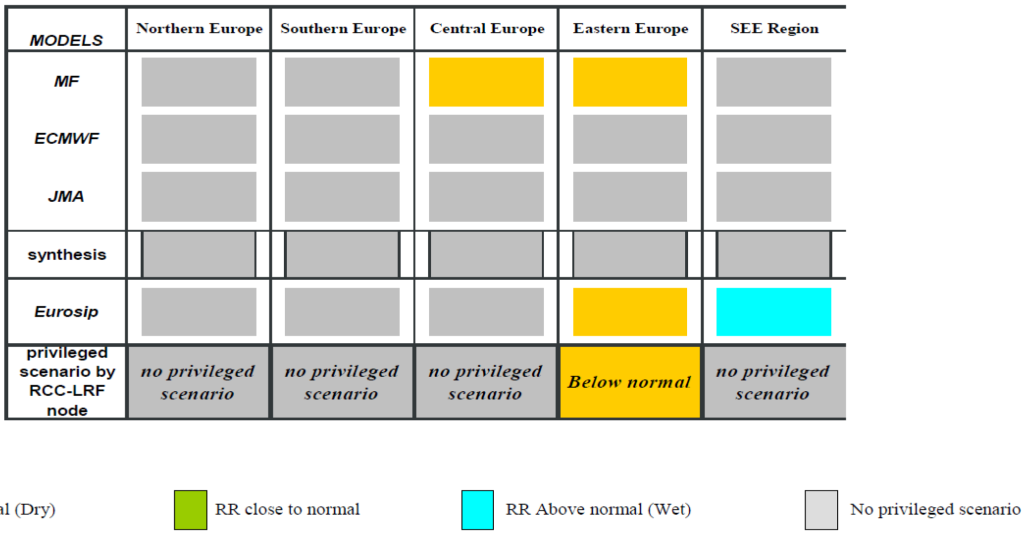

Figure 11. Synthesis of precipitation forecasts for May-June-July 2015 for European regions. Eurosip is presently built using 4 models - ECMWF, Météo-France, NCEP and UK Met Office. MF stands for Météo-France, ECMWF for European Centre for Medium Weather Forecast, JMA for Japan Meteorological Agency, NCEP for National centre for Environmental Prediction). The synthesis is made by the RCC-LRF Node of the RCC Network (Co-Led by Météo-France).

RCC-LRF node recommends above normal temperature and no signal in precipitation field for the Southeast Europe in the interval May-July 2015. Hindcast analysis has suggested that the model-provided temperatures for summer (starting from spring months) have relatively high skill scores over the Southeast Europe (Figure 12).

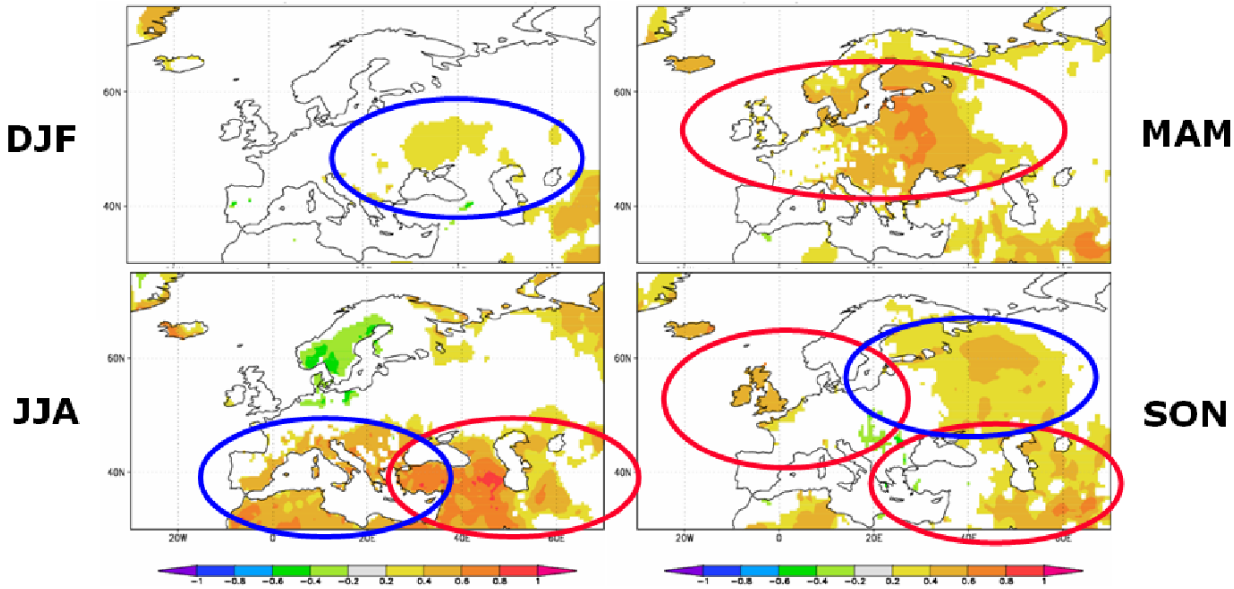

Figure 12. From Figure 5 of Doblas-Reyes (2010). Correlation of one-month lead System 3 seasonal predictions of near-surface temperature computed over the 1981-2005 period. The GHCN dataset has been used as reference. Results are plotted only where the correlations are significant with 80% confidence. Blue (red) circles correspond to the areas where consistently positive skill is found for the dynamical (persistence-based and dynamical) predictions.

References

Climate Prediction Center / NCEP - ENSO: Recent Evolution, Current Status and Predictions, update (11 May 2015) from http://www.cpc.ncep.noaa.gov/products/analysis_monitoring/lanina/enso_evolution-status-fcsts-web.pdf

Doblas-Reyes F. J., 2010: Seasonal prediction over Europe. ECMWF Seminar on Predictability in the European and Atlantic regions, 6 to 9 September 2010, pp 171-185.

Folland C K, Knight J, Linderholm H W, Fereday D, Ineson S and Hurrell J W 2009 The summer North Atlantic Oscillation: past, present and future J. Clim. 22 1082–102

RCC-LRF Node of the RCC Network (Co-Led by Météo-France) and RCC-Climate Monitoring Node (led by DWD) for the RAVI. GLOBAL CLIMATE BULLETIN n°191 – May 2015, 33 pp.

Screen, J. A., 2013: Influence of Arctic sea ice on European summer precipitation, *Environ. Res. Lett*. **8** 044015, doi:10.1088/1748-9326/8/4/044015