



**Third Session of the
MEDITERRANEAN CLIMATE OUTLOOK FORUM**

MEDCOF-3 MEETING

**ANALYSIS AND VERIFICATION
OF THE MEDCOF-2 CLIMATE OUTLOOK
FOR THE 2014 SUMMER SEASON
FOR THE RA VI PART OF THE MEDCOF REGION (RAVI-MED)**

WMO RA VI RCC Offenbach Node on Climate Monitoring

Deutscher Wetterdienst

Offenbach, Germany

1. MedCOF 2- Climate outlook for the 2014 summer season:

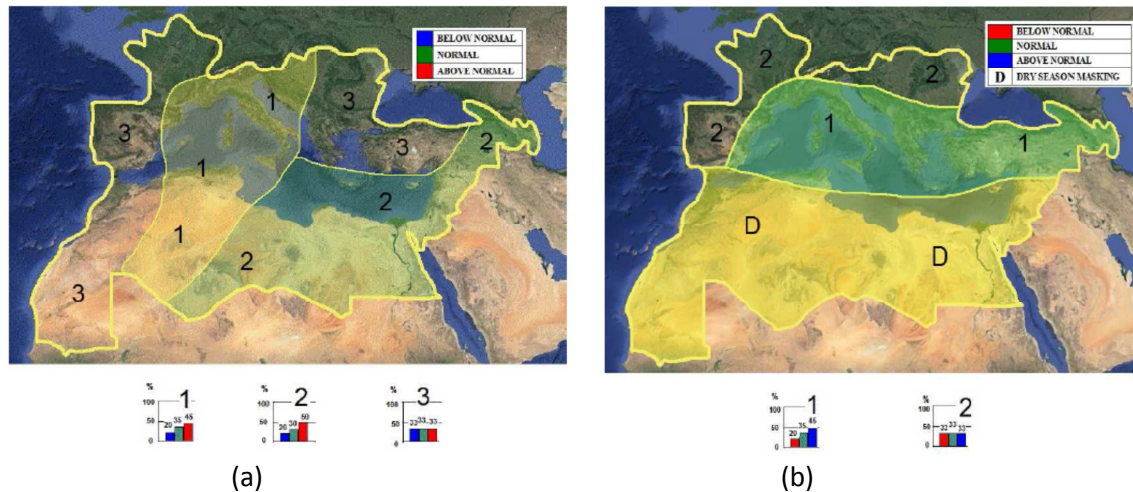


Figure 1: Graphical presentation of the climate outlook for the 2014 summer season for the Mediterranean region

(a) Temperature Outlook; (b) Precipitation Outlook

Temperature:

For the RA VI part of the MedCOF region (RAVI-MED), the Seasonal Climate Outlook for the 2014 summer season defined three forecast regions (figure 1 (a)). Region 1 and 2 both favor an above-normal scenario with 45% and 50% probability, respectively. These regions cover almost the whole Mediterranean water basin including its islands and most of its coasts, the Adriatic Sea, Italy, the western Balkan Peninsula, the Middle East, eastern Turkey and the South Caucasus.

For the remaining part of RAVI-MED (region 3), covering the Iberian Peninsula, France except the southeast, the Balkan Peninsula except the west, and Turkey except the east, no privileged temperature scenario was given (which means climatology was assigned).

Precipitation:

For precipitation, the MedCOF-2 outlook defined two forecast regions (figure 1 (b)) for RAVI-MED. Region 1 covers almost the whole Mediterranean water basin including its islands and coasts, Italy, the southern half of the Balkan Peninsula, Turkey, and the South Caucasus. An exception is the southernmost part of the Mediterranean basin and the Middle East countries of RA VI, which were excluded by dry season masking.

Region 2 covers western and northern land areas of the MedCOF region; these are the Iberian Peninsula, France, and the northern half of the Balkan Peninsula, except their Mediterranean coastal areas. For region 2 no privileged precipitation scenario was given, so again climatology was assigned here.

2. Analysis of the 2014 summer season:

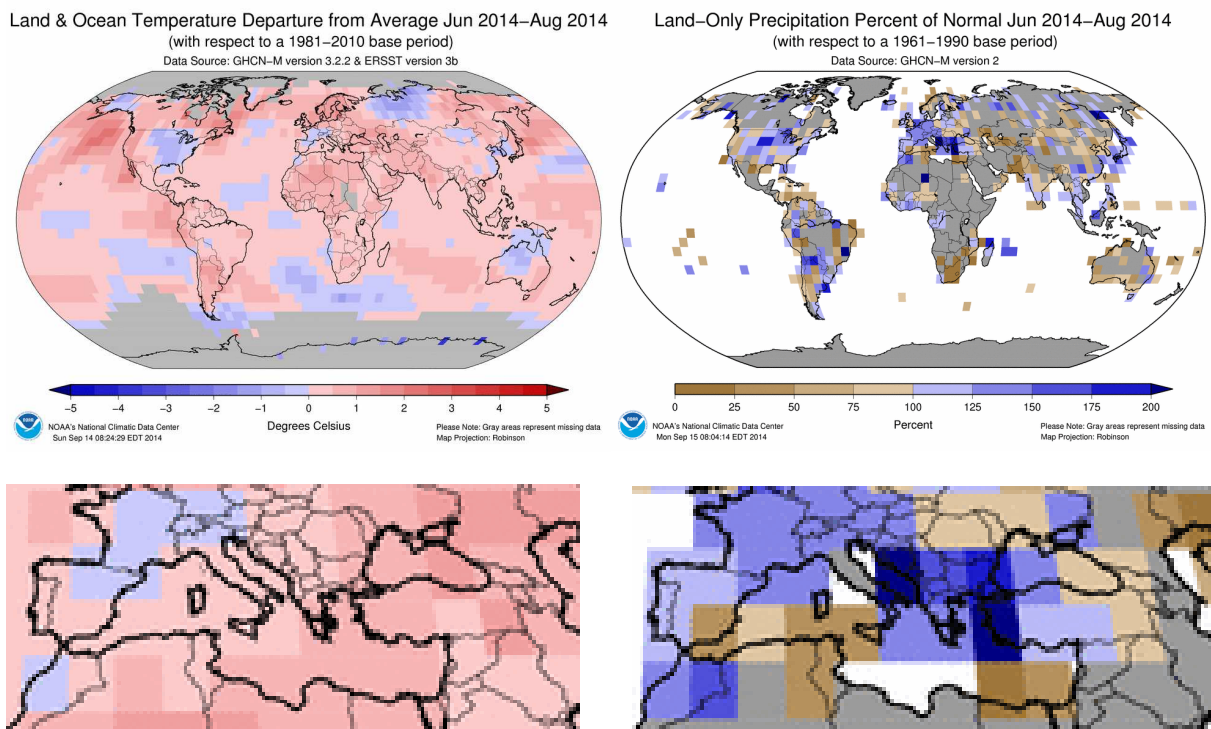


Figure 2: Upper left: Surface air temperature anomalies (1981-2010 reference) for summer 2014. Source: NOAA NCDC, <http://www.ncdc.noaa.gov/temp-and-precip/global-maps.php>

Upper right: Seasonal precipitation totals in percent of the normal (1961-1990 reference) for summer 2014. Source: NOAA NCDC, <http://www.ncdc.noaa.gov/temp-and-precip/global-maps.php>

Lower figures: the same zoomed for the RAVI-MED region.

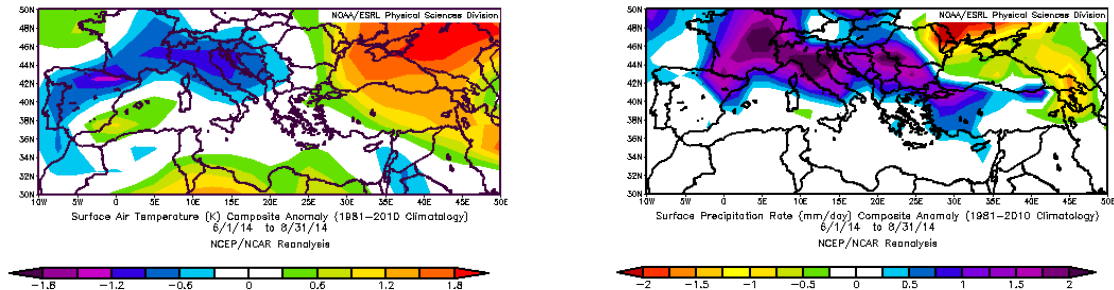


Figure 3: Left: Surface air temperature anomalies (1981-2010 reference) for summer 2014. Source: NCEP/NCAR Reanalysis, <http://www.esrl.noaa.gov/psd/data/composites/day/>

Right: Anomalies of surface precipitation rate (1981-2010 reference) for summer 2014. Source: NCEP/NCAR Reanalysis, <http://www.esrl.noaa.gov/psd/data/composites/day/>

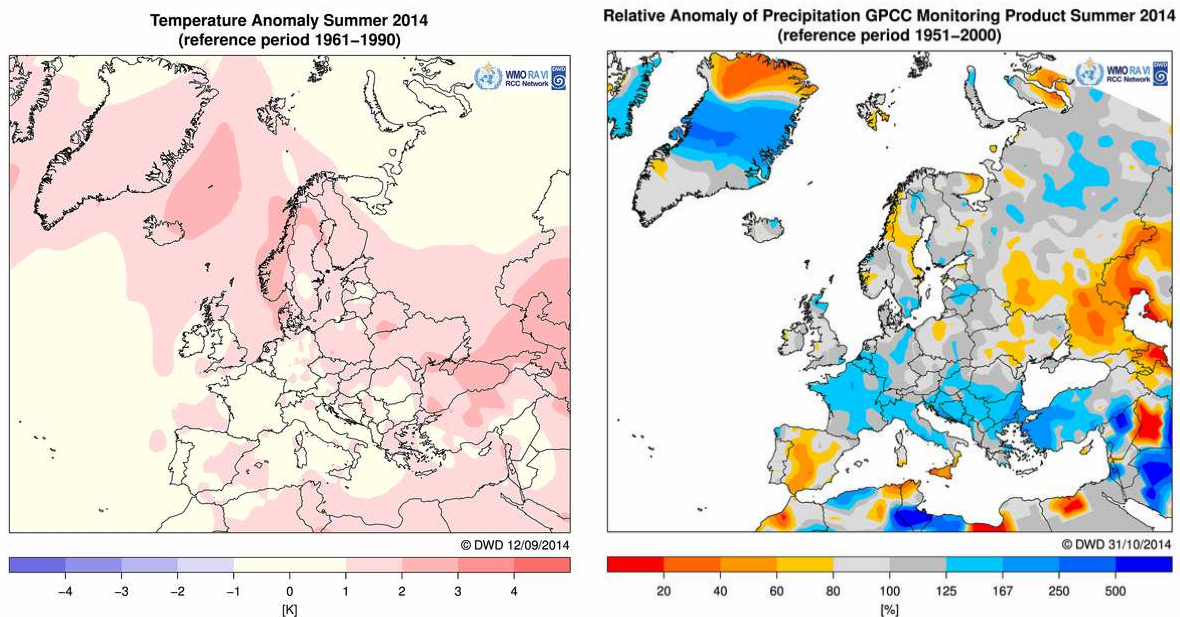


Figure 4: Left: Seasonal surface air temperature anomalies (1961-1990 reference) for summer 2014. Source: WMO RA VI RCC Offenbach Node on Climate Monitoring, Deutscher Wetterdienst, <http://www.dwd.de/rcc-cm>

Right: Seasonal precipitation totals in percent of the long-term mean (1951-2000 reference) for summer 2014. Source: WMO RA VI RCC Offenbach Node on Climate Monitoring, Deutscher Wetterdienst, data from Global Precipitation Climatology Centre, <http://www.dwd.de/rcc-cm>



WMO RA VI
RCC Network

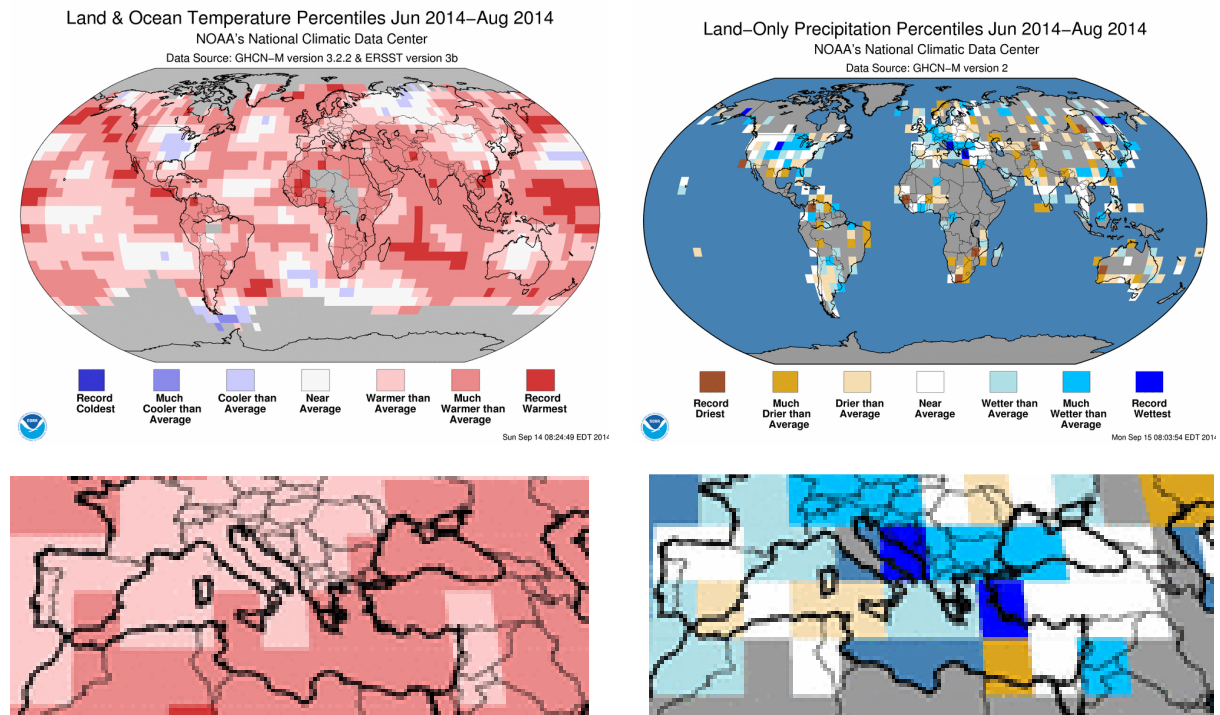


Figure 5: Upper left: Temperature percentiles (1981-2010 reference) for summer 2014. Source: NOAA NCDC, <http://www.ncdc.noaa.gov/temp-and-precip/global-maps.php>

Upper right: Precipitation percentiles (1981-2010 reference) for summer 2014. Source: NOAA NCDC, <http://www.ncdc.noaa.gov/temp-and-precip/global-maps.php>

Lower figures: the same zoomed for the RAVI-MED region.

For more information about monitoring analyses provided by the WMO RA VI RCC Offenbach Node on Climate Monitoring, see: <http://www.dwd.de/rcc-cm>

Temperature:

While western Europe was affected by several cold air outbreaks from the north, eastern Europe was more frequently dominated by warm subtropical air. This was also to be seen particularly in northern parts of the European MedCOF region.

As a result, summer 2014 was slightly cooler than normal (1981-2010 reference) particularly in northwestern parts of the MedCOF region, such as parts of the Iberian Peninsula, most of France, and parts of Italy (especially the north). However, in terms of percentiles these areas are slightly warmer than average for the same reference. This can happen when the temperature distribution is



not exactly symmetrical. Anyway, it seems to be reasonable to classify these regions by normal temperature.

In contrast, it was clearly warmer than normal in eastern parts of the RAVI-MED region, particularly the eastern Balkan Peninsula, Turkey and the South Caucasus. Highest anomalies within RAVI-MED occurred in its northeastern parts, especially in northern Turkey and western parts of the South Caucasus, which were up to more than +2°C above normal. The Mediterranean basin, too, was warmer than normal, although anomalies decrease from the east to the west.

Daily maximum temperatures varied from temporarily less than 20°C in the northernmost parts of the MedCOF region and higher mountains up to probably more than 45°C in eastern Syria. Some locations in southern Spain, southern Greece, Turkey and in the south Caucasus had temporarily maxima above 40°C.

Precipitation:

During summer 2014 several heavy rain events occurred, particularly in an area in the north of RAVI-MED from France / northeastern Spain to western Turkey, locally also near and over the eastern Mediterranean, which caused positive seasonal precipitation anomalies, partly above 125% of the 1951-2000 normal (GPCC data), in the east locally even more. On the other hand, summer was drier than normal in northeastern parts of RAVI-MED, which were more affected by high pressure influence, such as Moldova, the South Caucasus, and eastern Turkey. The remaining parts of RAVI-MED, consisting of most of the Iberian Peninsula and most of the Mediterranean water basin, had near normal precipitation, southern parts were dry as usual or even drier; parts of Spain and southern Italy had even less than 60% of the normal summer precipitation.

3. Verification of the MedCOF-2 climate outlook for the 2014 summer season:

Temperature:

The MedCOF-2 climate outlook for the 2014 summer season favored an above-normal temperature scenario for most of the Mediterranean basin and even some land areas of Europe, suggesting a subtropical warming which reaches areas quite far in the north of the MedCOF region. This was not exactly reflected by the actual distribution of seasonal summer temperature anomalies which show a slight cooling in western Europe and a warming in eastern parts of RA VI. In particular, the warming suggested for region 1 of the outlook occurred in the western parts of Mediterranean basin, but to a much lesser extent further north in southern France and northern Italy, which were affected by cooling. The outlook for region 2 (50% probability warming) was much better, since it shows the warming over eastern Turkey and South Caucasus, which has actually occurred very clearly, and also the warming over the eastern Mediterranean. In region 3, where the predictability was expected to be low, anomalies were mostly relatively low, so climatology was quite a good estimate, but except the eastern parts of that region (eastern Bulgaria, Greece, western Turkey).

In summary, the temperature prediction for the RAVI-MED part was more or less correct for most of the areas, although it does not reflect very well the large-scale differences between the west and the east of that region.

Precipitation

MedCOF-2 favored an above-normal precipitation scenario over most of the Mediterranean basin, Turkey and the South Caucasus, defined by region 1 of the precipitation outlook. In fact it was wetter than normal especially over northern parts of the basin and western Turkey. For more southern parts, the actual signal was less clear, and at least in some areas near southern Italy and southeastern Spain it was rather drier than normal, although absolute precipitation was generally low as usual in summer. The easternmost parts of region 1 (eastern Turkey and South Caucasus), too, were drier than normal, in contrast to the outlook. For region 2, the areas of France and the northern Balkan Peninsula (except the northeast) were clearly wetter than normal, so they were underestimated by the suggested climatology, while for most of the Iberian Peninsula, anomalies were small as expected.

In summary the outlook has reflected the wetter-than-normal area in the northern part of the Mediterranean basin at least partly, although in reality the wet pattern in western parts of the



region was shifted further to the north. There was also some failure in the eastern parts of the MedCOF region because the wet area of region 1 had been extended too far to the east, since the South Caucasus was clearly dry.

4. Users' perceptions of the MedCOF-2 outlook

No feedback from users received or reported. Partly the outlook was not provided to users.

Appendix A: Contributors to the Pre-COF of MEDCOF-3

- National Meteorological and Hydrological Services of Armenia, Azerbaijan, Bosnia and Herzegovina, Bulgaria, Croatia, Cyprus, Georgia, Greece, Israel, Macedonia, Moldova, Montenegro, Serbia, Spain, Turkey
- WMO RA VI RCC Offenbach Node on Climate Monitoring, Deutscher Wetterdienst, Germany

Country	Seasonal temperature (JJA)		Seasonal precipitation (JJA)		High impacts events
	Observed	MedCOF-2 climate outlook for temperature	Observed	MedCOF-2 climate outlook for precipitation	
Portugal (1) *	Around normal	Normal	Normal	Normal	No events reported
Spain (1)	Around normal	Above normal in the northeast and on Balears Islands, normal elsewhere	Above normal in the northeast and east, below normal in many places in the north and west	Above normal in the east and on Balears Islands, normal elsewhere	No high impact events
France (1) *	Above normal in the northwest, around normal elsewhere	Above normal in the southeast, normal elsewhere	Normal to above normal	Above normal in the southeast, around normal elsewhere	No events reported
Italy (1) *	Above normal in the south, around normal elsewhere	Above normal	Below normal in the south, above normal in the north	Normal in the north, above normal elsewhere	No events reported

Slovenia (1)*	Around normal	Above normal	Above normal	Normal	No events reported
Hungary (1)*	Above normal	Above normal in the west, normal in the east	Above normal in the west, around normal in the east	Normal	No events reported
Ukraine (2)	Above normal	No outlook	Mostly around normal	No outlook	Heat waves with daily maximum temperatures up to 40°C.
Moldova (1)	Above normal to normal	Above normal	Below normal to normal	Normal	Heat wave July 26 – August 16, increased number of days with daily maximum temperature above 30°C and 35°C; thunderstorms, fog, squall winds up to 25m/s, heavy rainfalls, hail caused damage to crops; hot weather and shortage of rainfall caused less favorite conditions to harvest and sowing.
Romania (1)*	Around normal in the west, above normal in the east	Normal	Above normal in the southwest, below normal in the east	Normal	
Serbia (1),(2)	Normal	Normal to above normal	Normal to above normal	Above normal in mountain region of central and southern Serbia, normal elsewhere	Heat wave June 6-13 in most places, several heavy rain events with locally record-breaking daily precipitation totals
Croatia (1),(2)	Normal to above normal	Above normal	Mostly above normal, around normal in the east and northwest	Normal	Extreme thunderstorms, hail, heavy rainfall, flash flood, water spout, new records of daily and monthly precipitation totals.
Bosnia-	Normal	Normal or	Above normal	Normal	Locally extremely heavy rainfall (Doboj, Banja Luka),

Herzegovina (1)		above normal			especially in August
Montenegro (2)	Normal to above normal	Normal	Below normal in the east, normal to above normal elsewhere	Above normal	Some storms with heavy rainfall, hail, high waves and flooding
Albania (1)*	Around normal	Normal	Above normal in the north, around normal in the south	Above normal	
Macedonia (1)	Around normal	Normal	Mostly above normal, normal in the southwest	Above normal	Locally record-breaking summer precipitation totals (Berovo), especially July and August were among the three wettest months ever recorded in Berovo.
Bulgaria (2)	Normal to above normal	Normal	Normal to above normal	Above normal	Frequent heavy rain events, wettest summer since 2005, floods and hailstorms
Greece (2), (3)	Normal to mostly above normal	Above normal in the south, normal elsewhere	Above normal in the north, normal to below normal in the southwest, almost zero on south Aegean islands	Above normal	No events reported
Turkey	Around normal in the southwest, above normal elsewhere	Slightly above normal in the east, normal elsewhere	Above normal in the west and much of the south, locally below normal in the east,	Normal to above normal	Storms causing damage to trees and houses, heavy rain and flooding affecting transportation, Tornado in Istanbul damaging trees and houses, hail affecting agriculture in Aegean region.

			around normal elsewhere		
Georgia	Above normal	Normal to above normal	Below normal, locally above normal	Above normal in the west, normal in the east	Heat wave with daily maxima above 40°C especially on 18/19 August, some heavy rain.
Armenia	Above normal	Above normal	Mostly normal or below normal, only locally above normal	Above normal	No events reported
Azerbaijan (2)	Above normal	Above normal	Below normal	Above normal	Large hail in June caused huge damage to agriculture, record breaking daily maxima in August. Some parts of the country had no rain in August.
Syria (1)*	Above normal	Above normal	Normal	Dry season	No events reported
Lebanon (1)*	Above normal	Above normal	Normal	Dry season	No events reported
Cyprus (1)	Around normal	Around normal	Mountainous areas above normal, coastal areas practically zero, inland above normal in June, then practically zero	Dry season	Daily temperature maxima up to more than 43°C (June). Heat wave of several days duration in August. Some heavy rain events caused problems in road traffic.
Israel (1)	Above normal	Above normal	No precipitation	Dry season	No events occurred.
Jordan (1)*	Above normal	Above normal	No precipitation	Dry season	No events reported



Note:

- (1) - Basic climatological period (1981-2010)
- (2) - Basic climatological period (1961-1990)
- (3) - Basic climatological period (1971-2000)

* Data sources: NOAA NCDC, GPCC

References:

MedCOF 2 Outlook: <http://medcof.aemet.es/Medcof/events/medcof2/step3/docStep3/Consensus%20Statement%20MedCOF-2.pdf>

RA VI RCC-CM Website with monitoring results: <http://www.dwd.de/rcc-cm>

NOAA ESRL composite maps: <http://www.esrl.noaa.gov/psd/data/composites/day/>

NOAA NCDC percentile maps: [http://www.ncdc.noaa.gov/temp-and-precip/global-maps.php?imgs\[\]=map-percentile-prcp&year=2014&month=16](http://www.ncdc.noaa.gov/temp-and-precip/global-maps.php?imgs[]=map-percentile-prcp&year=2014&month=16)

IRI climate library: <http://iridl.ldeo.columbia.edu/docfind/>