Climate Monitoring

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ArabCOF 4 (Jeddah, 26-28 November 2019)
Activities at regional scale

Tunisia Met Service contribute to the following regional activities:

Regional climate center:
Member of the Regional climate center for North-Africa region with the responsibility of ‘Climate monitoring node’

Regional Climate Forums for:
- North Africa region : PRESANORD
- Mediterranean region : MEDCOF
- Arab region 'ARABCOF'
Climate Monitoring

The monitoring of the climate attained a great importance and a public attention in discussions of a possible global warming in the past years.

In addition to providing climate monitoring products for Tunisia, the NMI produce also monitoring the climate for North Africa Region

Based on this expertise NMI has been selected to lead the World Meteorological Organization (WMO) Regional Climate Centre (RA I-NA) Network Tunisia Node on Climate Monitoring (RCC-CM)
Oceanic Analysis

The main oceanic driver at global scale is the Indian Ocean Dipole, IOD in a positive phase.
At regional scale, the Mediterranean Sea shows positive anomalies in October.
Current situation: **Neutral** ENSO and **Strongly positive** IOD.
Large scale circulation

The weather type classification shows a predominance of Greenland Anticyclone (NAO-) and Atlantic trough.

For the southern half of Europe and the Mediterranean region, geopotential anomalies were largely positive, except a slight negative anomaly over Tunisia and Libya.
Large scale circulation

Sea level pressure distribution shows the typical subtropical high-pressure belt extending from the Azores to Russia. The Azores High was more intense than normal in October, but over the Mediterranean region, high pressure was slightly weaker than normal.
Snow cover in Eurasia was above normal in October 2019, particularly over Scandinavia, where snow came quite early in the season.
Drivers

- No significant late-summer SST pattern in northern Atlantic
- Eurasian snow cover above normal in October
- NAO- supposedly enhanced (but not observed during recent winters)
- High IOD index has been shown to favour positive geopotential anomaly over Europe and Mediterranien bassin.

Conclusion: positive geopotential anomaly over Europe and Mediterranien region linked to strong positive IOD
Regional climate monitoring products

- **Monitoring**: Examination of daily, monthly, seasonal, and annual analyses of atmospheric and oceanic variability.

- **Monitoring products**: Annual reports, Monthly Weather Summary, Bulletin of the climate monitoring and Seasonal weather review. (Tables, report, statistics, graphics, maps, etc.)

- **Data sources**:
  - NCDC observed stations data
  - NCEP/NCAR Reanalysis data (50 Km)
  - CHIRPS data for the precipitation (25 Km)

- **Climate variables**:
  - Temperature
  - Precipitation
  - Extreme events
  - Pressure
  - SST
  - Drought index (SPI)
  - Soil moisture

- **Baseline period for norms**:
  - 1981-2010
North Africa

The graph below shows the monthly trend of air temperature anomaly of October in degrees Celsius since 1979 through 2019. The black line tracks the changes in the trend over time. The anomaly of the average temperature of October compared to the normal 1981-2010 reached 1°C.

For October, the warming rate was about +0.4°C per decade.
October 2019 was hotter than normal over most of North Africa area. The registered temperatures were above normal over all of Libya and Egypt and over most parts of Algeria, Tunisia and Morocco. Below normal anomalies were registered over the middle and the southwest of Algeria, the extreme southwest of Tunisia and a part of the south of Morocco. Monthly mean temperature in October 2019 ranged from less than 14°C in the north of Morocco and Algeria to above 32°C in the extreme south of Algeria.
Monthly precipitation totals in October 2019 were below 20 mm over almost the entire RAI-NA domain. Rainfall amounts exceeding 60 mm were registered in the extreme northeast of Algeria and the eastern coast of Tunisia. Near-normal conditions occurred over most parts of Libya and Egypt. These regions received between 75% and 125% of the normal. Slightly above-normal conditions occurred especially in the middle of Libya. Over Tunisia, Algeria and Morocco the precipitation was below normal during this month with less than 20%.
WMO recommend the **Standardized Precipitation Index (SPI)** as the main meteorological drought index that countries should use to monitor and follow drought conditions. For the North Africa region we compute SPI from the monthly precipitation data in time scales 1,3,6,9,12 and 24 months.

**Standardized Precipitation Index (SPI)**

9 Month SPI for October 2019

Data Source: Climate Hazards Group Infrared Precipitation with Station data (CHIRPS)

North African Regional Climate Center
National Institute of Meteorology Tunisia

Extremely dry

Extremely wet
Climate monitoring for Arab Region (October 2019)

Monthly Regional Land Temperature Anomalies for October from 1979 to 2019

(Compared with 1981-2010 average)

Trend = 0.41 °C/Decade

Anomaly (°C)

Year

The temperatures observed during October 2019 were higher than normal. The anomaly reached 3 °C compared to reference period.
Tercile mapping gives the possibility to better distinguish areas above-normal, near-normal and below-normal.
Most regions did not reach 100% of precipitation in October, with the exception of southern Sudan and Somalia.
Some climate indices of daily temperature and precipitation extremes are given for the Arabian region:

- **ECASU - Summer days index**: The number of days if the daily maximum temperatures greater than 25 °C.

- **ECACFD - Consecutive frost days index**: The largest number of consecutive days where the daily minimum temperature < 0 °C.

- **ECAETR - Intra-period extreme temperature range**: The extreme temperature range is the difference of the maximum of maximum temperature and the minimum of minimum temperature.

- **ECATR - Tropical nights index**: The number of days where the minimum temperature > 20 °C.

- **ECARX1DAY - Highest one day precipitation amount**: The maximum of daily precipitation amounts.

- **ECARX5DAY - Highest five-days precipitation amount**: The number of 5 day period with precipitation totals greater than 50 mm.

- **ECACDD - Consecutive dry days index**: The largest number of consecutive days where daily amount of precipitation is less than 1 mm.

- **ECACWD - Consecutive wet days index**: The largest number of consecutive days where RR is at least 1 mm.
The largest number of consecutive days where daily amount of precipitation is less than 1 mm. It can be used for irrigation in agriculture sector.
The largest number of consecutive days where RR is at least 1 mm
The extreme temperature range: is the difference of the maximum of maximum temperature and the minimum of minimum temperature.
The maximum of daily precipitation amounts.
The number of 5 days period with precipitation totals greater than 50 mm
The number of days if the daily maximum temperatures greater than 25 °C.
Thank you for your attention