Current and anticipated conditions in the Pacific, Indian Ocean, the Atlantic Ocean and their impact on climate over Arab region

The 8th Arab Climate Outlook Forum (ArabCOF) Meeting & The 5th Gulf Cooperation Council Climate Outlook Forum (GCC-COF) Meeting
Virtual, 6 & 7 December 2021

Dr Said Hamed AlSarmi
Meteorological Expert
Meteorological Directorate
Oman
Possible winter season drivers over the Arabian Peninsula.

Drivers conditions.

RAII RCCs and some WMO MME LR forecasts.
Possible winter season drivers over the Arabian Peninsula
Last summer Extreme climate events

Extreme Climate Events
June 2021 – August 2021

Updated: 30 September 2021

- Warm
- Cold
- Wet
- Dry
- Tropical Cyclone
- Disaster

Tropical Storm “CLAUDETTE”
Hurricane “IDA”
Hurricane “HENRI”
Temp June 21 – August 21 Anomaly
Precip June 21 – August 21 Anomaly
Correlation coefficients with two periods 1990-2008 and 1970-2008 between the DJF standardized regional average temperature and precipitation extreme indices and NAO (coefficients significant at 0.05 level are in bold and to 0.1 level in italic).

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>All</td>
<td>NMON</td>
</tr>
<tr>
<td>PRCP_Mon</td>
<td>-0.35</td>
<td>-0.28</td>
</tr>
<tr>
<td>RX1day</td>
<td>-0.23</td>
<td>-0.15</td>
</tr>
<tr>
<td>TMAXmean</td>
<td>0.00</td>
<td>0.06</td>
</tr>
<tr>
<td>TX10p</td>
<td>-0.01</td>
<td>-0.06</td>
</tr>
<tr>
<td>TX90p</td>
<td>0.26</td>
<td>0.31</td>
</tr>
<tr>
<td>TXX</td>
<td>0.19</td>
<td>0.20</td>
</tr>
<tr>
<td>TMINmean</td>
<td>-0.25</td>
<td>-0.10</td>
</tr>
<tr>
<td>TN10p</td>
<td>0.19</td>
<td>0.15</td>
</tr>
<tr>
<td>TN90p</td>
<td>-0.18</td>
<td>-0.10</td>
</tr>
<tr>
<td>TNX</td>
<td>-0.16</td>
<td>-0.10</td>
</tr>
</tbody>
</table>
Correlation coefficients with two periods 1990-2008 and 1970-2008 between the DJF standardized regional average temperature and precipitation extreme indices and NCP (coefficients significant at 0.05 level are in bold and to 0.1 level in italic).

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>All</td>
<td>NMON</td>
</tr>
<tr>
<td>PRCP_Mon</td>
<td>0.24</td>
<td>0.30</td>
</tr>
<tr>
<td>RX1day</td>
<td>0.31</td>
<td>0.32</td>
</tr>
<tr>
<td>TMAXmean</td>
<td>-0.60</td>
<td>-0.62</td>
</tr>
<tr>
<td>TX10p</td>
<td>0.69</td>
<td>0.70</td>
</tr>
<tr>
<td>TX90p</td>
<td>-0.51</td>
<td>-0.50</td>
</tr>
<tr>
<td>TXX</td>
<td>-0.37</td>
<td>-0.31</td>
</tr>
<tr>
<td>TMINmean</td>
<td>-0.24</td>
<td>-0.35</td>
</tr>
<tr>
<td>TN10p</td>
<td>0.47</td>
<td>0.49</td>
</tr>
<tr>
<td>TN90p</td>
<td>0.04</td>
<td>-0.07</td>
</tr>
<tr>
<td>TNX</td>
<td>0.09</td>
<td>0.07</td>
</tr>
</tbody>
</table>
Fig. 1. Map showing the poles of the North Sea – Caspian Pattern (NCP), (after Kutiel and Benaroch, 2002)
Fig. 8. The correlation of Niño 3.4 index and the mean temperature obtained from the NCEP data for the (a) Winter, (b) Spring, (c) Summer, and (d) Autumn seasons averaged over 1978-2010.
Fig. 12. The correlation of the NAO index and the mean temperature obtained from the NCEP data for (a) Winter, (b) Spring, (c) Summer, and (d) Autumn seasons averaged over 1978-2010.
Drivers conditions.
International climate model outlooks

NINO3.4 - Jan 2022

Sea Surface Temperature Anomaly (°C)

© Copyright Australian Bureau of Meteorology
RAII RCCs and some WMO MME LR forecasts.
JMA Seasonal Forecast (Forecast initial month is 11 2021)
Most likely category of Surface Temperature for DJF 2021

Probability (%) of Most Likely Category
Below Normal
Normal (>33%)
Above Normal

33 40 50 60 80
33 40 50 60 80
JMA Seasonal Forecast (Forecast initial month is 11 2021)
Most likely category of Precipitation for DJF 2021
JMA Seasonal Forecast (Forecast initial month is 11 2021)
Most likely category of Sea Surface Temperature for DJF 2021

Probability (%) of Most Likely Category
Below Normal
Normal (>33%)
Above Normal

© JMA
Difference from average sea surface temperature forecast for December 2021 to February 2022.
BCC Three-Month Forecast

Sea Surface Temperature (line) and its Anomaly (shading)

BCC_CSM1.1(m)

Started 20211101    Valid 202111 - 202201

Units: °C

Member Size = 24
BCC Three-Month Forecast
850 hPa Wind Anomaly
BCC_CSM1.1(m)

Started 20211101  Valid 202111 - 202201
Units: m/s
Member Size = 24

Scale: 1:26,000,000

Reference Vector
Probabilistic Multi-Model Ensemble Forecast
ECMWF, Exeter, Melbourne, Montreal, Moscow, Offenbach, Pretoria, Seoul, Tokyo, Toulouse, Washington

Sea Surface Temperature: DJF2021
(issued on Nov 2021)
Probabilistic Multi-Model Ensemble Forecast
Beijing, CMCC, ECMWF, Exeter, Melbourne, Montreal, Moscow, Offenbach, Seoul, Tokyo, Toulouse

850hPa Zonal Wind: DJF2021
(issued on Nov 2021)
Probabilistic Multi-Model Ensemble Forecast
Beijing, CMCC, ECMWF, Exeter, Melbourne, Montreal, Moscow, Offenbach, Seoul, Tokyo, Toulouse

850hPa Meridional Wind: DJF2021
(issued on Nov 2021)
Charabi and Al-Hatrushi (2009) found that: According to the data, a major part of Oman Winter Rainfall (OWR) is controlled by a large scale process coupled with two main anticyclonic centers, i.e. the Azorian and Siberian Highs.

Raziei et al. (2008) reported that: Winter precip modulated by interaction Siberian high and ENSO.

Hasanean et al (2012) found that Siberian High Index (SHI) is positively correlated to surface air temperatures over Saudi Arabia, and this is statistically significant in the western and north-western regions.

Hafez and Almazroui (2012) indicated that the present studies uncover the climatic relationship between the anomalies in geopotential height over Europe and weather conditions over KSA. The results revealed that air current aloft in the upper atmosphere over Europe, blocking systems, and climatic indices (NAO, SOI and El Nino3.4) have played a great role to impact full control of the weather conditions over KSA through the study period 1948–2012.

Hasanean and Almazroui (2015) draw the attention of the role of the strength and oscillation of subtropical jet stream play a big role in pulling hot, dry air masses of Saudi Arabia.

Hasanean and Almazroui (2016) found that the change in Indo-Pacific warm pool (IPWP) SST can be considered as one of the factors linked to increase surface air temperature over Saudi Arabia.
La Niña event will prevail in the upcoming DJF season.

IOD is expected to continue weak positive.

Drivers conditions suggest more probability for above normal Temp and near to below normal conditions of Precip over the Arabian Peninsula.

Climate change may contribute to increasing temperature in the upcoming DJF season.