WEATHER CLIMATE WATER

WORLD METEOROLOGICAL ORGANIZATION

GLOBAL SEASONAL CLIMATE UPDATE

TARGET SEASON: June-July-August 2022

Issued: 26 May 2022

Summary

During February-April 2022, all four Pacific Niño sea-surface temperature (SST) indices in the central and eastern Pacific were below-normal. The observed SST conditions in the equatorial Pacific were characterized by a weak La Niña state. The Indian Ocean Dipole (IOD) over the observed period was weakly negative. The North Tropical Atlantic (NTA) SST index was near-zero, and the South Tropical Atlantic (STA) SST index was positive.

For the June-August 2022 season, below-normal sea-surface temperature anomalies in the Niño 3.4 and Niño 3 regions with values of approximately -0.5° C (Niño 3.4) and -0.5° C (Niño 3) are predicted indicating a return toward near-normal conditions.

Although a tendency towards near-normal ENSO conditions is predicted for the equatorial central and eastern Pacific, negative sea-surface temperature anomalies are still expected through much of this region. The widespread warmer-than-average sea-surface temperatures elsewhere are predicted to dominate the forecast of air temperatures for June-August 2022, although the extent and strength of predicted warming is less than during March-May 2022. Positive temperature anomalies are expected over most of the land areas in the Northern Hemisphere, with the exceptions being a band running from southern Central America and Caribbean, through the Sahelian belt, the southern Arabian Peninsula, and the Indian subcontinent. Of these exceptions, it is only over part of the Indian subcontinent where below normal temperatures are predicted with high probability and model-to-model consistency. The largest land air-temperature anomalies are expected over the far northern and north-eastern parts of Asia at around 90 ºE, and in patchy areas at about 40 ºN including parts of North America, through much of Europe, and small areas in south-western, central and eastern Asia extending far to the east of Japan. The probabilities for above-normal temperatures are most increased immediately to the northeast of the Indian subcontinent, to the east of Japan, and over much of southeast Asia and the Maritime continent, but model-to-model consistency in predictions of positive temperature anomalies is high over most of the Northern Hemisphere landmasses. Exceptions include the Indian subcontinent, the southern half of the Arabian Peninsula, Africa south of about 20 ºN, and the northern part of South America extending along the Pacific coast of North America. In the Southern Hemisphere, positive temperature anomalies are predicted over the southern Maritime continent, extending to the southeast as far as about 90 ºW. There is also a fork of predicted positive temperature anomalies that extends over New Zealand and Tasmania. Probability for above-normal temperature, and model-to-model consistency is high through this whole region. Elsewhere in Australia, there is no consistent model signal in predicted air temperatures. Similarly, much of sub-Saharan Africa lacks consistency in the air temperature predictions, except for small near-equatorial areas in central Africa, within the Greater Horn, and over Madagascar. In these areas in mainland Africa, above-normal temperatures are predicted with high probability, but with lower probabilities over Madagascar. There is also reasonably strong consistency in predictions of below-average temperature anomalies along the west coast of southern and central Africa. Much of the west coast of the America's is also predicted to experience below-average temperatures. Probabilities are highest, and model-to-model consistency strongest from the equator to about 30 ºS. Elsewhere in South America, the only areas with a strong signal in predicted temperatures are south of about 30 ºS and inland west of about 60 ºW where above-normal temperatures are predicted with moderate consistency.

Like the predicted air-temperature anomalies, the predictions of rainfall anomalies are generally weaker for June-August 2022 than they were for March-May 2022. Nevertheless, there are exceptions and some predicted rainfall patterns are strong, most notably in the Southern Hemisphere. Predictions are similar to canonical rainfall impacts of La Niña, whose sea temperature anomalies continue to linger in a weakened state. There are increased chances of unusually dry conditions along the equator from about 150 ºE and extending towards and expanding over a large part of southern South America. Anomalously wet conditions are predicted in much of the Maritime subcontinent immediately south of the equator and extending over Australia and into the south-west Pacific. Model consistency is high over both these wet and these dry areas. Over northern South America and southern Central America, increased probabilities for above-normal rainfall are indicated, and model consistency is moderately high. In North America, the rainfall signals are weak, but there are small increases in probabilities for below-normal rainfall over western and central North America at about 40° N, and for above-normal rainfall over the far northwest and in the far north. There are similarly weak signals for above-normal rainfall in north-eastern and eastern Asia, but probabilities become a little stronger in parts of the Indian subcontinent and extending into the southern part of the Arabian Peninsula, parts of the Greater Horn and the Sahelian belt in Africa. Coastal parts of the Greater Horn, together with much of Central Africa, as well as the north coast and southern Europe are predicted with increased chances of below-normal rainfall. Model-to-model consistency is high in much of these dry areas.

Surface Air Temperature, JJA 2022 **Precipitation, JJA 2022**

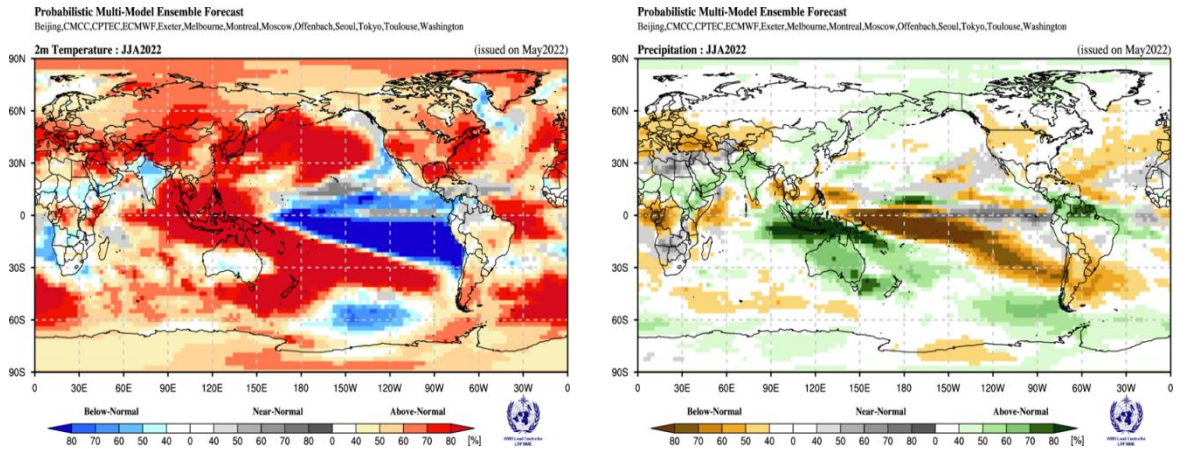


Figure 1. Probabilistic forecasts of surface air temperature and precipitation for the season June-August 2022. The tercile category with the highest forecast probability is indicated by shaded areas. The most likely category for below-normal, above-normal and near-normal is depicted in blue, red and grey shadings respectively for temperature, and orange, green and grey shadings respectively for precipitation. White areas indicate equal chances for all categories in both cases. The baseline period is 1993–2009.

1. Observations: February-April 2022

In the following sections, observed temperature and precipitation patterns for the previous season are briefly discussed. For more detailed information about regional and local climate anomalies, the reader is referred to the concerned WMO Regional Climate Centres (RCCs) or RCC Networks, listed in Section 5.

1.1 Large-scale sea surface temperature (SST) indices

During February-April 2022, all four Pacific Niño sea-surface temperature (SST) indices in the central and eastern Pacific were below-normal. The observed SST conditions in the equatorial Pacific were characterized by a weak La Niña state. The Indian Ocean Dipole (IOD) over the observed period was weakly negative. The North Tropical Atlantic (NTA) SST index was near-zero, and the South Tropical Atlantic (STA) SST index was positive.

Month	Niño 1+2	Niño 3	Niño 4	Niño 3.4	IOD	NTA	STA
February 2022	-1.4	-1.1	-0.2	-0.7	-0.4	0.5	0.7
March 2022	-0.7	-0.7	-0.7	0.9	-0.1	0.1	0.4
April 2022	-1.4	-0.9	-0.7	-1.0	-0.4	0.1	0.3
February-April 2022	-1.2	-0.9	-0.5	-0.3	-0.3	0.2	0.5

Table 1. Large-scale oceanic indices (°C). Anomalies are with respect to the 1981–2010 average. (*Source:* U.S. Climate Prediction Center)

1.2 Observed temperature

Over land, temperature anomalies across the globe continued their general tendency of warmer-than-normal conditions for the season of February-April 2022 (Figure 2, top), and in general, above-normal temperatures were prevalent over the global land areas. The most strongly positive land-temperature anomalies occurred over the north of 45° N Europe, northern Asia, western parts of the Indian subcontinent, and Greenland. Positive temperature anomalies also occurred over northern Australia, New Zealand, the Caribbean, over much of South America between equator and 30° S. Although much less extensive, there were also regions with below-normal temperature anomalies including much of North America, and parts of Africa.

Over the oceans, the south of the eastern Pacific below the equator had below-normal temperatures. In the extratropical southern oceans along 60° S near-to below average temperatures generally prevailed. SSTs in the equatorial central Pacific indicated a weak La Niña, with positive anomalies in the western equatorial Pacific and negative anomalies in the central and eastern Pacific - a pattern that indicates enhanced zonal SST gradients across the equatorial Pacific. SST anomalies in the extratropical North Pacific and Atlantic, Indian Ocean, western Atlantic Ocean, and in the southern Pacific along 30° N, were generally positive. A notable region having the largest observed positive ocean-temperature anomaly was in the northwest Pacific.

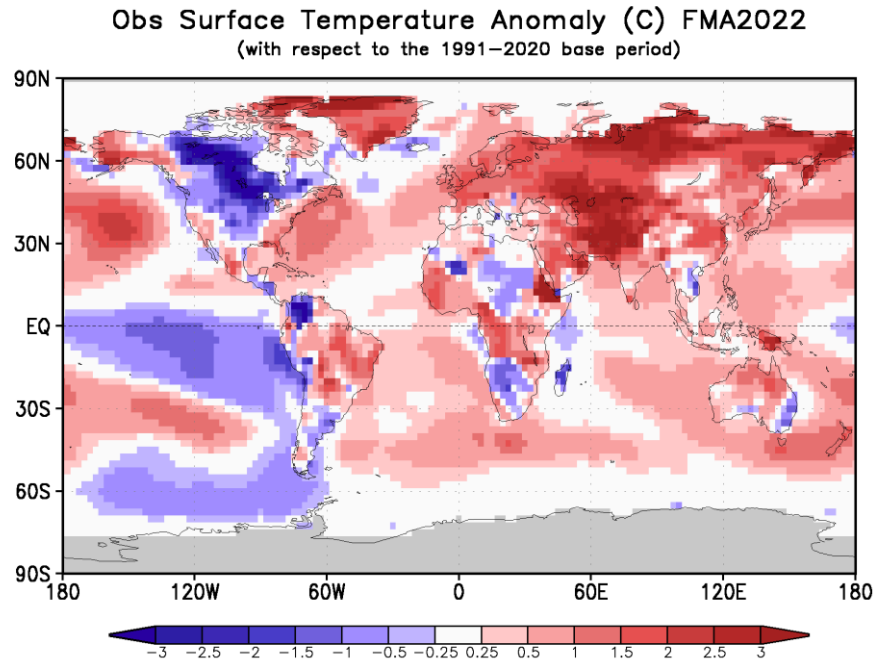
Consistent with the seasonal mean anomalies, warm extremes dominated (Figure 2, bottom panel). Warm extremes (exceeding all seasonal mean temperatures observed during 1991–2020) occurred over north-western Indian subcontinent. Some oceanic regions also had warm extremes, notably the extratropical Pacific around 30° N, western regions of southern Pacific along 30° S, and northwest Atlantic. No widespread extreme cold temperature was found over land areas.

1.2 Observed precipitation

For February-April 2022, the largest negative precipitation anomalies were in the equatorial Pacific near the date-line extending into the western Pacific with an equatorial band extending into the eastern Pacific, and a band extending into the southern Pacific towards South America (Fig. 3, top panel). Below-normal precipitation anomalies also occurred in the equatorial Indian Ocean, south-western Indian Ocean, northeast Pacific, and north-western Atlantic. Positive precipitation anomalies occurred in the oceanic regions in the vicinity of the Indonesian Archipelago.

Over land, negative precipitation anomalies were observed over southern Greenland, northern Australia, the western coastal regions of North America, and parts of southern Europe. Positive precipitation anomalies occurred over much of Africa south of 15° N, southeast Asia, the Indonesian Archipelago, and north-western regions of South America. Over much of Asia and northern and western Africa no large-scale systematic departures in precipitation anomalies of either sign were observed.

Except over a small region in central Africa which was extremely wet, no large-scale systematic regions with dry or wet extremes (precipitation below or above all seasonal totals observed during 1991-2020) over land occurred.



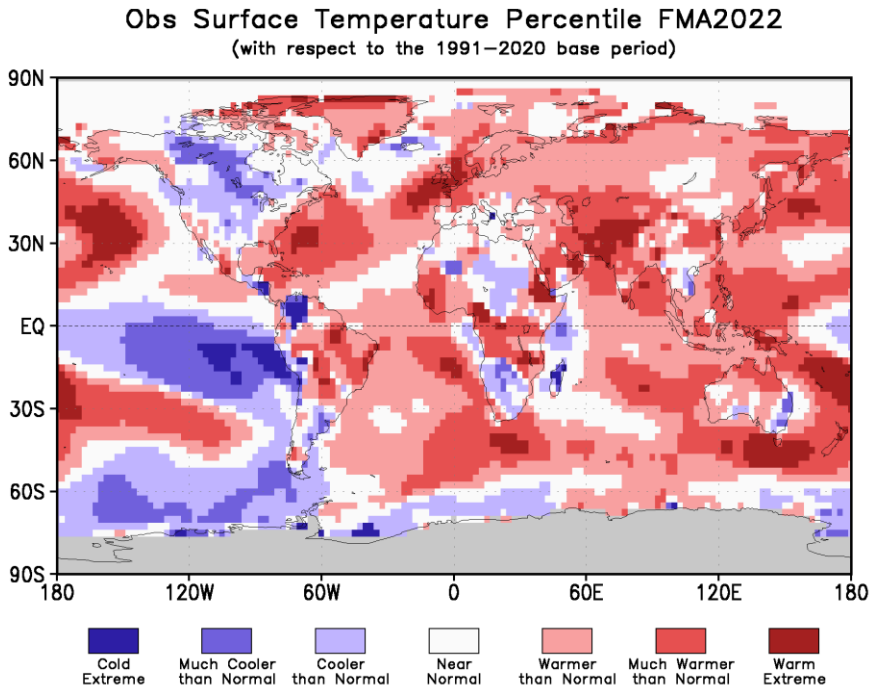
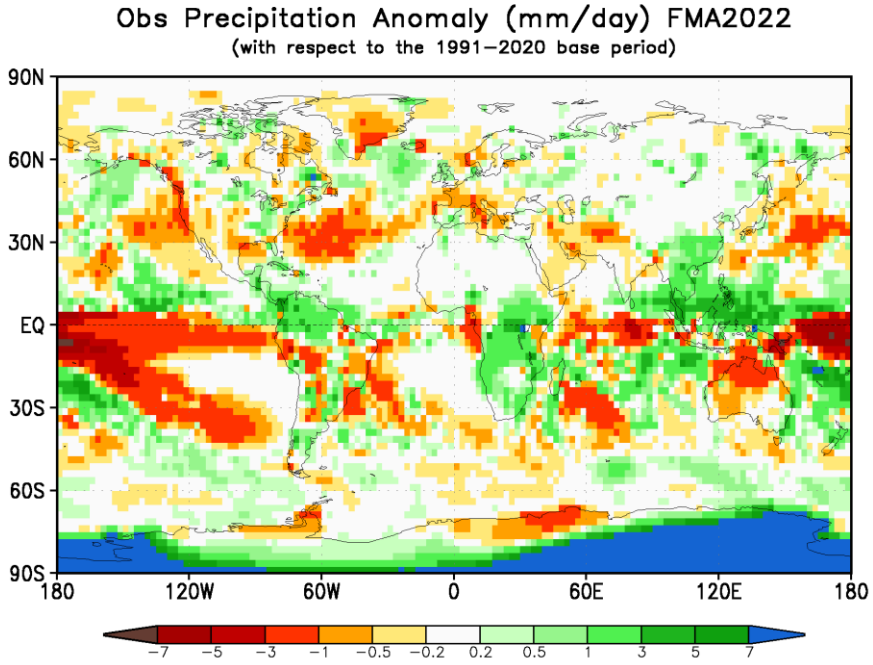


Figure 2. Observed February-April 2022 near-surface temperature anomalies relative to 1991–2020 (top). The *Cooler than Normal, Near Normal, and Warmer than Normal* shadings on the percentile map (bottom) indicate that seasonal mean anomalies were in the bottom, middle, and upper tercile of the 1981–2010 distribution, respectively. Regions with anomalies in the lowest and highest decile (or 10%) of the distribution are marked as *Much Cooler than Normal* and *Much Warmer than Normal*, respectively. The *Cold Extreme* and *Warm Extreme* shadings indicate that the anomalies exceeded the coldest and warmest temperature values of the 1991–2020 period for the season. Grey shading indicates areas where observational analysis was not available. (*Source:* U.S. Climate Prediction Center).



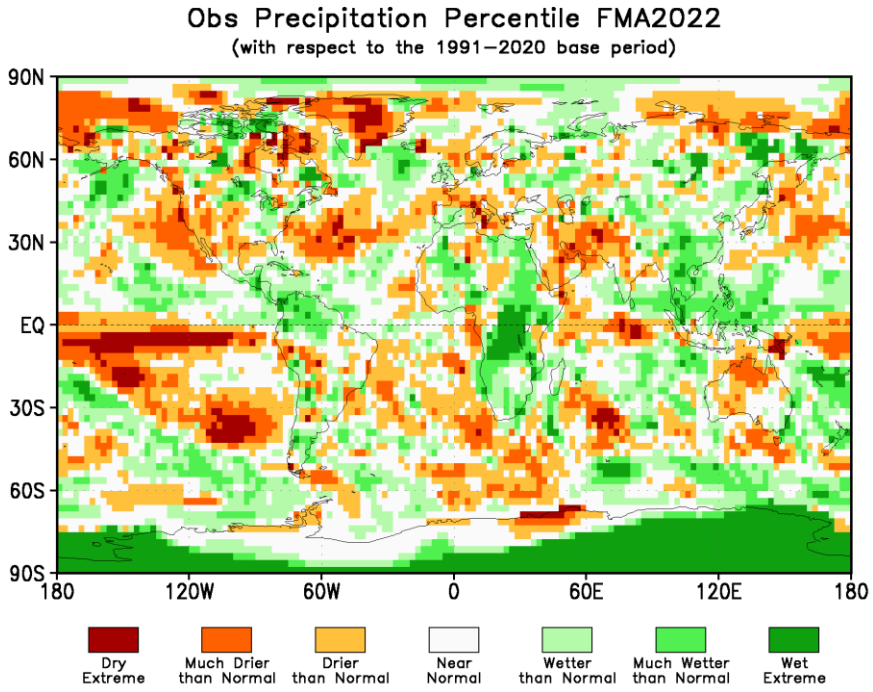


Figure 3. Observed precipitation anomalies for February-April 2022, relative to 1991–2020 base period (top). The *Drier than Normal, Near Normal and Wetter than Normal* shadings on the percentile map (bottom) indicate that seasonal mean anomalies were in the bottom, middle, and upper tercile of the 1981–2010 distribution, respectively. Regions with anomalies in the lowest and highest decile (or 10%) of the distribution are marked as *Much Drier than Normal* and *Much Wetter than Normal*, respectively. The *Dry Extreme* and *Wet Extreme* shadings indicate that the anomalies exceeded the driest and wettest values of the 1991–2020 period for the season. (*Source:* U.S. Climate Prediction Center).

2. Potential evolution of the state of the climate over the next three months (June-August 2022)

2.1 Large-scale SST-based indices, June-August 2022

Month	Nino 1+2	Nino 3	Nino 4	Nino3.4	IOD	NTA	STA
June 2022	-0.9±0.3	-0.5±0.2	-0.7±0.3	-0.7±0.2	-0.8±0.2	0.1±0.1	0.0±0.1
July 2022	-0.8±0.3	-0.4±0.2	-0.7±0.3	-0.5±0.2	-1.1±0.3	0.2±0.1	0.0±0.1
August 2022	-0.7±0.3	-0.4±0.2	-0.6±0.3	-0.5±0.3	-1.3±0.4	0.2±0.1	0.0±0.1
June-August 2022	-0.8±0.3	-0.4±0.2	-0.7±0.3	-0.5±0.2	-1.1±0.4	0.2±0.1	0.0±0.1

Table 2: Multi-model forecasts for oceanic indices (℃), with standard deviation. Values are the equal-member-weighting average of those derived, using each GPC model's own hindcast climate mean, from the GPCs supplying SST forecasts (GPC Beijing, CMCC, ECMWF, Exeter, Melbourne, Montreal, Offenbach, Seoul, Tokyo, Toulouse, Washington). The standard deviation is calculated on all ensemble members. The latitude/longitude bounds of the regions are given in the supplementary information section.

Observed sea-surface temperatures in the central tropical Pacific were in a weak La Niña condition during February-April 2022. Below-normal sea-surface temperature anomalies in the Niño 3.4 and Niño 3 regions with values of approximately -0.5° C (Niño 3.4) and -0.4° C (Niño 3) are predicted during the June-August 2022 season indicating a return to near-normal or marginal La Niña conditions. Farther west in the Niño 4 region, the sea-surface temperature anomaly is also predicted to remain below normal, with a value of about -0.7° C. The JJA 2022 prediction, therefore, indicates a return to near-normal ENSO or marginal La Niña conditions in the central tropical Pacific. The IOD is predicted to be negative over JJA 2022. In the equatorial Atlantic, SSTs are predicted to be near-normal in both the northern (NTA) and the southern (STA) areas during the season.

2.2 Predicted temperature, June-August 2022

For information on the construction of the multi-model forecast maps refer to the supplementary information section. (Note: Maps indicating forecast consistency among GPC models are available in the supplementary information[1]).

[1] File with supplementary information can be downloaded from https://ftp.cpc.ncep.noaa.gov/mingyue/GSCUWMO/Forecasts/GSCU_JJA2022_supplementary_info_LC-LRFMME.docx

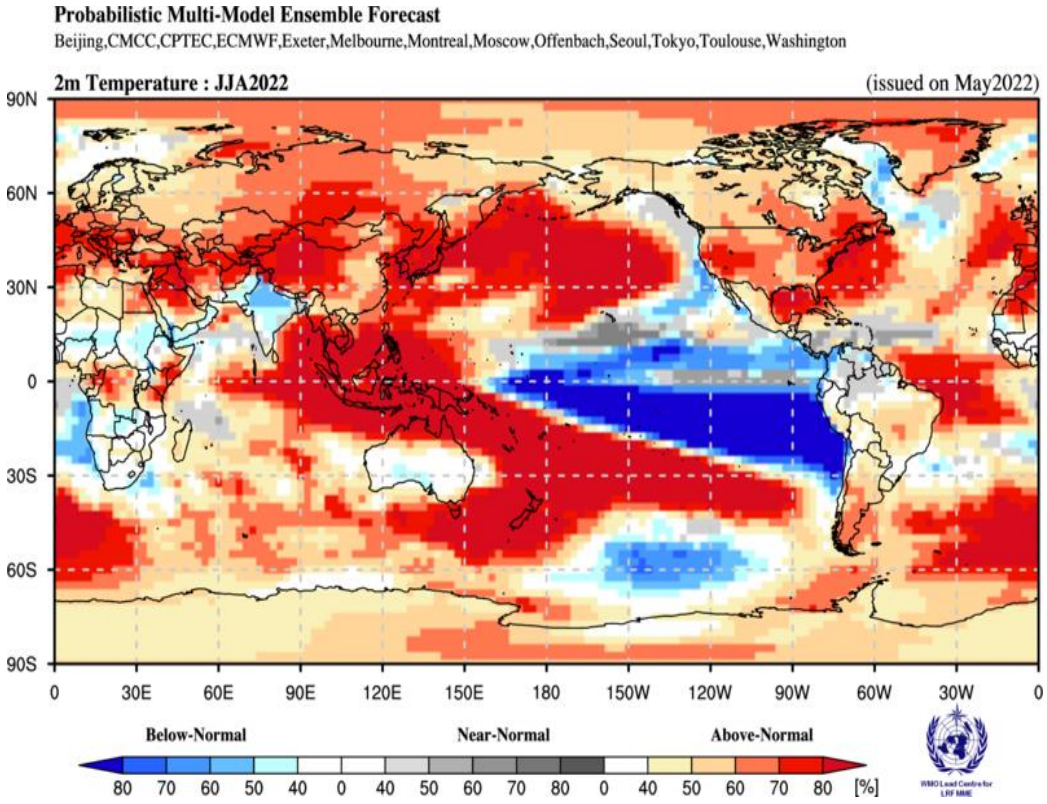


Figure 4. Probabilistic forecasts of surface air temperature for March – May 2022. The tercile category with the highest forecast probability is indicated by shaded areas. The most likely category for below-normal, above-normal and near-normal is depicted in blue, red and grey shadings respectively. White areas indicate equal chances for all categories in both cases. The baseline period is 1993–2009. Figure is generated by The WMO Lead Centre for Long-Range Forecast Multi-Model Ensemble.

Although a tendency towards near-normal ENSO conditions is predicted for the equatorial central and eastern Pacific negative sea-surface temperature anomalies are still expected through much of this region. The widespread warmer-than-average sea-surface temperatures elsewhere are predicted to dominate the forecast of air temperatures for June-August 2022, although the extent and strength of predicted warming is less than during March-May 2022. Positive temperature anomalies are expected over most of the land areas in the Northern Hemisphere, with the exceptions being a band running from southern Central America and Caribbean, through the Sahelian belt, the southern Arabian Peninsula, and the Indian subcontinent. Of these exceptions, it is only over part of the Indian subcontinent where below normal temperatures are predicted with high probability and model-to-model consistency. The largest land air-temperature anomalies are expected over the far northern and north-eastern parts of Asia at around 90 ºE, and in patchy areas at about 40 ºN including parts of North America, through much of Europe, and small areas in south-western, central and eastern Asia extending far to the east of Japan. The probabilities for above-normal temperatures are most increased immediately to the northeast of the Indian subcontinent, to the east of Japan, and over much of southeast Asia and the Maritime continent, but model-to-model consistency in predictions of positive temperature anomalies is high over most of the Northern Hemisphere landmasses. Exceptions include the Indian subcontinent, the southern half of the Arabian Peninsula, Africa south of about 20 ºN, and the northern part of South America extending along the Pacific coast of North America. In the Southern Hemisphere, positive temperature anomalies are predicted over the southern Maritime continent, extending to the southeast as far as about 90 ºW. There is also a fork of predicted positive temperature anomalies that extends over New Zealand and Tasmania. Probability for above-normal temperature, and model-to-model consistency is high through this whole region. Elsewhere in Australia, there is no consistent model signal in predicted air temperatures. Similarly, much of sub-Saharan Africa lacks consistency in the air temperature predictions, except for small near-equatorial areas in central Africa, within the Greater Horn, and over Madagascar. In these areas in mainland Africa, above-normal temperatures are predicted with high probability, but with lower probabilities over Madagascar. There is also reasonably strong consistency in predictions of below-average temperature anomalies along the west coast of southern and central Africa. Much of the west coast of the America's is also predicted to experience below-average temperatures. Probabilities are highest, and model-to-model consistency strongest from the equator to about 30 ºS. Elsewhere in South America, the only areas with a strong signal in predicted temperatures are south of about 30 ºS and inland west of about 60 ºW where above-normal temperatures are predicted with moderate consistency.

RA I (Africa): Enhanced probabilities of above-normal temperatures are indicated over some far northern and north-western parts of mainland of Africa, and in near-equatorial areas. Model consistency is moderate to high over these areas. Over the west coast of southern and central Africa, there is an increased probability of below-normal temperatures; consistency is moderate. Madagascar is predicted with increased probabilities of above-normal temperatures, but the signal is rather weak, and consistency is moderate. Elsewhere there is no clear indication for a signal (and model consistency is also weak).

RA II (Asia): Enhanced probabilities for above-normal temperatures are indicated over most of Asia, except for parts the Indian subcontinent and the southern part of the Arabian Peninsula, where the forecast is for below-normal temperatures. Models are consistent in predicting positive temperature anomalies over the bulk of the continent, but less consistency in predicting the anomalously cold areas. The models have greatest consistency over the southeast Asia, which is predicted to be anomalously warm. Consistency is also high between about 30º and 40º N.

RA III (South America): Weak enhanced probabilities for above-normal temperatures are indicated over some parts of South America south of about 10º S. Model-to-model consistency, however, is strong only south of 30º S. Over much of the west coast of the continent, below-normal temperatures are predicted as the most likely outcome, and model-to-model consistency is strong between the equator and about 30º $. North of the equator, the models predict normal or below-normal temperatures, but with weak consistency.

RA IV (North America, Central America, and the Caribbean): There are enhanced probabilities for above-normal temperatures over most of North and Central America and the northern half of the Caribbean. The probabilities for above-normal temperatures are highest over the northern Caribbean, eastern North America and an area over the western part of the continent. Model-to-model consistency is high over most areas east of about 120º W. Over the west coast and in the southern part of Central America there are increased probabilities of normal or anomalously cold conditions, and model consistency is moderate here. Normal and below-normal temperatures are predicted for much of the eastern Pacific.

RA V (Southwest Pacific): Strongly enhanced probabilities for above-normal temperatures are predicted in a band from north of Australia, extending to the south-eastern South Pacific, and in an arc extending over New Zealand to the vicinity of Tasmania. The Indonesian Archipelago, northern Australia and many of the southwest Pacific islands lie within this band of above-normal temperatures, and model-to-model consistency is strong over most of the area. There is a sharp transition to an area of predicted below-normal temperature to the northeast, but largely south of the equator, which coincides with the distribution of predicted negative sea-surface temperature anomalies associated with the prediction for declining La Niña conditions. Model-to-model consistency in this cold area is strong. Over most of Australia, there is no strong indication for a clear signal and there is also no model-to-model consistency, except for an area towards the south where below-normal temperatures have increased probabilities.

RA VI (Europe): The probabilities for above-normal temperatures are increased over almost all of Europe and Greenland with the largest probabilities south of about 45° N. The model-to-model consistency is moderate to high except over northern Scandinavia.

2.3 Predicted precipitation, June-August 2022

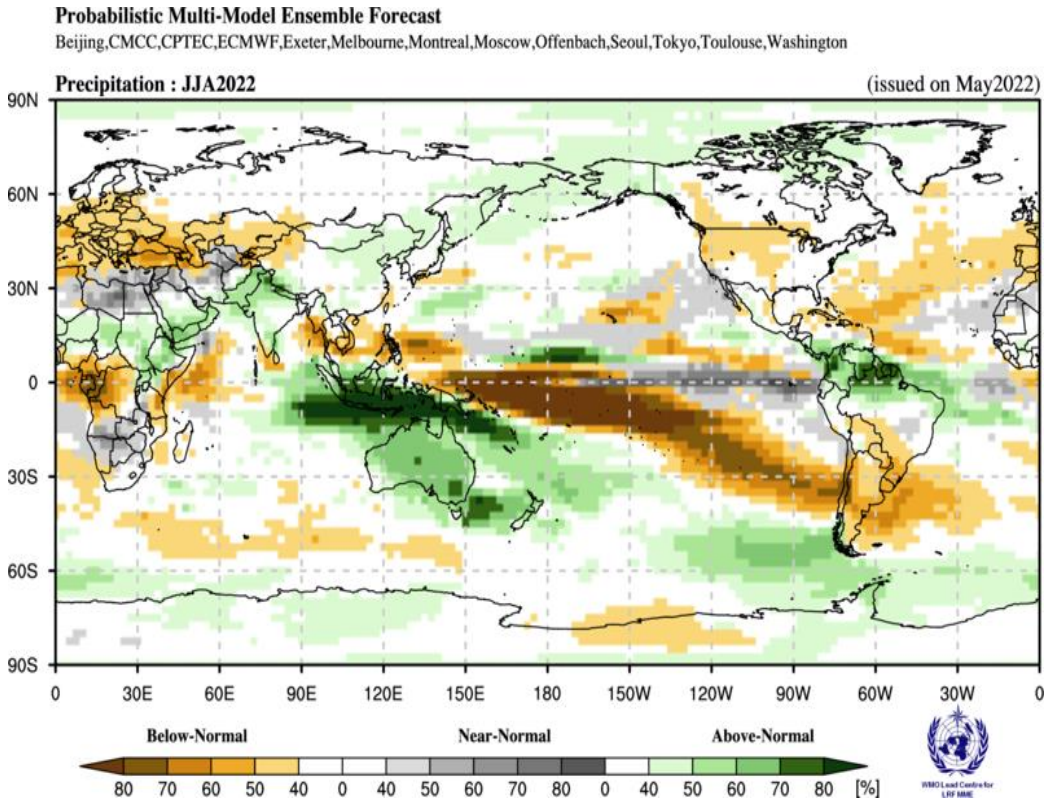


Figure 5. Probabilistic forecasts of precipitation for the season for June-August 2022. The tercile category with the highest forecast probability is indicated by shaded areas. The most likely category for below-normal, above-normal and near-normal is depicted in orange, green and grey shadings respectively. White areas indicate equal chances for all categories in both cases. The baseline period is 1993–2009. Figure is generated by The WMO Lead Centre for Long-Range Forecast Multi-Model Ensemble.

Like the predicted air-temperature anomalies, the predictions of rainfall anomalies are generally weaker for June-August 2022 than they were for March-May 2022. Nevertheless, there are exceptions and some predicted rainfall patterns are strong, most notably in the Southern Hemisphere. Predictions are similar to canonical rainfall impacts of La Niña, whose sea temperature anomalies continue to linger in a weakened state. There are increased chances of unusually dry conditions along the equator from about 150 ºE and extending towards and expanding over a large part of southern South America. Anomalously wet conditions are predicted in much of the Maritime subcontinent immediately south of the equator and extending over Australia and into the south-west Pacific. Model consistency is high over both these wet and these dry areas. Over northern South America and southern Central America, increased probabilities for above-normal rainfall are indicated, and model consistency is moderately high. In North America, the rainfall signals are weak, but there are small increases in probabilities for below-normal rainfall over western and central North America at about 40º N, and for above-normal rainfall over the far northwest and in the far north. There are similarly weak signals for above-normal rainfall in north-eastern and eastern Asia, but probabilities become a little stronger in parts of the Indian subcontinent and extending into the southern part of the Arabian Peninsula, parts of the Greater Horn and the Sahelian belt in Africa. Coastal parts of the Greater Horn, together with much of Central Africa, as well as the north coast and southern Europe are predicted with increased chances of below-normal rainfall. Model-to-model consistency is high in much of these dry areas.

RA I (Africa): Enhanced probabilities for below-normal precipitation are predicted over much of Central Africa, along northern parts of the continent and in coastal areas of part of the Greater Horn, and the model consistency is moderate to high in all these regions. Over southern Africa there are areas where the probabilities for normal or below-normal rainfall are increased, and where consistency is moderate, but most of these areas are experiencing the beginning of their dry season at this time of year. The Sahelian belt and the north-western half of the Greater Horn have increased chances of above-normal precipitation, but the signal is not strong, especially over the Sahel. Over the rest of Africa, there is no clear indication for rainfall signal.

RA II (Asia): Over mainland Asia there are no large-scale rainfall signals in the forecast. Parts of the Indian subcontinent and the southern Arabian Peninsula do have enhanced probabilities for above-normal rainfall but model consistency is only moderate. Enhanced probabilities for unusually wet conditions extend through east Asia to the far northeast of the continent, but again, model consistency is only moderate at best, and the increases in probabilities are weak. There is a stronger degree of model consistency in predictions of below-normal rainfall conditions in the along about 45º N extending into Europe from about 90º E. Enhanced probabilities for below-normal rainfall are predicted over coastal parts of southeast Asia.

RA III (South America): Northern regions of South America are predicted to have above-normal rainfall (model-to-model consistency is mostly moderate to strong). South of 15º S there is an increase in probability of below-normal rainfall, and model consistency is moderate to strong, although in the far southwest of the peninsula the forecast indicates increased chances of above-normal rainfall, part of which is likely to fall as snow. Along the west coast, north of about 15º S, there are some areas with increased probabilities for normal rainfall.

RA IV (North America, Central America, and the Caribbean): There are no large-scale rainfall signals in the forecast for North America, but weak increases in probabilities for above normal are indicated in the northwest, and for below-normal over part of the mainland. Model consistency is moderate in both areas. The strongest rainfall anomalies and shifted probabilities are indicated for the southern part of Central America, which is expected to be anomalously wet. Model consistency is moderate to strong. Much of the Caribbean has increased probabilities for below-normal rainfall, and the signal strengthens to the northeast.

RA V (Southwest Pacific): Probabilities for above-normal rainfall are enhanced over an area extending from the western Maritime continent over the Indonesian Archipelago, primarily south of the equator, and Australia into the Southwest Pacific to an area northeast of New Zealand, and reappearing again in the south-eastern South Pacific. The model consistency is high in much of the eastern section of this area. Probabilities are strongly enhanced along about 10º S and between 90º and 160º E. Over the central Pacific there is an area of strongly increased probabilities for below-normal rainfall that straddles the equator. This anomalously dry area extends from about 150º E towards the southeast reaching as far as South America, and model consistency is high throughout. Along the equator normal rainfall has the highest probability east of about 150º W.

RA VI (Europe): Much of Europe south of about 50º S has increased probabilities for below-normal precipitation and model consistency is moderate to strong. There is no clear rainfall signal over northern Europe.

3. Latest updates for monitoring and prediction information

Each month, the latest updates for the real-time monitoring and seasonal mean predictions included in GSCU can be found at:

Monitoring:

https://ftp.cpc.ncep.noaa.gov/mingyue/GSCUWMO/

Predictions:

www.wmolc.org/board/downloadExt?fn=WMOLC_T2M.png

http://www.wmolc.org/board/downloadExt?fn=WMOLC_PREC.png

4. How to use the Global Seasonal Climate Update

The GSCU is intended as guidance for RCCs, Regional Climate Outlook Forums (RCOFs) and National Meteorological and Hydrological Services (NMHSs). It does not constitute an official forecast for any region or nation. Seasonal outlooks for any region or nation should be obtained from the relevant RCCs (see below for contact details) or NMHS.

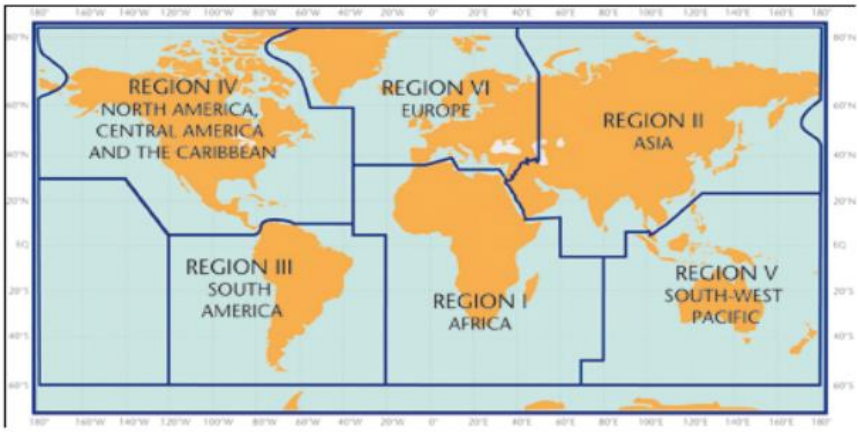
Figure 4 shows the spatial pattern of seasonal mean surface air temperature forecast probabilities. Probabilities are calculated for the average temperature for the season being in the highest third (above-normal or warm), middle third (normal) or lowest third (below-normal or cold) ranges of the baseline record (1993-2009) at each location. Colour code is indicated only for the category that has the highest probability of occurrence. For example, for regions highlighted in red, the most likely forecast category for seasonal mean surface air temperature to occur is warmer than normal. Similarly, the blue colour highlights regions where the seasonal mean surface air temperature forecast indicates the colder than normal category as most likely, while grey colour highlights regions where the seasonal mean temperature forecast indicates the near normal category as most likely. Deeper shades of respective colours highlight increasing probability for the seasonal mean temperature to be in the indicated category. White areas indicate equal chances for all categories.

A particular colour does not assure that the seasonal mean temperature is “certain” to be observed in the most likely forecast category that is shown, but rather its probability of being in that category. As a consequence, the observed seasonal mean temperatures have a non-negligible probability to be observed in a category different from the category indicated on the map as most likely. Users need to take the probabilistic nature of seasonal forecasts into account when making decisions. It should also be noted that the absolute values for the surface air temperature corresponding to the definitions of the above normal (warm), normal or below normal (cold) categories depend on the climatology (historical information) at the location, and therefore, is location dependent.

The interpretation of the probabilities for the rainfall forecast (Figure 5) is the same as that for the seasonal mean surface air temperature except that green, brown colour indicate whether the forecasted seasonal mean precipitation is most likely to be in the wet or dry category. As for surface temperature, grey colour highlights regions where the seasonal mean rainfall forecast indicates the near normal category as the most likely.

The skill of seasonal forecasts is substantially lower than that of weather timescales and skill may vary considerably with region and season. It is important to view the forecast maps together with the skill maps provided in the supplementary material.

For reference, the six WMO Regional Associations domains are depicted in the figure below.


REGION IV
NORTH AMERICA,
CENTRAL AMERICA
AND THE CARIBBEAN
REGION VI
EUROPE
REGION II
ASIA
REGION III
SOUTH
AMERICA
REGION I
AFRICA
REGION V
SOUTH-WEST
PACIFIC

5. Designated and developing WMO Regional Climate Centres and Regional Climate Centre Networks

- https://public.wmo.int/en/our-mandate/climate/regional-climate-centres

6. Resources

Sources for the graphics used in the GSCU:

- The WMO Lead Centre for Long-Range Forecast Multi-Model Ensemble (LC-LRFMME): http://www.wmolc.org
- WMO portal to the Global Producing Centres for Long-range Forecasts (GPCs-LRF): https://public.wmo.int/en/programmes/global-data-processing-and-forecasting-system/global-producing-centres-of-long-range-forecasts
- WMO portal for Regional Climate Outlook Forums https://public.wmo.int/en/our-mandate/climate/regional-climate-outlook-products
- International Research Institute for Climate and Society (IRI): https://iri.columbia.edu/
- NOAA Climate Prediction Centre (CPC): http://www.cpc.ncep.noaa.gov

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