

Grand Challenge on Near-Term Climate Prediction (GC-NTCP)

Recent Outcomes reported by Co-Chair Adam Scaife:

- A white paper on Decadal Climate Prediction ([Kushnir et al, 2019](#))
- Delivering the WMO Lead Centre for Annual-to-Decadal Climate Predictions
- Producing the WMO Global Annual-to-Decadal Climate Update
- Data standards for operational decadal prediction in progress

Next steps:

- The final stages of the grand challenge will address the utility of decadal forecasts and look at applications
- Terry O’Kane (CSIRO) will replace Yochanan Kushnir as co-chair



WORLD METEOROLOGICAL ORGANIZATION

[PDF of Update](#)
[WMOLC-ADCP](#)

Global Annual to Decadal Climate Update

Target years: 2020 and 2020-2024

Executive Summary

This update presents a summary of annual to decadal predictions from [WMO designated Global Producing Centres and non-designated contributing centres](#) for the period 2020-2024. Latest



This update was for the forecast initialised at the end of 2019 was the first public release.



Released 9 July 2020 accompanied by press releases from [WMO](#) and [Met Office](#).



Featured in the [United in Science](#) 2020 report.



Online impacts in more than 1,800 media outlets.



WMO Secretary-General Taalas was interviewed by Reuters TV and Maxx Dilley by APTN, resulting in widespread broadcast media outreach. Adam Scaife gave additional interviews.



Attracted major attention on social media, the messaging has been echoed by scientific and UN partners, and by the UN Secretary-General.

Global Producing Centres

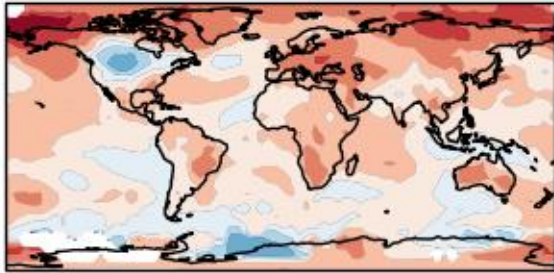
Institutes contributing in 2019: BSC, CCCMA, DWD, MOHC, CSIRO, BCCR, GFDL, LASG, MIROC, MRI, NRL, SMHI/DMI

Recent Climate

Baseline: 1981-2010

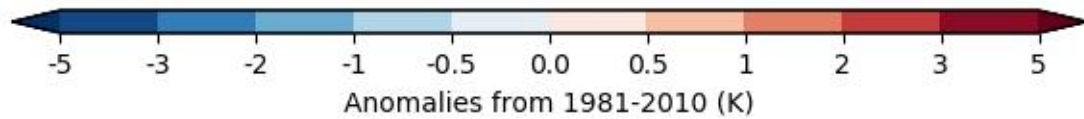
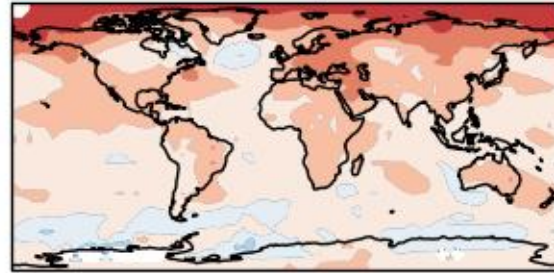
Observations 2019

surface temperature



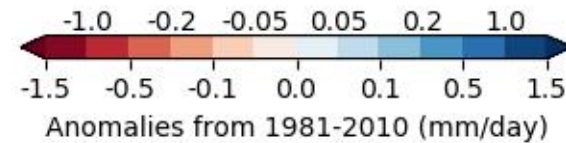
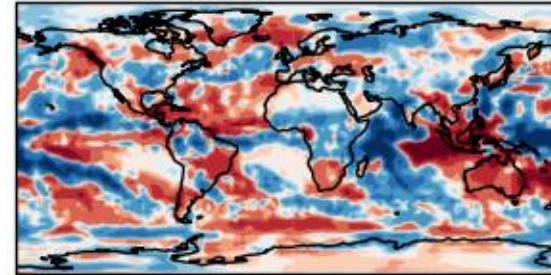
Observations 2015-2019

surface temperature



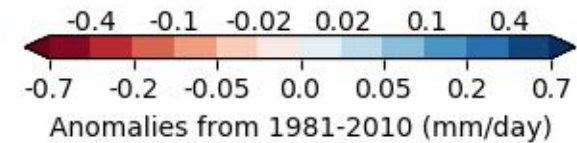
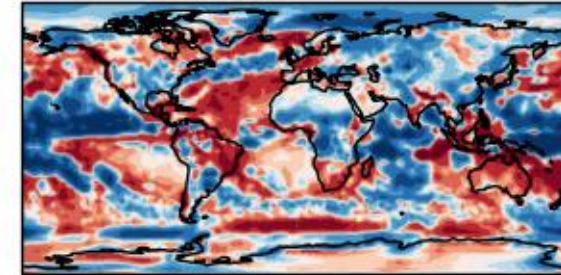
Observations 2019

precipitation

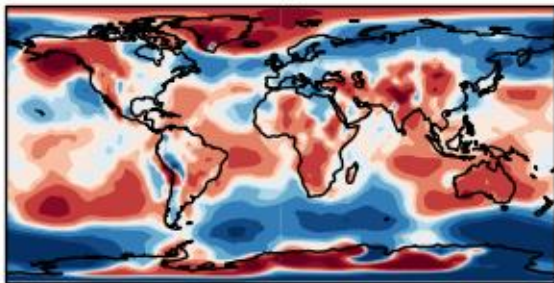


Observations 2015-2019

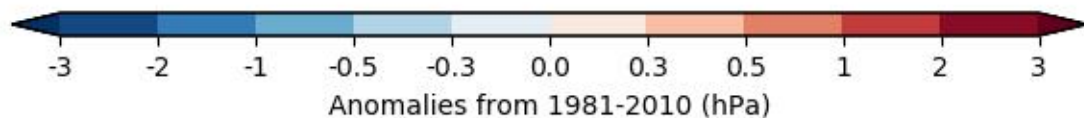
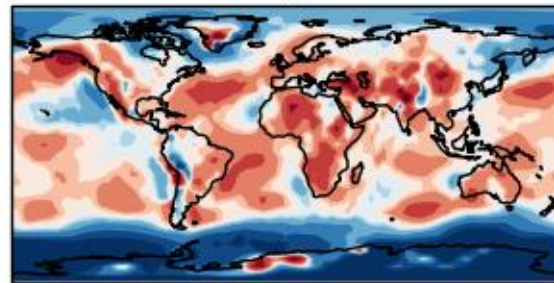
precipitation



sea-level pressure

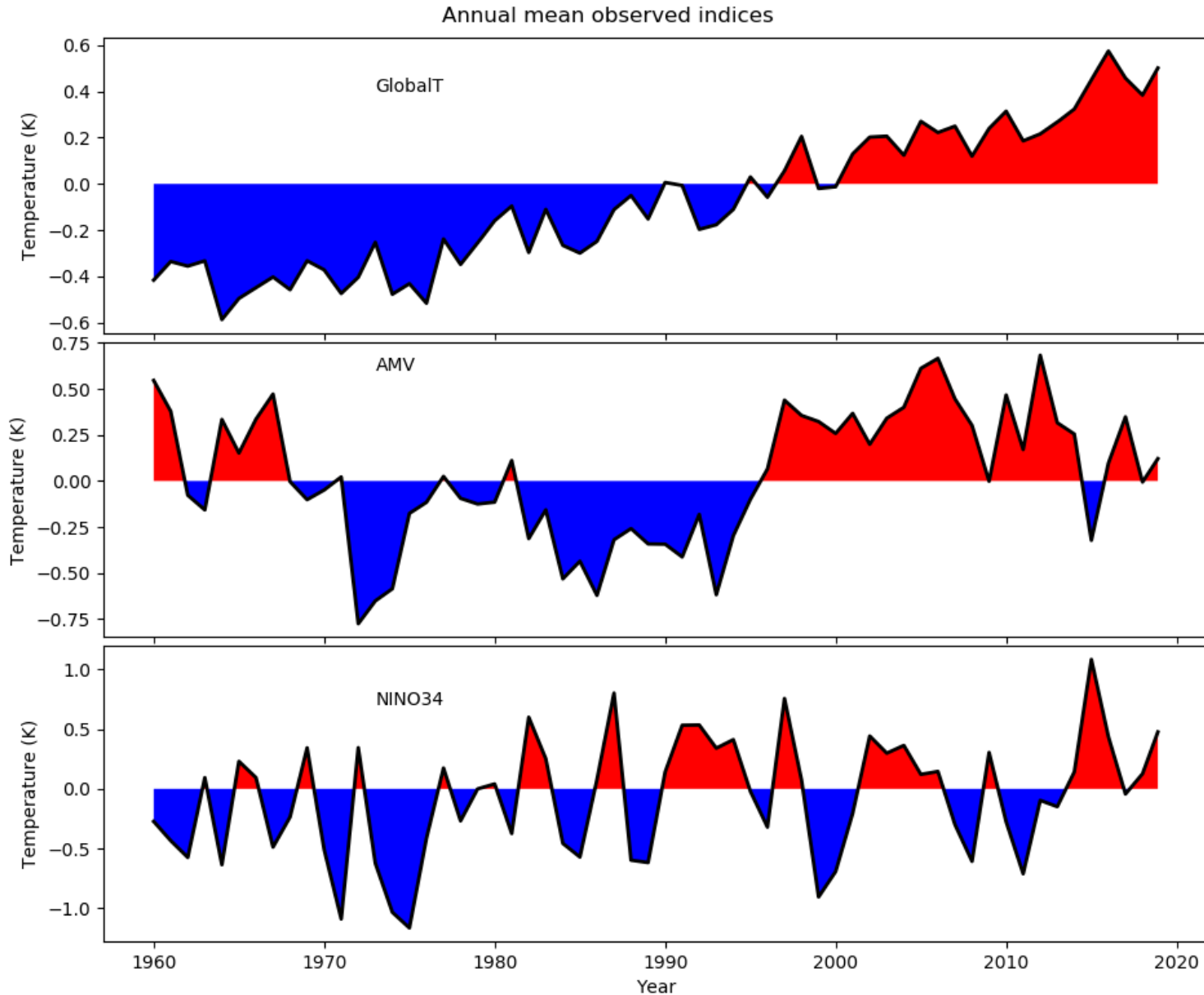


sea-level pressure

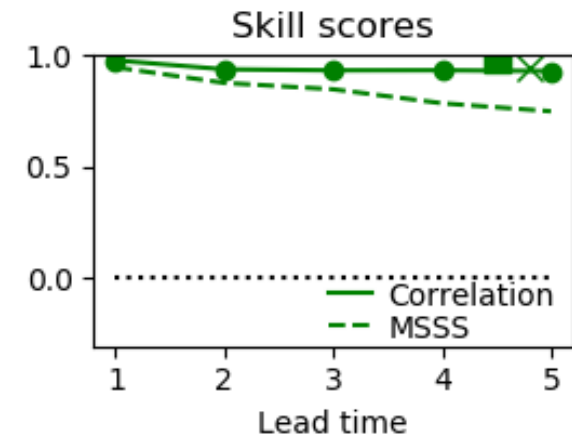
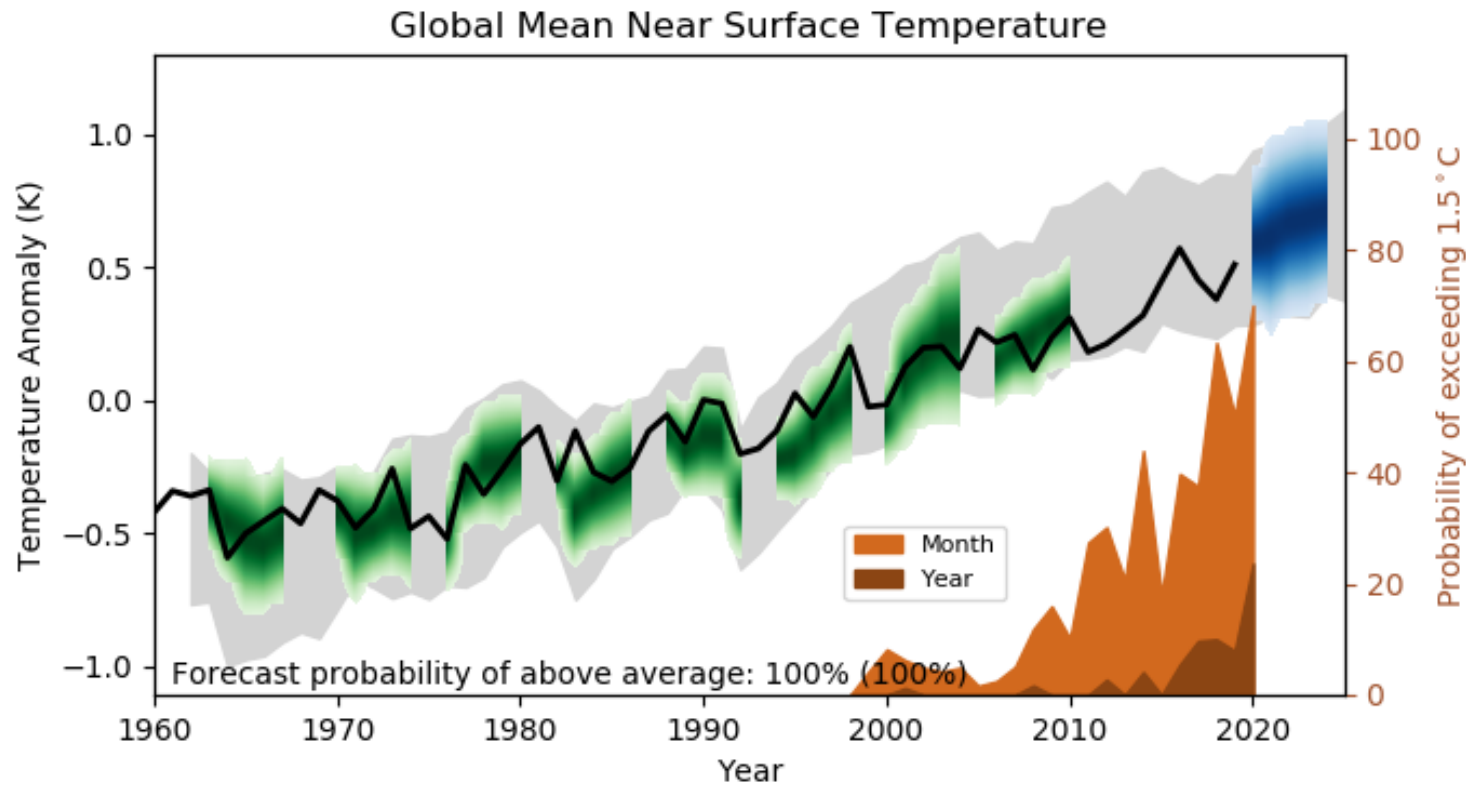


- Warming was largest at high latitudes in the Northern Hemisphere, and generally larger over land than ocean.
- Both the Arctic and Antarctic Oscillations have been positive on average over the last five years.
- Most of Eurasia, eastern USA and central Africa have been wetter than average, with southern Africa, eastern Australia, Indonesia, north-east Brazil and western Europe drier than average.

Observed Climate Indices



- Global mean temperatures have increased steadily since the 1960s
- Since 2015 the subpolar North Atlantic between 45-65°N has cooled significantly, consistent with extreme winter heat loss in the 2013/2014 and a weakening of the meridional ocean circulation.
- Since one of the largest El Niños on record in 2015/16, annual mean anomalies in the tropical East Pacific have been mainly positive apart from weak La Niña conditions during northern hemisphere winter in 2017 and 2018.



		Observed	
		Yes	No
Forecast	Yes	5 (5)	0 (0)
	No	2 (3)	32 (35)

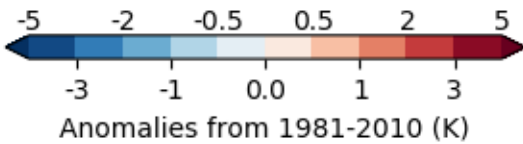
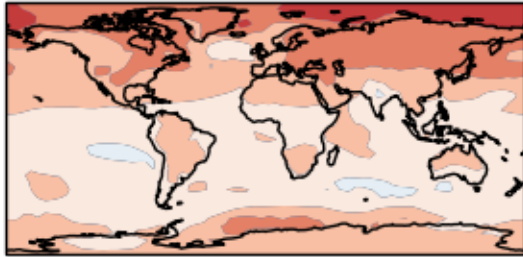
Hit rate: 71% (62%)
False alarm rate: 0% (0%)

- Annual global temperature is likely to be at least 1°C warmer than preindustrial levels in each of the coming 5 years
- There is a growing chance (~20%) that one of the next 5 years will be at least 1.5°C warmer than preindustrial levels
- It is likely (~70% chance) that one or more months will be at least 1.5°C warmer than preindustrial levels during the next 5 years

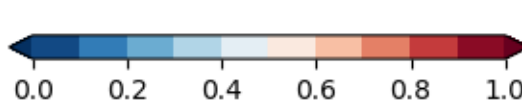
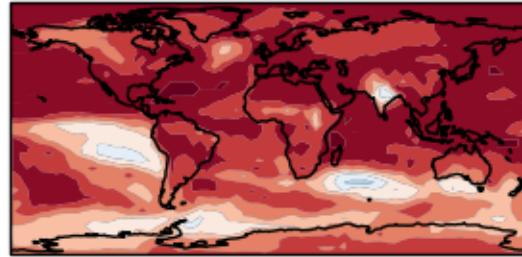
Forecast maps for 2020

Baseline: 1981-2010

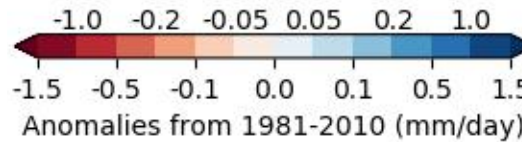
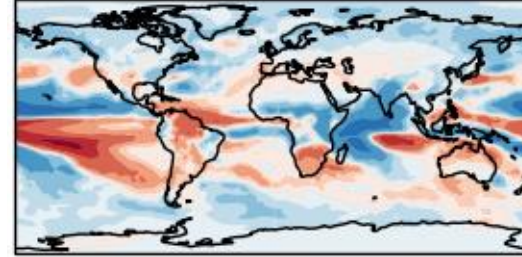
Ensemble mean forecast for 2020
surface temperature



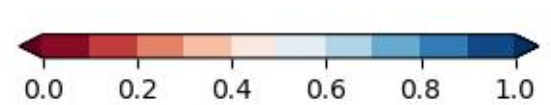
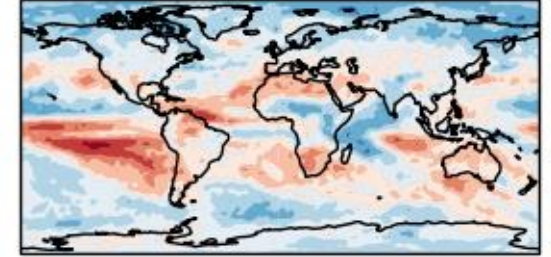
Probability of above average
surface temperature



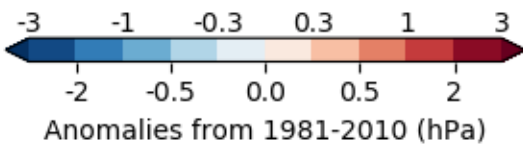
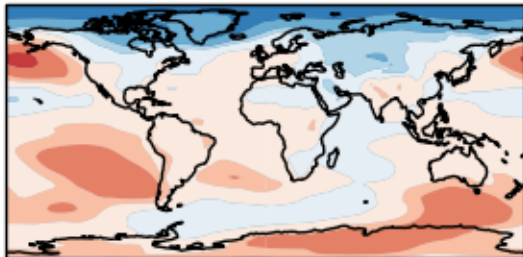
Ensemble mean forecast for 2020
precipitation



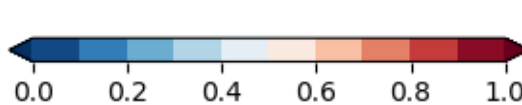
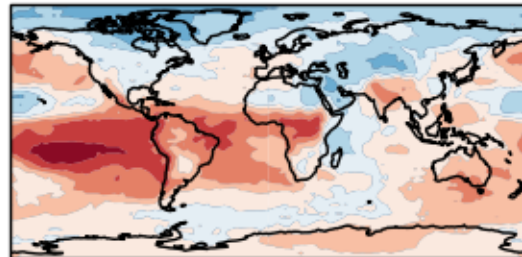
Probability of above average
precipitation



sea-level pressure



sea-level pressure

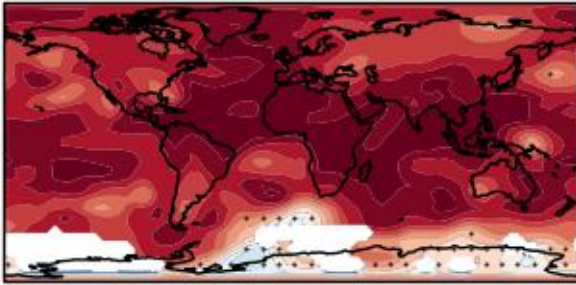


- Temperatures in 2020 are predicted to be higher than the 1981-2010 average in almost all regions except parts of the Southern Ocean and south-east Pacific
- Sea-level pressure forecasts suggest anomalous low pressure over the Arctic consistent with a positive Arctic Oscillation (AO).
- Precipitation patterns suggest an increased chance of drier conditions over northern South America, northern Australia, southern Africa and wetter conditions in northern Europe and Alaska.

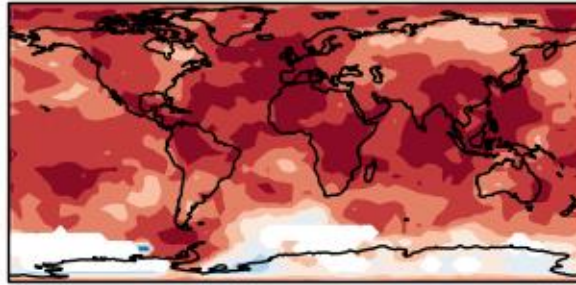
Skill maps for 1 year lead time

Baseline: 1981-2010

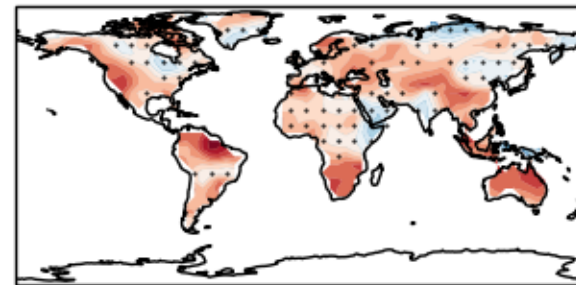
Pearson correlation
surface temperature



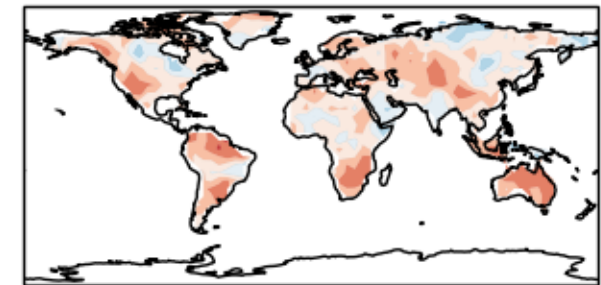
ROC score
surface temperature



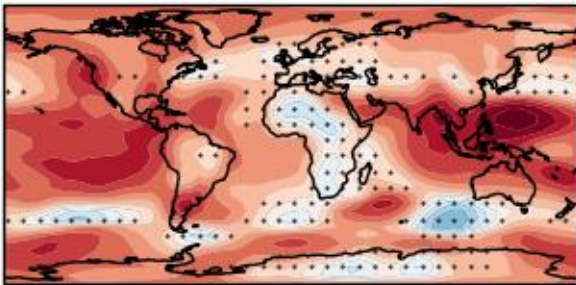
Pearson correlation
precipitation



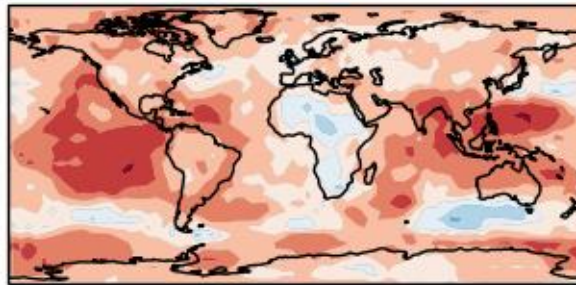
ROC score
precipitation



Pearson correlation
sea-level pressure



ROC score
sea-level pressure



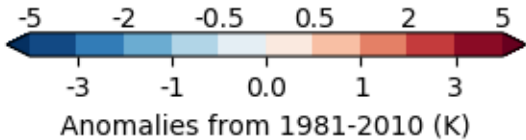
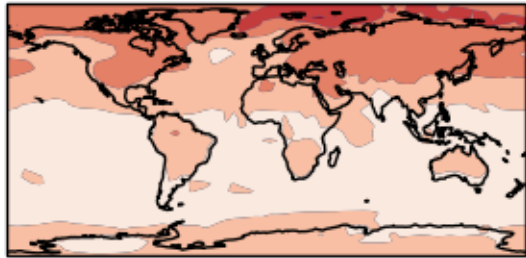
- Skill is reasonably high in most regions for near surface temperature giving high to medium confidence.
- Moderate but significant correlations for sea-level pressure, giving medium confidence in the AO prediction.
- Moderate skill for South America, northern Australia, southern Africa, northern Europe and Alaska giving low to medium confidence for these regions.

Stippling where positive correlation skill is not significant at the 5% level

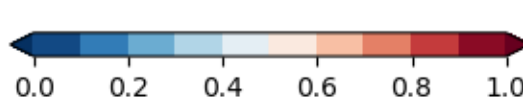
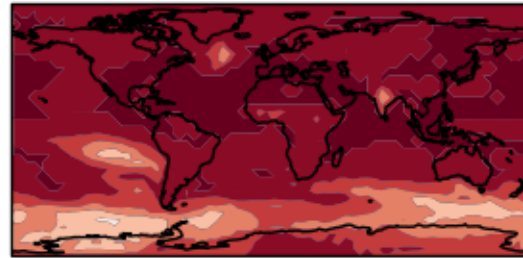
Forecast maps for the next five years

Baseline: 1981-2010

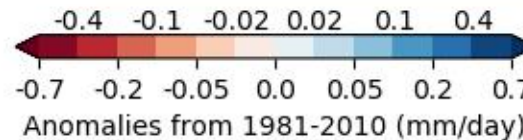
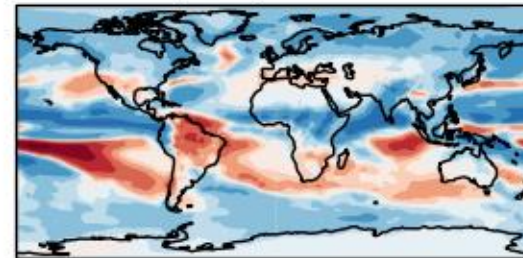
Ensemble mean forecast for 2020-2024
surface temperature



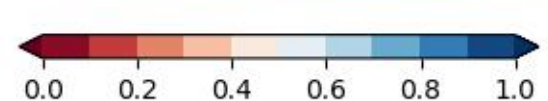
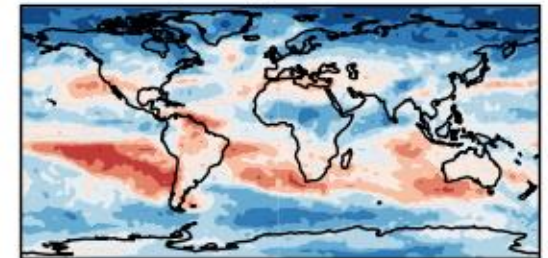
Probability of above average
surface temperature



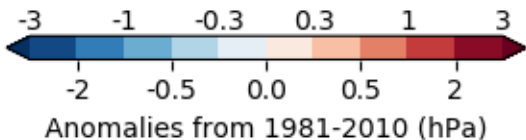
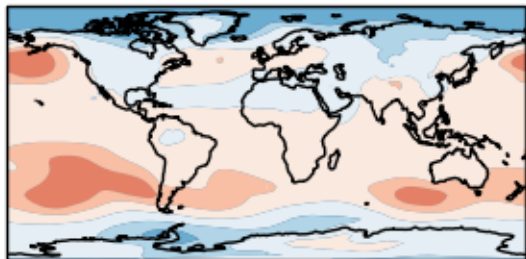
Ensemble mean forecast for 2020-2024
precipitation



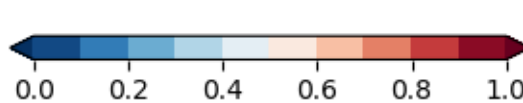
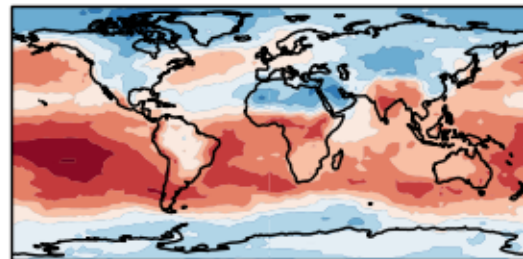
Probability of above average
precipitation



sea-level pressure



sea-level pressure

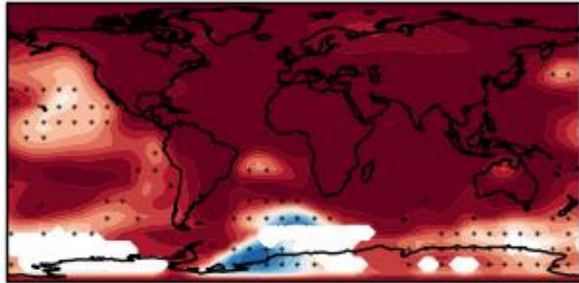


- Enhanced warming at high northern latitudes and over land compared to ocean
- Positive Arctic Oscillation (AO) and Antarctic Oscillation (AAO)
- Increased precipitation over the Sahel and across northern Europe and Eurasia
- An increased chance of tropical cyclones and extra-tropical cyclones in the Atlantic

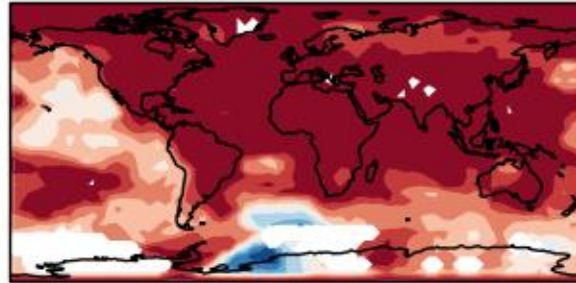
Skill maps for 1-5 years lead time

Baseline: 1981-2010

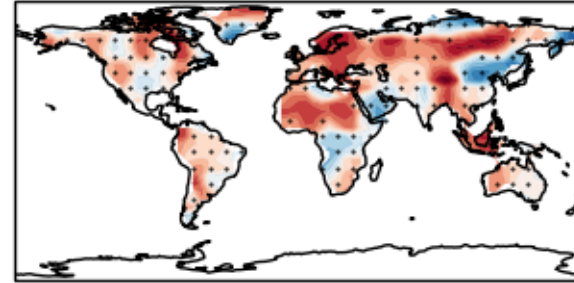
Pearson correlation
surface temperature



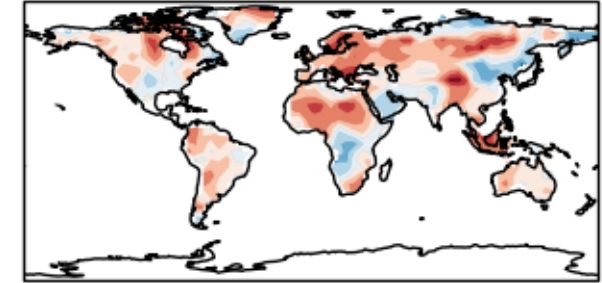
ROC score
surface temperature



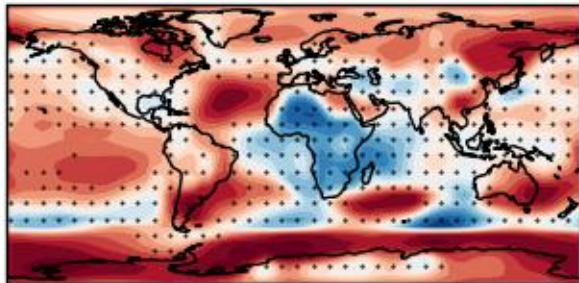
Pearson correlation
precipitation



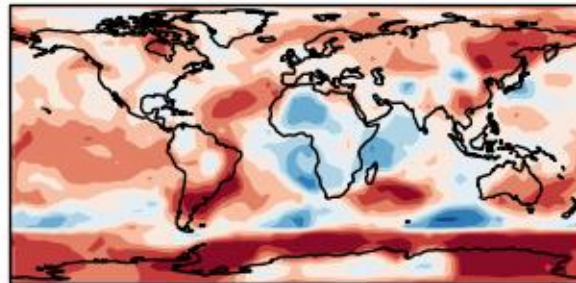
ROC score
precipitation



Pearson correlation
sea-level pressure



ROC score
sea-level pressure



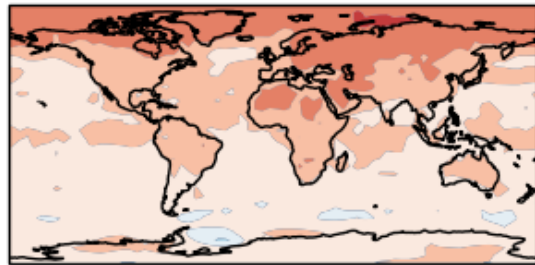
Stippling where positive correlation skill is not significant at the 5% level

- Skill for near surface temperature is high in all regions apart from the eastern Pacific and Southern Ocean.
- Over the polar regions, sea-level pressure skill is moderate and significant giving medium confidence in the forecast of positive AO and AAO.
- There is moderate but significant correlation skill over the Sahel and across northern Europe and Eurasia, giving medium confidence in the forecast for an increased chance of precipitation in these regions.

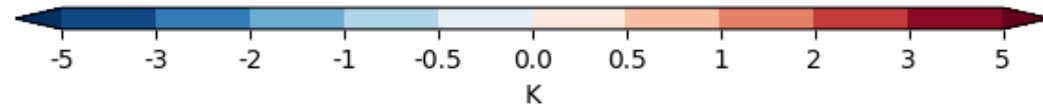
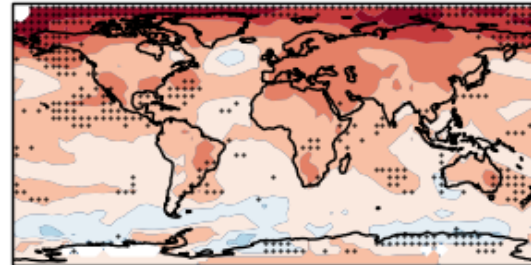
Evaluation of previous forecast

Baseline: 1971-2000

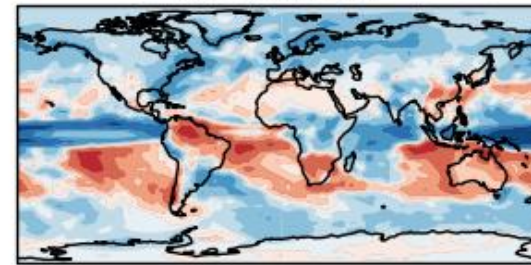
Ensemble mean forecast
surface temperature



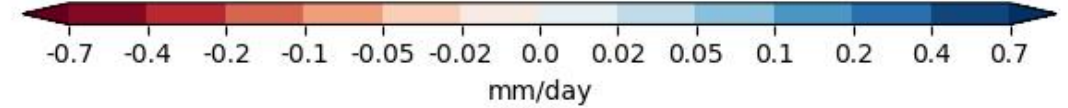
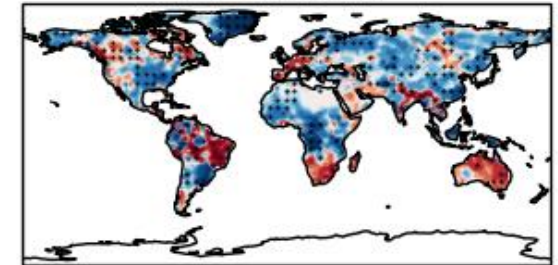
Observations 2015-2019
surface temperature



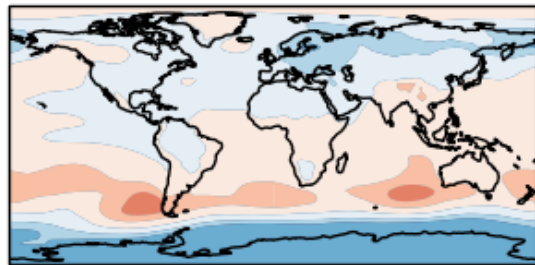
Ensemble mean forecast
precipitation



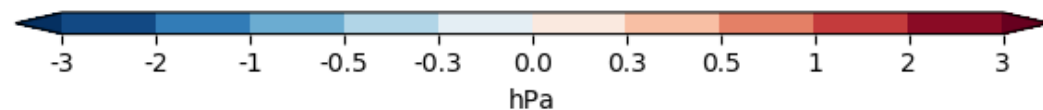
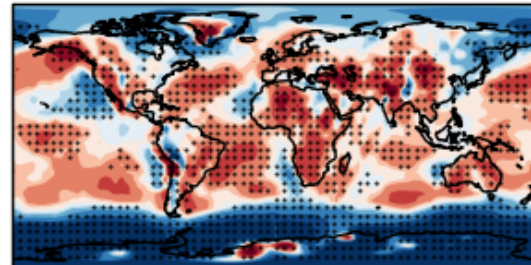
Observations 2015-2019
precipitation



sea-level pressure



sea-level pressure



Stippling where observations fall outside the 90% range of the forecast ensemble

- Cooler than average conditions in the Southern Ocean and northern Atlantic are not seen in the ensemble mean but are mostly within the forecast range.
- Forecast anomalies for sea-level pressure are small and the observations are outside the forecast range in many regions even when the ensemble mean shows the correct sign.
- Precipitation patterns show reasonable agreement with observations, but dry conditions in western Canada and Europe were not predicted.

Executive Summary

- Annual global temperature is likely to be at least 1°C warmer than preindustrial levels (defined as the 1850-1900 average) in each of the coming 5 years and is very likely to be within the range 0.91 – 1.59°C
- It is unlikely (~20% chance) that one of the next 5 years will be at least 1.5°C warmer than preindustrial levels, but the chance is increasing with time
- It is likely (~70% chance) that one or more months during the next 5 years will be at least 1.5°C warmer than preindustrial levels
- It is very unlikely (~3%) that the 5 year mean temperature for 2020-2024 will be 1.5°C warmer than preindustrial levels
- In 2020, large land areas in the Northern Hemisphere are likely to be over 0.8°C warmer than the recent past (defined as the 1981-2010 average)
- In 2020, the Arctic is likely to have warmed by more than twice as much as the global mean
- The smallest temperature change is expected in the tropics and in the mid-latitudes of the Southern Hemisphere
- In 2020, many parts of South America, southern Africa and Australia are likely to be dryer than the recent past
- Over 2020-2024, almost all regions, except parts of the southern oceans are likely to be warmer than the recent past
- Over 2020-2024, high latitude regions and the Sahel are likely to be wetter than the recent past whereas northern and eastern parts of South America are likely to be dryer
- Over 2020-2024, sea-level pressure anomalies suggest that the northern North Atlantic region could have stronger westerly winds leading to more storms in western Europe