

Reunion Island, 29 October 2021

Seasonal forecast of tropical cyclone activity in the South-West Indian Ocean for cyclone season 2021-2022

The 2021-2022 cyclone season is expected to be characterized by near-normal activity in the South-West Indian Ocean cyclone basin¹. This season could therefore see the development of 8 to 12 systems (tropical storms and cyclones), with 4 to 6 among them reaching the stage of a tropical cyclone. In a large-scale context similar to that of last year, the genesis areas will still be favored over the eastern half of the basin. Overall, the privileged tracks should be oriented towards the west or southwest, which could lead some of the phenomena to threaten or hit the inhabited lands of the western part of the basin.

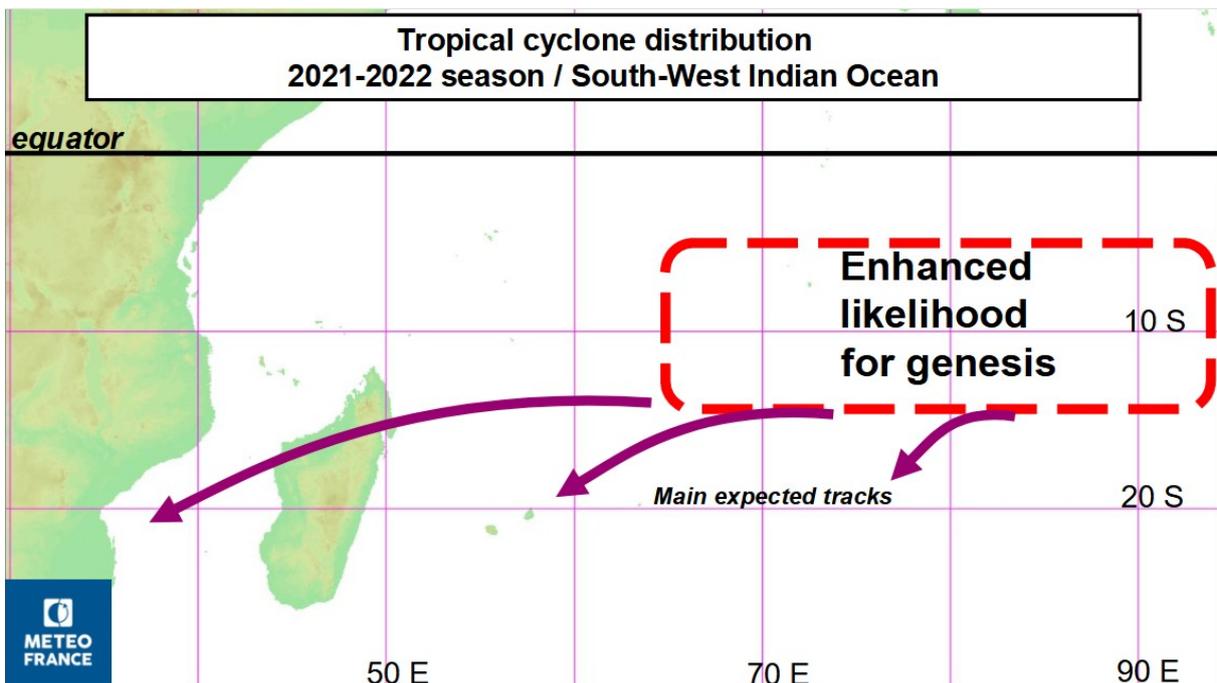
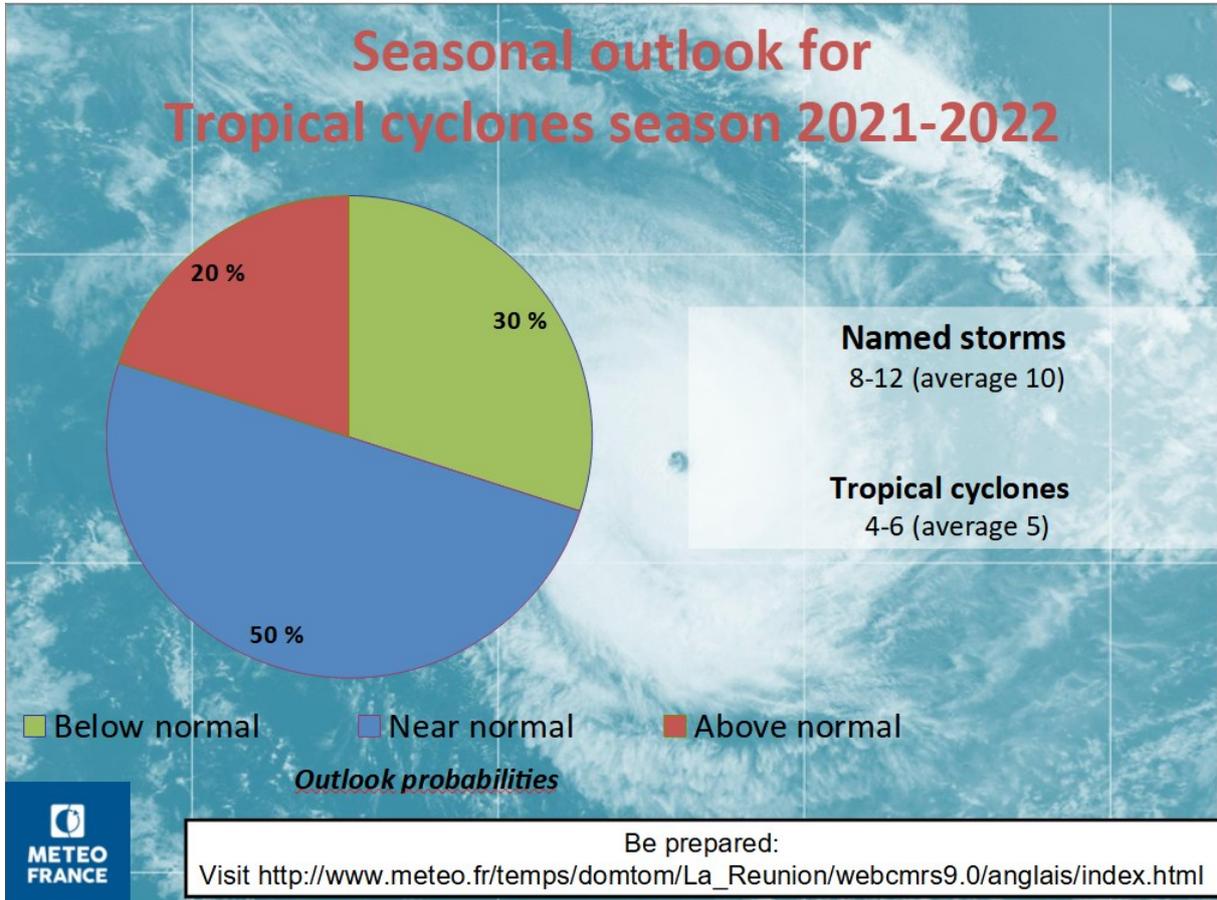
We estimate that for the entire 2021-2022 cyclone season, there is a 50% probability of near-normal cyclone activity, a 30% probability of below-normal activity, and a 20% probability of above-normal activity². We expect, with a 70% probability, to have 8 to 12 cyclonic events (tropical storms and cyclones) over the South-West Indian Ocean (normal is 10), with 4 to 6 of which that may become tropical cyclones (normal is 5).

The expected return of La Niña in the equatorial Pacific is expected to induce a large-scale context presenting some similarities with last season. Thus, like last year, the eastern half of the basin (east of 65°E) should remain the privileged area for the systems' geneses. **A majority of trajectories oriented towards the west or southwest is envisaged, potentially leading systems to impact the inhabited lands of the western part of the basin, particularly the east coast of Madagascar, the Mascarene Islands and possibly the coast of Mozambique.**

In this context, it is advisable to implement from now on and as every year, the usual preventive measures at the beginning of the cyclone season. **Let us recall that for a given location, only one system is needed to experience an impact that can be catastrophic !**

1 The South-West Indian Ocean cyclone basin covers about two thirds of the southern Indian Ocean. It extends from the African continent to 90°E and from the equator to 40°S.

2 The cyclone activity of a season is not only characterized by the number of systems formed. Parameters characterizing the life span and intensity of cyclones and storms are also taken into account to qualify the level of activity.



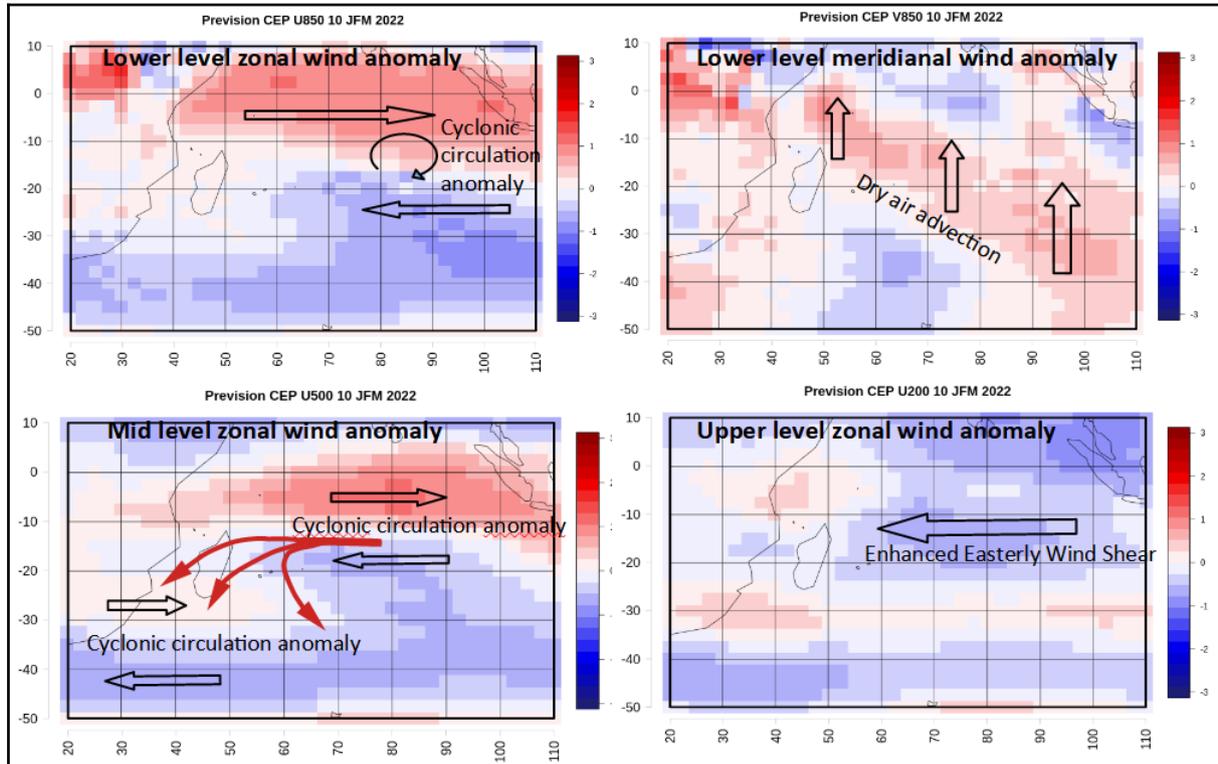
[Large-scale conditions expected for austral summer 2021-2022.](#)

At the global level, the most likely scenario is the return of a La Niña event before the end of the year in the equatorial Pacific (it would be the second consecutive summer marked by a La Niña event after the one observed in 2020-2021). At the regional level, the scenario is much less clear regarding the evolution of the Subtropical Indian Ocean Dipole (SIOD), which is currently neutral. It is envisaged either a shift to a positive phase (whose magnitude remains uncertain) or the persistence of neutral conditions.

In this context, what can be expected for the cyclone activity in the South-West Indian Ocean?

During a La Niña event, conditions are generally **more favorable for the formation of cyclonic phenomena in the eastern part of the basin**. There are warmer than normal waters and enhanced low-levels vorticity within the Intertropical Convergence Zone. However, enhanced easterly vertical wind shear, coupled with dry air intrusions, may temper these favorable conditions by making the formation and intensification processes more difficult, or even by inhibiting certain attempts. However, cyclogenesis should not be absent over the western part of the basin, especially in the second part of the season, where it will have a better chance to occur. We can also note that the likelihood of formation of cyclonic phenomena in the Mozambique Channel may be increased in case of development of a positive phase of the SIOD. Historically, cyclonic activity is quite variable during La Niña episodes, but we note that seasons of low activity are most often associated with a strong positive phase of the SIOD (such as the very low activity of seasons 1998-1999 and 2010-2011). **There is therefore a higher than normal uncertainty on the prediction of cyclonic activity for this year in connection with an uncertain evolution of the SIOD.**

In terms of track typology, the existence of a subtropical ridge stronger than normal over the eastern part of the basin but less pronounced over the southwestern part of the basin, should favor zonal to parabolic tracks, i.e. with a dominant westward or southwestward component. **This track pattern may lead some systems to threaten or impact the inhabited lands of the western part of the basin (the eastern coast of Madagascar, the Mascarene Islands and possibly the seaboard of Mozambique).**



Forecasts from the European Centre Climate Model (October 2021 run) valid for January-February-March 2022 for 4 large-scale parameters that play a role in the formation, maintenance and motion of tropical storms and tropical cyclones. In the left column are displayed the factors favorable for genesis over the eastern half of the basin and for zonal or parabolic tracks. The right-hand column shows conditions that are more unfavorable to cyclonic activity, associated for example with laborious genesis phases.

Methodology

This forecast is based on a statistic-dynamical approach which made it possible to identify the modes of variability of certain large-scale parameters (e.g. the sea surface temperatures, the zonal component of the wind at about 1500 m altitude and the zonal component of the wind at high altitude) best correlated with the descriptive parameters of the activity of a cyclone season (number of phenomena, number of days of storms and cyclones, genesis longitude anomaly, zonal and meridian motion anomalies, preferred track typology). Time-series going back to 1985 for both large scale parameters and cyclone activity (RSMC best-tracks) are used as learning period.

Secondly, we used the large scale forecasts of the French and European climate models in order to determine the predicted parameters of the forthcoming cyclonic activity, by applying the statistical relationships established during the learning period. Objective scores of the model for each of the large-scale parameters, shows that its performance is best when using the sea surface temperature (parameter best predicted by climate models), the zonal

**RSMC La Reunion
Tropical Cyclone Centre
for the South-West Indian**



component of the wind at 1500 m and - but to a lesser extent - the zonal component of the wind at very high altitude.

This forecast was also compared to the dynamical approach of directly "counting" the number and geographic distribution of cyclone activity as simulated by the climate model of the European Centre.