Testbed Handbook: Madagascar

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Testbed Overview

The ACACIA "testbed" is an online forum which brings together forecast users, forecast producers and researchers.

A testbed is a practical environment where researchers and practitioners work together to trial, improve, and evaluate climate services. It is designed as a "safe-to-fail" space, meaning it is okay if things do not work perfectly at first. This allows learning through repeated testing. In a testbed, scientific methods, decision-making tools, and user needs come together under realistic conditions.

Testbeds help partners explore uncertainties, check how useful forecasts or information products are, and improve them through ongoing feedback and adjustments.

The ultimate aim of these testbeds is to co-produce prototype forecast products in real-time that meet the needs of decision-makers in the humanitarian sector.

Testbed meetings are hosted on Microsoft Teams. To be **added to the mailing list**, please contact l.c.hirons@reading.ac.uk.

Please join the Forecasting testbed forum within the **ACACIA WhatsApp community**.

Overview of the ACACIA testbed schedule

Throughout the tropical cyclone season in Madagascar **(January to March (JFM))** testbed meetings are held **weekly** and provide a collaborative space to discuss the latest forecasts and explore new products developed during the project.

JFM 2025 testbed
Baseline testbed that supported the documentation of current state-of-the-art tropical cyclone risk forecasting.

In-between: Improve forecast accessibility

JFM 2026 testbed
- Strong focus on national Direction Générale de la Météorologie (DGM) operational procedures.
- Continued dialogue with Croix-Rouge Malagasy (CRM) to explore how the sub-seasonal forecasts communicated by DGM can be improved.

In-between: Develop evaluation capability

JFM 2027 testbed
- Focus on improving communication of co-produced forecast products and forecast skill.

In-between: Create post-processing techniques to improve forecast skill

JFM 2028 testbed
- Test the new forecast products developed through the lifetime of ACACIA and explore potential for sustained legacy.

Figure 1: Overview of the testbed cycle, adapted from content by Talib and Hirons 2025.

Co-production Approach

The testbeds follow a co-production approach, empowering forecast users to inform the development of new tools through active collaboration with forecast producers and researchers.

Image produced using Microsoft CoPilot

Co-production is about **working together** so that forecasts aren't just a one-way product delivered from producers to users but are also shaped directly by the needs of people who will use them. The combination of forecast users' knowledge and experience with that of forecast producers and researchers is essential for creating forecasts that are **appropriate, accurate and actionable.**

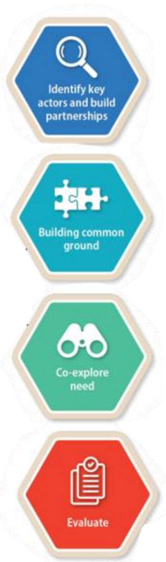
Reflection: What does co-production mean for you?

Have a think about what co-production could look like for you, whether you are a forecast producer, a forecast user or a researcher.

Your input helps make forecasts better for everyone.

The Building Blocks of Co-Production

The ACACIA testbeds follow the "building blocks" of the co-production approach, outlined in the "Co-production in African weather and climate services" manual (Carter et al., 2019). In the baseline testbed, four of these "building blocks" were used to frame the weekly discussions. Reflections on the questions posed below will be useful throughout the testbed cycle.



Partnerships

- Are the key actors involved in the testbed?
- What are the challenges in building equitable, trust-based partnerships?

Building common ground

- What do you hope to get out of the ACACIA forecasting testbed?
- What does success look like for you?

Co-exploring user needs

- Is current weather and climate information available, useful, useable and used?

Evaluation

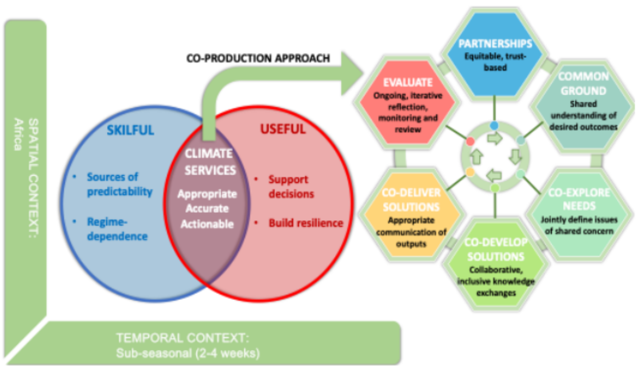
- How will we ensure honest feedback is shared in the forecasting testbeds?

Figure 2: Four of the six building blocks of co-production, source: "Co-production in African weather and climate services" manual (Carter et al., 2019).

The remaining two building blocks – *co-developing and co-designing solutions* were embedded throughout the testbed discussions and will be the focus of remaining testbeds.

The benefits of co-production

The benefits of taking a co-production approach are described in Figure 3.



- **More actionable and reliable climate services.** Better understanding of user needs, more appropriate user-relevant communication of forecasts which can actually inform real decisions and build resilience.
- **Increased uptake of forecasts** because they are more actionable and reliable and fit for purpose. Impactful, solutions-orientated research.
- **Capable of addressing complex transdisciplinary problems** by bringing together different knowledge and experience to jointly address issues of shared concern in an equitable way.
- **Strengthened institutional and individual partnerships** which help build collaboration beyond project-initiated services. Long-term partnerships are key to sustainable advances in climate services.

Figure 3: Hirons 2025, ACACIA testbed session 1. Building Blocks of Co-production adapted and synthesised from WISER/FCFA Manual for Co-production in African Weather and Climate Services; Carter et al., 2019.

Decision context

The focus of ACACIA is on the development of forecast products at the **sub-seasonal** timescale, with a specific project focus on information that can be produced **2 to 4 weeks** ahead.

In the testbeds, we will often refer to 'week three' or 'week four' forecasts. These refer to forecasts of the average weekly conditions e.g. rainfall totals, or tropical cyclone risk forecast in three- or four-weeks' time.

Using the "Ready, Set, Go" framework, new ACACIA products are being developed to support decisions that can be made in the "Set" phase.

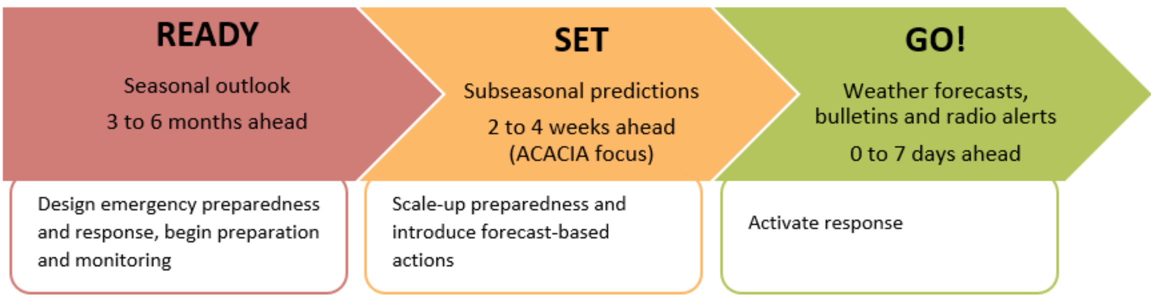


Figure 4: Ready, Set, Go framework, reproduced from Goddard et al., 2014.

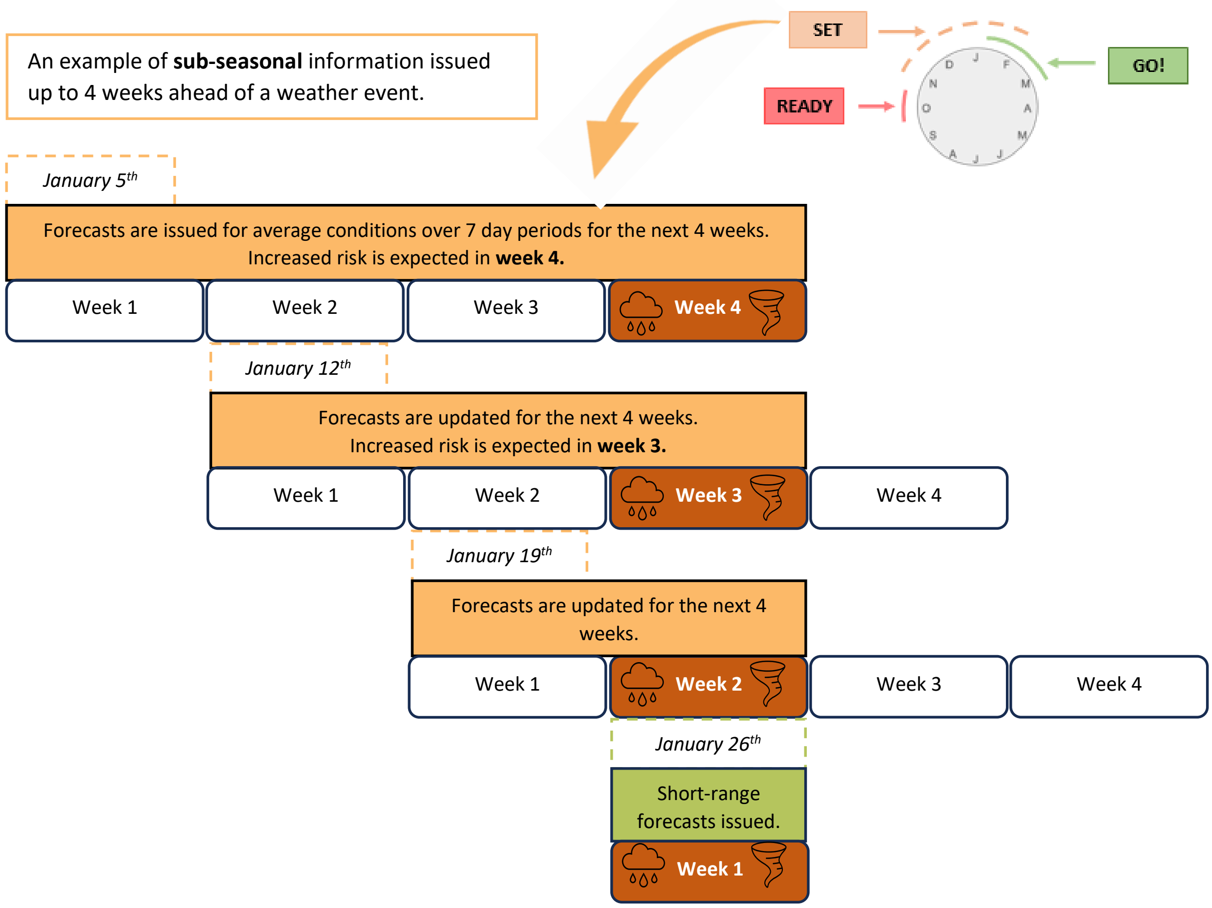


Figure 5: Example of sub-seasonal information issued up to four weeks ahead of a weather event.

During the initial ACACIA testbeds, decisions that could be taken at the "Set" timescale were discussed. These are shown below.

SET
Subseasonal predictions
2 to 4 weeks ahead
(ACACIA focus)

- Alerting the Disaster Risk Management department and all Red Cross branches to allow them to activate preparedness plans.
- Sending tools (e.g. rapid needs assessment) to allow branch and volunteers to act in case of emergency.
- Monitor short and medium-range forecasts.
- Co-ordinate with authorities on actions in the contingency plan.

What we'd like to explore in upcoming ACACIA activities, including upcoming testbeds:

Are there other decisions that are, or could be, made during this timeframe?

How can the forecast be tailored to better inform these decisions?

Meteorological Context

What are tropical cyclones?

ACACIA

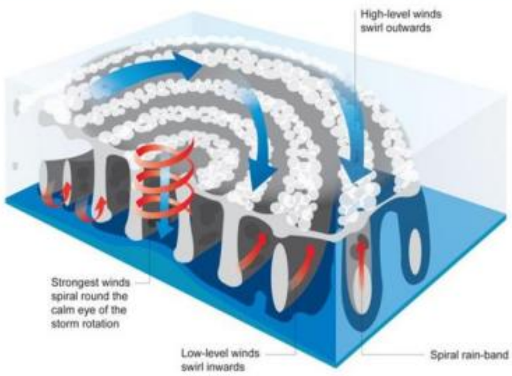
Factsheet: Tropical Cyclones

What is a tropical cyclone?

A tropical cyclone is the generic term for a low-pressure system over tropical or subtropical waters, with organised convection (thunderstorm activity) and winds at low levels circulating either anti-clockwise in the northern hemisphere or clockwise in the southern hemisphere. The storm system may be five to six miles high and 300 to 400 miles wide, although they can sometimes be even bigger. It typically moves forward at speeds of 10 to 15 mph, but can travel as fast as 40 mph. The tropical storm is referred to as a hurricane in the Atlantic and eastern North Pacific, a typhoon in the western North Pacific, or a tropical cyclone in the Indian Ocean and South Pacific.

Madagascan case study – January 2025

Tropical cyclone Dikeledi passed over northern Madagascar on 11th January 2025. As of 13th January, media reports three fatalities and around 15,200 people displaced across northern Madagascar. The cyclone continued to eastern Africa, making landfall over north-eastern Mozambique on 13th January.
Source: reliefweb



Madagascan case study – Strongest

The strongest tropical storm to make landfall over Madagascar was Cyclone Gafilo in March 2004. The Category 5 Cyclone made landfall on the island's northeast coastline with sustained winds reaching an estimated 161 mph, destroying much of the town of Antalaha.
Source: NASA Earth Observatory

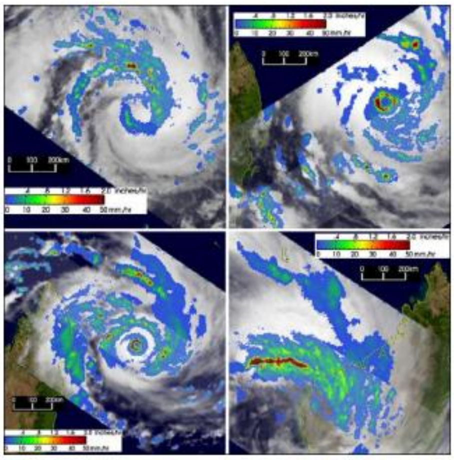
Tropical cyclone classifications

Tropical storms with wind speeds of up to 38 mph are classified as tropical depressions and those with wind speeds ranging between 39 to 73 mph are classified as tropical storms.

- Category 1: wind 74 to 95 mph
- Category 2: wind 96 to 110 mph
- Category 3: wind 111 to 129 mph
- Category 4: wind 130 to 156 mph
- Category 5: wind >156 mph

Once wind speeds exceed 73 mph, tropical storms are classified as a tropical cyclone (or equivalent name for other regions). However, there are five categories for tropical cyclones, based on wind speed, as shown to the left.

Source: Met Office



Cyclone Gafilo, Image source: NASA

ACACIA is funded by the European Union under Grant Agreement No. 101137847.

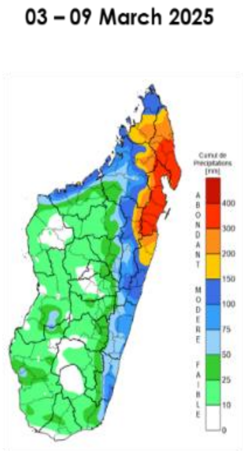
DGM products

The sub-seasonal operational tools currently produced by DGM are the primary focus of testbed discussions. These products will continue to be co-developed throughout the ACACIA project.

The sub-seasonal DGM forecasts are presented for 7-day periods and currently represent either weekly accumulation (rainfall) or weekly risk (tropical cyclone activity).

Rainfall forecasts

Rainfall forecasts are available for **week 1 to week 4.** These forecasts display the weekly rainfall accumulation expected, with white and green colours representing light rainfall, blue representing moderate rainfall and orange and red representing high rainfall.



Weekly rainfall accumulation forecasts

Colours represent the total rainfall expected in mm.

- White and green colours represent light rainfall (<50mm)
- Blue colours represent moderate rainfall (50-150mm)
- Orange and red colours represent high rainfall (>150mm)

Figure 6: Example rainfall forecasts taken from the baseline testbed series. Original source: DGM

Cyclone activity forecasts

Cyclone risk is determined by combining information about the predicted likelihood, intensity and potential tracks of tropical systems with real-time tracking information and expert judgement.

Cyclone risk forecasts for weeks 1 to 4.

Colours represent the risk of a tropical cyclone.

- Yellow: low risk
- Orange: moderate risk
- Pink: elevated risk

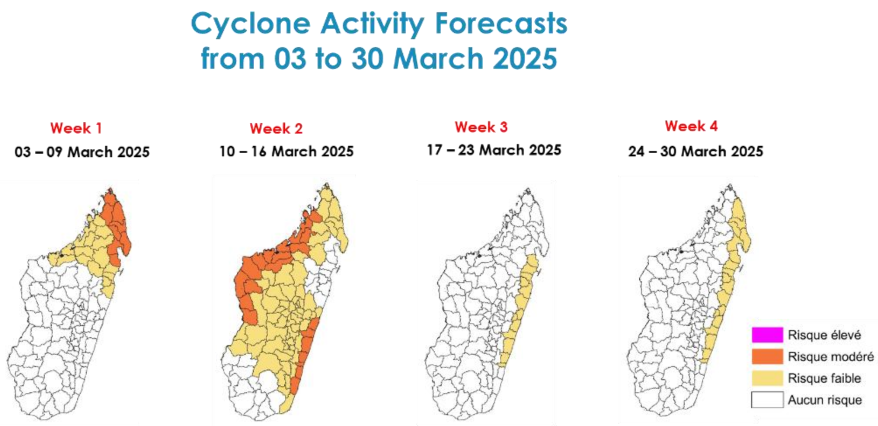
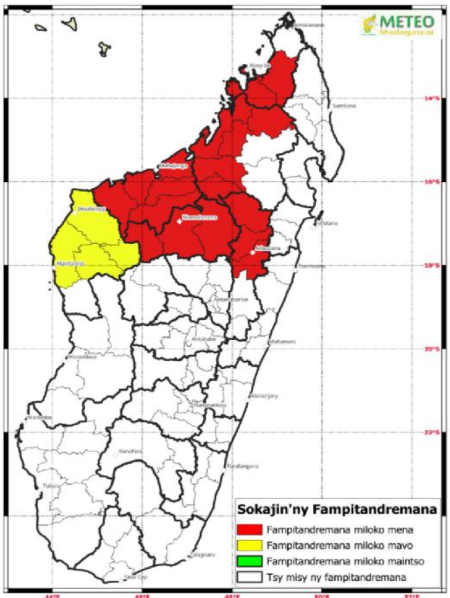


Figure 7: Cyclone activity forecasts. Colours indicate risk. Original source: DGM.

Short-range rainfall advisories

DGM also produce short-range advisories for rainfall which are presented using risk categories from green (low risk) to red (high risk). These are not the focus of ACACIA but will be referenced during the testbed where appropriate.



- **Green**: Low Risk
- **Yellow:** Moderate Risk
- **Red:** Elevated Risk

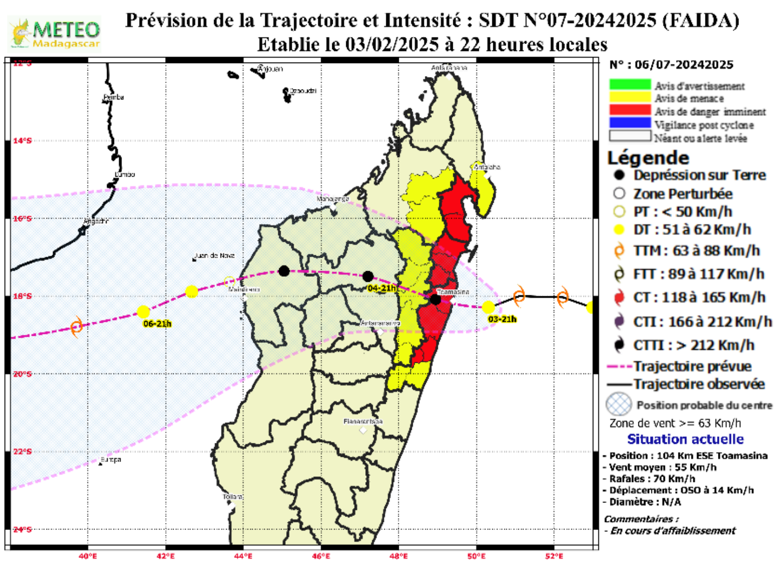
Thresholds are currently standardised across the whole country.

Figure 8: Example rainfall advisory taken from the baseline testbed series. Original source: DGM.

Short-range tropical cyclone warnings

DGM produce tropical cyclone warnings which are disseminated between 5 days and 12 hours before a cyclone is expected to make landfall. The colours presented in these warnings communicate the expected time from landfall, rather than the intensity of the system or the expected impacts.

Again, these products will not be the focus of development during the ACACIA project but will be presented and discussed during the testbeds when issued.



For the tropical cyclone warnings, colours relate to timing of impact rather than intensity.

Figure 9: Example tropical cyclone warning taken from the baseline testbed series. Original source: DGM.

ECMWF products

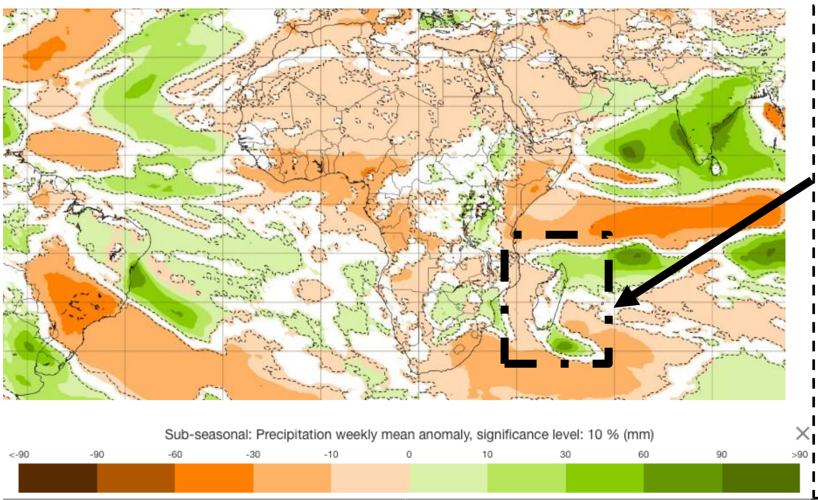
Various sub-seasonal forecasting tools were discussed during the baseline testbed. Those most frequently used to inform discussions are included here. Future sub-seasonal products will be added to this handbook as they become available.

Sub-seasonal forecast products/charts from ECMWF:

- provide an overview of potential weather conditions up to 46 days ahead;
- mainly focus on average conditions over seven-day periods starting on Mondays, within this testbed; and
- arere typically presented in terms of how much operational forecasts deviate from a long-term (model-based) climatology (known as anomaly forecasts).

Precipitation products

Weekly mean anomalies highlight areas where mean forecast values differ from the model-based climatology (i.e. from what is considered "normal" for the time of year).



Orange colours represent lower precipitation than "normal" for the time of year.

Green colours represent higher precipitation than "normal" for the time of year.

The **darker** the colour, the **greater the difference** compared to "normal".

Figure 10: Example weekly mean anomaly map reproduced from Deliverable 4.1. Original source: ECMWF

Tropical cyclone products

ACACIA

Factsheet: ECMWF tropical storm sub-seasonal forecast products

Sub-seasonal forecasting bridges the gap between short-range weather and seasonal climate forecasts. At ECMWF, sub-seasonal forecast models are issued out to 46 days (1.5 months).

*Intense tropical storms have different names depending on where they originate from. The term **'Hurricane'** is used in the Atlantic, the term **'Typhoon'** is used in the northwest Pacific, and the term **'Cyclone'** is used in the Indian Ocean and parts of the Pacific. All three terms refer to storms with a wind speed greater than 32 m/s.*

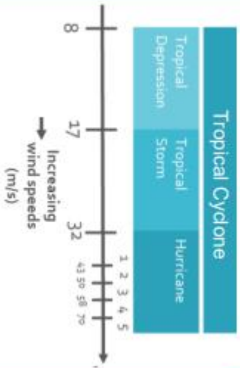
Here, ECMWF use the term 'hurricane' for tropical storm probabilities.

Overview

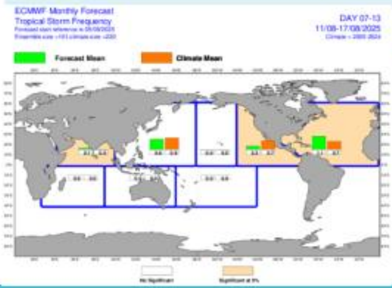
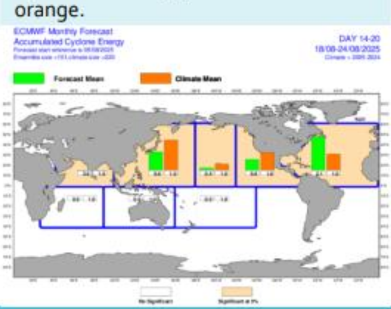
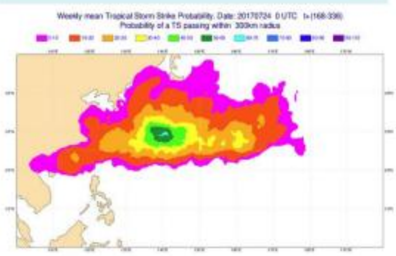
The ECMWF (European Centre for Medium-Range Weather Forecasts) provides forecasts for tropical storms using advanced computer models. Sub-seasonal forecasts show where storms might go (**track**) and how strong they could become (**intensity**). ECMWF runs its model many times (an ensemble) to give a range of possible (**probability**) storm paths and strengths. ECMWF also makes the same calculations in a set of reforecasts (where forecasting models are run for a historic period) to show how the model's prediction differs from what is normally expected for that place and time of year (**anomaly**).

ECMWF classifies tropical disturbances by wind speed measured in metres per second (m/s): **tropical depressions** (above 7 m/s); **tropical storms** (above 17 m/s); and **hurricanes** (above 32 m/s). These classifications are illustrated in the diagram to the right. Hurricanes are further split into five sub-categories – see the ACACIA factsheet on tropical cyclones for more detail.

ECMWF produces three different **sub-seasonal products** to provide a view of tropical storm risk in the coming weeks. These are detailed in the table below. This ECMWF webpage describes how to use these products.



Tropical Storm Frequency	Accumulated Cyclone Energy (ACE)	Tropical Storm Strike Probability
The ensemble **mean number** of tropical storms (>17 m/s) forecast in a 7-day period (**valid time**), averaged over an ocean basin.	**Total** tropical storm (>17 m/s) **energy** in a 7-day period (**valid time**), averaged over an ocean basin.	The **probability** of a tropical disturbance **passing near (<300km)** a location over a 7-day period (**valid time**).
Green bars: forecast mean. Orange bars: 20-year (e.g. forecast to 2028 would be 2008-2027) historical average for same 7-day time window. These bars have both been normalised and are **directly comparable**. If the green bar is higher than the orange bar, a higher-than-average frequency of tropical storms is forecast. If the difference between these two numbers is significant enough, the area is shaded orange.	ACE considers the number, strength, and duration of all tropical storms and produces a total energy value. Green bars: forecast energy value. Orange bars: 20-year (e.g. forecast to 2028 would be 2008-2027) historical average energy value, normalised to 1. These bars have both been normalised and are **directly comparable.** If the green bar is higher than the orange bar, a higher-than-average ACE is forecast. If the difference is significant enough, the area is shaded orange.	The Tropical Storm Strike Probability charts are generated for the **three storm categories**. The **colours** show probability in terms of **percentages,** as indicated by the colour scale on the charts. Probability anomaly charts are also provided which show whether the strike probabilities are higher (red shading) or lower (blue shading) than the 20-year historical average, determined by a set of reforecasts, for the same 7-day window.

ACACIA is funded by the European Union under Grant Agreement No. 101137847.

Medium-Range products

ECMWF tropical cyclone products on the medium-range (up to 15 days) timescale have also been discussed during the testbeds. Particularly during weeks leading up to an expected tropical cyclone event.

Meteograms

Figure 11 shows daily ensemble meteograms for 15 days for Antsohihy. Each individual box and whisker represents the ensemble spread of 24 hour accumulated precipitation forecast for each day.

- The shaded green area represents the model climatology, which can be considered to represent "normal" conditions for the time of year in the selected location.
- The darkest green line within the shading represents the median of the model climate.
- The darkest green shading represents the 25th-75th percentiles of the model climate, and the lightest green shading represents the 10th – 90th percentiles of the model climate.

If the ensemble median is above the green line, this can be interpreted as a forecast for higher than normal precipitation for this day at this location.

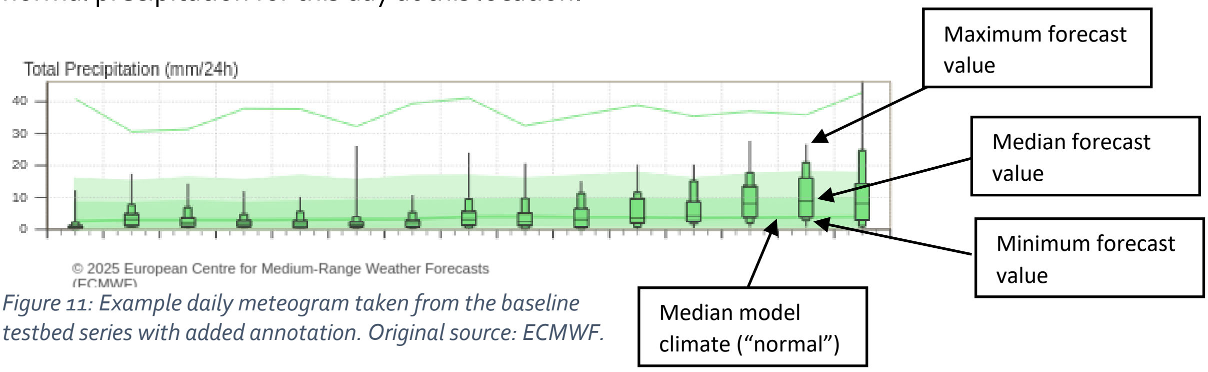


Figure 11: Example daily meteogram taken from the baseline testbed series with added annotation. Original source: ECMWF.

A similar product is available at the sub-seasonal timescale (Figure 9). In this case, each individual box and whisker plot represents the ensemble spread of forecast weekly mean precipitation anomalies i.e. how different the total rainfall for each week is expected to differ from the "normal" total rainfall for that week in the model climatology.

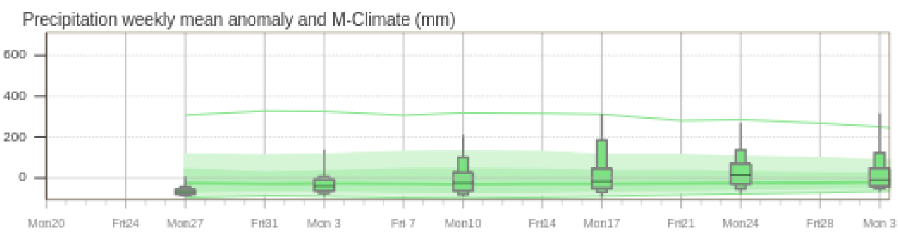
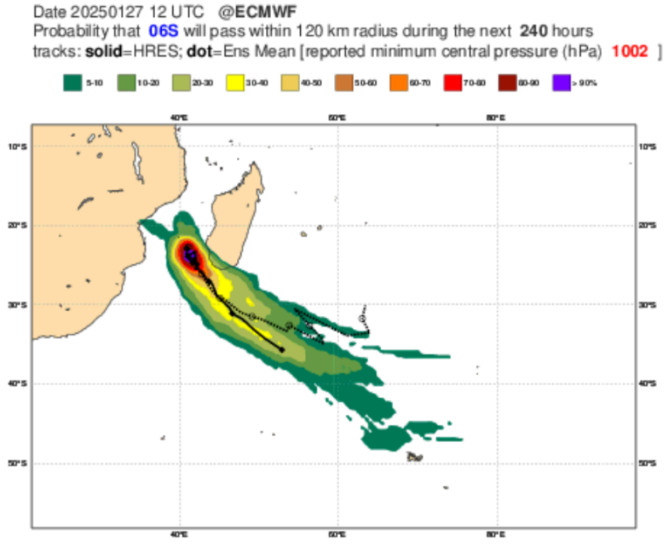


Figure 128: Example weekly meteogram taken from the baseline testbed series. Original source: ECMWF.

Tropical cyclone strike probability and characteristics

This product (also known as a tropical cyclone track plot) shows the likelihood of a tropical cyclone passing near a location and provides details about its possible intensity, wind speeds, and central pressure over the next 10 days.



Probability that the cyclone will pass within 120 km of a location during the forecast period.

Colours represent probability:

- **Dark red** / **purple** = very high chance (>80%)
- **Orange** / **red** = 50-80% chance
- **Green** / **yellow** = lower chance (10-40%)

The cyclone track is shown by:

- Solid line = high-resolution forecast (HRES)
- Dotted line = ensemble mean track

Figure 13: Example tropical cyclone strike probability map, taken from the baseline testbed series. Original source: ECMWF.

Intensity category probability (top)

Bars show the percentage chance of the cyclone being in each intensity category (see factsheet for definitions). Taller bars represent a higher probability of that intensity on the given day

- **Green**: Tropical Depression
- **Orange**: Tropical Storm
- **Red:** Hurricane Cat 1
- **Dark red:** Hurricane Cat 2
- **Black**: Hurricane Cat 3

See the Tropical Cyclone Factsheet for definitions

10m wind speed (middle) and central pressure (bottom)

- Solid line = HRES forecast
- Dots = ensemble mean
- Blue box and whiskers = spread of ensemble members (uncertainty). Wider spread = more uncertainty.

Lower pressure and higher wind speed typically indicate a

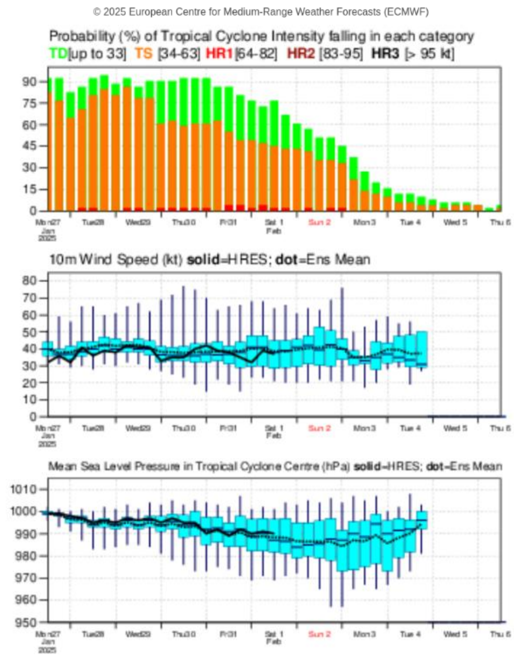


Figure 14: Example intensity category plot (top), wind speed (middle) and pressure (bottom). Original Source: ECMWF.

Météo-France products

The Regional Specialised Meteorological Centre (RSMC) of La Reunion, operated by Météo-France, is the tropical cyclone centre for the South-West Indian Ocean. RSMC La Réunion monitors tropical cyclone activity across the Indian Ocean basin, and issues forecasts, warnings and guidance.

PISSARO project

The PISSARO project (2020–2023) was led by the Laboratoire de l'Atmosphère et des Cyclones (LACy) in Réunion Island, working with Météo-France's Indian Ocean Directorate (DIROI), the Red Cross PIROI platform, and the Seychelles Meteorological Authority (SMA).

The project worked to improve the use of sub-seasonal and seasonal weather forecasts in the south-west Indian Ocean to support better planning for sectors, including disaster response.

One key outcome was a tropical cyclone forecast updated weekly during the austral summer, providing maps and early warnings for islands in the region.

LACy will join the ACACIA consortium in 2026, contributing additional expertise and enabling continuity of learning focussed on improving sub-seasonal and seasonal forecasting in the region.

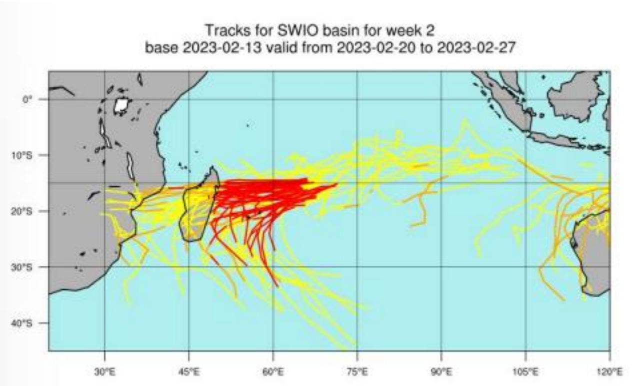


Figure 15 PISSARO : co-development of a support decision tool for TC risk anticipation | H. Vérèmes - WWRP / WCRP S2S Summit 2023

Ensemble tropical cyclone forecast. This map displays the possible forecast trajectories of low pressure systems for a given week.

The colour of the line represents the strength of the system:
Yellow: tropical depressions
Orange: tropical storms
Red: tropical cyclones

Tropical cyclone hazard anticipation product.

This map highlights areas expected to be affected by a tropical cyclone.

Colours indicate an **increasing** degree of reliability:
Yellow: Maximum Hit Detection Rate
Orange: Best Hit / False Alarm Rate
Dark Red: Low False Alarm Rate

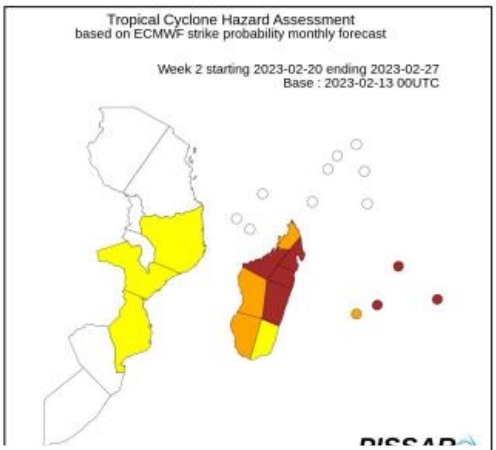


Figure 16 PISSARO : co-development of a support decision tool for TC risk anticipation | H. Vérèmes - WWRP / WCRP S2S Summit 2023.

Technical content

Forecast Terminology

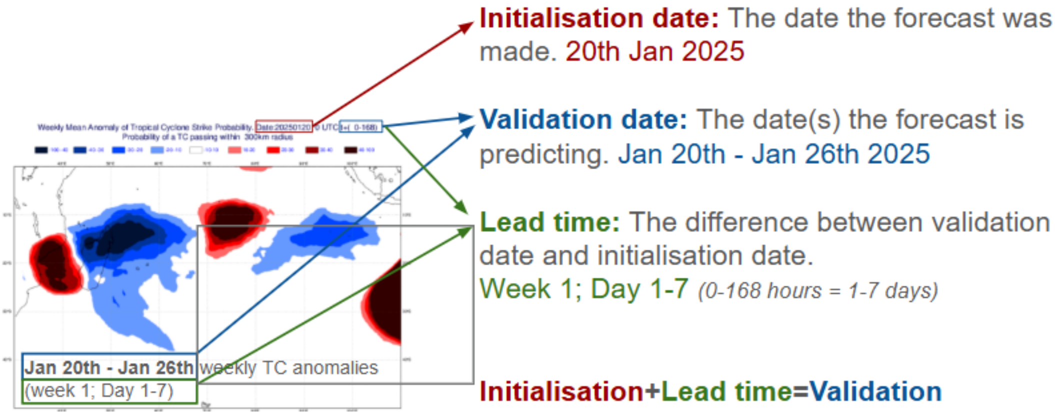


Figure 17: Forecast terminology definitions from baseline testbed. Talib 2025.

Forecast Initialisation Date

What is the forecast initialisation date?

The *initialisation date* (sometimes called "start date") is the moment in time when ECMWF's forecasting system begins a new sub-seasonal forecast. In other words, it's the date from which the computer model "starts" its prediction.

Why does the initialisation date matter?

- The forecast's "memory" starts from that date: what the model predicts for the future (e.g., average tropical cyclone probability for week 1, week 2, ...) is based on the atmospheric and surface conditions *at* the initialisation date. These conditions are based on a blend of observations and model data.
- If you compare forecasts launched on different initialisation dates (e.g., Monday vs. Thursday), they may give different predictions, because the 'initial' conditions at the start are different.
- Because of small but important changes in conditions from day to day, users sometimes look at more than one forecast run (i.e., forecasts with different initialisation dates), to create a "lagged ensemble" — not just the most recent run.

Relation to climatology ("model climate")

- To decide whether a forecast is "anomalous" (e.g., unusually wet, unusually low likelihood of tropical cyclone development), the forecast is compared to a **model-climate baseline**.
- The model-climate is built from many re-forecasts (historical forecasts run from past dates – also known as hindcasts), all of which also have their own initialisation dates.

Lagged Ensemble

A *lagged ensemble* is a forecast method that **combines forecasts started on different recent initialisation dates** (i.e. different "start times") rather than using only the most recent run.

For example, forecasts that began on Monday, Tuesday, Wednesday may be combined to form one ensemble output.

Why are they used?

- Forecast systems recognise that **initial conditions change each day** and that forecasts started on different days may yield slightly different results.
- By combining runs from several days, the ensemble becomes larger and better represents uncertainty, which is especially useful in sub-seasonal timeframes.

When is it especially helpful to use a lagged ensemble?

- In the **sub-seasonal range** (weeks ahead) when predictability is weaker and you want to maximise ensemble size and represent uncertainty.
- At longer lead times, the latest run may *not necessarily* be the best and users may wish to consider more than one set of solutions as a lagged ensemble.

Re-forecast

A *re-forecast* (or *hindcast*) is when the weather (or climate) model is run over **past dates**, using the same model setup as for real forecasts, but with historical starting conditions.

Why are re-forecasts useful?

- To **build a "model climatology"**: By running the model many times in the past, forecasters can see what the model thinks "normal" weather looks like, for each time of year and forecast lead time.
- To **correct or calibrate real forecasts**: Real-time forecasts are compared against the re-forecast climatology to detect and adjust for model biases (systematic errors).
- To **check model performance**: Because re-forecasts can cover many years, they provide a large dataset for measuring how skilful the model is (how well it would have done in the past) at different lead times.

When a forecast is produced, the anomalies (how much above or below "normal" things are) are calculated relative to the "model climatology".

Lead time

Lead time is the **time between when a forecast is started (initialised) and the future date it is predicting**.

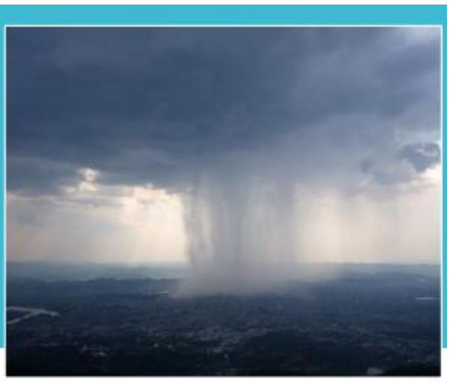
- For example, if a forecast is initialised on Monday, and it predicts the weather for the following Friday, the lead time is **4 days**.

Why is lead time important?

- Lead time tells you **how far into the future the forecast is looking**.
- Sub-seasonal forecasts are often **for 2–6 weeks ahead**, so lead times in this context are measured in **days to weeks**.

Madden Julian Oscillation (MJO)

Factsheet: Madden-Julian Oscillation



What is the Madden-Julian Oscillation (MJO)?

The Madden-Julian Oscillation (MJO) is a large-scale moving pattern of clouds, rain, wind, and pressure that travels eastward around the Earth in the tropics. It takes about 30 to 60 days to complete one cycle. Unlike El Niño/La Niña conditions, which can last for many months in the Pacific Ocean, the MJO can happen multiple times in one season. This means the MJO changes from week to week, affecting the weather across the whole tropics. Source: NOAA, Gottschalck, 2014.

Forecast models now do a good job of predicting the MJO on timescales of two weeks to two months (sub-seasonal) in the tropics. By monitoring tropical winds and clouds, the location of the MJO can be identified; these are defined as phases (see Figure 2). Understanding the link between the phase of the MJO and weather systems, such as tropical cyclones in the Indian Ocean, helps to provide information that is crucial to support anticipatory action ahead of storms.

A video on the MJO can be viewed here (source: Met Office YouTube).

The MJO, Madagascar, and tropical cyclones

There is growing evidence that the MJO affects cyclones in the southern Indian Ocean and over Madagascar. Tropical cyclones can form more easily, develop and become more intense during certain phases of the MJO (see Figure 1).

Rainfall in Madagascar has also been linked to certain phases of the MJO (Macron et al., 2016). MJO phases 6-7 can cause wetter conditions over Madagascar. However, it is important to remember other parts of the climate system also influence Madagascar's weather and climate .

The MJO phases

- **Phase 1:** greater rainfall over the western Indian Ocean.
- **Phases 2, 3:** rainfall moves eastwards over Africa, the Indian Ocean and parts of India, Pakistan, and Bangladesh.
- **Phases 4, 5:** rainfall reaches Indonesia and the western Pacific.
- **Phase 6, 7, 8:** rainfall moves eastward over the western Pacific, and eventually dies out in the central Pacific area.
- Either next MJO cycle begins or MJO weakens and discontinues.

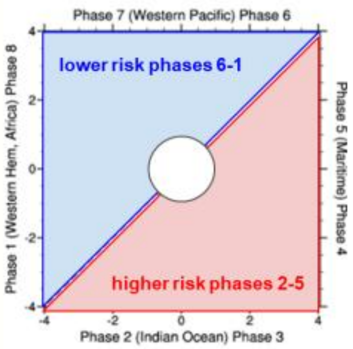


Figure 1 (left): when the MJO is in phases 2, 3, 4 or 5 (shaded red) there is **higher risk** of tropical cyclones impacting Madagascar. When the MJO is in phases 6, 7, 8 or 1, (shaded blue) risk is lower.

If forecasts fall within the central white circle, there is weak MJO activity and, therefore, no added skill from MJO.

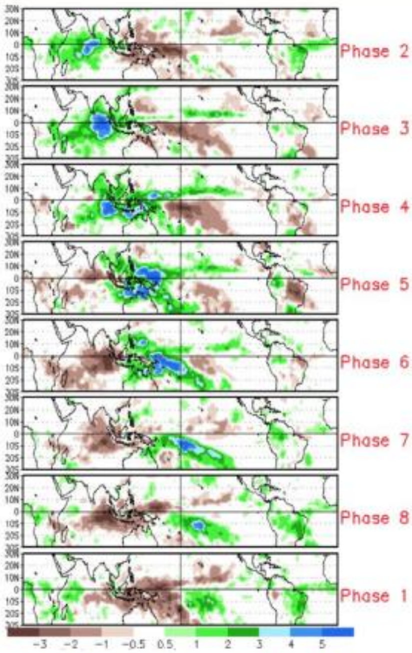


Figure 2 (above): phases of the MJO. Green shading indicates more rainfall than normal; brown indicates less rainfall (source: NOAA, 2014).

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Abbreviations & acronyms

ACACIA – Anticipatory Climate Adaptation for Communities in Africa

ACE – Accumulated Cyclone Energy

Cat – Category

CRM – Croix-Rouge Malagasy (Malagasy Red Cross)

DGM – Direction Générale de la Météorologie (Madagascar Meteorological Service)

DIROI – Météo-France Indian Ocean Directorate

ECMWF – European Centre for Medium-Range Weather Forecasts

HRES – High-Resolution Forecast

JFM – January–February–March (seasonal shorthand)

LACy – Laboratoire de l'Atmosphère et des Cyclones

MJO – Madden Julian Oscillation

MPH – Miles Per Hour

NASA – National Aeronautics and Space Administration

NCAS – National Centre for Atmospheric Science

PIROI – Indian Ocean Regional Intervention Platform (Red Cross)

RSMC – Regional Specialised Meteorological Centre

SMA – Seychelles Meteorological Authority

S2S – Sub-seasonal to Seasonal (forecast timescale)

TC – Tropical Cyclone

WWRP / WCRP – World Weather Research Programme / World Climate Research Programme

Glossary

Anomaly
A measure of how much a forecasted value differs from what is considered "normal" for that time of year, based on a long-term average (climatology).

Austral summer
The summer season in the Southern Hemisphere, typically from December to February.

Box and whisker plot (or boxplot)
A graphical way to summarise the spread of data, showing the range, middle values, and variability using a box for the central values and lines (whiskers) for the extremes.

Climatology (Model Climate)
The average weather conditions over a long period, typically 30 years, used as a reference to identify whether current or forecast conditions are unusual.

Consortium
A group of organisations that work together on a shared project or goal, often combining expertise and resources.

Co-production
In this context, co-production is about working together so that forecasts aren't just a one-way product delivered from producers to users but are also shaped directly by the needs of the people who will use them.

Disaster response
The actions taken immediately before, during, and after a disaster to save lives, reduce harm, and meet basic human needs.

Ensemble Forecast
A set of forecasts produced by running a weather model multiple times with slightly different starting conditions, or model structure, to represent uncertainty.

Forecast Initialisation Date
The date and time when a forecast model run begins, using the best estimate of current atmospheric conditions.

Forecast skill
A measure of how well a forecast matches what actually happens. Higher skill means the forecast is more accurate and reliable compared to a simple baseline.

Humanitarian
Concerned with, or seeking to promote, human welfare.

Initialisation date
The date the forecast was made.

Intensity Category
Classification of tropical cyclones based on wind speed and pressure, ranging from tropical depression to hurricane strength.

Lagged Ensemble
An ensemble created by combining forecasts from different initialisation times to increase ensemble size and better represent uncertainty.

Lead Time
The time between when a forecast is issued and the period it predicts.

Madden-Julian Oscillation (MJO)
A large-scale tropical weather pattern that influences rainfall and cyclone activity, typically moving eastward around the globe every 30–60 days.

Median
The middle value in a dataset when the values are ordered from lowest to highest.

Medium-Range

Weather predictions for a period of 3 to 15 days ahead.

Meteogram
A type of chart that shows how weather variables, such as temperature, rainfall, or wind, are expected to change over time for a specific location.

Percentile
A value that shows how a data point compares to the rest of the dataset. For example, the 90th percentile means 90 percent of values are below that level – effectively the top 10 percent.

Rainfall accumulation
The total amount of precipitation (rain, snow, sleet, hail) that falls over a specified period of time, such as a day, a week, or a season.

Re-forecast (Hindcast)
A model run for a past period used to assess model performance and build climatology.

Strike Probability
The likelihood that a tropical cyclone will pass within a specified distance of a location during the forecast period.

Sub-seasonal
The focus on ACACIA is on the development of forecast products at the sub-seasonal timescale, with a specific project focus on information that can be produced 2 to 4 weeks ahead.

Testbed
In the context of the ACACIA project, the testbed is an online forum which brings together forecast users, forecast producers, and researchers.

Tropical cyclone tracks
The paths that tropical cyclones follow as they move across the ocean and land, usually shown on a map over time.

Validation date
The date(s) the forecast is predicting.