METEOROLOGICAL SERVICES DEPARTMENT

NEWSLETTER

ISSUE 5 | 2025

Minimizing Risk Through Science

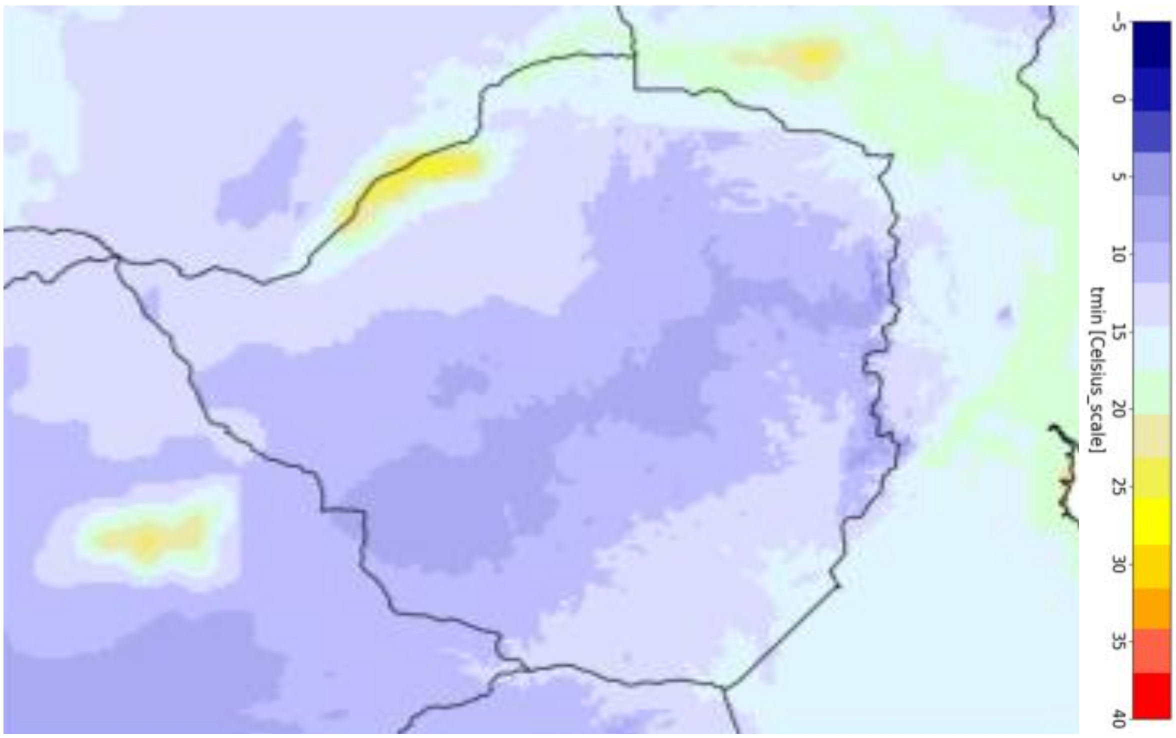
Meteorological Services Department of Zimbabwe
Cnr Bishop Gaul Ave & Hudson Ave, Belvedere
Box BE 150, Belvedere, Harare, Zimbabwe
Telephone: +263 (242) 778204 - 6, 778218, 778027
Website: www.weatherzw.org.zw

MSD Newsletter April 2025

Contents

Zimbabwe 2025 Winter Season Temperature Forecast

Isaac Masawana - MSD



Forecast For The 2025 Winter Season

Our winter season extends from May to September annually, characterized by predominantly dry conditions with minimal rainfall. The primary meteorological focus during this period revolves around temperature fluctuations rather than precipitation.

Temperature Projections: Below-average temperatures are anticipated across much of the country, with the most pronounced cold conditions expected along the Highveld, where minimum temperatures below 5°C are expected which are in the cold range. Occasional minimum temperatures below 0 are also probable. In contrast, the Zambezi and Sabi valleys are forecast to experience higher temperatures compared to the highveld, where average minimum temperatures are expected range between 10°C and 15°C from May to July. However, temperatures marginally lower than this range cannot be entirely ruled out.

Agricultural Impact: Frost Risk

Frost poses a significant challenge for horticultural farmers during winter. The most vulnerable areas include Nyanga, Lupane, Matobo, Gweru, Kwekwe, Henderson, Masvingo, and other Highveld areas, where ground temperatures frequently fall below 0°C on certain days.

Winter Precipitation Patterns

Precipitation during winter is typically limited to drizzle and light rain, often associated with guti-type weather conditions, marked by windy, overcast skies (predominantly low cloud cover) and cold temperatures due to subtropical high-pressure systems. This weather pattern is most prevalent in Masvingo, Matabeleland South, Manicaland, and southern Midlands.

Rainfall accumulations remain negligible during this period. The persistent cloud cover associated with these conditions suppresses daytime temperatures significantly while moderating nighttime cooling, thereby substantially reducing the likelihood of ground frost formation.

The public is advised to continuously get updates from the Meteorological services Department for their short-term decisions.

Proceedings of the SAFE4ALL Living Lab Technical Workshop In June 2025

The SAFE4ALL project, a four-year European Union funded initiative implemented in Ghana, Kenya, and Zimbabwe, aims to enhance climate information services through co-production between European providers, National Meteorological Services (NMSs), and local agriculture and disaster risk reduction (DRR) stakeholders. In Zimbabwe, the project focuses on fifteen wards in Marondera district, where tools like Thunderstorm Nowcasting, the Uliza Chatbot, and DropApp are being evaluated for their local applicability. The Meteorological Services Department of Zimbabwe (MSD) hosted the SAFE4ALL Living Lab Technical Workshop from 23 June to 27 June 2025. The workshop brought together key stakeholders, including MSD representatives, the Zimbabwe Farmers Union (ZFU), smallholder farmers, government agriculture officials, academic researchers, media, and civil society. International partners, including Climate Adaptation Services (CAS), Delft University of Technology, and weather station technology provider TAHMO, facilitated discussions on co-designing localized weather forecasts, early warning systems, and digital tools like the Uliza-WI Chatbot and Drop App.

The event began with a planning session at the Meteorological Services Department Headquarters in Belvedere on 23 June 2025 and an overview of the project by Mark Melotto one of the project coordinators, emphasizing the co-production of tailored climate services to address climate change impacts.

Mark Melotto (standing) explaining the SAFE4ALL project during the 1st meeting

SAFE4ALL Living Lab Technical Workshop Participants posing for a photo on the second day of the workshop

On the second day, the Project Coordinator introduced the project for the benefit of some participants who might have never heard of the project. He highlighted the need for stakeholder involvement in the development of the various tools which cover the climate services value chain (observations, forecasting & dissemination). The TAHMO representative stressed the importance of meteorological data in the provision of the weather and climate services. He highlighted the challenges that most National Meteorological Services particularly in Africa face with regards the availability of meteorological data and how TAHMO through its low cost equipment was attempting to improve data availability.

Proceedings of the SAFE4ALL Living Lab Technical Workshop

The third day was characterized by breakout sessions. In the breakout groups the participants had hands on activities in Foodsheds session while some were introduced to the eWaterCycle Python package which allows anyone without in depth knowledge of the programming language to run hydrological models. Since eWaterCycle is quite a collection of multiple models and functionalities, we were introduced to the Hydrologiska Byråns Vattenbalansavdelning (HBV). HBV is a conceptual, semi distributed hydrological model which was developed by the Swedish Meteorological and Hydrological Institute (SMHI). It is used for simulating streamflow based on precipitation, air temperature, potential evapotranspiration, catchment characteristics.

On the fourth day MSD, ZFU and the overseas SAFE4ALL team went to Marondera to showcase some of the Digital Climate Tools developed by the SAFE4ALL partners. Each of the 2 groups went to 2 different wards in Marondera to introduce the Drop mobile application and the Uliza Wi Telegram Chatbot. In a collaborative fashion to introduce innovative agricultural technology to farmers in Marondera, the project implementors, MSD, ZFU, TAHMO, Delft University, and Resilient Cities organized themselves into two groups. One group, introduced the Uliza Wi Telegram Chatbot in 2 wards, and the other group introduced the Drop App in the other 2 wards.

The Drop App is an application designed to provide short-term point weather forecasts to help farmers plan their agricultural activities more effectively. However, many farmers were unprepared for the digital demonstrations as most of them had left their smartphones at home, and others lacked data access, limiting their ability to explore the app's functionalities. Despite these challenges, the team emphasized the benefits of using the Drop App, encouraging farmers to incorporate it into their planning strategies to boost productivity.

Some farmers in Marondera getting assistance from the MSD and the Overseas team with logging into the DropApp

During the discussion on the fifth day, The Project Coordinator thanked everyone for attending the 2 day training and field visits. He highlighted the need to do follow a up on the use of Uliza Wi-Chatbot and the DropApp by farmers as some had not successfully managed to register on these applications due network challenges. It was agreed that a WhatsApp group be created where the project coordinator will interact with local farmers and get feedback. It was also discussed that Weather Impact should incorporate local forecast products and models onto the Uliza Wi Chatbot instead of the ECMWF forecasts.

Scan the QR Code to Interact with the Uliza Wi Chatbot Now

Or Click Here.

Summary Review of the 2024-25 Rainfall Season

Isaac Masawana – MSD

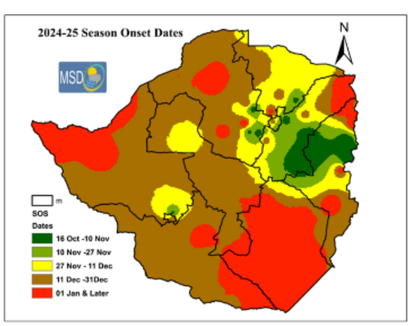
The 2024-25 rainfall season in Zimbabwe exhibited significant temporal and spatial variability, characterized by a delayed onset, and an extended cessation. The season's effective start was delayed by approximately one month, with most areas recording the onset criteria by mid-December 2024 rather than the typical mid-November long-term mean. This delay was compounded by false starts in November, where early rainfall was followed by a prolonged mid-December dry spell exceeding 10 days, disrupting critical early-season moisture accumulation. The delayed onset had cascading effects on agricultural planning and water resource management across the country.

Monthly rainfall performance revealed distinct hydroclimatic phases throughout the season. October 2024 recorded below-average nationwide rainfall under high-pressure dominance, with totals remaining below 60mm except for isolated late-month convective events. November showed marked improvement, particularly in northern and eastern regions where accumulations reached 87-134mm, though spatial anomalies varied widely from 50% below to 50% above climatological averages. December exhibited a west-east disparity, with western parts of the country exceeding 100mm while northeastern areas suffered deficits over 50% below average due to persistent mid-level ridging. The season peaked in January 2025 with rainfall totals exceeding 350mm in eastern and northern areas, driven by optimal ITCZ positioning and tropical systems like Cyclone Dekeledi, before gradually reducing through February-April, though April remained anomalously wet with some areas receiving over 100mm.

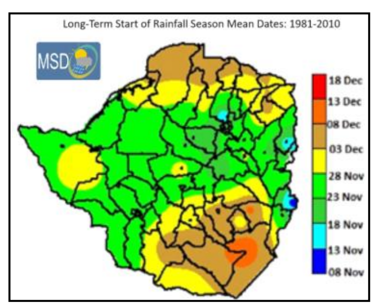
The season's progression was shaped by evolving atmospheric drivers across three distinct phases. Early season suppression of convection under dominant high-pressure systems created initial dry conditions and delayed onset. Mid-season recovery was facilitated by the interaction of westerly cloud bands with tropical moisture sources, including Tropical Depression Chido in December, which enhanced rainfall intensity across western districts. Paradoxically, late in the season, the position of cyclones in the Mozambique Channel like Honde in March reduced rainfall over the country due to their drying effects, particularly in southern and eastern districts, despite being typically wet months.

Forecast verification showed mixed performance across the season. The October-December outlook predicting normal-to-below rainfall achieved 70% accuracy, correctly anticipating the delayed onset and early dry spells. The January-March normal-to-above forecast performed even better, matching observations in over 80% of the places. However, localized misses occurred in northern areas during February-April where predicted above-normal rains failed to materialize.

THE START OF SEASON



The start of season is the first day that a place receives rainfall accumulation of 20mm or more in one or two consecutive days that should not be followed by a dry spell of more than ten days in the next thirty days. False start of season is when some of the



conditions for the start are not satisfied. Dry day is a day that a place receives rainfall accumulation of less than 2.95mm. Consecutive number of dry days makes a dry spell. In 2024-25 season the bulk of the country recorded a delayed start of the season. Although much rainfall was received in November, the dry spell that hit the country during the first and second dekad of the month of December led to a lot of places recording false start of the season during the month of November 2024. Consequently, most places had onset in December 2024 and January 2025.

OCTOBER-NOVEMBER-DECEMBER 2024

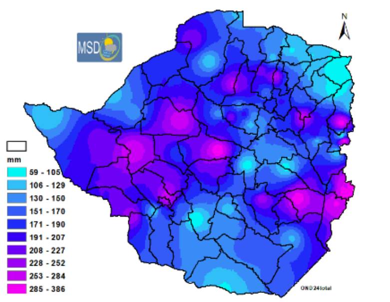
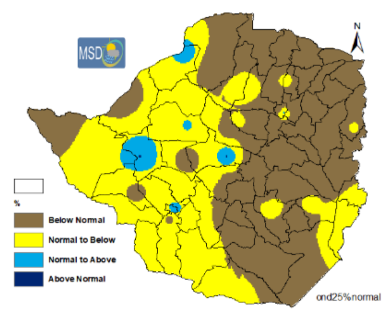
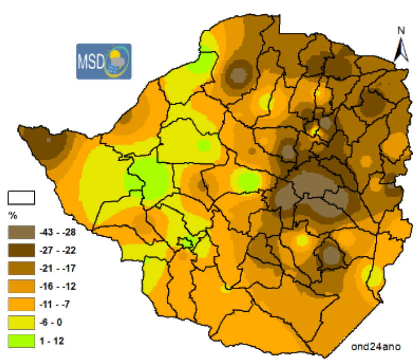


Figure 3: Rainfall Accumulation: October to December 2024

The first three months of the season recorded generally low rainfall. As illustrated in **Figure 3,** the highest cumulative rainfall (exceeding 250mm, shown in purple) was limited to a few areas, while most of the country received between 130mm and 200mm.

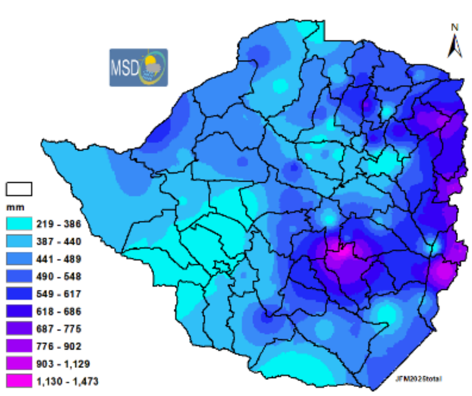


When compared to the long-term average **Figure 4,** much of the country recorded below-average rainfall, with the eastern half being the most severely affected. The seasonal forecast issued in August 2024, which predicted normal to below-normal rainfall for the October–December period proved to be highly accurate. It achieved a **hit** (yellow areas), a **half hit** (brown areas), and a **half miss** (blue areas).

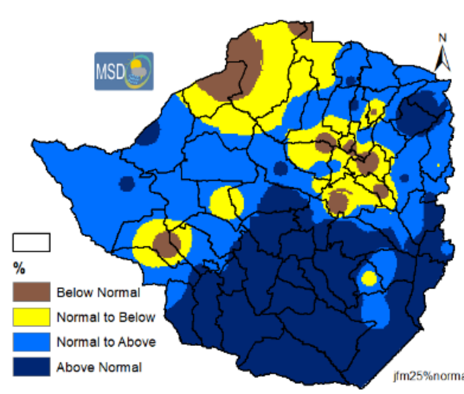


The relative anomalies map **Figure 5,** highlights that the eastern districts experienced the most significant rainfall deficits (brown), while regions in orange to green had the smallest deviations from normal. This indicates that the areas to the eastern central parts of the country and the northern distincts were the most affected by the rainfall deficit during the period October to December 2024.

JANUARY-FEBRUARY-MARCH 2025

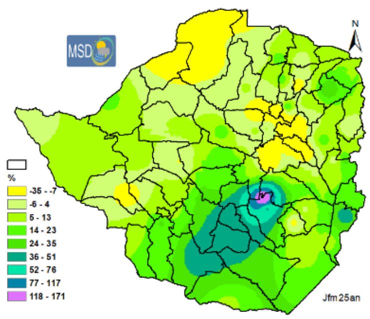


The period January-March recorded the highest rainfall amounts. The eastern parts received higher rainfall compared to the western parts. Most



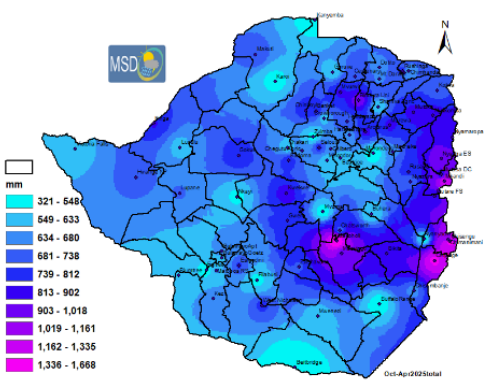
places measured accumulated rainfall exceeding 500mm with the highest being measured in the eastern parts of the country such as Manicaland, and Masvingo Province. Raifall amounts exceeding 900mm were recorded in these areas. The months that contributed much to the rainfall totals were January and February, a period when the ITCZ was at its peak.

Expressed as a percentage of the long term average, January-Febuary-March accumulated rainfall was above average in most parts of the country except for a few areas that are in brown and yellow colour legend. The forecast that was issued for this part of the season was normal to above normal across the country. Figure 7, shows that the forecast was on point in more than 80% of the country indicating that it performed very well.

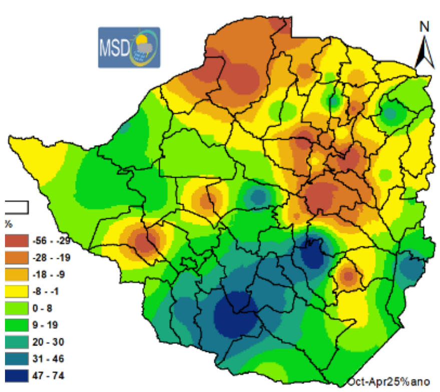


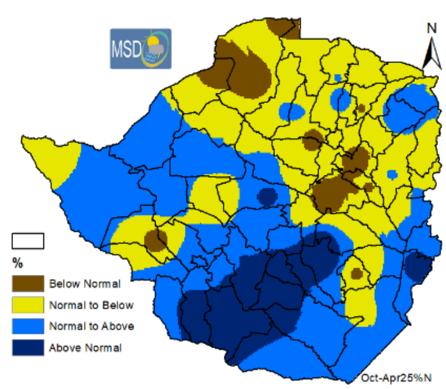
The relative anomaly map, Figure 8, shows that almost all the places received positive anomaly except for a few districts that include Chikomba, Marondera, Tsholotsho, Hurungwe and Kariba. The highest positive rainfall anomaly was recorded in the southern provinces namely Masvingo, Midlands, some parts of Manicaland and Matabeleland South.

OCTOBER-APRIL 2025



The seasonal cumulative rainfall across country, Figure 9, shows that most areas recorded over 550mm, with isolated locations exceeding 1000mm. Comparative analysis against long-term averages, Figure 10, reveals approximately half the country experienced above-average rainfall, while the remainder fell within normal ranges with a bias towards below (depicted in yellow Figure 10). Notably, only minimal areas - represented by brown spots on Figure 10 - recorded below-average rainfall outside normal range. Spatial analysis identified distinct anomaly patterns as indicated in Figure 11: the most significant rainfall deficits occurred in extreme northern regions and central eastern areas, while the highest positive anomalies were concentrated in Matabeleland South,

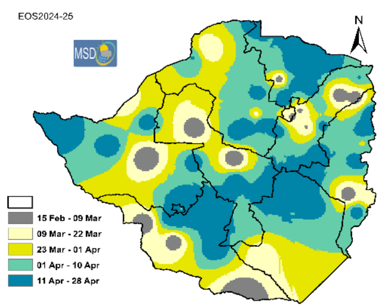




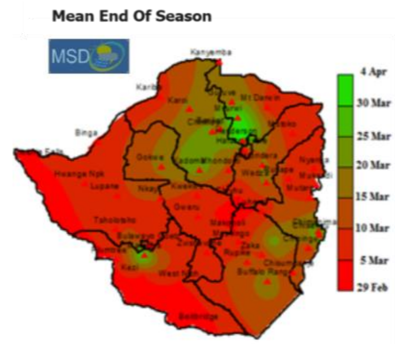
Masvingo, and southern portions of Manicaland provinces. This distribution created a marked contrast between

END OF SEASON

western surplus and eastern deficit regions during the season.

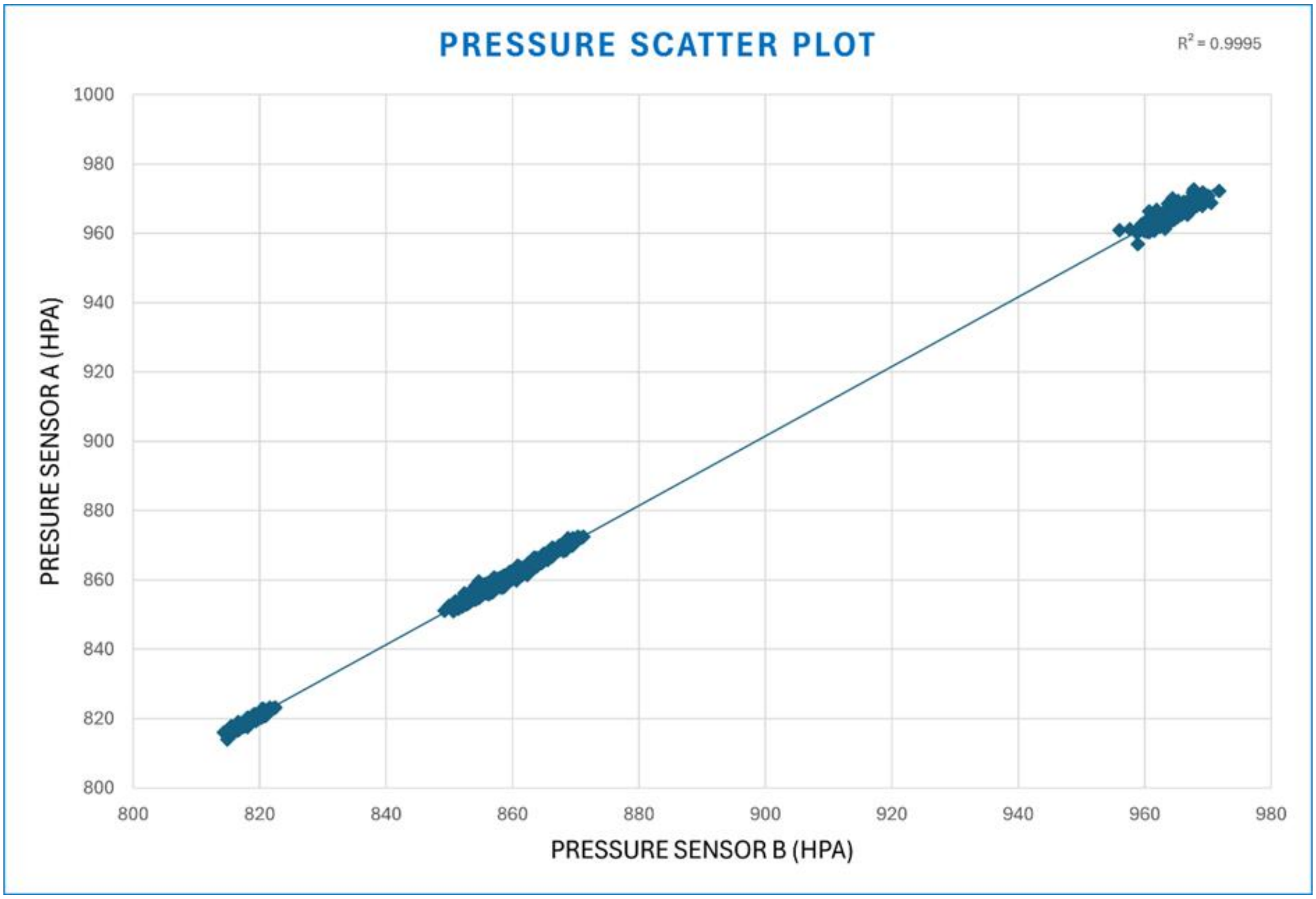


The end of the 2024-25 season was a bit delayed in most parts of the country. This was attributed to the wet April which in a normal season is relatively dry. Figure 13 shows the long term mean end of season while Figure 12 shows what transpired during the 2024-25 season. Most places recorded the end of season in April compared to early March shown in Figure 13.



A Curious Case of Pressure: What's Behind These Clusters?

Tinetariro Chikati - MSD



Pressure Scatterplot for 2 co-located sensors in 7 different locations [Source – Meteorological Services Department]

The scatter plot above might catch your eye, not just because it shows a strong 99% correlation between two pressure sensors, but because of the intriguing pattern it reveals. The data comes from two collocated sensors installed at 7 Meteorological Services Department stations across Zimbabwe. Stations like Rusape, Nyanga, Harare, and Kariba all contributed to this dataset, which spans from September 2024 to July 2025. As expected, the sensors agree well. The correlation is impressively high, a good sign that both instruments are doing their job, as designed by the manufacturer, and as expected by the nation of Zimbabwe.

But what's unusual is how the data arranges itself. There are three distinct clusters, each situated around a different pressure level. So, what's going on here? One possible explanation is the shifting of pressure through the seasons. After all, this dataset stretches across nearly a full year. But pressure changes with the seasons tend to be gradual, not dramatic, and these clusters are anything but subtle. The data was also logged at the same hour of the day, with small deviations of 5 to 35 seconds, therefore the data cannot be clustered by time.

A more convincing explanation lies in the landscape itself. Zimbabwe's terrain is richly varied, and the stations included in this dataset are scattered across highlands, valleys, and everything in between. Pressure naturally decreases with altitude, so it makes sense that stations sitting at similar elevations would group together in the plot. In essence, these clusters might be whispering the story of our country's topography, the silent imprint of hills and plains captured in numbers. So, while the sensors are in the same spots, their surroundings, their altitude, likely tell the real story behind the pattern.

What's your take on this trend?

Understanding Zimbabwe's Temperature Classifications: A Guide for Weather Awareness

Tinetariro Chikati - MSD

FORECAST DETAIL KEY 1

MAXIMUM Temperature Category	COLD	COOL	MILD	WARM	HOT	VERY HOT
Kariba, Binga, Kanyemba	<23	23-26	27-30	31-34	35-38	39-42
Victoria Falls, Mutare, Masvingo	<21	21-24	25-28	29-32	33-36	37-40
Bulawayo, Matopos	<19	19-22	23-26	27-30	31-34	35-38
Harare, Gweru, Vumba	<16	16-20	21-24	25-28	29-32	33-36
Nyanga, Chimanimani	<15	15-18	19-22	23-26	27-30	31-34

FORECAST DETAIL KEY 2

MINIMUM TEMPERATURES	VERY COLD	COLD	COOL
	<5	5-10	11-15

A key from one of the MSD forecasts released in winter 2025 [Source – Meteorological Services Department]

Weather forecasts often use terms like "**COOL**," "**WARM**," or "**VERY HOT**," but what do these labels really mean? In Zimbabwe, temperature classifications vary by region, reflecting the country's diverse climates, from the scorching lowlands of Kariba to the chilly highlands of Nyanga. Let's break down how temperatures are categorized and what they mean for residents and travelers alike.

On the forecast key, the maximum and minimum temperatures were grouped into six categories: Cold, Cool, Mild, Warm, Hot, and Very Hot. However, the exact temperature ranges for each category depend on location. For example, in Kariba, Binga, and Kanyemba, some of Zimbabwe's hottest areas a "COLD" day is below 23°C, while "Very Hot" means blistering figures in the high 30s°C. Victoria Falls, Mutare, and Masvingo, have slightly cooler thresholds, with "VERY HOT" starting at 37°C. Bulawayo and Matopos are cooler still, where temperatures must reach at least 35°C to be considered "Very Hot." In Harare, Gweru, and the Vumba, the highland climate means "Cold" is below 16°C, and "Very Hot" ranges from 33 to 36°C.

The coldest regions, Nyanga and Chimanimani, have the lowest thresholds, where "Cold" is below 15°C, and even their "Very Hot" range (31 – 34°C) would only qualify as "Warm" in Kariba. This regional variation in temperature classification ensures that forecasts are meaningful, as what feels "Hot" in Nyanga would be considered merely "Mild" in Binga. By tailoring temperature categories to local climates, Zimbabwe's weather forecasts are logically consistent with what the end user of the forecast feels.

CLIMSOFT Web Data Entry System Implementation Update

The ongoing implementation of Climsoft Web for meteorological data capture across our weather stations network continues to show promising progress, though several operational challenges require attention. While the majority of stations have successfully transitioned to the new system, four locations, Tsholotsho, Kadoma, Matopos, and Rupike, remain behind schedule due to persistent technical difficulties with their allocated mobile devices. Provincial Meteorological Technicians are currently engaged in resolving these hardware issues to bring all stations online as quickly as possible .

At stations where the system is operational, such as Kanyemba, initial performance indicators are largely positive. Data transmission rates have shown significant improvement compared to previous manual methods. However, as anticipated during this transitional phase, some recurring data entry errors have emerged that warrant attention. A representative example from Kanyemba station shows a consistent entry of "9000 ft" for cloud height when the correct entry for clear skies should simply be "9". This error pattern persisted throughout the daytime observations from 0600hrs to 1700hrs, suggesting either a misunderstanding of the coding protocol or a potential interface issue within the application itself. Similar patterns of systematic data entry errors have been noted at other recently converted stations.

Beyond these user-related challenges, the system has revealed some technical limitations that require developer attention. Most notably, when internet connectivity is interrupted, the application successfully stores observations locally but fails to automatically synchronize this backlog with the central MSD server once connectivity is restored. While the local storage functionality provides crucial data redundancy, a marked improvement over previous systems, the lack of automatic synchronization and clear user notification creates potential gaps in the central database. Observers currently have no definitive way to confirm whether locally stored data has subsequently been transmitted successfully, which could lead to undetected data loss during prolonged connectivity issues.

To address these challenges and ensure the continued success of the Climsoft Web implementation, several corrective measures should be prioritized.

First, a program of targeted refresher training for observers appears necessary, particularly focusing on proper coding protocols for common observations like cloud cover. These sessions should emphasize not only correct procedures but also the meteorological significance of accurate data recording. Second, the technical team should work with the software developers to implement two crucial system upgrades: an automatic synchronization protocol for offline data and clear visual notifications to confirm successful data transmission or alert users to pending uploads.

Concurrently, Meteorological Chiefs should implement more robust monitoring procedures to quickly identify and correct data quality issues. This might include daily reviews of submitted observations from their jurisdictions during this transitional period, with particular attention to stations showing patterns of systematic errors. Perhaps most importantly, we should foster an organizational culture that views these implementation challenges as opportunities for improvement. Observers should feel comfortable reporting difficulties without concern, understanding that the transition to any new system inevitably involves a learning curve.

The successful implementation of Climsoft Web represents a significant step forward in modernizing Zimbabwe's meteorological data infrastructure. While the current challenges are not unexpected for a project of this scale, they do require prompt and systematic attention. By combining targeted training, technical improvements, and enhanced oversight, we can ensure that the system delivers on its potential to provide more accurate, reliable, and timely weather data. The coming months should focus on consolidating these gains while addressing the remaining technical and operational hurdles, with regular progress reviews to monitor improvement and identify any emerging issues. With this proactive approach, we can expect to see continued improvements in both data quality and system reliability as users become more proficient with the new platform.

ZIMBABWE

METEOROLOGICAL SERVICES DEPARTMENT

'Where Science Meets The Sky'

MSD

Vision

A world class provider of meteorological, climatological and seismological products and services by 2025.

Mission Statement

To provide customer and stakeholder driven quality seismological, weather and climate services for socio economic development.

Core Values

- **Teamwork:** We value unity of purpose
- **Equality:** We offer equal status, rights and opportunities to all
- **Customer focus:** We prioritize and address customer needs.
- **Transparency:** We are open to scrutiny
- **Integrity:** We have strong moral principles
- **Creativity:** We focus on innovation and continuous improvement.
- **Accountability:** We take responsibility for one's own actions.

facebook.com/MSDZIM/

x.com/MSDZIM

Facebook.com/MSDZIM