



# METEOROLOGICAL SERVICES DEPARTMENT

## OF ZIMBABWE NEWSLETTER

**March 2026**

*Celebrating the World Meteorological Day,*

*Under the Theme:*

*“Observing Today, Protecting Tomorrow”*

**Minimizing Risk Through Science**

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# The Director's Remarks

This edition of the newsletter is World Meteorological Day, today marks the establishment of observation and serves as a reminder and climate services play in economic development, and The 2026 theme, “Observing To- es strong emphasis on the im- ous observation as the founda- vices. Every forecast, warning, the quality of the data collected As climate variability and extreme weather events become more pronounced, the need for reliable, real-time data has become even more critical.



*MSD Director - Mrs. R. Manzou*

published in commemoration of served annually on 23 March. The the World Meteorological Organi- of the essential role that weather safeguarding lives, supporting protecting the environment.

day, Protecting Tomorrow,” plac- portance of accurate and contin- tion of all meteorological ser- and climate outlook depends on through our observation systems.

A key highlight in this edition is the ongoing paradigm shift in meteorological instrumentation. The transition from conventional, manual instruments to automated and digital systems is transforming how we monitor temperature, rainfall, atmospheric pressure, and wind. Modern technologies now enable continuous data collection, improved accuracy, and rapid dissemination of information, strengthening our ability to provide timely and effective services. This shift is also aligned with global environmental commitments, including the Minamata Convention on Mercury, which calls for the phase-out of mercury-based instruments in favour of safer and more sustainable alternatives.

The articles presented in this issue further illustrate the breadth of work being undertaken within the Department and across the meteorological community. From advancements in satellite-based observation systems and data processing, to capacity building initiatives and climate services development, these contributions demonstrate a strong commitment to innovation and operational excellence. They also highlight the critical role of partnerships, both locally and internationally, in strengthening our ability to respond to evolving climate challenges.

This edition also reflects the interconnected nature of meteorology with other sectors, particularly forestry and environmental management. The joint commemoration activities underscore the importance of integrated approaches in building resilience, recognising that weather, climate, and ecosystems are closely linked.

As we reflect on the theme for this year, the message is clear: investment in observation systems today is an investment in the safety and sustainability of tomorrow. Strengthening our capacity to observe, analyse, and communicate weather and climate information remains central to our mandate.

It is hoped that the insights shared in this newsletter will enhance understanding of the work being carried out and reinforce the importance of meteorological services in national development and climate resilience.

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**March 2026**

# MSD Commemorates the 2026 World Meteorological Day in Bulilima

## Matabeleland South

The World Meteorological Day is an annual event celebrated on March 23rd, commemorating the establishment of the World Meteorological Organization (WMO) in 1950, and it serves to highlight the vital contributions of meteorological and hydrological services to societal safety, sustainable development, and environmental protection. The theme announced by the WMO for World Meteorological Day 2026 was "Observing Today, Protecting Tomorrow" which emphasizes the critical importance of continuously and accurately monitoring our planet's weather, climate, and water systems, and using that essential data to build a safer, more resilient future for communities worldwide by improving our understanding of the planet and mitigating climate-related risks.

This year, the Meteorological Services Department of Zimbabwe held a joint celebration with the Forestry Commission for the combined commemoration of World Meteorological Day and the International Day of Forests, which took place in Bulilima District, Matabeleland South Province, on March 20th. This event aimed to highlight the deep interconnection between meteorology and forestry in building climate resilience, environmental sustainability, and disaster risk reduction. The combination of these two fields is particularly powerful for several reasons. Forests play a critical role in regulating local and global climates through biophysical processes that affect temperature, humidity, wind speed, and rainfall patterns.

Meteorological data and climate science are essential for sustainable forest management, helping guide decisions on species selection, planting schedules, fire risk monitoring, and long-term adaptation planning. Trees also modify micro-climates in ways that can protect crops and communities from extreme temperatures and maintain soil moisture, yet this effect is often overlooked in standard weather station data. Finally, healthy forests contribute to disaster risk reduction by stabilizing soils, regulating water flows, and reducing the impacts of floods and droughts, while accurate weather observations help predict and prepare for such events.



**Ambassador T. T. Chifamba Planting a Tree in Bulilima**



**Director Mrs. Manzou Talking to a Delegate at One of the Exhibition Booths**

# MSD Commemorates the 2026 World Meteorological Day in Bulilima Matabeleland South [Continued...]



*Ms. Muponda and Mr. Sizeni Manning the MSD Booth at the Joint World Met Day and the International Day of Forests*



# Forging Tomorrow's Civil Service: MSD's Bold Induction for Vision 2030

## **Praise Govere**

The Meteorological Services Department (MSD) has set the tone for excellence by inducting its newest officers through a dynamic five-day workshop facilitated by the Public Service Commission (PSC). Held at the department's headquarters in Belvedere, the program was more than just orientation.

It was a powerful initiation into the ethos of civil service, designed to sharpen minds and ignite purpose. With Vision 2030 as the guiding star, and the National Development Strategy 2 (NDS2) as the roadmap, the recruits were immersed in the fundamentals of governance, learning the intricate workings of government arms, the civil service hierarchy, grievance procedures, and the rights and privileges that come with public duty.

The training was deliberately crafted to instil discipline, professionalism, and a sense of national pride, ensuring that every new MSD worker steps into their role not just as an employee, but as a custodian of Zimbabwe's development agenda.

By equipping them with knowledge and resilience, the PSC has empowered these recruits to carry the weight of responsibility with confidence, ready to contribute to climate resilience, disaster preparedness, and sustainable growth. This induction was not a mere formality, it was a bold statement that the future of the civil service is in capable hands, and that MSD's new generation of professionals is prepared to deliver with integrity, innovation, and unwavering commitment to Vision 2030.



**MSD Officers Taking Notes During the Induction Workshop**

## MSD Holds the Second NACOF, and Reviews 2025/26 Seasonal Forecast

On 4 March 2026, the Meteorological Services Department of Zimbabwe (MSD) convened the second National Climate Outlook Forum (NACOF) to review the initial 2025/2026 seasonal rainfall forecast. The review followed Zimbabwe's participation in a regional seasonal assessment in Eswatini, conducted under the auspices of the Southern African Development Community (SADC). Outcomes from the regional meeting informed the national update.

### **Outlook Update**

**March 2026** : Normal to above-normal rainfall expected.

**April 2026** : Likely shift to normal to below-normal rainfall.

### **Stakeholder Engagement**

Partners including the United Nations Development Programme (UNDP), Zimbabwe Farmers Union, Zimbabwe National Water Authority (ZINWA), and the World Food Programme (WFP) participated, leveraging the updated forecast to guide sectoral planning and decision-making.



**Delegates Having Discussions During the NACOF**

# Day in The Life of a Meteorological Observer

## ***Praise Govere***

The life of a meteorological observer is one of discipline, precision, and routine. Each day is structured around internationally agreed observation times and standards, set by the World Meteorological Organization (WMO). These synoptic hours such as 08:00 hrs, 11:00 hrs. and 14:00 hrs are observed worldwide, ensuring that weather data collected in different regions can be compared and integrated into global forecasting systems. Ten minutes before the observation hour, the observer must already be at the station, preparing for the sequence of tasks. The first step is to read the cup anemometer, which provides an initial measure of wind speed. This is followed by visual observations: checking visibility, noting haze, fog, or mist, and identifying cloud cover. The observer must classify clouds by type and altitude, recording their distribution across the sky. In winter, ground thermometers are read early, and rainfall if present is measured five minutes before the hour.



***Mr. Govere Taking a Wind Speed Reading***

As the observation time approaches, a second cup anemometer reading is taken to confirm wind speed in knots. At stations equipped with barometers, atmospheric pressure is recorded exactly three minutes before the hour. Then, at the precise observation time, the Stevenson screen is opened. Inside, the dry and wet bulb thermometers are read to determine temperature and humidity. Maximum and minimum thermometers are checked immediately afterward, capturing extremes since the last observation. Rainfall and evaporation measurements are also part of the routine. The automatic rain gauge provides totals for the past 24 hours, while the evaporation pan indicates water loss, a key factor for agriculture and hydrology. These readings, combined with visibility checks, give a complete picture of the atmosphere. Visibility assessments are especially important, as they determine how far objects can be distinguished against their background, revealing whether haze or mist is interfering with accurate observation.



***Mr. Govere Taking an Evaporation Reading***

All these details, cloud type, wind speed, rainfall, pressure, visibility, are fed into the forecasting system. The observer's meticulous work ensures that forecasters have reliable data to predict storms, droughts, or clear skies. Though repetitive and often carried out in challenging conditions, the observer's role is vital. They are the silent sentinels of the atmosphere, translating the sky's behaviour into data that allows humanity to anticipate tomorrow's weather with confidence. Beyond the routine of instruments and timings, the meteorological observer's life is shaped by the environment in which they work. Observations are often carried out in extreme conditions, whether it is the biting cold of winter mornings, the heavy rains of tropical storms, or the blinding glare of summer heat. In each case, the observer must remain focused, ensuring that every reading is accurate despite discomfort or distraction. Their commitment is not just to science but to safety, as the data they collect can influence aviation decisions, agricultural planning, and disaster preparedness. The observer's resilience in the face of harsh weather underscores the importance of their role, they are not only measuring the atmosphere but also standing as its witness, ensuring that humanity can prepare for whatever the skies may bring.



***Mr. Govere Taking a Pressure Reading***

# Observing Today, Protecting Tomorrow: The Hidden System Behind Every Forecast

**Denford Sizeni**

The weather is everybody's business. It determines if you will grab your coat as you head out of your home in the morning, and it informs leaders of countries if their people are going to have to have a harvest and enough to eat. This influence extends through history in many fascinating instances. But to get weather on television or your smartphone, a long, complex, and expensive process would have been required to produce the high-quality forecast. At the most basic level, it involves observation of the current weather in numerous parts of the world. That information is subsequently processed by computers to give a meaningful synopsis of the weather around the world or a specific region, and further analysed to make a forecast of the weather. To give more attention and express appreciation for the work the observation team contribute to this work, the World Meteorological Organization (WMO) decided to have the 2026 World Meteorological Day (23 March) theme as "Observing Today, Protecting Tomorrow." But that is not all. As the Secretary General, Celeste Saulo made sure to detail in her statement that observing the weather involves a multitude of people. It involves meteorologists who release weather balloons twice a day, every day; satellite technicians who make sure our "eyes from above" stay awake, as well as computer engineers who crunch the numbers to make sense of the data and share it. It also includes citizen volunteers in different parts of the world who measure snow depth, rainfall and unusual weather sightings- information which greatly enriches the standard weather observations by national weather services across the world. This work is of untold importance because it protects the future. As our planet is now poised to breach the "safe" 1.5° C warming agreed by the Paris Climate Agreement in 2015, it is now more imperative than ever to be better able to foresee and be equipped to deal with flailing weather patterns that will soon come to stay. The world's economies, agricultural stability and sustainability of healthy biodiversity all depend on weather and climate. Protecting the future is hard work and is certainly not limited to professional weather observers. It demands more quality education in the domain of science, technology and mathematics (STEM), supporting and empowering fresh thinking from young people as well as embracing new technologies such as Artificial Intelligence, which is now emerging as a versatile tool in complementing the work of weather services. At any rate, whatever costs are taken to make the future of our planet more resilient, they are well worth it! But those hard efforts and costs must be taken today. In other words, that is this year's message on 23 March 2026 - what will you do today to protect the future of our planet and the people on it?

## Eland Oak Junior School Visits MSD for a Tour



**Mr. Mugadza Explaining How the Meteorological Instruments Work at the Instruments Site**

# March 2026 Seismic Activity in Zimbabwe

*Monalisa Muponda*

During the month of March 2026, a total of 38 seismic events were recorded. These events comprised 21 local, 12 regional, and 5 tele-seismic (distant) earthquakes.

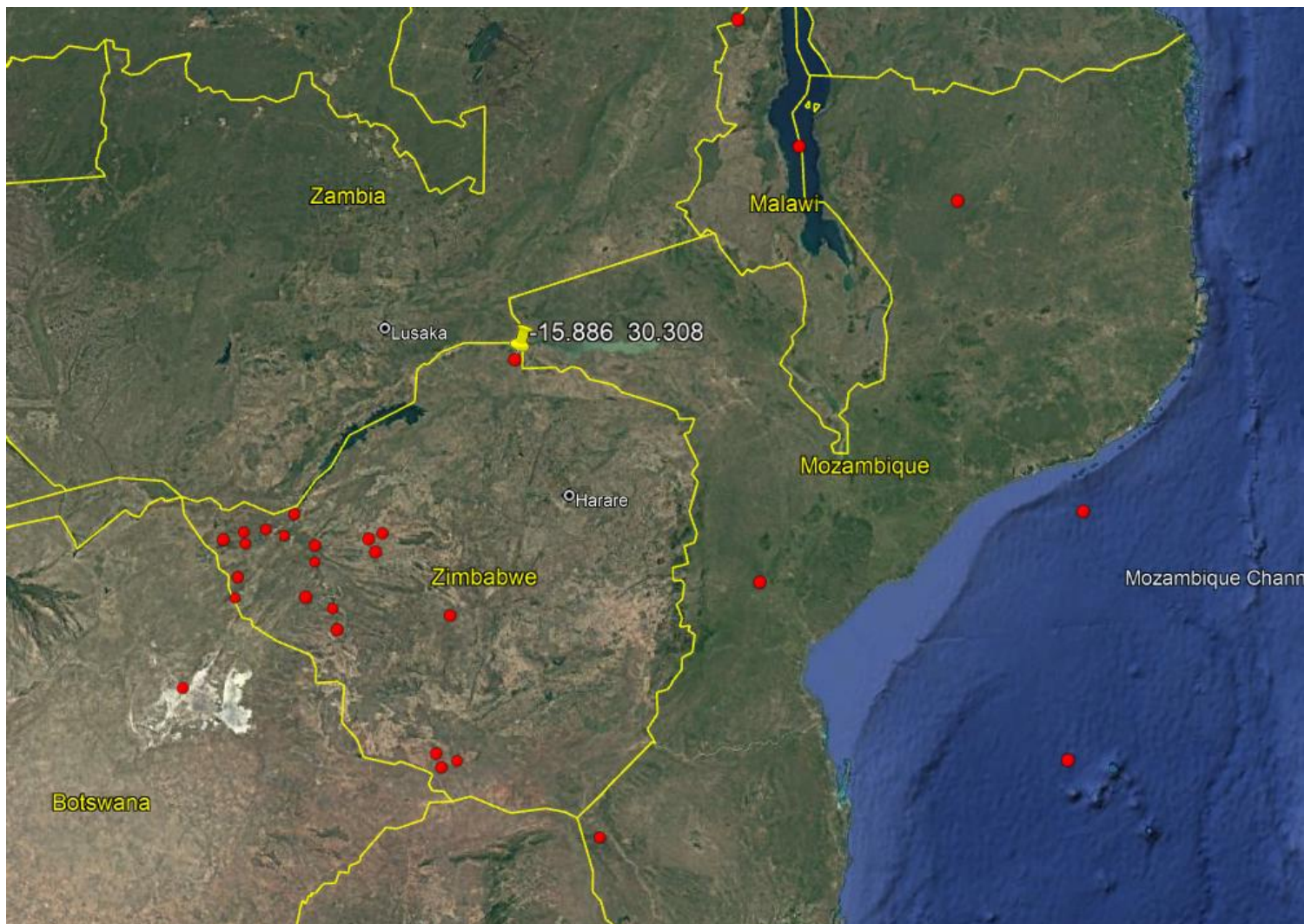
## Largest Recorded Event

The largest local earthquake recorded had a magnitude of 3.7ML, with its epicenter located in Chewore Safari Area. The region's location within a rift system, its fractured geological structure, and the effects of Lake Kariba all contribute to the seismic activity of the area.

## Local Seismicity Distribution

Most local seismic events were concentrated in Binga and Hwange, which lie within the Zambezi Basin. Seismic activity in this region is influenced by reservoir induced seismicity associated with Kariba Dam, as well as tectonic activity along the Deka Fault.

This seismically active zone extends from the northern extremity of Zimbabwe, trending in a southwesterly direction through Lake Kariba, Devil's Gorge, and along the Deka Fault toward the western border of the country. It remains the most seismically active region in Zimbabwe. Additional local seismicity was recorded in Gwanda. This area has some active faults which can cause earthquakes from time to time.



Map of events recorded in March 2026 (The epicenters are shown as red solid circles)

# The Ministry of Environment, Climate and Wildlife Enhances Institutional Knowledge through Intern Sensitization

**Edward J. Evans**

The Ministry of Environment, Climate and Wildlife conducted a full-day Sensitization and Induction Program for interns on 23 March 2026 at the Ministry Boardroom. The programme was designed to equip interns with a clear understanding of the Ministry's mandates, departmental roles, and national development priorities. It also highlighted the importance of youth participation in national development, while drawing attention to emerging areas such as climate finance, biodiversity credits and carbon markets, which are increasingly relevant to Zimbabwe's economic resilience. The induction was convened to familiarise interns with the Ministry's operational structure and strategic direction. Through a structured agenda, participants were introduced to the roles played by different departments and how these contribute to national development and climate governance. The programme brought together senior officials, technical experts and interns, creating a platform for knowledge sharing and interaction. The session began with a welcome and overview delivered by the Deputy Director for Communications and Advocacy, who outlined the objectives of the programme and provided context on national development achievements under the National Development Strategy 1. This set the stage for the day's discussions, which focused on aligning the work of the Ministry with broader national priorities.

In the opening remarks, the Chief Director emphasised the importance of understanding the Ministry's leadership structure and reiterated the role of young people in driving Zimbabwe's development. He highlighted existing employment opportunities within the Ministry, noting that the presence of interns reflected the institution's commitment to nurturing future professionals. The remarks underscored the expectation that interns would actively contribute to the Ministry's operations. A key presentation was delivered on the Meteorological Services Department, where its mandates, operational stations and core functions were outlined. The department's role in aviation services, training and early warning systems was highlighted, along with its collaboration with other departments such as Civil Protection and Climate Change Management. The importance of understanding both daily weather patterns and seasonal forecasts was emphasised as critical for effective decision making and disaster preparedness. It was also noted that efforts were underway to accredit the meteorological training school, which would strengthen national capacity in the field. The Climate Change Management Department presentation focused on the scientific and economic dimensions of climate change. It addressed the causes and impacts of

climate variability, particularly in relation to food security. The discussion extended to carbon markets and climate finance, identifying key funding mechanisms such as the Green Climate Fund and the Adaptation Fund. These were presented as important tools for supporting national adaptation and resilience initiatives.

Further insights were provided by the Forestry and Wildlife Resources Management Department, which outlined its role in conservation policy and implementation. Community-based initiatives such as CAMPFIRE were highlighted as effective models for sustainable resource management. The presentation also covered transboundary conservation efforts, particularly within the Kavango-Zambezi region, and introduced the concept of biodiversity credits as an emerging financing mechanism. Reference was made to international frameworks such as the Ramsar Convention and CITES, demonstrating Zimbabwe's commitment to global conservation standards. The session on Gender Mainstreaming, Inclusivity and Well-being addressed workplace wellbeing and safety. The establishment of the Occupational Health Management System was explained, with attention given to different categories of workplace hazards and the measures used to manage them. Emphasis was placed on inclusivity, particularly in relation to disability awareness. Interns were also encouraged to register on the Public Service Commission platform to improve their access to employment opportunities.

Overall, the induction programme provided a comprehensive overview of the Ministry's work and its contribution to national development. It strengthened interns' understanding of key thematic areas including meteorology, climate change, environmental management and institutional governance. The programme also reinforced the importance of youth involvement in addressing climate and environmental challenges. The session concluded with recommendations aimed at enhancing future training and engagement. These included the need for follow-up technical sessions, structured mentorship programmes, and practical exposure through field visits. The successful delivery of the induction programme demonstrated the Ministry's commitment to capacity building and to preparing interns to contribute effectively to national development and climate resilience efforts.

**The Ministry of Environment, Climate and Wildlife Enhances Institutional Knowledge through Intern Sensitization [Continued...]**



***MSD Interns Posing for a Photo at The Ministry Premises at the End of the Event***

# WORLD METEOROLOGICAL DAY

23 MARCH EVERY YEAR

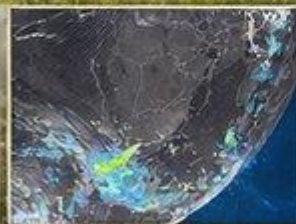
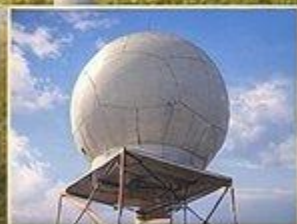
*Theme for 2026 -  
Observing today,  
protecting tomorrow*



METEOROLOGICAL  
SERVICES  
DEPARTMENT



MINISTRY OF ENVIRONMENT,  
CLIMATE AND WILDLIFE



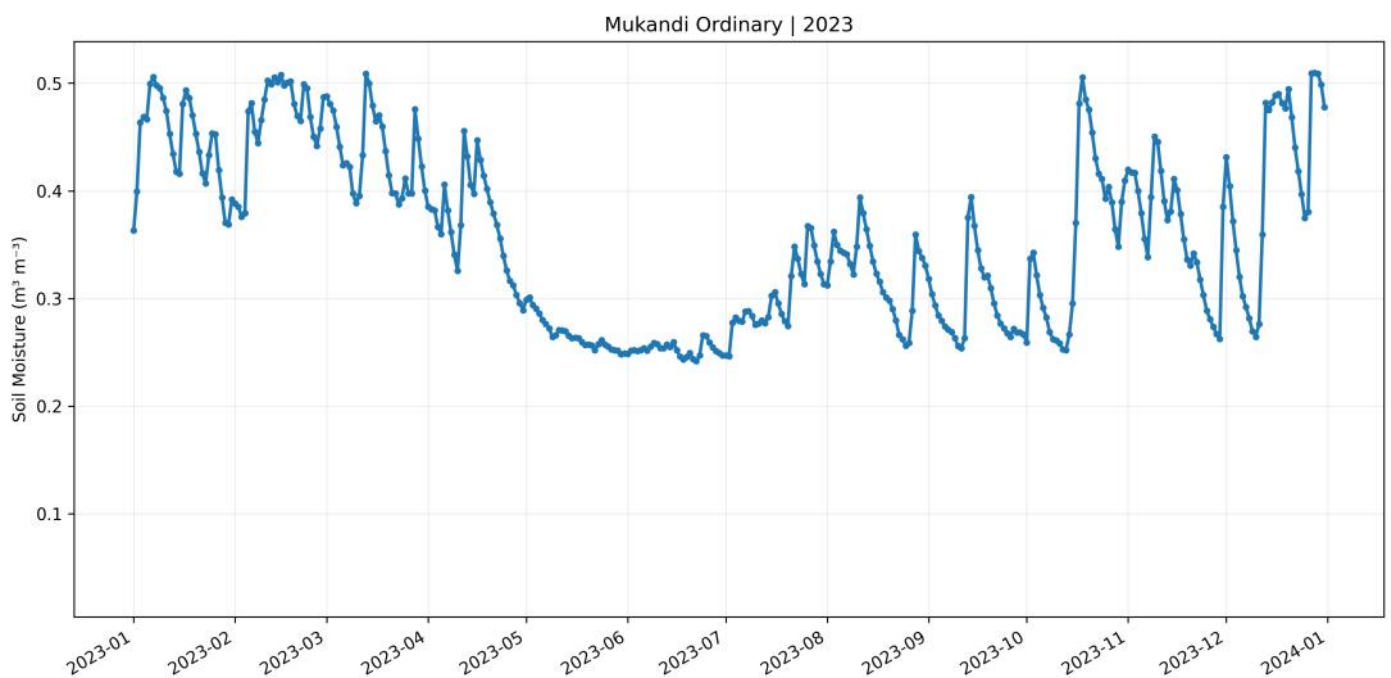
*Minimizing Risks Through Science*

# MSD Bridging Gaps in the Weather Observation Network Through Satellite Weather Data Bias Correction

**Tinetariro Chikati**

The Meteorological Services Department conducted an in house refresher training session to strengthen staff capacity in the use of satellite based climate datasets and associated analytical techniques. This initiative followed MSD’s earlier participation in two technical workshops held under the UNDP Green Climate Fund Satellite Product Development Project. While the consultant -led sessions introduced key methodologies, several practical challenges had been identified during implementation. These included limitations in internet connectivity affecting the download of large datasets, constraints associated with free cloud computing platforms when handling large-scale geospatial processing, and the need for additional practice on more advanced analytical procedures. It was also observed that not all relevant officers had attended the original workshops, creating gaps in technical knowledge across the team. To address these issues, the in house training was organised to ensure that all officers involved in the project had a consistent level of understanding. It also provided an opportunity for participants from the earlier workshops to reinforce their knowledge and improve practical application of the techniques. The training was held at MSD from 10 to 12 March 2026 and was structured around three key technical areas: satellite gridded data download, temperature bias correction, and rainfall bias correction. The first component of the training focused on accessing and downloading satellite-based climate datasets. Participants created accounts on the European Centre for Medium Range Weather Forecasts Climate Data Store, which provides open access to extensive global climate archives. Using this platform, participants downloaded several datasets relevant to climate analysis. These included daily volumetric soil water content data spanning 1981 to 2024, as well as multiple temperature datasets covering the same period. The temperature data included hourly observations, daily summaries, time series, and gridded products. In addition, participants obtained CHIRPS rainfall data, a widely used satellite-derived dataset that provides daily precipitation estimates over the same historical period.

The second part of the training focused on temperature bias correction. Participants applied bias correction techniques to the NASA POWER MERRA temperature dataset that had been downloaded earlier. This process was conducted using Python, with scripts that had been prepared to be accessible to users with varying levels of programming experience. The scripts required only minimal modification, primarily involving the adjustment of file paths to match local data storage locations. This approach enabled participants to focus on understanding the correction process itself rather than the complexities of programming. The final component of the training addressed rainfall bias correction. In contrast to the temperature correction workflow, which was carried out locally, rainfall bias correction was implemented using Google Earth Engine. This cloud-based platform allows users to process large volumes of satellite data without reliance on local computing resources. Participants were introduced to the Earth Engine environment and learned how to create and run scripts using its JavaScript based interface. The training covered the key steps involved in the workflow, including creating scripts within the code editor, uploading datasets as assets, executing bias correction procedures, and generating virtual gridded stations. Participants also learned how to export processed datasets for further analysis or use in operational applications. Overall, the training successfully addressed the gaps identified after the initial workshops and strengthened the technical capacity of MSD staff. By ensuring that all relevant officers were equipped with the necessary skills to access, process and analyse satellite-based climate data, the department improved its ability to implement project activities effectively. The refresher approach also reinforced practical understanding, which is essential for the sustained use of these tools in operational climate services.



**Soil Moisture Timeseries Product for Mukandi for the Year 2023**

# MSD Transitions to METEOSAT Third Generation and upgrades to PUMA 2025

The transition to the METEOSAT Third Generation system marked a significant advancement in satellite-based meteorological observation across Africa. Building on earlier programmes such as the Preparation for the Use of METEOSAT in Africa, the new system was designed to deliver more precise and timely weather data to support forecasting, climate monitoring and early warning services. The introduction of MTG brought improved temporal and spatial resolution, with image updates increasing from 15 minute intervals to 10 minutes and infrared resolution improving from 3 km to 1 km. These enhancements strengthened the capacity to detect and monitor extreme weather events, contributing to efforts aimed at safeguarding lives and livelihoods. As MTG gradually replaced the METEOSAT Second Generation system, which was scheduled for decommissioning by the end of 2026, it became clear that existing infrastructure such as PUMA 2015 would not be able to process the new data streams. This necessitated the implementation of PUMA 2025 to ensure continuity in meteorological services. The upgraded system was designed to support the visualization and processing of MTG satellite data alongside numerical weather prediction outputs and in situ observations. It also integrated with the ClimSA system, enabling forecasters and climate scientists to analyse current weather conditions in relation to historical climate data.

The need for operational readiness was further reinforced by the Strengthening Early Warning in Africa project, a continental initiative supported by EUMETSAT, ECMWF and the African Union. Running from 2025 to 2029, the programme aimed to enhance Africa's capacity to generate and deliver space-based data and services for early warning systems. Ensuring that PUMA 2025 was functional by early 2026 was therefore critical to meeting these objectives. During a training workshop held in Nairobi from 10 to 15 November, insights were gained into the installation and maintenance of PUMA systems. Interactions with other countries revealed that Zimbabwe had faced unique challenges in locking onto the satellite signal. In most cases, installations in other countries had been completed using existing antenna systems from PUMA 2015, requiring only minor component changes. The difficulties experienced locally were largely attributed to signal interference within the C band frequency range. Traditionally used for satellite communications, parts of this spectrum had been reallocated for 5G mobile broadband services. The proximity of these frequencies introduced interference risks, particularly where spatial separation between communication systems was limited. High power emissions from 5G base stations were identified as a potential source of signal degradation.

The installation of the PUMA 2025 workstation involved both hardware setup and system configuration. The indoor components, which included monitors, dual computers, a satellite receiver, a KVM switch and various power management devices, were unpacked and mounted onto racks. The system was structured into two main subsystems. The switching subsystem handled data flow and communication between devices, while the energy subsystem ensured stable and continuous power supply. Within the switching subsystem, the KVM switch enabled control of two computers using a single monitor, while the satellite receiver facilitated signal acquisition from the antenna. Data distribution across the system was managed through a network switch. All connections within this subsystem were successfully completed. The energy subsystem was then established, integrating grid power with backup solutions such as uninterruptible power supplies, an inverter, battery systems and automatic transfer switches. This configuration ensured resilience against power outages, with the long-term UPS providing extended operation during prolonged interruptions. Once the indoor setup was completed, the system was powered on and initial access was achieved. With remote support from Technavia, connectivity issues were resolved, and system configurations were adjusted to align with local network settings. This enabled remote access to the station, confirming successful integration into the broader operational framework.

Attention then shifted to the outdoor components, including the satellite dish, feed, low-noise block converter and filter. Existing cabling from the previous installation was tested and found to be in good condition. Signal strength was initially measured and deemed acceptable, although some attenuation was observed when using a splitter. To address this, the team opted for a direct connection to the receiver. Installation of a new LNB further improved signal quality, and reception was confirmed as satisfactory by the support team. Final steps involved system configuration and user account setup. Local user accounts were created with appropriate access levels, while remote access accounts were prepared pending activation of two-factor authentication. This security measure was implemented to enhance system protection. Administrative accounts were established for both local and remote operations, and a request was submitted for EUMETCAST licensing to enable full data access. The installation process concluded successfully, with the station fully operational and capable of receiving satellite data. While performance was already satisfactory, further improvements were identified, including the potential installation of a line amplifier or upgraded cabling to

# A Paradigm Shift in Meteorological Instrumentation: Observing Today, Protecting Tomorrow

**Tinetariro Chikati**

The evolution of meteorological instrumentation reflects a broader transformation in how weather and climate are observed, understood, and applied in decision making. This shift, from manual and mercury based instruments to automated, digital, and networked systems, aligns directly with the theme of World Meteorological Day 2026, “*Observing Today, Protecting Tomorrow.*” This theme underscores the critical role of modern observation systems in safeguarding lives, supporting development, and strengthening climate resilience. At the core of this transformation is temperature measurement, which has moved away from traditional liquid in glass thermometers toward electronic sensors such as thermistors and resistance temperature detectors. These modern instruments enable continuous, high frequency data collection and eliminate the need for manual observation. Integrated within Automated Weather Stations (AWS), they provide real time data transmission, significantly improving both temporal resolution and spatial coverage. This transition not only enhances accuracy but also supports advanced forecasting systems that rely on continuous streams of data.



**Liquid in glass thermometers in a Stevenson's screen (left)**



**Digital thermometers in a Stevenson's screen (right)**

Rainfall measurement has undergone a similar transition. Manual rain gauges, once the standard, are increasingly replaced by tipping bucket, weighing, and optical gauges capable of recording rainfall intensity and duration in real time. These instruments are often linked to telemetry systems, enabling immediate data access for operational forecasting and early warning. Beyond ground based observations, satellite and radar technologies now provide spatially continuous precipitation estimates, filling observational gaps and strengthening hydrometeorological analysis. Such developments reflect the growing importance of integrated observing systems in modern meteorology.



**Manual Rain Gauge (left)**



**Automatic Tipping Bucket Gauge (right)**

# A Paradigm Shift in Meteorological Instrumentation: Observing Today, Protecting Tomorrow [Continued...]

Atmospheric pressure measurement has also shifted significantly, particularly due to environmental concerns. Mercury barometers, long valued for their precision, are being phased out and replaced by digital barometers using capacitive or piezoresistive sensors. These modern instruments are compact, safer, and easily integrated into automated systems, offering continuous digital output that is essential for high-resolution forecasting. The transition is strongly influenced by global environmental policy, particularly the Minamata Convention on Mercury, which mandates the phase-out of many mercury-containing devices to reduce environmental and health risks.

Wind measurement technologies have advanced from mechanical cup anemometers and wind vanes to sophisticated ultrasonic and remote sensing systems. Sonic anemometers, which measure wind using sound waves, eliminate moving parts and reduce maintenance requirements while improving accuracy. In addition, technologies such as LiDAR now allow for vertical wind profiling, providing detailed insights into atmospheric dynamics that were previously difficult to capture. These innovations are critical for applications ranging from aviation safety to renewable energy planning.



**Traditional Cup Anemometer (left)**



**Ultrasonic Anemometer (right)**

Collectively, these changes represent more than incremental improvement; they signal a fundamental paradigm shift in meteorological observation. Modern systems are increasingly automated, interconnected, and data-driven, forming part of a global observing network that includes satellites, weather stations, ocean buoys, and atmospheric sensors. This network underpins weather forecasts, climate monitoring, and early warning systems, all of which depend on accurate and timely observations.

The theme “*Observing Today, Protecting Tomorrow*” encapsulates this transformation by emphasizing the link between present-day observations and future resilience. Continuous monitoring of temperature, rainfall, pressure, and wind enables meteorological services to anticipate hazards, inform policy, and support sectors such as agriculture, water management, and disaster risk reduction. As climate variability intensifies, the need for reliable, real-time data becomes even more critical.

In this context, the shift away from mercury-based instruments is not only an environmental necessity but also part of a broader modernization agenda. Safer, digital technologies align with global efforts to enhance observation networks while minimizing ecological impact. The result is a more robust, efficient, and sustainable meteorological system capable of meeting the demands of a changing climate. The paradigm shift in instrumentation, therefore, is both technological and strategic. It reflects a move toward smarter observation systems that do not merely record weather but actively contribute to protecting lives, supporting economies, and building resilience for future generations.

26.16°E

28.17°E

30.18°E

32.19°E



16.10°S

16.10°S

18.11°S

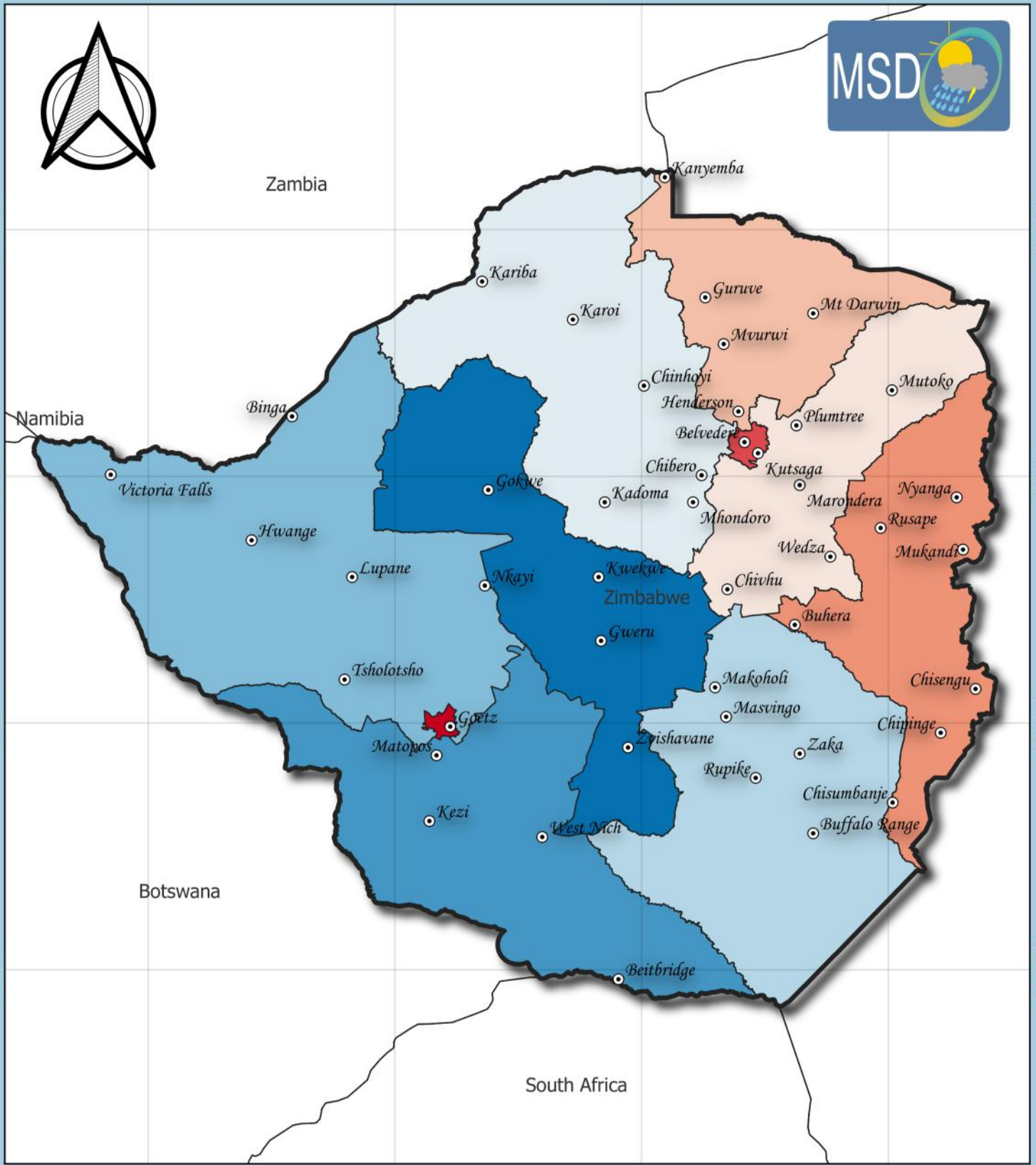
18.11°S

20.12°S

20.12°S

22.13°S

22.13°S



### Legend

⊙ Stations

Zimbabwe

#### Provinces

- |              |                  |                    |
|--------------|------------------|--------------------|
| Manicaland   | Mashonaland West | Matabeleland South |
| Mash Central | Mashonaland East | Midlands           |
| Harare       | Mash East        | Matabeleland North |



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](http://www.weatherzw.org.zw)

**Minimizing Risk Through Science**