DATA SHARING

in the African, Caribbean, and Pacific (ACP) Group of States

WORLD METEOROLOGICAL ORGANIZATION

ClimSA

INTRA-ACP CLIMATE SERVICES AND RELATED APPLICATIONS PROGRAMME

An initiative of the Organisation of African, Caribbean and Pacific States funded by the European Union

WEATHER CLIMATE WATER

Under the EU-funded Intra-ACP Climate Services and Related Application (ClimSA) Programme, the World Meteorological Organization (WMO) supports regional partners in the African, Caribbean and Pacific (ACP) Group of States in implementing the climate services value chain in five priority sectors. A key WMO focus includes strengthening observations, data rescue, use of datasets and model comparisons.

This brochure highlights work being led by WMO under its ClimSA grant to advocate for and support data sharing.

The need for regional meteorological data

Historical climate data are a fundamental resource. These data contribute to monitoring and evaluating the impact of climate change across sectors, to understanding climate trends and extremes and to helping guide critical adaptation measures. While global climate trends can already be assessed with available data, regional data disparities result in blind-spots for localized climate change assessments and services—particularly for vulnerable areas that are most in need.

To improve adaptation plans, vulnerability assessments, or criteria for new infrastructure, information is needed at local, national, and regional levels on climate trends and high-impact extremes such as droughts, heat waves, and floods. These extremes often span country borders, highlighting the need for coordinated sharing of high-quality, regularly updated, long-term data series of meteorological variables at the regional level. By making such data publicly available, governmental bodies, private companies, and research communities can use them (along with other relevant data), enhancing local and regional knowledge.

WMO Regional Climate Centres (RCCs) are well-positioned to support the sharing of regional climate data in collaboration with their member National Meteorological and Hydrological Services (NMHSs). As part of its effort to ensure RCCs have operational access to existing climate information produced at the national level, ClimSA is working to strengthen the collaboration between NMHSs and RCCs. One of the key outputs thus far is the Data-sharing Rationale, which highlights concrete examples of the benefits of improved data sharing between NMHSs and RCCs, including:

- **More data** to guide National Adaptation Plans
- **Improved services** like early warnings and weather forecasts
- **Strengthened assessments** of model skills and bias
- **Better calibration** of retrieval algorithms
- **Opportunities for data rescue** through digitalization and quality control
- **Enhanced cooperation** without losing data ownership or control

Data-sharing landscape

In 2021, WMO approved the Unified Data Policy and the Global Basic Observing Network (GBON) to systematically increase observational data and data products from across the globe. However, despite the demonstrated benefits and need for improved climate data sharing at the regional level, large gaps in data quality, management and sharing in the ACP regions remain. Among the challenges facing data providers is the sheer complexity of the climate data landscape.

As seen in Figure 1, data collected from automatic or manual weather stations travel through NMHSs, to Regional Telecommunications Hubs (RTHs) through to the Global Telecommunications System (GTS) or RCCs. This process can lead to technical errors, missing variables, and confusion on how data policies can be maintained. To address these challenges, ClimSA activities focus on providing support and assistance for improving data availability issues, improving international data exchange, assisting in data rescue, and ensuring the sustainability of observational data in ClimSA focus countries.

New players in climate data

Where NMHSs have historically been the primary providers of climate data, increased interest in and need for meteorological data by, among others, the private energy sector, citizen science groups and research institutes, has led to the expansion of meteorological monitoring stations. For example, CoCoRaHS is a non-profit, community-based network of volunteers measuring and mapping precipitation. Similarly, the Weather Observations Website (WOW) is a platform for international voluntary weather observations, impacts and photos.

Today, these groups are adding to the complexity of the current data landscape. It is therefore a crucial time to strengthen collaboration between NHMSs, RCCs and these groups to strive for improved data quality and management.

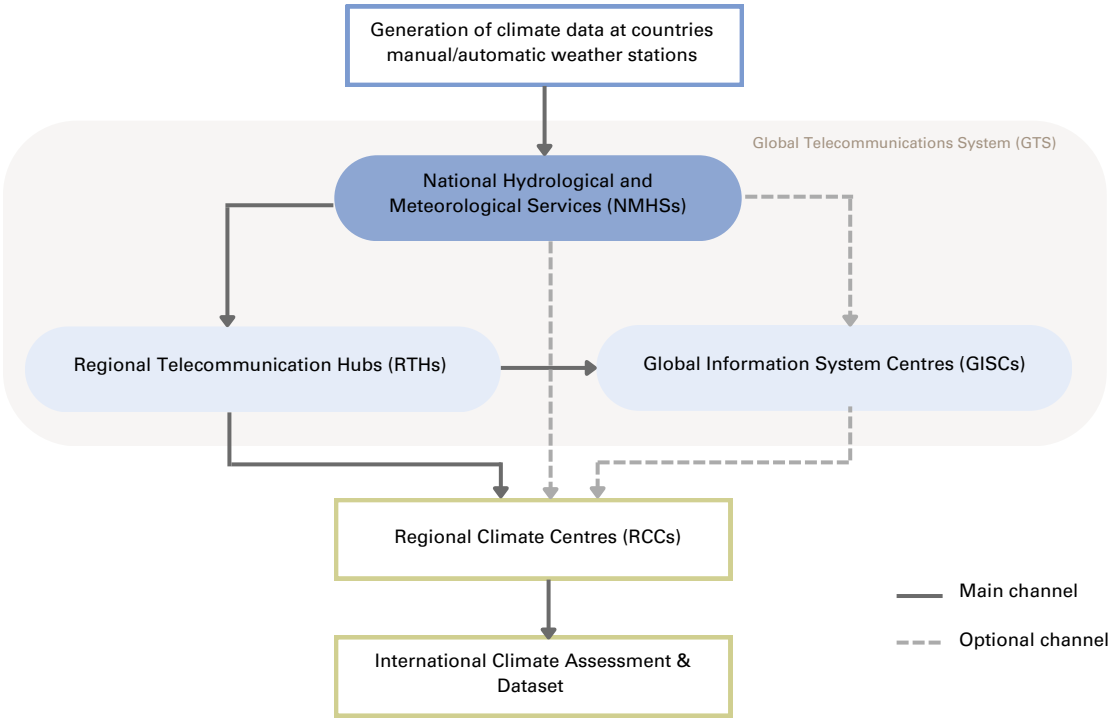


Figure 1. Data flows from national to regional and international

Common challenges in data sharing

Observations: Lack of resources, instrument/transmission system failures, interrupted or stopped station operations, quality control issues, lack of proper operation and maintenance activities.

Communication: Incomplete messages with missing variables, lack of data-management systems, system/medium issues (unstable internet, bad GSM coverage).

Exchange: Insufficient technical infrastructure, lack of human capacity, incompatible data formats, out of date data-exchange configuration within GTS, national data-exchange policies.

ClimSA support: providing technical guidance

Receiving technical guidance and assistance through ClimSA on improving infrastructure can be a catalyst for NMHSs to improve data exchange. For example, prior to a ClimSA-supported site visit to Burkina Faso in October 2022, the WIGOS Data Quality Monitoring System (WDQMS) web tool indicated several availability and quality problems associated with reporting stations, as represented by the black dots seen in Figure 2 (below). The Burkina Faso NMHS had included in WDQMS many stations that only exchange data nationally while WDQMS shows the reporting status of stations intended for international data exchange.

In cooperation with the Regional WIGOS Centre (RWC) Casablanca and Global Information System Centre (GISC) Casablanca, support for WIGOS and WIS implementation was provided—identifying and solving metadata and quality issues, providing guidance on international data exchange, and providing hands-on training, amongst other activities. As a result, nine stations intended for international exchange increased messages from eight to 24 per day, the metadata for 252 stations was updated in OSCAR/Surface and 11 stations were nominated as GBON stations.

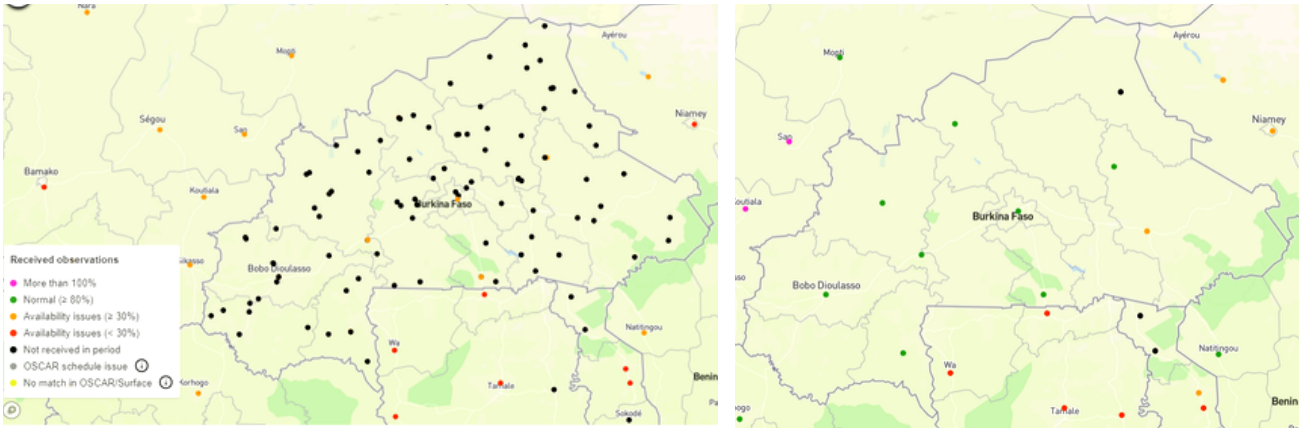


Figure 2. Quality Monitoring Results of Burkina Faso in May 2022 (left) and March 2023 (right). Black dots represent problematic reporting at international level and green dots represent correct reporting at international level.

ClimSA support: improving access to climate data

Beyond providing technical assistance at the national level, ClimSA is also contributing to improving access to climate data. The WMO Information System 2.0 (WIS 2.0), intended to be the successor to GTS, is one example of improving data flows from the national to global level. ClimSA is supporting WIS 2.0 activities by assessing the existing capacities of the focus countries and RCCs for international data exchange and helping implement the WIS2-in-a-box project, including IT infrastructure, installation, and training, in collaboration with relevant GISCs. Additionally, ClimSA is improving data access by a wider audience through the implementation of the International Climate Assessment and Dataset (ICA&D) in focus countries.

ClimSA support: international climate assessment and dataset (ICA&D)

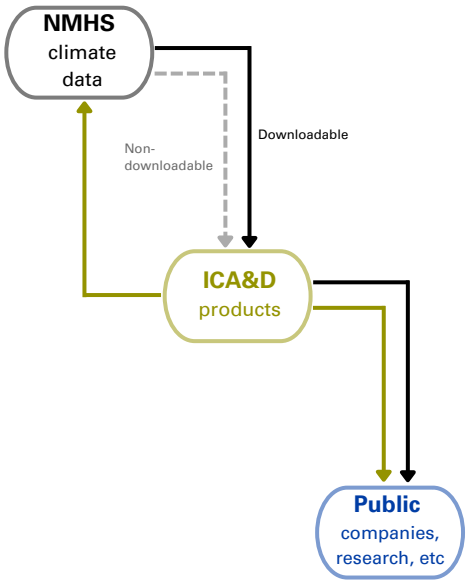
ICA&D is a web-based climate information system that is maintained in RCCs and is connected to a meteorological observational database for gathering, archiving, and disseminating climate data. ICA&D uses validated daily precipitation and temperature series collected from multiple NMHSs to generate a variety of derived information products for use in climate monitoring and services. For instance, using daily station temperature data, ICA&D produces heat stress indices, useful for human health policymakers and researchers alike. Datasets can also be combined to formulate other sector-specific indices. For example, the agricultural sector benefits from indices related to precipitation to determine the start of the monsoon and possible shifts over time.

The ICA&D system was created following the success of the European Climate Assessment & Dataset (ECA&D) system. Established in 1998, ECA&D has grown to receive data from 81 participants for 65 countries, with approximately 10 000 website visits per month and 1 700 academic citations per year. Following implementation of ICA&D in Southeast Asia, called SACA&D, ClimSA is facilitating the installation of ICA&D in each RCC in the ACP, and has thus far implemented ICA&D systems in the RCCs that serve the Caribbean and West Africa, with plans in place for Central, Eastern and Southern Africa, the Pacific and Indian Oceans.

Photo: Sprouts in a field

Benefits

- ✓ **Saves time** with up-to-date climate information over a large region available without having to contact individual meteorological services.
- ✓ **Provides more robust analyses** than national datasets alone, as many climate extremes do not respect national borders.
- ✓ **Facilitates data quality control & data rescue** as historical data is safely stored and quality controlled.
- ✓ **Enables knowledge transfer** through an e-learning platform for public, RCC staff and eventually decision-makers.



Daily temperature and precipitation data from the Global Historical Climatology Network (GHCNd) was added to ICA&D for demonstration purposes. However, to analyze the latest climate trends, regional cooperation between NMHSs and RCCs is essential for the ICA&D system to be updated with the latest climate data. A key example comes from the Caribbean Institute for Meteorology and Hydrology (CIMH), where they are presently exploring how best to add time series data to the climate database.

ICA&D uses historical data to analyze longer climate trends. Providing data to ICA&D can therefore be useful for focus countries prioritizing rescuing old climate archives and digitizing them into digital databases. ClimSA provides a platform for collaboration with many beneficiary countries to accelerate the rescue and digitization of historical climate archives. The WMO international Data Rescue initiative (I-DARE) and the Copernicus Climate Change Service (C3S) Data Rescue Service collaborate with ClimSA, CREWS and several international partners and agencies on projects worldwide. More information on data rescue projects, guidance and tools can be found at the I-DARE portal.

Photo: Thunderstorm over a farm in Highveld, South Africa

Ensuring compliance with data policies

Climate data is a valuable national resource. The ICA&D system ensures that observational data from National Meteorological and Hydrological Services (NMHSs) intended to have restricted access cannot be accessed by the public. Only observational temperature and precipitation data to which providers have given permission for public access will be "Downloadable".

As such, NMHSs and users from the public can benefit from derived products such as climate indices without compromising the security or value of their data. Concrete examples of how this is achieved can be found in Annex 1 of the Data-sharing Rationale.

Conclusion

Improving data sharing at the regional level is critically important for improving climate services. ClimSA is taking strides to improve it by informing key stakeholders on the importance of climate data sharing, providing technical assistance, and establishing web-based climate information systems. Each of these activities requires collaboration from NMHSs and RCCs to ensure success. RCCs are encouraged to work with NMHSs' directors in the ACP sub-regions to commit to sharing climate data, and to sign a joint declaration to make sub-regional meteorological data available for RCC operations.

WMO will continue to provide guidance and assistance to the focus countries for sustainable observations within the scope of ClimSA by implementing WIGOS and WIS. This guidance includes developing national plans for sustainable observations, solving availability and quality issues of observational data exchange, improving the international data exchange capacities of focus countries, and supporting improvement of cooperation among relevant agencies led by NMHSs.

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