COUNTRY HYDROMET DIAGNOSTICS

Informing policy and investment decisions for high-quality weather forecasts, early warning systems, and climate information in developing countries.

September, 2024

Dominican Republic Peer Review Report

Reviewing Agency: Agencia Estatal de Meteorología - AEMET

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Fecha: 2024.10.28 08:42:27 +01'00'

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Authorisation for release of this report has been received from AEMET and ONAMET as of April, 2024.

Disclaimer

Acknowledgements

Special thanks to Ing. Gloria Ceballos, Director ONAMET, Ing. Miguel Campusano, Deputy Director ONAMET and their staff, for their invaluable cooperation during the reporting process. Also to the World Meteorological Organization (WMO) headquarters for providing the technical guidance and the necessary documents.

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List of Acronym

AEMET	Agencia Estatal de Meteorología- State Meteorological Agency
ANAMAR	Autoridad Nacional de Asuntos Marítimos- National Authority for Maritime Affairs
AWS	Automatic Weather Stations
IDB	Inter-American Development Bank
BIP-M	Basic Instruction Package-Meteorologist
BSC	Barcelona Supercomputing Center
CAEI	Consorcio Azucarero de Empresas Industriales- Sugar Consortium of Industrial Companies
CAP	Common Alerting Protocol
CDSF	Capacity Development Support Facility
CHD	Country Hydromet Diagnostics
CIMHET	Conferencia de los SMHN Iberoamericanos-Iberoamerican NMHSs Conference
CNCCMDL	Consejo Nacional para el Cambio Climatico y Mecanismo de Desarrollo Limpio- National Council for Climate Change and Clean Development Mechanism
CNE	Comisión Nacional de Emergencias- National Emergency Commission
CN-PMR	Comité Nacional de Prevención, Mitigación y Respuesta- National Committee for Prevention, Mitigation and Response
COE	Centro de Operaciones de Emergencias- Emergency Operations Center
COPRE	Comité de Operación de Presas y Embalses- Dams and Reservoirs Operation Committee
CNS	Centro Nacional de Sismología- National Center for Seismology
CPN	Centro de Pronostico Nacional- National Forecast Center
CR	Central Romana
ECMWF	European Centre for Medium-Range Weather Forecasts
EGEHaina	Empresa de Generación Eléctrica Haina- Haina Power Generation Company
EGEHID	Empresa de Generación Hidroeléctrica Dominicana- Dominican Hydroelectric Generation Company
EWS	Early Warning System
FDC	Fundación Dominicana de Ciegos-Dominican Foundation for Blind
GBON	Global Basic Observing Network
GFS	Global Forecast System
GHG	Greenhouse Gases
GTS	Global Telecommunication System
IDB	Interamerican Development Bank
ICAO	International Civil Aviation Organization
IDAC	Instituto Dominicano de Aviación Civil- Dominican Institute of Civil Aviation
IDIAF	Instituto Dominicano de Investigaciones Agropecuarias y Forestales- Dominican Institute of Agricultural and Forestry Research
INDOCAFE	Instituto Dominicano del Café- Dominican Coffee Institute
INDRHI	Instituto Nacional de Recursos Hidraúlicos- National Institute of Water Resources
INTEC	Instituto Tecnológico de Santo Domingo-Santo Domingo Technological Institute
ITZC	Inter Tropical Convergence Zone
JAD	Junta Agroempresarial Dominicana-Dominican Agroenterprise Board
MARENA	Ministerio de Medio Ambiente- Ministry of the Environment
MAP	Ministerio de Administración Pública- Ministry of Public Administration
MEPyD	Ministerio de Economía, Planificación y Desarrollo- Ministry of Economy, Planning and Development
NOAA	National Oceanic and Atmospheric Administration

OAI	Oficina de Libre Acceso a la Información- Office of Open Access to Information
OGTIC	Oficina Gubernamental de Tecnologías de la Información y Comunicación- Government Office of Information and Communication Technology
ONAMET	Oficina Nacional de Meteorología-National Meteorological Office
ONE	Oficina Nacional de Estadística- National Statistical Office
PUCMM	Pontificia Universidad Católica Madre y Maestra- Pontifical Catholic University Mother and Teacher
QMS	Quality Management System
SGN	Servicio Geológico Nacional-National Geological Service
SINI	Sistema Integrado Nacional de Información- National Integrated Information System
SN-PMR	Sistema Nacional para la Prevención, Mitigación y Respuesta ante Desastres- National System for Disaster Prevention, Mitigation and Response
SOFF	Systematic Observations Financing Facility
SOP	Standard Operating Procedure
WFP	World Food Programme
WIGOS	WMO Integrated Global Observing System
WIS	WMO Information System
WMO	World Meteorological Organization

Executive Summary

The Country Hydromet Diagnostic (CHD) was conducted as part of the planned activities for the development of the "Systematic Observations Financing Facility" (SOFF) initiative in Dominican Republic. The purpose of the report is to assess the Meteorological National Office (ONAMET) through a peer review, evaluating the 10 elements outlined in the CHD methodology. The assessment provides a maturity level for each element and offers recommendations for enhancing maturity levels.

ONAMET is a key institution for the provision of meteorological and climate services in the Dominican Republic. It is integrated into the National System for Disaster Prevention, Mitigation and Response and is also the institution responsible for the provision of meteorological services for aviation.

The current administrative structure of ONAMET implies serious difficulties in accessing funds that allow for the proper maintenance of its services. The process currently underway to modify its structure can be a very significant element in improving its functionality.

One element that hinders the development of adequate climate services is the lack of qualified personnel, especially meteorologists. Also noteworthy is the problem caused by the lack of personnel with the appropriate professional qualifications for the provision of aeronautical meteorological forecasting services, most of whom are not qualified as meteorologists according to the WMO definition.

The network of automatic stations of ONAMET is based on donations received from different projects. One of its main problems is its sustainability, mainly due to the lack of staff and spare parts.

The following figure and table present the maturity levels of ONAMET based on the CHD methodology:

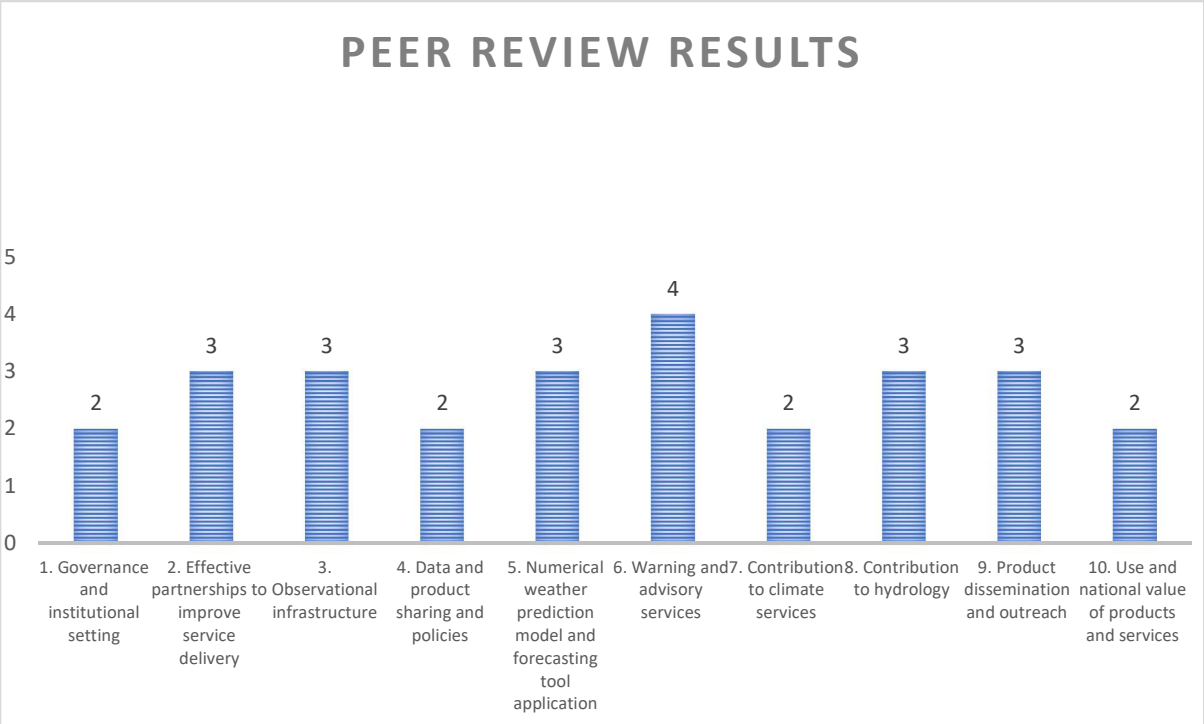

Figure 1: Peer Review Results of the Ten (10) Critical Elements

Element	Maturity level score
1. Governance and institutional setting	2
2. Effective partnerships to improve service delivery	3
3. Observational infrastructure	3
4. Data and product sharing and policies	2
5. Numerical weather prediction model and forecasting tool application	3
6. Warning and advisory services	4
7. Contribution to climate services	2
8. Contribution to hydrology	3
9. Product dissemination and outreach	3
10. Use and national value of products and services	2

Table 1: Peer Review Results of the Ten (10) Critical Elements

The main recommendations to raise or maintain the level of maturity of each of the elements are the following:

Element	Recommendations
Element 1. Governance and Institutional Settings	• Complete the process of transforming ONAMET into a Meteorological Institute, trying to have its administrative dependency in a ministry with a clear cross-cutting component, such as the Ministry of the Presidency. • Increase the number of personnel qualified as meteorologists to provide aeronautical meteorology services. Propose a training course according to the BIP-M similar to the one provided by AEMET within the framework of CIMHET but exclusively for ONAMET staff. • Establish policies that allow for the availability of research staff in the institution. • Implement the developing Strategic Plan as soon as possible • Establish a policy to try to recover aeronautical costs that have a direct repercussion on the institution
Element 2. Effective Partnerships to Improve Service delivery	• Complete the transformation currently in parliamentary processing, into a Meteorological Institute, which may give it a greater capacity to lead international cooperation projects and access to the corresponding funds • Establish a research and development unit in the institution, with adequately trained personnel • Establish partnerships with the private sector, especially with institutions with observation networks

Element 3. Observation Infrastructure	• To automatize the 15 stations of the synoptic network • Implement a calibration laboratory or establish agreements with other NMHS in the region that have these facilities for their use, as the INSMET of Cuba. • Establish a plan for the maintenance and calibration of the stations, having mobile calibration semi-standards at least for temperature, pressure and relative humidity, which allow to ensure the quality of the data of the stations and that can be routinely checked with the NOAA calibrated equipment available at the Santo Domingo sounding station. • Strengthen the unit responsible for the maintenance and repair of equipment, ensuring the availability of personnel • Train the staff of the synoptic and aeronautical observatories for the maintenance of the equipment in the first step. • Locate servers in an isolated room with adequate cooling • Consolidate the agreement with NOAA to continue the operation of the Santo Domingo upper air station • Recover, as far as possible, automatic stations that have stopped working • Changing AWS communications systems to means of interacting with stations • Use the CIMHET horizontal cooperation mechanism to exchange experts related to equipment calibration and maintenance. • Increase OSCAR/Surface trained staff • Establish agreements with private institutions to support the installation and maintenance of weather stations
Element 4 Data and Product Sharing and Policies	• Adapt at least 5 surface stations to meet GBON requirements, including them in the National GBON Contribution Plan. Incorporate the Santo Domingo upper air station into GBON. • Start the migration process to the WIS2.0 system, acquiring a server for specific use. Take advantage of the possibility of using horizontal cooperation mechanism of CIMHET to train ONAMET technicians by displacing experts from other Ibero-American NMHSs that have already completed the process, such as INSMET in Cuba. • Develop a National WIGOS Implementation Plan to systematize the current data exchange between institutions operating meteorological and hydrological networks • Implement the Geonetcast system to receive information from different meteorological satellites.

Element 5. Numerical Model and Forecasting applications	• Implement a research unit, to develop tools in order to improve the use of available information for operational purposes. • Initiate a process to implement probabilistic forecasts, especially for weather warnings. • Take advantage of the horizontal cooperation mechanism of CIMHET for the exchange of experts in numerical modelling and in the use and interpretation of forecasting models. • Increase radar coverage in the Dominican Republic, with the installation of a new radar in the NW of the country and through the repair or replacement of the radar installed at the ONAMET headquarters, or, if IDAC installs a radar at Las Américas airport, through a data use agreement.
Element 6 Early warning and advisory services	• Establish a alert system by levels, that takes into account thresholds and possible impacts, involving other institutions such as Civil Defense or INDRHI. • Systematize the way of receiving and processing the feedback information provided by society through social networks. • Establish a procedure for evaluating the reliability and timeliness of the warnings issued. • Digitize the alert and forecast bulletins, currently available on paper • Include more events in advisories, such as flash floods, wildfires, air quality, or UV radiation • Implementing the CAP • Take advantage of the horizontal cooperation mechanism of the CIMHET for expert assistance on issues related to the implementation of the CAP, impact based forecasting, and the inclusion of warnings of other phenomena.
Element 7 Contribution to Climate Services	• Develop governance systems for coordination in service delivery • Disseminate climate information in digital form, in formats that are useful for the systems used by the different sectors of users. Implement the information dissemination process through the MCH system • Analyze the information provided by users in surveys. Establish indicators that allow the socio-economic benefits of the services provided to be assessed, in collaboration with the different sectors of users • Establish mechanisms to train technicians from different institutions in the use and interpretation of the services provided. • Continue with the process of digitising climate information, with clear deadlines and milestones in its development • Promote the implementation of the project Generation and management of hydrometeorological data and climate change scenarios Dominican Republic

Element 8 Contribution to Hydrology	• Develop an SOP between ONAMET and INDRHI that allows systematizing the collaboration between both institutions • Work together with ONAMET and INDRHI for the development of operational products related to hydrological monitoring and forecasting • Support ONAMET and INDRHI the development of the project "Generation and management of hydrometeorological data and climate change scenarios in the Dominican Republic"”
Element 9 Product dissemination and outreach	• Establish agreements with OGTIC that allow greater functionality on the ONAMET website to allow more information to be disseminated in a more accessible way for users. • Train forecasters in communication techniques. • Develop an App for mobile telephony, if possible taking advantage of the experience of other analogue NMHSs that already have them operational, through the exchange of experts promoted by CIMHET • Develop a system of meteorological warnings by levels that allows society to quickly and easily assess the risk • Design formats for presenting weather information on social networks that are attractive to young people
Element 10 Use of National Products and values	• To carry out studies on the socio-economic benefits of the products supplied by ONAMET. To do this, it can draw on the experience available at WMO and CIMHET. • To qualify aeronautical forecasters as meteorologists. To this end, take advantage of the opportunity presented by the training course according to the BIP-M provided by AEMET, both within the CIMHET training plan and through an ad hoc edition for ONAMET. • Establish a protocol with the IDAC to receive feedback from aircraft on phenomena such as shear, turbulence, or icing. • Systematically carry out user satisfaction surveys following the procedures implemented by the MAP • Complete the implementation of the QMS according to the ISO 9000:2015 standard in the aeronautical field and initiate the process to implement it in the rest of ONAMET's areas, especially in those related to observation and early warning services.

Chapter 1: General information

Introduction

The Dominican Republic occupies two-thirds of the eastern area of the island of Hispaniola (Figure 2), which it shares with Haiti, being the second largest country in the Caribbean, with an area of 48,442 km^2 and 1,576 km of coastline, including many small islands and cays. Its maximum dimensions are 390 km from east to west and 265 km from north to south. There are three main mountain systems: the Cordillera Central, where the highest mountain in the Antilles is located, the 3,087 m Pico Duarte; the Northern Sierra and the Eastern Sierra. There are abundant rivers, many of which are navigable.

From an administrative point of view, the Dominican Republic is divided into 31 provinces and one National District, with 158 municipalities. The census published by the National Statistics Office in 2022 indicates that there are a total of 10,771,504 inhabitants (5,442,517 women and 5,328,987 men)

Figure 2. Map of the Dominican Republic

The climate of the Dominican Republic is defined as tropical. The average annual temperature is 25.5ºC, although due to the influence of the relief, there are great differences between the lowest and highest areas, where extreme temperatures below 0ºC have been recorded during the period of frontal activity. The average annual rainfall (Figure 3) is 1.3465 mm, ranging from around 500 mm (Southwest and Northwest) to more than 3,000 mm (Northeast, Southeast and North).

Tropical cyclones and severe local storms are the weather events associated with some of the greatest disaster hazards, and are responsible for some of the observed climate extremes, most notably heavy rainfall, large accumulations of precipitation, and flooding of coastal areas. The hurricane season runs from June 1 to November 30, with August and October being more likely.

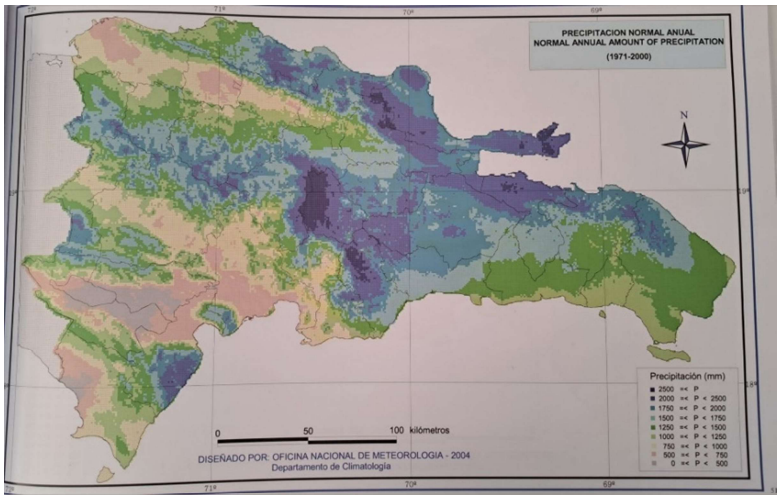

Figure 3. Distribution of annual precipitation in Cuba

Hispaniola is located on the border between tropical and extratropical circulation zones, being influenced by both seasonally. In the season that runs approximately from November to April, the passage of cold fronts and troughs at medium levels predominates; the period from May to July is characterized by convective phenomena associated with moisture impulses generated by the Intertropical Convergence Zone (ITCZ) and between August and October the conditions associated with tropical phenomena, including hurricanes, predominate.

CHD methodology

This Country Hydrometeorological Diagnosis (CHD) has been carried out using a peer review by staff from the State Meteorological Agency of Spain (AEMET) in close collaboration with ONAMET staff, carrying out an assessment of the institution, its operating environment and its contribution to meteorological, climate, hydrological services and weather alerts.

The information provided by ONAMET to WMO in the questionnaire on the elements of the CHD has been used for this report, several preparatory videoconferences have been held with ONAMET management staff and finally an on-site evaluation has been carried out.

Meetings have been held with the management and technical staff of ONAMET, with staff of the World Food Program, responsible for the implementation of the SOFF in the Dominican Republic, a meeting to present the project to representatives of the Ministry of the Presidency, Ministry of Public Works and Communications, Emergency Operations Center, National Institute of Hydraulic Resources, Civil Defense, Dominican Institute of Civil Aviation, and National Council for Climate Change and Clean Development Mechanism. Finally, visits were made to the facilities of the National Emergency and Civil Defense Commission, as well as to the Emergency Operations Center and the Ministry of Presidency.

The 10 elements included in the CHD methodology have been analysed, in collaboration with ONAMET staff, establishing a maturity level, between 1 and 5, for each one and recommending a series of actions to raise the level in each element.

Chapter 2: Country Hydromet Diagnostics

Element 1: Governance and institutional setting

1.1: Existence of Act or Policy describing the NMHS legal mandate and its scope.

In the Dominican Republic, hydrometeorological services are provided by two institutions. The meteorological ones by the National Meteorological Office (ONAMET), under the Ministry of Public Works and Communications and the hydrological ones by the National Institute of Hydraulic Resources (INDRHI), belonging to the Ministry of Environments and Natural Resources

ONAMET was created in 1954 as a technical-scientific body and regulatory body for meteorological information. Decree 1838 of February 24 of 1984 regulates the operation of ONAMET[1].

On the other hand, Decree 8-45 stipulates the use of the national meteorological data bank, designating ONAMET as the governing body for public and private meteorological data in the Dominican Republic, with institutions that have meteorological observation networks having the obligation to send their data to ONAMET and ONAMET to store and publish them. This mandate is not fully fulfilled.

ONAMET is a Government Agency with commercial activities. Its main areas of responsibility being Meteorology and Climatology, having areas of shared responsibility with the National Seismology Center and the Emergency Operational Center (COE) in the issuance of tsunami warnings. Its main mission is to act as a specialized technical entity, in charge of providing meteorological services to the entire country and complying with all international commitments resulting from its affiliation with the World Meteorological Organization (WMO).

A draft law is currently being developed to convert ONAMET into the Dominican Institute of Meteorology (INDOMET), which will provide it, among other administrative capacities, with a greater capacity to access funded projects as well as greater financial autonomy to be able to carry out its activities, currently quite restricted due to its status as a National Office.

Given the scope of action expected of INDOMET, providing services to numerous sectors of Dominican society, it is recommended that in this process of transformation, the future Institute be framed in a ministry that has the greatest possible transversality, such as the Ministry of the Presidency

ONAMET is the aeronautical meteorological authority of the Dominican Republic, as well as the aeronautical meteorological service provider.

Only two aeronautical forecasters are accredited as meteorologists according to the current WMO classification and therefore ICAO recommendations regarding the qualification of personnel responsible for aeronautical forecasts are not being complied with in general. It is estimated that around 36 meteorologists would be needed to adequately cover the service at the 8 international airports. Several ONAMET technicians have been trained as meteorologists by receiving the Ibero-American Meteorologist Training Course following the Basic Instruction Package for Meteorologists (BIP-M) given by the State Meteorological Agency (AEMET) within the CIMHET training plan. As the course (blended) lasts two years and one or two ONAMET students participate per edition, the availability of trained personnel has a slow pace and sometimes, once trained, they tend to move on to other units outside aeronautical forecasting.

[1] https://onamet.gob.do/index.php/sobre-nosotros/marco-legal/category/32-03-decretos

Law 147-02 on risk management regulates risk policy, creating the different instruments through the National System for Disaster Prevention, Mitigation and Response (SN-PMR), which includes both the National Council for Disaster Prevention, Mitigation and Response and the National Technical Committee for Risk Prevention and Mitigation, with the ONMET being included in both.

Although the decree that regulates the functions of ONAMET indicates that it is responsible for issuing weather warnings, there is no national regulation that indicates that this is the exclusive responsibility of ONAMET. So far, no other institution, public or private, has emerged to issue this type of product.

The main meteorological risks affecting the Dominican Republic and for which ONAMET issues the corresponding warnings are:

- Tropical cyclones
- Storm surges/coastal flooding
- Storms/squall lines

ONAMET, as the national meteorological service of the Dominican Republic, belongs to the Conference of Ibero-American NMHSs (CIMHET), a network of the Ibero-American Community that includes all the NMHSs of the same. This gives it Access to the different activities approved at the Conference meetings, especially those related to training and horizontal cooperation

ONAMET is a member of the ARIV Hurricane Committee, receiving support from NOAA's National Hurricane Center (NHC) for the issuance of tropical cyclone watches and warnings.

1.2. Existence of Strategic, Operational and Risk Management plans and their reporting as part of oversight and management.

ONAMET does not currently have a Strategic Plan (SP). It is in the process of preparing an Institutional Strategic Plan for the period 2025-2027, in order to follow the Government strategic lines, which is scheduled to be completed during October 2024. This plan will not need approval by a higher authority than ONAMET itself.

It is expected that the SP will have a six-monthly frequency of reporting on its compliance, being executed with the Annual Operational Plan l

1.3 Government budget allocation: (consistently covers the needs of the NMHS in terms of its national, regional and global responsibilities and based, among others, on cost-benefit analysis of the service. Evidence of sufficient staffing to cover core functions).

ONANET's 2024 budget is 245,998,207 DOP (4,241,348 USD), of which 191,836,407 DOP (78%) are allocated to personnel costs and 54,161,800 DOP (22%) to operational expenses. This budget, which is 100% governmental, represents 0.015% of the total state budget.

There is no direct repercussion on ONAMET for the aeronautical taxes, the amount of which goes to the Ministry of Finance.

The administrative structure of ONAMET does not allow it to manage funds other than those allocated directly by the Government. It is to be hoped that the process of transformation currently underway towards a Meteorological Institute will allow it to access more funds, especially from international cooperation projects.

Although there is no direct funding from the cooperation programmes, it has been possible to access the donation of different equipment, especially weather stations, through participation in different projects.

There is no income to the institution for its commercial activities, although the amount collected is practically residual (1,200 USD in 2023).

1.4 Proportion of staff (availability of in-house, seconded, contracted-out) with adequate training in relevant disciplines, including scientific, technical, and information and communication technologies (ICT). Institutional and policy arrangements in-country to support the training needs of NMHS.

As of March 11, 2024, the total staff of ONAMET was 330 people, distributed as follows:

Staff Categories	Value (self-reported)
Number of Staff (Management)	46
Meteorologist	12
Meteorological Technician	162
Hydrologist	0
Hydrological Technician	0
Climate Services	30
Researcher	0
Other	80
Total Staff number Male (Male): Female (F)	330 (M= 158, F=172)

Table 2. ONAMET Staff

The concept of "Other" mainly includes administrative and service staff.

There are no research staff and it is considered by the institution that there should be at least 19 meteorologists to be able to adequately cover the different areas. A significant part of the workforce is close to retirement and there are no replacement staff.

If aeronautical forecasts are made in each airport and not centrally, around 36 meteorologists would be necessary to cover the 8 international airports according to the WMO qualification, while currently there are only 2.

When the Strategic Plan is implemented, it is foreseen that annual staff competency assessments will be carried out. In the event of detecting deficiencies, a training plan will be established to solve them.

There is an annual training plan, administered by the Human Resources section and the Meteorological Education Unit.

There are agreements with different universities and the Ministry of Higher Education, Science and Technology that provide undergraduate and postgraduate scholarships. They also have access to the courses that the National Institute of Public Administration (INAP) provides to the public sector as well as to the courses included in the annual training plan of the CIMHET.

1.5 Experience and track record in implementing internationally funde HydroMet projects as well as research and development projects in general.

ONAMET does not coordinate any international projects. It is participating in different projects as a partner of other institutions, including:

- Harmonize project in collaboration with the Barcelona Supercomputing Center (BSC) to place three Automatic Weather Stations (EMAs) to collect data to strengthen research into diseases caused by different vectors.
- Low-cost AWS project, in collaboration with the University Corporation for Atmospheric Research (UCAR) and NOAA, for the fabrication by 3D printing, installation and implementation of stations that strengthen the density of the ONAMET observation network.

Summary Score, Recommendations, and Comments for Element 1

ONAMET has clearly defined its mandate and responsibility for action in the face of severe hydrometeorological systems. It is in the process of developing a Strategic Plan for the period 2024-27.

A shortage of personnel, especially meteorologists, is detected, mainly for the provision of aeronautical meteorology services according to ICAO regulations. It does not have personnel for research work.

There is no policy of cost recovery for aeronautical services, and there is no direct income for this concept.

The conversion of ONAMET into an Institute of Meteorology is in the process of being processed, which would give it a greater capacity to access different sources of financing and manage funds.

Taking into account the situation described, Element 1, Governance and institutional environment is rated as **Maturity Level 2: Effort ongoing to formalize mandate, introduce improved governance, management processes and address resource challenges.**

In order to increase this level, it is proposed:

- Complete the process of transforming ONAMET into a Meteorological Institute, trying to have its administrative dependency in a ministry with a clear cross-cutting component, such as the Ministry of the Presidency.
- Increase the number of personnel qualified as meteorologist to provide aeronautical meteorology services. Propose a training course according to the BIP-M similar to the one provided by AEMET within the framework of CIMHET but exclusively for ONAMET staff.
- Establish policies that allow for the availability of research staff in the institution.
- Implement the developing Strategic Plan as soon as possible
- Establish a policy to try to recover aeronautical costs that have a direct repercussion on the institution

Element 2: Effective Partnerships to Improve Service Delivery.

2.1. Effective partnerships for service delivery in place with other government institutions.

There are agreements with different government institutions such as:

- Air Force: Providing data to ONAMET

- Military Cartographic Institute: Leveling of ONAMET's tide gauges
- National Authority for Maritime Affairs (ANAMAR): Provision of buoy data, incorporated into the ONAMET website

The following agreements have been established to strengthen the ONAMET observation network:

- Santo Domingo Institute of Technology (INTEC), donation of 5 stations
- Plan Sierra, donation of 4 weather stations
- National Geological Survey, plans to acquire stations
- Framework cooperation agreement with the National Council for Climate Change and Clean Development Mechanism (CNCCMDL) to join forces and achieve seasons

2.2. Effective partnerships in place at the national and international level with the private sector, research centers and academia, including joint research and innovation projects.

ONAMET has non-formal agreements with institutions in the sugar sector of La Romana that send data from their networks to the institution.

It has established coordination forums with the Emergency Operational Center (COE), the Dam and Reservoir Operation Committee (COPRE), the National Council for Climate Change and Clean Development Mechanism and the Water Commission. These platforms meet more than once a year, and ONAMET is not the main organizer of them.

There is an agreement with the Santo Domingo cable car, to which they provide specific weather warnings and the latter gives the data it pays for to the global lightning detection network of the Vaisala company.

Decree 845-03 of 3 September 2003 obliges public and private institutions to provide data from their meteorological networks to ONAMET, as the governing body for public and private meteorological data in the Dominican Republic, for storage and publication. This mandate is not fully fulfilled.

Although there is no law explicitly prohibiting the private sector from providing meteorological information, Decree 1838 of 24 February 1984, which regulates the operation of ONAMET, grants it exclusive attributions for this function.

He does not participate in any research project, neither national nor international. A research unit is in the process of being developed, although the lack of qualified personnel is a major limiting factor.

2.3. Effective partnerships in place with international climate and development finance partners.

There is no bilateral partnership with international cooperation institutions. The current administrative structure of ONAMET prevents it from accessing international financing mechanisms.

There is an agreement with NOAA to operate the Santo Domingo upper air station, through which it supplies ONAMET with the material, spare parts and software necessary to operate the station.

As a member of CIMHET, ONAMET uses the different services included in the annual action plan approved by the components of the network, on three strategic axes: Institutional

strengthening and resource mobilization; Provision of meteorological, climatic and hydrological services; Training and horizontal cooperation.

2.4. New or enhanced products, services or dissemination techniques or new uses or applications of existing products and services that culminated from these relationships.

ONAMET is not currently conducting any investigative tasks.

A project is being developed, with NOAA, on the 3D printing of low-cost Automatic Weather Stations.

Summary Score, Recommendations, and Comments for Element 2

ONAMET is the recognized institution for the provision of meteorological services in the Dominican Republic. It does not have formal agreements with the private sector, although there is collaboration with some institutions, especially in the tourism sector.

As the governing body for meteorological data in the Dominican Republic, it is mandated to receive, store and disseminate data from public and private meteorological networks. The commitment to receive data from all institutions is not being fully fulfilled.

It does not carry out any research activities related to meteorology and climatology.

Given the above, the level of maturity in Element 2, Effective Partnerships to Improve Service Delivery is **Level three: Moderately effective partnerships but generally regarded as the weaker partner in such relationships, having little say in relevant financing initiatives**.

To increase this level, it is recommended:

- Complete the transformation currently in parliamentary processing, into a Meteorological Institute, which may give it a greater capacity to lead international cooperation projects and access to the corresponding funds
- Establish a research and development unit in the institution, with adequately trained personnel
- Establish partnerships with the private sector, especially with institutions with observation networks

Element 3: Observational Infrastructure

3.1. Average horizontal resolution in km of both synoptic surface and upper air observations, including compliance with the Global Basic Observation Network (GBON).

ONAMET has a synoptic network composed of 16 stations, of which 15 are operational (Figure 4), 6 installed in observatories and 9 in airports. Observations are made manually every 3 hours. In four of the airports and headquarters with scheduled H-24 and in the rest from sunrise to sunset, being transmitted by ftp to the GTS via Washington.

The area with the lowest coverage is in the West, Center and Southwest of the country.

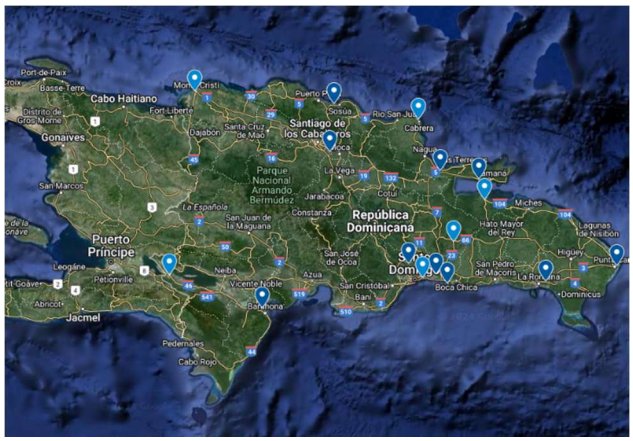

Figura 4. Red sinóptica ONAMET

There is an upper air station located in Santo Domingo, at the headquarters of ONAMET, which has been carrying out two observations a day since 1959. The material, spare parts and software necessary for the operation of the station is supplied by NOAA, which carries out an annual supervision of the station.

With this, the resolution of the surface synoptic network is around 60 km and the upper air of 250 km.

The network of automatic meteorological stations (AWS), which do not produce synoptic reports, nominally consists of 43 stations, although only 23 are currently operational. There are 15 out of service, mainly due to communications failures, 4 to be installed and one is used to have spare parts. Communications are via radio, through a repeater in Alto Bandera that links all stations with the ONAMET headquarters. Communication is unidirectional, without the possibility of acting remotely on them. The information is not transmitted internationally. All these AWS have been received through donations.

There are 5 operational agrometeorological stations, of the 9 that make up the network, with manual data collection and 22 operational conventional weather stations, of the 76 that make up the network, with temperature and precipitation measurements.

It has 2 tide gauges for tsunami warnings and can access the data of 8 buoys installed by ANAMAR.

A network of 12 thermopluviometric stations of volunteer observers is available.

Data from about 100 EMAs from the amateur meteorology community is accessed.

Figure 5 shows the complete ONAMET network. It can be seen that there are areas with a lack of observation, especially in the protected environmental areas due to lack of security in the facilities, in the central area of the island due to the complex orography and in the eastern area, due to lack of budget to expand the network and access to cooperation projects.

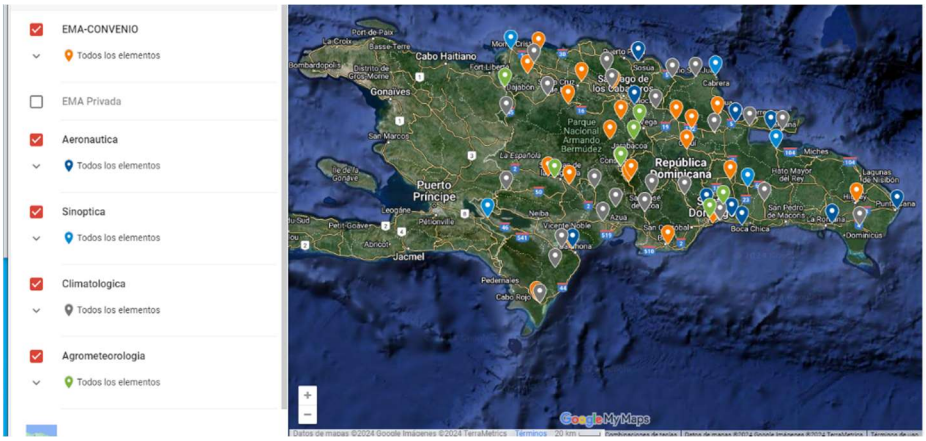

Figure 5. ONAMET Surface Observation Network

3.2. Additional observations used for nowcasting and specialized purposes.

Data from ANAMAR buoy network is routinely received and displayed on the ONAMET website.

Observational data are exchanged with INDRHI.

Data are received daily from 72 AWS from ONAMET, the private sector and other institutions with weather stations.

There is a network of 40 collaborators from the Ministry of Agriculture who send daily rainfall data.

They receive the information from the AWS managed by the IDAC at the airports, used for the preparation of the observation reports (METAR and SPECI).

They have the information provided by the meteorological radar installed in Punta Cana, which is privately owned and managed by the IDAC.

They have access to the global lightning detection network of the company Vaisla thanks to an agreement with the Santo Domingo cable car, which pays for the network's data.

Only the data from the 15 synoptic stations is transmitted to the GTS. AWS data are for internal use at ONAMET.

3.3. Standard Operating Practices in place for the deployment, maintenance, calibrations, and quality assurance of the observational network.

ONAMET does not have a calibration laboratory. They have a Vaisala digital barometer as an itinerant semi-standard, which is calibrated with the fixed standard installed in the radiosonde station and which is calibrated on a regular basis by NOAA. A maintenance and calibration plan is not available.

Forms are developed to know the status of each team. A workshop is available at the headquarters in Santo Domingo to carry out repairs and commissioning of the equipment. There is currently only one person in charge of operational maintenance, with the possibility of leaving the institution and three other technicians currently in training.

There is one person trained in OSCAR/Surface and one person currently in training.

Messages received from the WDQMS are checked daily. In the event that there is information regarding the lack of quality or information of a station, there is a maximum period of 5 days to receive a report from the affected station on the existing problem.

The staff of the synoptic and aeronautical stations do not carry out any type of maintenance at the first level.

The servers for data management are located in the same room as the operators, with climate control not adequate to ensure the correct functioning of the equipment.

3.4 Implementation of sustainable newer approaches to observations.

There is currently no National Plan for the implementation of WIGOS. There is a project underway, financed by the Inter-American Development Bank (IDB) and in collaboration with INDRHI that can start the process to implement WIGOS.

AWS communications are currently based on one-way radio communications, so they cannot be interrogated. It would be desirable to have two-way communication systems, such as mobile telephony or satellite communications.

There is a meteorological radar in Punta Cana, operated by IDAC, and from which images are received in ONAMET units. On the other hand, the IDAC has reported that it is in the process of acquiring a new weather radar for the Las Américas airport, in Santo Domingo. It would be desirable to establish, when this process is completed, an agreement similar to the one that exists with the Punta Cana radar.

There have been examples of successful public-private partnerships, such as the acquisition of a weather radar, which is now inoperative, by a private hotel group and which was transferred to the Government for operational use. Alternatives for this type of collaboration can be further explored to maintain and operate existing meteorological networks.

3.5. Percentage of the surface observations that depend on automatic techniques.

The synoptic network is fully manual. AWS is available, which do not transmit data to the GTS.

In the last 5 years, 29 AWS have been received from donations, of which 16 are operational, 9 are out of service and 4 are pending installation. The data from these stations is captured at ONAMET headquarters and incorporated into the MCH database management system.

The forecasting units receive the images provided by the meteorological radar installed in Punta Cana by the IDAC, used by ONAMET meteorologists and technicians for the development of products related to alerts and warnings.

Summary Score, Recommendations and Comments for Element 3

ONAMET has a network of 15 manual surface synoptic stations, whose data are fed to the GTS.

The AWS network does not disseminate data internationally, with only 55% of the network operating.

There is a upper air station, which NOAA is responsible for providing material, spare parts and software for its operation and which is operated by ONAMET staff Se dispone de un taller para la reparación de los equipos. No hay un plan de mantenimiento y calibración de las estaciones.

There is no National WIGOS Implementation Plan

In view of the above, the Maturity level for Element 3, observational infrastructure at ONAMET is assessed as **Level 3: Moderate network with some gaps with respect to WMO regulations and guidance and with some data quality issues**.

In order to increase this level, it is recommended:

- To automatize the 15 stations of the synoptic network
- Implement a calibration laboratory or establish agreements with other NMHS in the region that have these facilities for their use, such as the INSMET of Cuba.
- Establish a plan for the maintenance and calibration of the stations, having mobile calibration semi-standards at least for temperature, pressure and relative humidity, which allows to ensure the quality of the data of the stations and that can be routinely checked with the NOAA calibrated equipment available at the Santo Domingo sounding station.
- Strengthen the unit responsible for the maintenance and repair of equipment, ensuring the availability of personnel
- Train the staff of the synoptic and aeronautical observatories for the maintenance of the equipment in the first step.
- Locate servers in an isolated room with adequate cooling
- Consolidate the agreement with NOAA to continue the operation of the Santo Domingo upper air station
- Recover, as far as possible, automatic stations that have stopped working
- Changing AWS communications systems to means of interacting with stations
- Use the CIMHET horizontal cooperation mechanism to exchange experts related to equipment calibration and maintenance.
- Increase OSCAR/Surface trained staff
- Establish agreements with private institutions to support the installation and maintenance of weather stations

Element 4: Data and Product Sharing and Policies

4.1. Percentage of GBON compliance - for how many prescribed surface and upper-air stations are observations exchanged internationally. Usage of regional WIGOS centres.

Currently, none of ONAMET's surface synoptic stations meet GBON requirements. They are manual stations, with three-hour broadcasting, with data dissemination internationally through the GTS.

None of the 23 AWS currently operational transmit data internationally, they are only available at ONAMET.

The migration process to WIS2.0 has not started. A person from the institution has participated in the training provided by WMO.

Although the Santo Domingo upper air station is not currently included in GBON, it is prepared to meet the requirements, especially when the migration to WIS2.0 takes place.

Currently, the data is sent via FTP to NOAA headquarters from where it is disseminated internationally

No Greenhouse Gas (GHG) measurement stations are available.

4.2. A formal policy and practice for the free and open sharing of observational data.

In the Dominican Republic, there are several public and private institutions that operate meteorological and hydrological networks (Figure 4), such as:

- INDRHI
- Central Romana (CR)
- Sugar Consortium of Industrial Companies (CAEI)
- Haina Electric Generation Company (EGE Haina)
- REDDOM Foundation
- Guakía Ambiente
- Dominican Institute of Agricultural and Forestry Research (IDIAF)
- Dominican Coffee Institute (INDOCAFE)
- Santo Domingo Technological Institute (INTEC)
- Dominican Agroenterprise Board (JAD)
- Pontifical Catholic University Mother and Teacher (PUCMM)
- National Geological Survey (SGN)
- ISA University
- Development Plan for the Yaque del Norte River Basin

Figure 4. Active weather stations according to the entities that operate them. (Source: Guakía, 2023)

There is no systematic system for accessing or exchanging data with the networks of these institutions, as the national WIGOS is not implemented and there are no specific

agreements in place. Many of the stations belonging to the networks outside ONAMET do not comply with WMO observation standards.

There is a Decree that authorizes the sale of data to non-research institutions, although the annual amount collected is very small, around 1,200 USD in 2023.

Decree 845-03 of September 3, 2003 indicates that all national hydrometeorological data must reside in the ONAMET database. These regulations are not fully complied with by different institutions, public and private..

Article 3 of Law 157-02 establishes the National Integrated Information System (SINI) as one of the instruments of the risk management policy. The SINI platform was created in 2018 but currently does not have information on meteorological and climate data, maps and hydrometeorological risk data.

There is a space enabled in the MCH database management system to receive and store data from sources external to the institution. This system has an automatic threshold quality control system, depending on the climatic extremes recorded.

The data from the synoptic stations, manual, are controlled by means of a monthly form. The MCH is in the process of being installed in the synoptic observatories so that the data can be directly entered.

There is an open data portal, consisting of monthly summaries and normal values of a station in the Transparency Portal of the Office of Free Access to Information (OAI).

Agreements are in place with INDRHI for data exchange, with ANAMAR for access to buoy data and with the National Geological Service for tsunami monitoring.

The WIS2.0 deployment process has not started. There are difficulties in having adequately trained personnel for this process. It is advisable to develop collaboration with institutions in the region that have already completed the process, such as INSMET of Cuba, taking advantage of the possibilities presented by CIMHET's horizontal cooperation program

4.3. Main data and products received from external sources in a national, regional, and global context, such as model and satellite data.

Information available from GOES-16 through the NOAA website is used. There is no Geonecast system available to receive satellite information or any satellite data receiving station.

The information is received in real time from the meteorological radar installed in Punta Cana, managed by the IDAC. This radar reasonably covers the eastern third of the country.

WMO data and products are accessed using the ftp protocol.

The internet bandwidth available at ONAMET's headquarters, 100 Mbps, symmetrical, very stable and with a backup line.

Summary score, recommendations, and comments for Element 4

There is no surface station that currently meets GBON requirements. Synoptic stations disseminate data, obtained manually, on a trihourly frequency, by ftp.

The Santo Domingo upper air station is not included in GBON, although it meets the current requirements for it.

There are no satellite data receiving stations, accessing GOES-16 data through the NOAA website.

Data from external institutions can be incorporated into the database management system available in ONAMET, with automatic quality controls.

In view of the above, the maturity for Element 4, Data and Product Sharing and Policies, is **Level 2: A limited amount of GBON-compliant data is shared internationally. The existing data sharing policies or practices or the existing infrastructure severely hamper two-way data sharing.**

To increase the level of maturity, it is suggested:

- Adapt at least 5 surface stations to meet GBON requirements, including them in the National GBON Contribution Plan. Incorporate the Santo Domingo upper air station into GBON.
- Start the migration process to the WIS2.0 system, acquiring a server for specific use. Take advantage of the possibility of using horizontal cooperation mechanism of CIMHET to train ONAMET technicians by displacing experts from other Ibero-American NMHSs that have already completed the process, such as INSMET in Cuba.
- Develop a National WIGOS Implementation Plan to systematize the current data exchange between institutions operating meteorological and hydrological networks
- Implement the Geonetcast system to receive information from different meteorological satellites.

Element 5: Numerical Model and Forecasting Tool Application

5.1. Model and remote sensed products form the primary source for products across the different forecasting timescales.

The products available on the websites of different Numerical Weather Prediction Centers are used. The most widely used products are those provided by the European Centre for Medium-Range Forecasts (ECMWF), and by the Global Forecast System (GFS).

The INSMET of Cuba provides daily output of the SisPi-ONAMET model with a range of 72h and resolution of 3 km.

ONAMET does not have a numerical modelling unit, so they can only access the products available on the web pages of the different prediction centres.

Access to the products provided by these centres is highly reliable, and the amount of information available on the corresponding websites has also increased.

GOES16 data are accessed through the NOAA website, and there is no equipment that allows the specific reception of satellite data, such as Geonetcast.

The information is received in real time from the meteorological radar installed in Punta Cana, managed by the IDAC. This radar covers the eastern third of the country, with information missing from the rest.

There is a C-Band meteorological radar installed at the ONAMET headquarters in Santo Domingo, which has not been operational for at least 20 years. In case of repair or replacement by new equipment, it could provide adequate coverage to the SW third of the Dominican Republic. To adequately cover the entire country, and also to provide support to Haiti, an additional radar located in the NW of the island would be necessary.

In the event that IDAC were to install a new weather radar at Las Américas airport (Santo Domingo) and an agreement similar to the existing one with the Punta Cana radar was reached, it would not be necessary to rehabilitate the radar at ONAMET headquarters.

5.2. a) Models run internally (and sustainably), b) Data assimilation and verification performed, c) appropriateness of horizontal and vertical resolution.

There is no numerical modelling unit at ONAMET, so no models are run internally.

Forecasts are prepared by analysing the information available in the different models used, selecting in each case the most reliable for the prevailing weather conditions.

The products of the analyses of the models used are automatically saved in a folder with direct access by the predictors. There is no system for integrating and visualizing analysis and forecasting information.

5.3. Probabilistic forecasts produced and, if so, based on ensemble predictions.

No probabilistic forecasts are made for weather prediction.

In the case of climate perspectives, the prediction is probabilistic, indicating the probability of being above or below the climatology.

Summary Score, Recommendations, and Comments for Element 5

Most of the products used for weather forecasting and warnings are those available on the websites of the different Numerical Prediction Centres.

There is no ONAMET unit dedicated to numerical time modelling.

Satellite data receiving stations are not available, using the information available on the NOAA website.

The information provided by the meteorological radar installed in Punta Cana is available.

The maturity level for Element 5 is **Level 3. Prediction based mostly on model guidance from external and limited internal sources (without data assimilation) and remoted sensed products in the form of maps, figures and digital data and cover nowcasting, short and medium forecast time ranges**.

To improve this level of maturity it is recommended:

- Implement a research unit, to develeop tools in order to improve the use of available information for operational purposes.
- Initiate a process to implement probabilistic forecasts, especially for weather warnings.
- Take advantage of the horizontal cooperation mechanism of CIMHET for the exchange of experts in numerical modelling and in the use and interpretation of forecasting models.
- Increase radar coverage in the Dominican Republic, with the installation of a new radar in the NW of the country and through the repair or replacement of the radar

installed at the ONAMET headquarters, or, if IDAC installs a radar at Las Américas airport, through a data use agreement.

Element 6: Warning and advisory services

6.1. Warning and alert service cover 24/7.

The National Emergency Commission, made up of 34 institutions, including ONAMET, is responsible for executing the policies and decisions of the National Committee for Prevention, Mitigation and Response (CN-PMR), assigning the competencies to the different institutions of the System.

The following action protocols are established:

- Hydrometeorological between ONAMET-INDRHI-COE-Geological Institute
- Operational plan for the hurricane season
- Standard operation protocol against tsunamis between COE-CNS-SGN-ONAMET

The ONAMET alert service operates 24/7. Bulletins are prepared and sent with fixed emission times three times a day (11 am, 5 pm and 11 pm), which include alerts in case they occur. There is no specific weather alert bulletin.

The Forecasting System consists of a Central Station, at the ONAMET headquarters in Santo Domingo and three Regional Centers, located at the airports of Santiago, Catey and Punta Cana. A daily briefing is carried out among the technicians of all these units to discuss the most significant situations that have occurred and the forecast for the coming days and another longer weekly briefing, on Thursdays, with the participation of personnel from other units.

The Early Warning System (EWS) implemented in the Dominican Republic is established for hydrometeorological alerts and for tsunami warnings.

The warnings are issued as text bulletins, not having a system based on alert levels by thresholds or impacts.

The alerts to the population are issued by the COE, based on information from ONAMET. It is not guaranteed that this information will reach the entire population, although it is widely disseminated.

In the case of tropical cyclones, alerts are issued 72 hours in advance, with updates to 48 hours and 36 hours to be transferred to hourly bulletins when the situation is imminent, depending on the adversity of the situation.

6.2. Hydrometeorological hazards for which forecasting and warning capacity is available and whether feedback and lessons learned are included to improve warnings.

ONAMET provides forecasts and warnings on precipitation, winds, tropical cyclones and the effects of extratropical cyclones. No specific warnings are given for landslides, although the risk of their occurrence is mentioned in the rainfall alerts.

The Dominican Republic participates in the RAIV Hurricane Committee, in which the Tropical Cyclone Operational Plan is updated and approved every year, receiving support for the issuance of Watches and Warnings by NOAA's National Hurricane Center (NHC).

No specific flash flood advisories are issued. It is a challenge that the National Forecast Center of ONAMET currently has. A specific bulletin has been designed but has not yet been officially implemented.

Drought warnings are not issued, although drought occurrence is monitored using the Drought Monitor and weekly bulletins that are submitted to the Water Observatory by an ONAMET technician.

In collaboration with the COE, the National Geological Service (SGN) and the National Seismology Center (CNS) monitor the risk of Tsunamis, issuing the corresponding warnings.

Products provided by the U.S. NHC are used for hurricane tracking.

There is no evaluation of the predictions by ONAMET and there is no evidence that an evaluation of the warnings issued is made.

The COE sends feedback on the effects of the phenomena. There is access to different Whatsapp groups in which individuals include information on the phenomena and impacts in real time.

The COE prepares a bulletin on the different situations that have occurred. The timeliness or accuracy of the notices is not evaluated.

Forecast and alert bulletins are automatically stored in a digital folder, with the oldest ones being available on paper.

Annual exercises on hurricane effects are carried out, coordinated by the COE, in which the trajectory of a Hurricane is simulated and all the information is managed, based on a previous event. Likewise, annual national, COE-coordinated and regional Tsunami Warning Exercises (Caribbean Wave exercise) are carried out in accordance with UNESCO's mandate on this subject.

To mitigate the problems associated with frequent power failures, three emergency generator sets are available at ONAMET's headquarters, which include continuity groups to avoid cuts in the supply to the equipment.

There are two independent internet accesses, the operational, symmetrical 100 Mb and a contingency one, 50 Mb, supplied by another company.

A satellite phone is available that is only used in the event of a failure of all communications systems.

Evacuation exercises are carried out once a year in the event of earthquakes.

6.3. Common alerting procedures in place based on impact-based services and scenarios taking hazard, exposure, and vulnerability information into account and with registered alerting authorities.

In the Dominican Republic, the Common Alert Protocol (CAP) format is not implemented. The preliminary phase of the implementation process is in contact with WMO.

No specific predictions based on impact are made, although possible effects are indicated in the bulletins including recommendations to the population. Return information on

impacts is available through COE bulletins on the effects of severe phenomena and information provided by society through Whatsapp groups.

Flood zone maps are available that have been used to establish alert levels through thresholds defined between INDRHI and ONAMET.

Summary score, recommendations, and comments for Element 6

ONAMET has a 24/7 weather alert service. The alerts are issued through text bulletins from which the COE issues the corresponding alerts. There is no evidence that these reach the entire population without exceptions.

The CAP is not implemented. Impact prediction has not been developed.

The Maturity for Element 6, is **Level 4: Weather-related warning service with strong public reach and standard operational procedures driving close partnership with relevant institutions, including disaster** management **agencies**

To improve this level, it is recommended:

- Establish an alert system by levels, that takes into account thresholds and possible impacts, involving other institutions such as Civil Defense or INDRHI.
- Systematize the way of receiving and processing the feedback information provided by society through social networks.
- Establish a procedure for evaluating the reliability and timeliness of the warnings issued.
- Digitize the alert and forecast bulletins, currently available on paper
- Include more events in advisories, such as flash floods, wildfires, air quality, or UV radiation
- Implementing the CAP
- Take advantage of the horizontal cooperation mechanism of the CIMHET for expert assistance on issues related to the implementation of the CAP, impact-based forecasting, and the inclusion of warnings of other phenomena.

Element 7: Contribution to Climate Services

7.1. Where relevant, contribution to climate services according to the established capacity for the provision of climate services.

There is currently no general governance system regarding the provision of climate services by ONAMET. There is an ongoing data management project, which also covers the assessment of climate change, but it is pending signature between the Ministry of the Presidency, INDRHI and ONAMET.

Climate information is mainly distributed by email. There is a project to disseminate information through the MCH system.

The following information is routinely produced:

- Drought bulletins
- El Niño/La Niña bulletins

- Hydric balance
- Decadal and monthly percentage deviations from rainfall
- Daily Precipitation and Temperature Maps

Observational data are provided to different companies, in the public and private sectors.

Interinstitutional meetings, three per year, have resumed after the interruption caused by the pandemic, in which the climate outlook is presented.

Surveys are carried out with users on the usefulness of the information provided, although analysis and evaluation of these are not available. There is no system in place to identify the socio-economic benefits of the provision of climate services.

The daily summaries of the synoptic stations are digitized.

Coordinated by the Presidency of the Republic and with the support of the IDB, the project "Generation and management of hydrometeorological data and climate change scenarios in the Dominican Republic" has been designed as a joint action between ONAMET, INDRHI, CNCCMDL, Ministry of Economy, Planning and Development (MEPyD) and the Ministry of Environment (MARENA), with the purpose of improving the quality of Climate Services. as a key instrument for defining policies for adaptation to climate change.

Summary Score, Recommendations, and Comments for Element 7

Given the current conditions in the provision of climate services, the maturity level for element 7 is considered as **Level two: Basic Capacity for Climate Services Provision.**

To increase this level, it is recommended:

- Develop governance systems for coordination in service delivery
- Disseminate climate information in digital form, in formats that are useful for the systems used by the different sectors of users. Implement the information dissemination process through the MCH system
- Analyze the information provided by users in surveys. Establish indicators that allow the socio-economic benefits of the services provided to be assessed, in collaboration with the different sectors of users
- Establish mechanisms to train technicians from different institutions in the use and interpretation of the services provided.
- Continue with the process of digitising climate information, with clear deadlines and milestones in its development
- Promote the implementation of the project Generation and management of hydrometeorological data and climate change scenarios Dominican Republic

Element 8: Contribution to Hydrology

8.1. Where relevant, standard products such as quantitative precipitation estimation and forecasts are produced on a routine basis according to the requirements of the hydrological community.

In the Dominican Republic, the institution responsible for the different fields of Hydrology is the National Institute of Hydraulic Resources (INDRHI).

ONAMET exchanges observation data from surface networks with INDRHI, which are used to complement its bulletins.

As in the case of the meteorological network, the hydrological network managed by INDRHI also has difficulties in its operational maintenance. In 2019, of the 175 stations in the hydrometric network, 121 were out of operation with significant damage and only 30 were operating normally. It has been proposed that ONAMET assume the operation and maintenance of some of the stations that INDRHI has difficulties in keeping in operation, but the lack of qualified personnel prevents this collaboration from being carried out.

8.2. SOPs in place to formalize the relation between Met Service and Hydrology Agency, showing evidence that the whole value chain is addressed.

The early warning protocol regulates the relationship between ONAMET and INDRHI. There is no specific Standard Operating Plan (SOP) between the two institutions.

Flood risk maps are available, although a flood management plan has not been developed.

Weekly meetings are held between ONAMET and INDRHI on water resources management, forecasting and flood risk, with the Dominican Hydroelectric Generation Company (EGEHID), COPRE, the irrigation board and COE, among others.

The Risk Reduction plan, coordinated by the Civil Defense, includes the studies of danger, vulnerability and risk associated with floods.

Law 147-02 on Risk Management creates the National System for Disaster Prevention, Mitigation and Response (SN-PMR) that integrates public and private entities responsible for activities related to risk reduction, and coordinating their activities. Among these entities are ONAMET and INDRHI, both forming part of the National Technical Committee for Risk Prevention and Mitigation and the COE.

8.3. Data sharing agreements (between local and national agencies, and across international borders as required) on hydrological data in place or under development.

There is an exchange of hydrometeorological data between ONAMET and INDRHI. No data is exchanged operationally with the only border country, Haiti.

In emergency situations, information and data are exchanged with Puerto Rico, including those corresponding to meteorological radars.

8.4 Proyectos/iniciativas conjuntas con la comunidad hidrológica diseñadas para construir cooperación hidrometeorológica.

The aforementioned project "Generation and management of hydrometeorological data and climate change scenarios in the Dominican Republic" has as one of the purposes to improve the quality of and access to meteorological and hydrological data managed by ONAMET and INDRHI.

Summary Score, Recommendations, and Comments for Element 8

The institution responsible for hydrology in the Dominican Republic is INDRHI, with which ONAMET exchanges hydrometeorological data.

There is a protocol for the exchange of data, including the precipitation data of the INSMET network in the National Network of Rain Gauges of the INDRHI.

In view of the situation shown above, the maturity level of Element 8 is considered to be **Level three: There is a moderately well-functioning relationship between the**

meteorological, hydrological and water resources communities but considerable room for formalizing the relationship and SOPs.

As an improvement to this situation, it is proposed:

- Develop an SOP between ONAMET and INDRHI that allows systematizing the collaboration between both institutions
- Work together with ONAMET and INDRHI for the development of operational products related to hydrological monitoring and forecasting
- Support ONAMET and INDRHI the development of the project "Generation and management of hydrometeorological data and climate change scenarios in the Dominican Republic"

Element 9: Product Dissemination and Outreach

9.1 Channels used for user-centred communication and ability to support those channels (for example, does the NMHS operate its own television, video, or audio production facilities? Does it effectively use cutting-edge techniques?)

There is a very active line of work in meteorological communication on the part of ONAMET to disseminate the information, having a team of journalists, who adapt the information prepared by the prediction service and disseminate it through social networks.

The forecasters in charge of forecasts and alerts attend directly to the media. There are about 170 monthly visits by the media to the prediction room at ONAMET's headquarters, with interviews with the service forecasters, although they do not have specific training in communication techniques. The information is also disseminated via email to the media attached to the prediction service.

In the event of the occurrence of singular phenomena, the communication unit prepares special information that is disseminated by the different systems used by ONAMET.

The website, used to disseminate weather information, is restricted for further development as it has to be conform to the provisions of the Government Office of Information and Communication Technologies (OGTIC). Agility has been lost when it comes to disseminating information by this means, since ONAMET do not control the operation of the page nor can anything be developed outside the standards determined by the OGTIC. Given the uniqueness of the information that ONAMET can provide, where immediacy is a fundamental requirement, compared to other institutions of the Dominican Administration, these regulations represent a great restriction for a timely dissemination of the different meteorological products.

A mobile phone app with weather information is in the process of being planned.

Weather warnings are sent to the COE, which sets the alert levels by means of a colour code, indicating the most vulnerable areas.

9.2. Education and awareness initiatives in place.

The ONAMET School of Meteorology coordinates outreach talks, which are quite frequent in schools, private companies and public institutions, as well as visits to the ONAMET headquarters by students of all academic levels, including university students.

9.3. Special measures in place to reach marginalized communities and indigenous people.

There is an agreement with the Dominican Foundation for Blind (FDC) to adapt the information that the service forecaster transfers daily.

The information transferred to social networks is adapted, by the institution's communication experts, to the type of language and majority audience of the same.

Summary Score, Recommendations, and Comments for Element 9

ONAMET has various means to disseminate the information generated, being especially relevant the fact that it has a communication unit that adapts the information provided to the different diffusion systems.

Multiple activities are carried out to raise awareness of the meteorology and climatology, as well as the institution itself.

The ONAMET website has difficulties in being able to distribute adequate weather information.

For all of the above, the maturity level for element 9 is **Level three: A moderately effective communication and dissemination strategy and practices are in place, based only on in- house capabilities and supported by user-friendly website r.**

To improve this level, it is suggested:

- Establish agreements with OGTIC that allow greater functionality on the ONAMET website to allow more information to be disseminated in a more accessible way for users.
- Train forecasters in communication techniques.
- Develop an App for mobile telephony, if possible taking advantage of the experience of other analogue NMHSs that already have them operational, through the exchange of experts promoted by CIMHET
- Develop a system of meteorological warnings by levels that allows society to quickly and easily assess the risk
- Design formats for presenting weather information on social networks that are attractive to young people.

Element 10: Use and National Value of Products and Services

10.1. Formalized platform to engage with users in order to co-design improved services.

There is no platform to formalize interaction with users in general and that allows the production of tailor-made services in collaboration with the different sectors.

There are a series of instances in which actions are coordinated, such as:

- The National System for Disaster Prevention, Mitigation and Response, which consists of several coordination bodies, in which ONAMET participates:
    - National Council for Disaster Prevention, Mitigation and Response, with two annual meetings

    - National Emergency Commission. Meetings on the 3rd Wednesday of each month.
- Weekly meetings on water resources management, forecasting and flood risk, between ONAMET, INDRHI, EGEHID, COPRE, irrigation board and COE.
- Regular meetings with the National Statistical Office (ONE) to learn about the use of data by ONAMET users.

There is a direct line to the prediction room for the general population, with the possibility of speaking with the service forecaster.

There is a social communication department, responsible for managing the institutional accounts of X (former Twitter), with 17,500 followers, Facebook, with 46,000 followers and Instagram, with 82,000 followers.

No studies have been carried out on the socio-economic benefits of meteorological, climate and hydrological services.

The following aeronautical meteorology services are provided:

- SIGMET from Las Americas airport
- TAF y TREND
- METAR y SPECI

They do not have return information on turbulence or icing by aircraft.

10.2. Independent user satisfaction surveys are conducted, and the results used to inform service improvement.

In 2019, the Ministry of Public Administration (MAP) carried out a satisfaction survey on the quality of the Public Services offered by ONAMET, analyzing the following aspects:

- Satisfaction with the public service of the Institution
- Overall satisfaction with the service received vs. expected
- Adequacy of services to the needs of the user
- Contact with the website

It is expected to carry out this type of survey, which is mandatory by the MAP with a standard format, when the ONAMET Strategic Plan is implemented.

A user satisfaction survey is currently being carried out, which does not coincide with the format of the MAP, sending a questionnaire to all those who request information from ONAMET, in paper format if it is face-to-face or in an Excell file if it is through the web, although there is no capacity to analyze the results.

There is currently no system in place to assess the quality of weather and climate services, including forecasts and warnings. Monthly reports are made on the punctuality of aeronautical products (METAR and TAF), as well as on the CLIMAT reports.

10.3. Quality management processes that satisfy key user needs and support continuous improvement.

ONAMET has only partially implemented, without having been certified, a Quality Management System (QMS) for the provision of aeronautical services, in accordance with

the ISO 9001:2015 standard. It is expected to be fully implemented in a period of more than three years.

A major problem is the qualification of the forecasting staff in charge of aeronautical forecasting, since of the 69 technicians who are working operationally in the 9 international airports, only two of them (one in Las Américas and one in Santiago) meet the requirement, demanded by the ICAO, of being a meteorologist according to the WMO definition.

A QMS is not implemented for the rest of ONAMET's services, nor is it expected to be implemented within a period of less than three years.

Summary Score, Recommendations, and Comments for Element 10

ONAMET is an important player in national platforms related to disaster risk reduction and water management.

There is no procedure for the development of tailor-made products in collaboration with the different stakeholders.

The QMS has not been fully implemented for the provision of aeronautical services and is not planned to do so for the rest of the services in the next three years.

The maturity level for element 10 is **Level two: Service development draws on informal stakeholder input and feedback.**

To improve this level of maturity, it is suggested:

- To carry out studies on the socio-economic benefits of the products supplied by ONAMET. To do this, it can draw on the experience available at WMO and CIMHET.
- To qualify aeronautical forecasters as meteorologists. To this end, take advantage of the opportunity presented by the training course according to the BIP-M provided by AEMET, both within the CIMHET training plan and through an ad hoc edition for ONAMET.
- Establish a protocol with the IDAC to receive feedback from aircraft on phenomena such as shear, turbulence, or icing.
- Systematically carry out user satisfaction surveys following the procedures implemented by the MAP
- Complete the implementation of the QMS according to the ISO 9000:2015 standard in the aeronautical field and initiate the process to implement it in the rest of ONAMET's areas, especially in those related to observation and early warning services.

Annex 1 Consultations (including experts and stakeholder consultations)

To carry out the CHD, the following actions and meetings have been held:

- Virtual meetings in December 2023 and January 2024 between AEMET and ONAMET staff, to analyze the information included in the guidance matrix to carry out the CHD
- Face-to-face meetings, at the ONAMET headquarters in Santo Domingo, between February 5 and 9, 2024, with the following heads of the institution:
    - Gloria María Ceballos Gómez, National Director
    - Andrés Miguel Campusano Lasose, National Deputy Director
    - Juana Sille Puello, Head of the Climatology Department
    - Eurípides Bolivar Ledesma Villa, Head of the General Meteorology Department
    - Wagner Confesor Lorenzo Lorenzo, Head of the Operational Meteorology Department
    - Cecilia del Carmen Viloria Holguín, Head of the Department of Meteorological Education
    - Tomas Vidal Rodríguez Holguin, Head of the Communication, Press and Public Relations Department
    - Heriberto Fabián, Department of Communication, Press and Public Relations
    - Eugenia Bautista, Communicaton department
    - Jenuel Almonte, Responsible for automatic weather stations

- Project presentation meeting at the ONAMET headquarters, with the participation of the following people and institutions:
    - Mario Grullón, Ministry of the Presidency
    - Martha Souffron, Ministry of Public Works and Communications
    - Carlos Paulino, Emergency Operations Center
    - Edwin Ruiz, National Institute of Water Resources
    - Bernardo Rodríguez, Deputy Director of Civil Defense
    - Gender Castro y Alejandro Bartolomé, Dominican Institute of Civil Aviation
    - Teodoro Jiménez, National Council for Climate Change and Clean Development Mechanism
- Visit to the ONAMET Prediction Room
- Meeting with the Director of Civil Defense, Juan Salas
- Visit to the Civil Defense offices and the Emergency Operations Center
- Meeting at IDAC Headquarters
- Meeting with the Director of Climate Change National Council,
- Meeting with the Director of INDRHI
- Meeting at Ministry of Planification and Developlment
- Meeting with Deputy Minister of Ministry of Presidence
- Meeting with Minister of Public Works and Communications
- Meeting with Graciela Pérez of the World Food Programme, responsible for the implementation of the project.

Annex 2 Urgent needs reported.

Chapter 2 discusses each of the 10 elements that are considered to carry out CHD, establishing a maturity level for each of them and providing a series of recommendations to raise this level.

Among the recommendations raised, the following are considered most critical or urgent

- Have a staff with the appropriate qualifications to provide aeronautical weather forecasting services
- Have sufficient staff for the maintenance of meteorological equipment
- Adapt at least 5 surface stations to meet GBON resolution requirements
- To finalize the change of administrative status from ONAMET to that of the Institute of Meteorology, seeking to depend on a Ministry with a transversal character, such as Presidency.
- Implement the national WIGOS system
- Implement a Quality Management System, especially in the area of aeronautical meteorology. in the areas of INSMET related to the certification of the calibration laboratory and to Early Warning Systems

Annex 3 References and information supplied through WMO

Hydromet GAP Report 2021. Alliance for Hydromet Development

The gaps in the Global Basic Observing Network (GBON). SOFF, 2020

The Global Basic Observation Network (GBON). EC-76/Doc. 3.2 (3) ANNEX, 2023

Curso WIGOS Learning Portal. ETRP Moodle Site (wmo.int).

CHD Operational Guidance for SOFF. SOFF, 2023

Country Hydromet Diagnostics. WMO-Alliance for Hydromet Development, 2022

Multi-hazard Early Warning Systems: A Checklist. WMO, 2018

The WMO Strategy for Service Delivery and its implementation plan. WMO nº1129, 2014

CHD EW4All Data Sheet v1.3 Dominican Republic

Survey of Satisfaction with the Quality of Public Services offered by the Public Administration-ONAMET. Ministry of Public Administration

Generation and management of hydrometeorological data and climate change scenarios in the Dominican Republic. Guakía Ambiente, 2023

Climate Atlas of the Dominican Republic 2004. ONAMET

Annex 4 Pictures

ONAMET Headquarters

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Participants in the presentation of the project at ONAMET headquarters

National Forecast Centre


Santo Domingo upper-air station

Meeting at the Emergency Operational Center