

WIGOS REGIONAL CENTER OF MOROCCO



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WMO OMM

World Meteorological Organization
Organisation météorologique mondiale

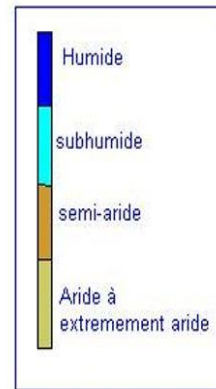
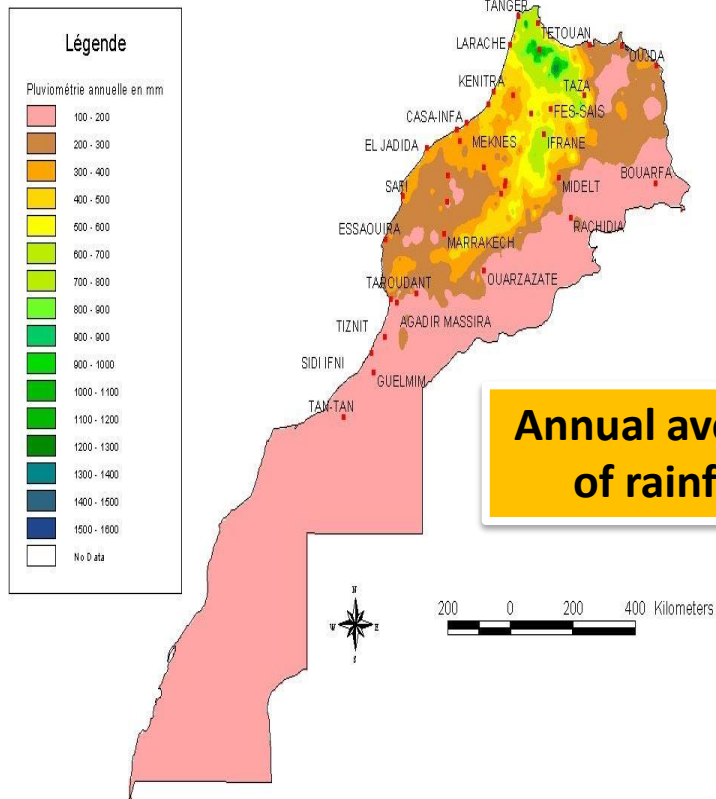
HIGHWAY Workshop on RWCs in East Africa
3-5 December 2019, Nairobi, Kenya

Outline

- I. Brief introduction to the country and the NMHS
- II. Current national observing capabilities
 - i. Surface observing network
 - ii. Upper air observing network
 - iii. Remote sensing
 - iv. Complementary observing networks
- III. Partner's observing networks
- IV. List of available and requested resources for WRC
- V. Main activities to be conducted
- VI. The WRC implementation plan

Brief introduction to the country and the NMHS

- Total area of 710,850 km²
- Two maritime facades
- 3500 Km of coasts
- Highest point of the mountainous chain of 4165m

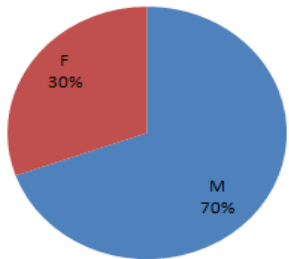


**Climatic chart of Morocco
for the period 1960-2005
based on Martone
indicator**

Brief introduction to the country and the NMHS

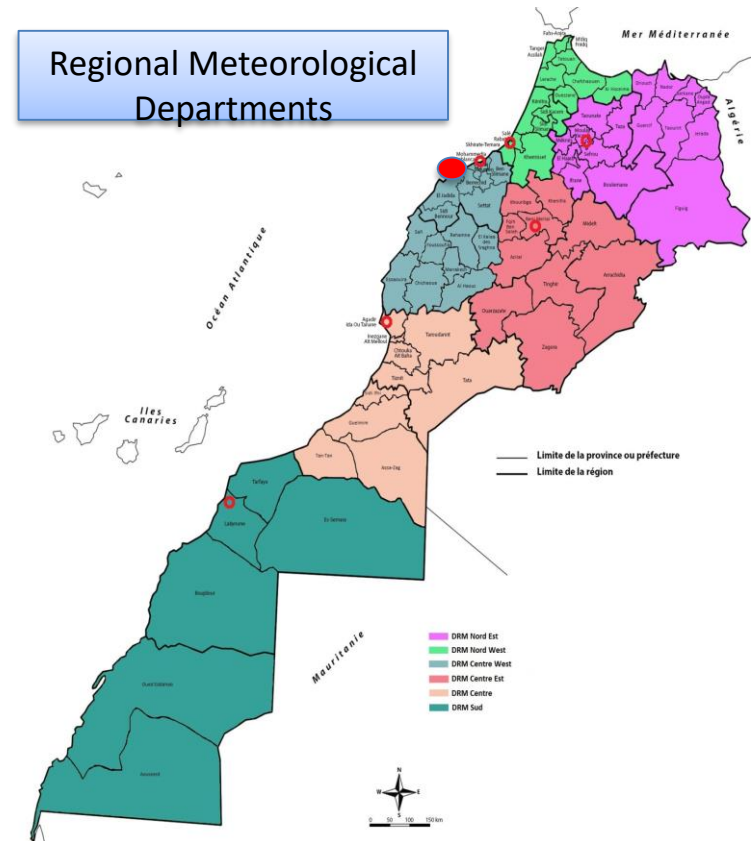


- Headquarter in Casablanca (central office)
- Six regional meteorological departments
- 43 manned stations
- about 750 employees including more than 220 engineers.



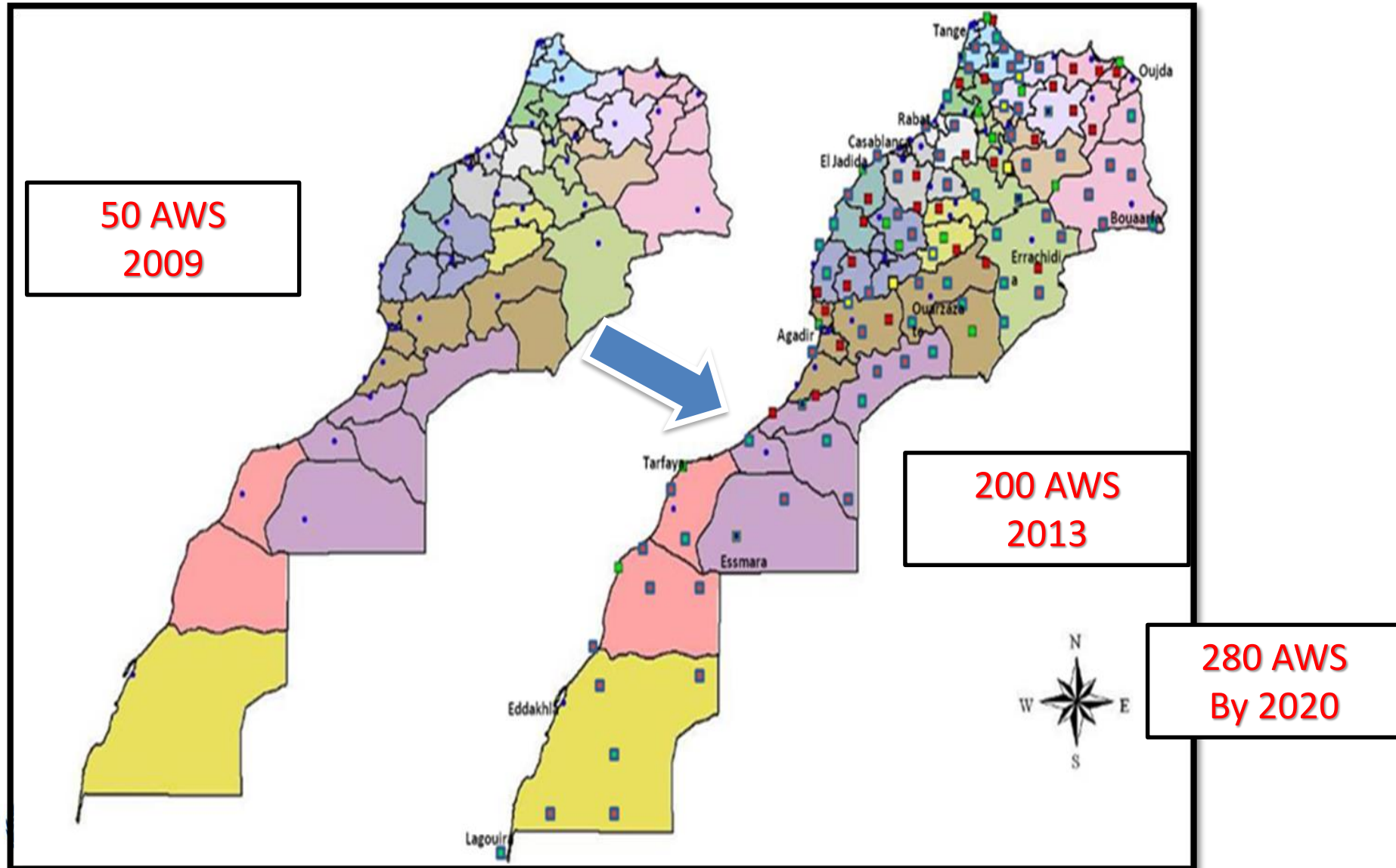
Repartition par genre

- DMN is certified ISO 9001vs 2008 since 2014 and the vs 2015 is in its final stages
- DMN is also RIC, RMIC, GISC, RCC and Lead center for Satellite Training for RA I



Current national observing capabilities

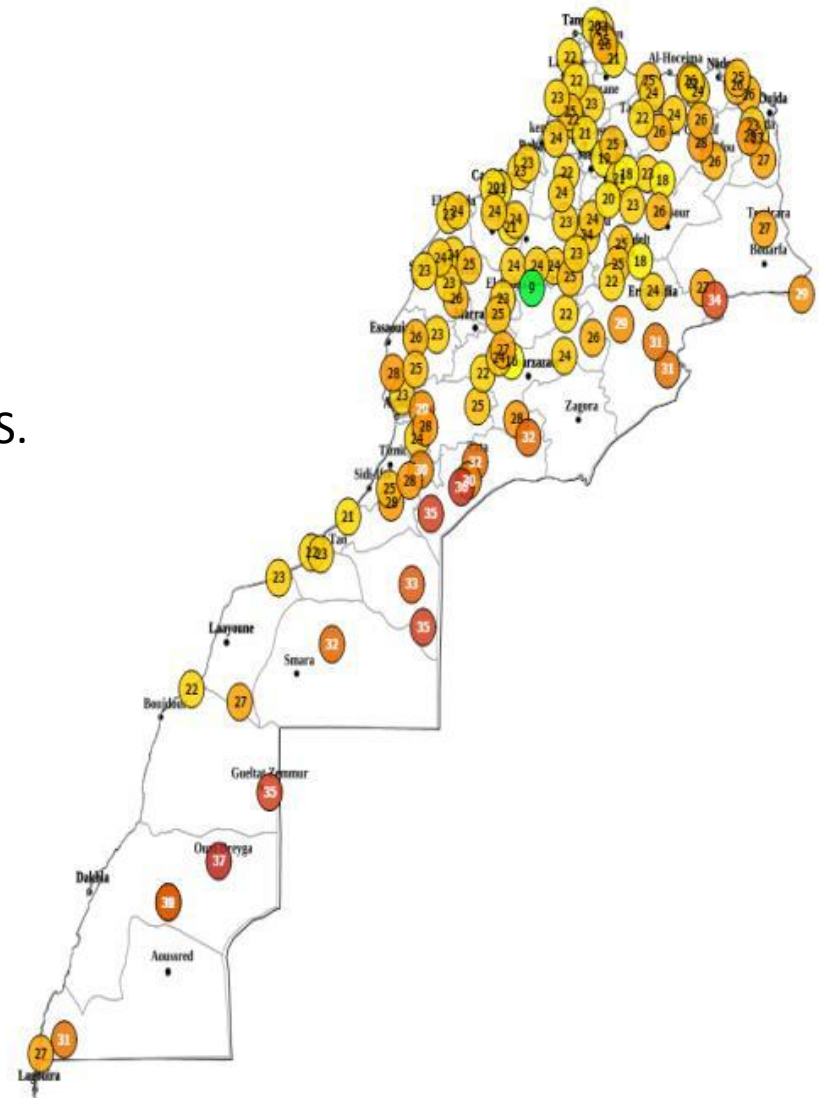
Surface observing network:



Current national observing capabilities

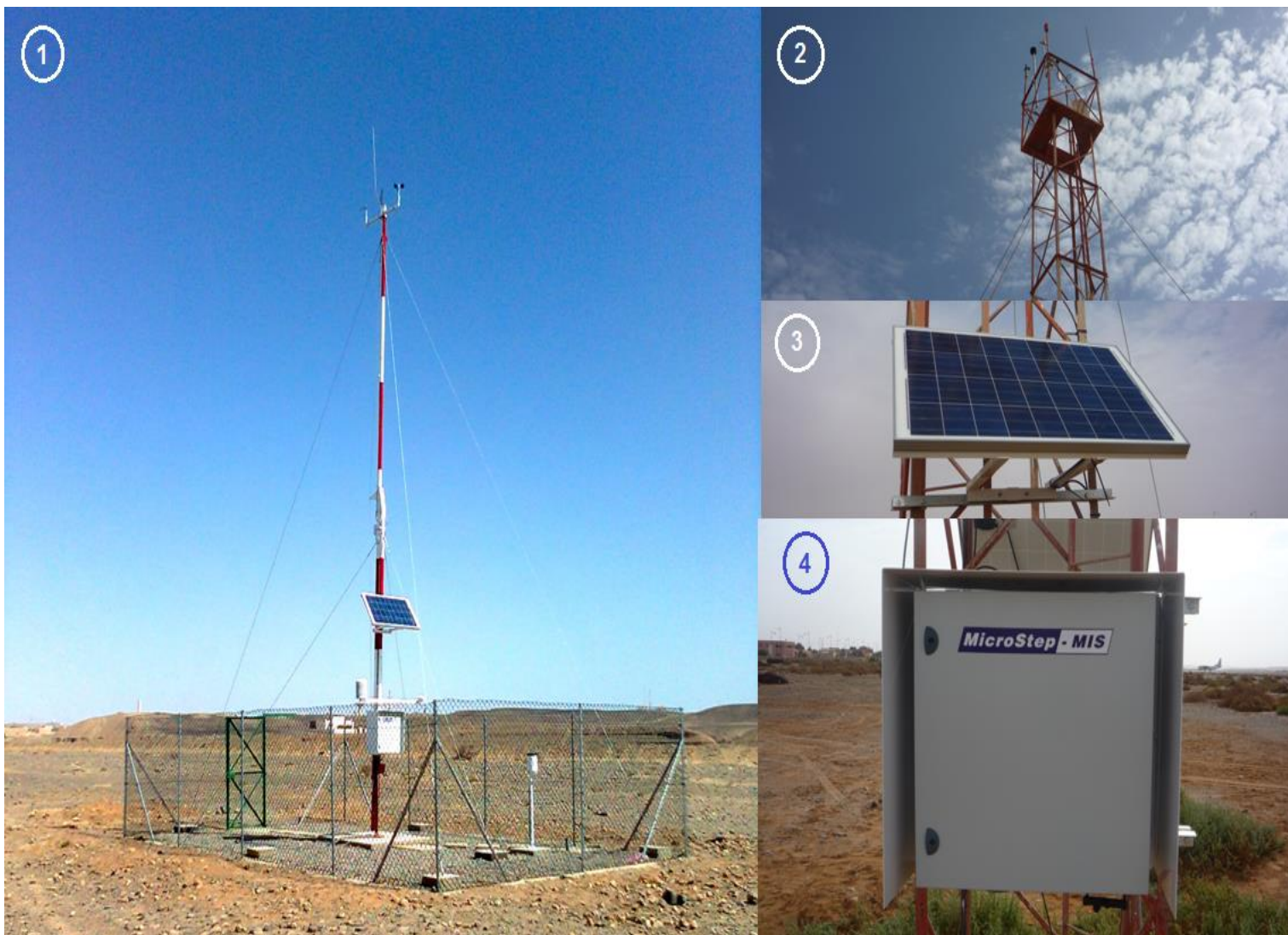
Surface observing network:

- 40 manned stations with coexistence of conventional instrument and AWS
- 200 AWS, (86 are in process of implementation)
- 18 AWS are measuring snow fall
- Different suppliers/brands of AWS,
- Data are transmitted using GPRS or GSM,
- For each brand of AWS, there is a dedicated CIPS.
- AWS network is under maintenance contract
- The AWS is monitored in daily basis in the three levels: local, regional and central.



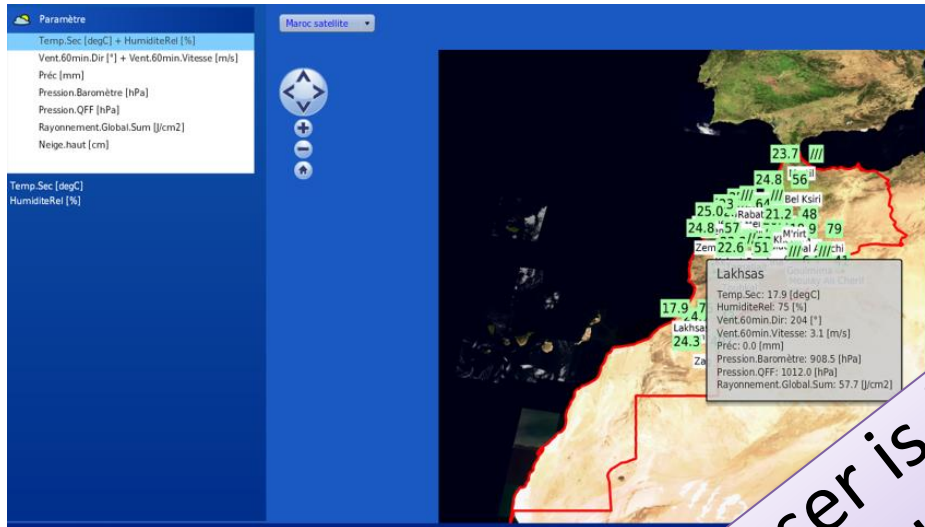
Current national observing capabilities

Surface observing network:



Current national observing capabilities

Surface observing network:



The final user is faced to partial displays and different web interfaces



Sélectionner le périmètre

Aide en ligne

Consultation > Tableau de données

Site

Date

Périodicité

Captur

Type de mesures

Comparer à

Afficher

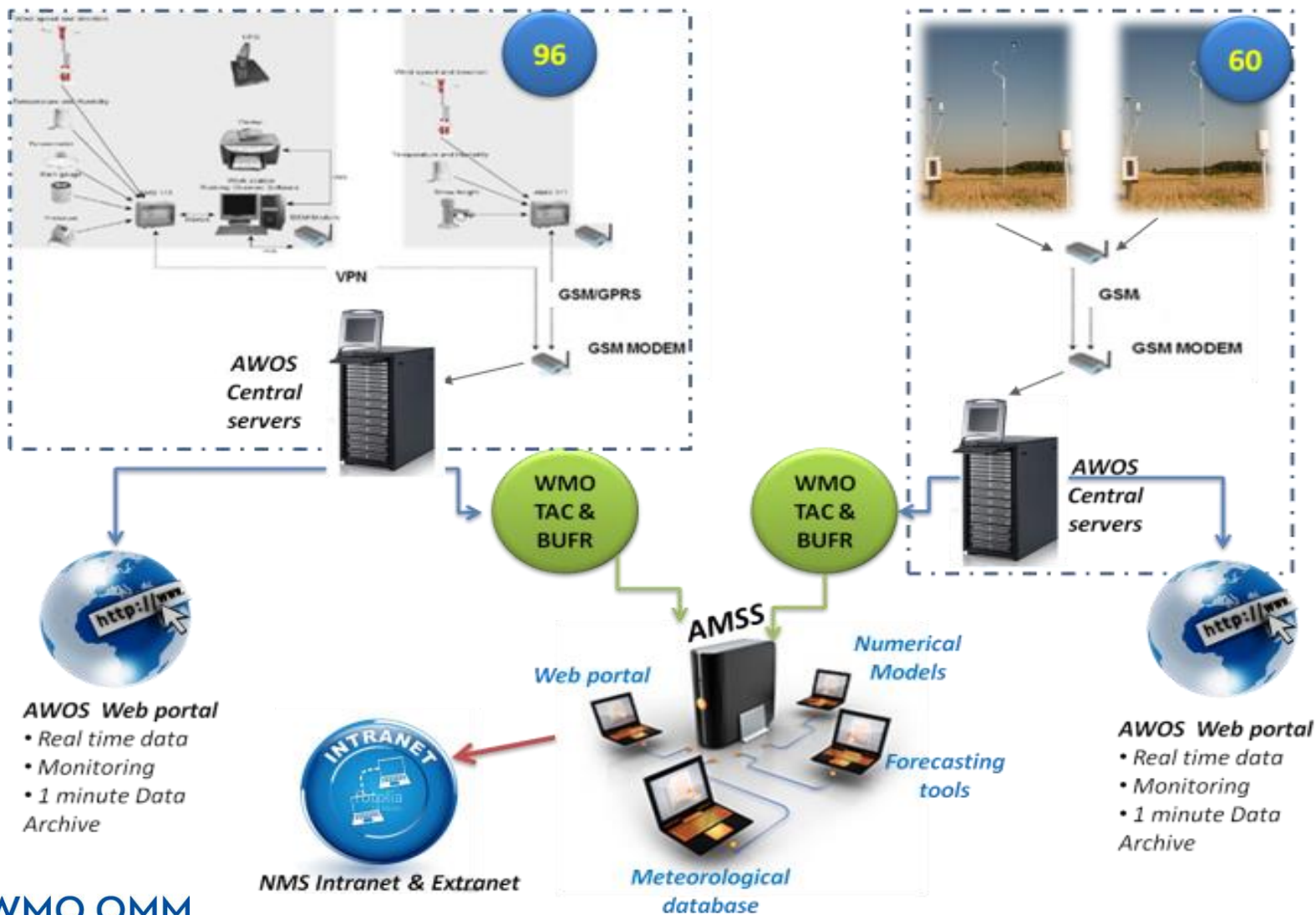
Exporter

Site : AGDZ

Date	T	U	TD	RR	VM10	VT	GIM10	P	Pmer	QNH	RAYGL	RA	PS
10/10/2018 00:00	19.7	53.5	10.0	0.0	0.0	0	88	906.64	1009.44	1014.11	0	5.40	0
10/10/2018 01:00	21.3	47.5	9.7	0.0	1000	0	88	906.00	1008.16	1013.41	0	5.36	0
10/10/2018 02:00	20.0	51.5	6.7	0.0	0.0	0	88	905.68	1008.27	1013.06	0	5.36	0
10/10/2018 03:00	21.1	56.0	12.0	0.0	0.0	0	88	905.56	1007.65	1012.93	0	5.32	0
10/10/2018 04:00	20.2	60.0	12.2	0.0	1000	88	905.68	1008.10	1013.06	0	5.32	0	
10/10/2018 05:00	19.5	63.5	12.4	0.0	0.0	0	88	905.60	1008.26	1012.97	0	5.28	0
10/10/2018 06:00	18.6	68.0	12.6	0.0	1000	88	905.96	1008.98	1013.36	4000	5.32	2	2
10/10/2018 07:00	22.4	60.0	14.3	0.0	0.0	0	88	906.52	1008.15	1013.98	54000	5.44	53
10/10/2018 08:00	24.8	50.0	13.7	0.0	0.0	0	88	907.00	1007.86	1014.50	134000	5.64	126
10/10/2018 09:00	24.4	49.5	13.2	0.0	0.0	0	88	907.08	1008.11	1014.59	14000	5.68	11

Current national observing capabilities

Surface observing network:



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Current national observing capabilities

Upper-air observing network:

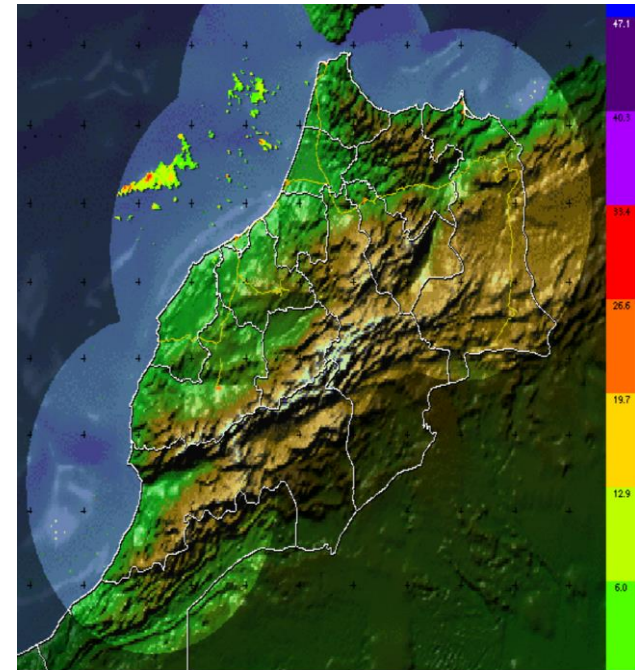
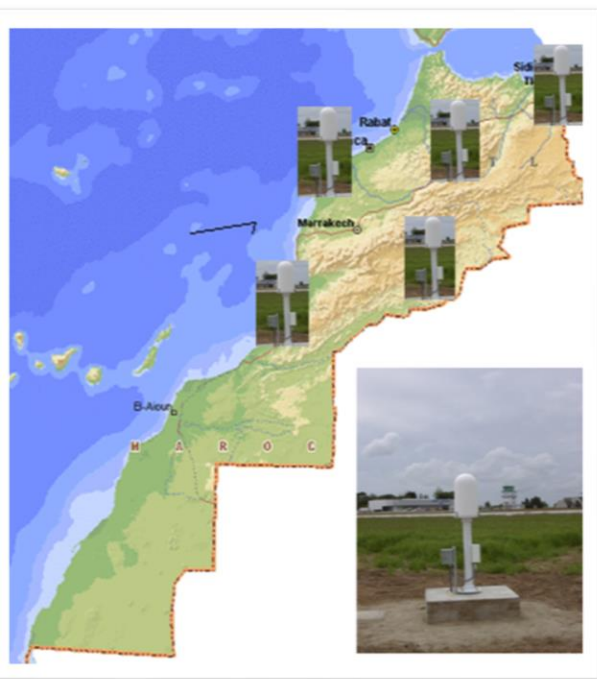
- Three operational stations, two of them are equipped with automatic launching system.
- Three additional automatic radiosonde stations are in process of acquirement and should be operational by the end of 2020.



Current national observing capabilities

Remote Sensing:

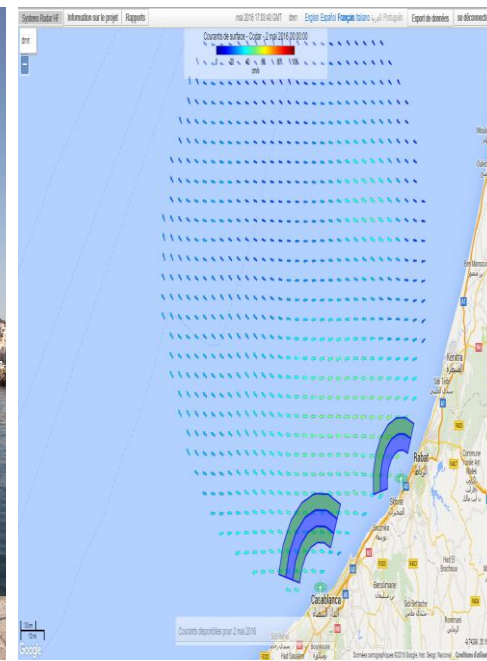
- ❑ MSG receiving system in both C and Ku bands,
- ❑ 7 operational doppler weather radars operating in C Band,
- ❑ 4 additional weather radars are in the process of acquirement (2 in C band and 2 in X band),
- ❑ A new lightning detection network including 8 sensors for the coverage of the whole territory.



Current national observing capabilities

Complementary observing networks:

- ❑ Dedicated GPS network for numerical prediction purposes (10 GPS stations),
- ❑ Two oceanic FH radars for maritime surface current measurements and for oceanic wave features,
- ❑ A network of 5 Tide gages,
- ❑ A surface network for air quality measurements including 36 fixed stations and 2 mobile laboratories measuring the following parameters: CO, CO₂, NO, Nox, PM10, O3, HCT and HCNM

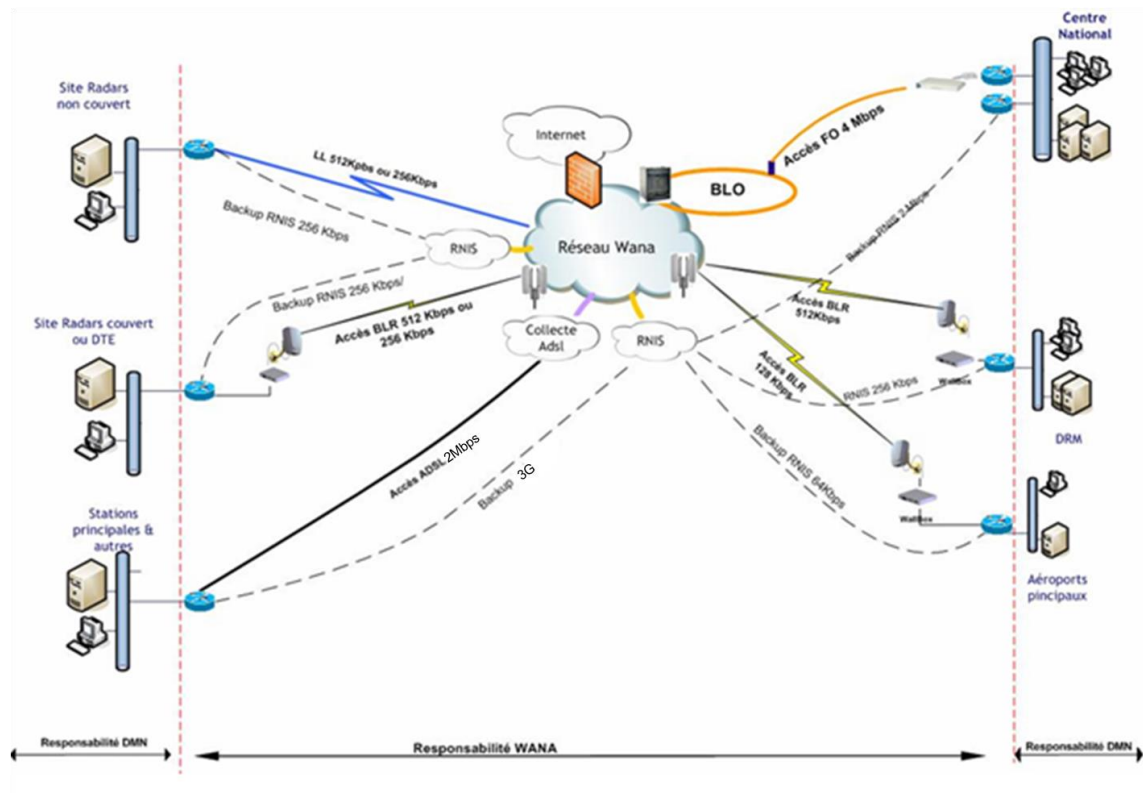


Current national observing capabilities

Telecommunication means:

- Member of the RMDCN since 2010
- Redundant high speed internet connection
- Internet and 4G-VPN as back up for synoptic stations
- GPRS and GSM for AWS
- Dedicated links for aeronautical purposes

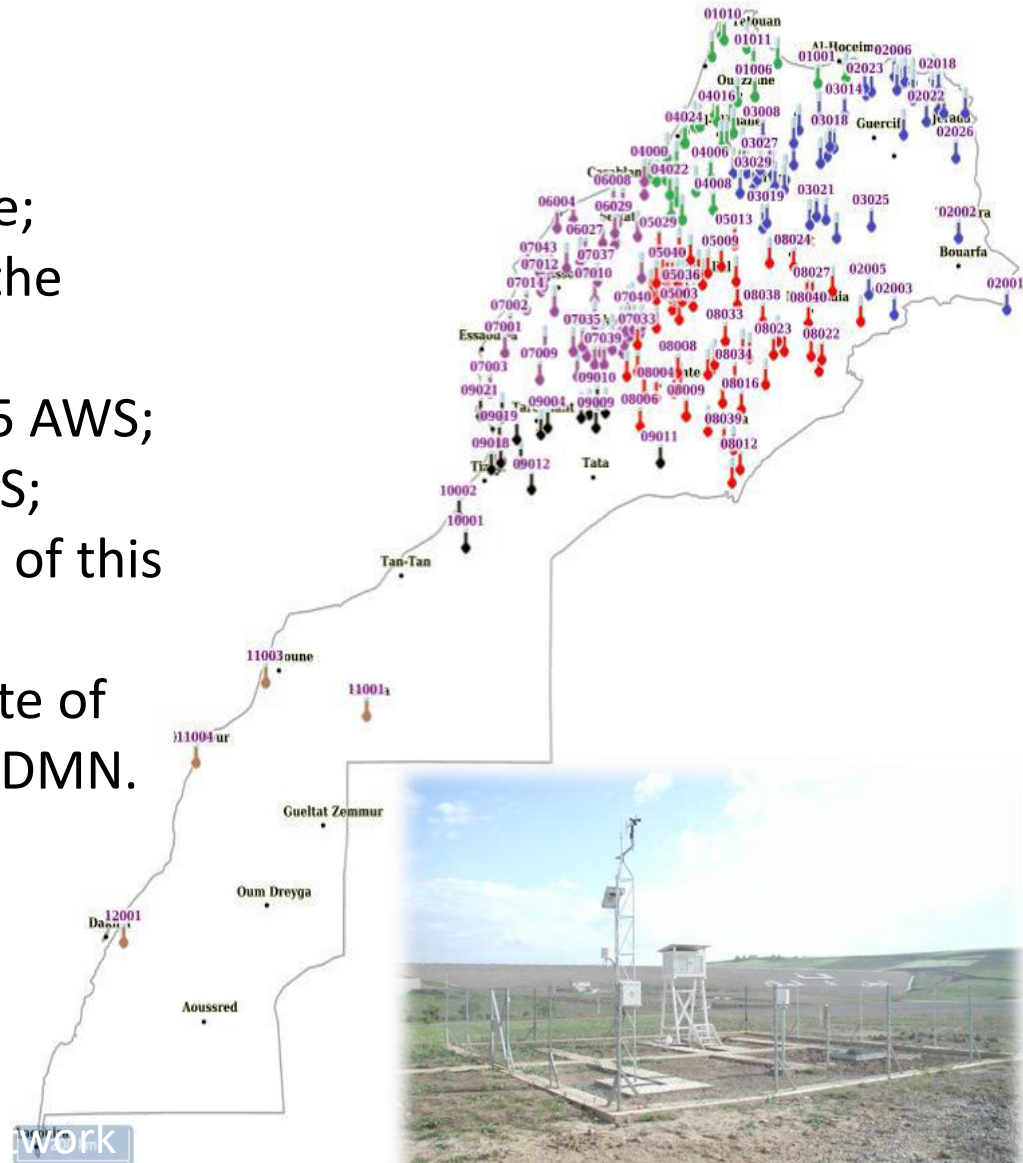
VPN telecommunication network



Partner Observing Capabilities

Ministry of Agriculture:

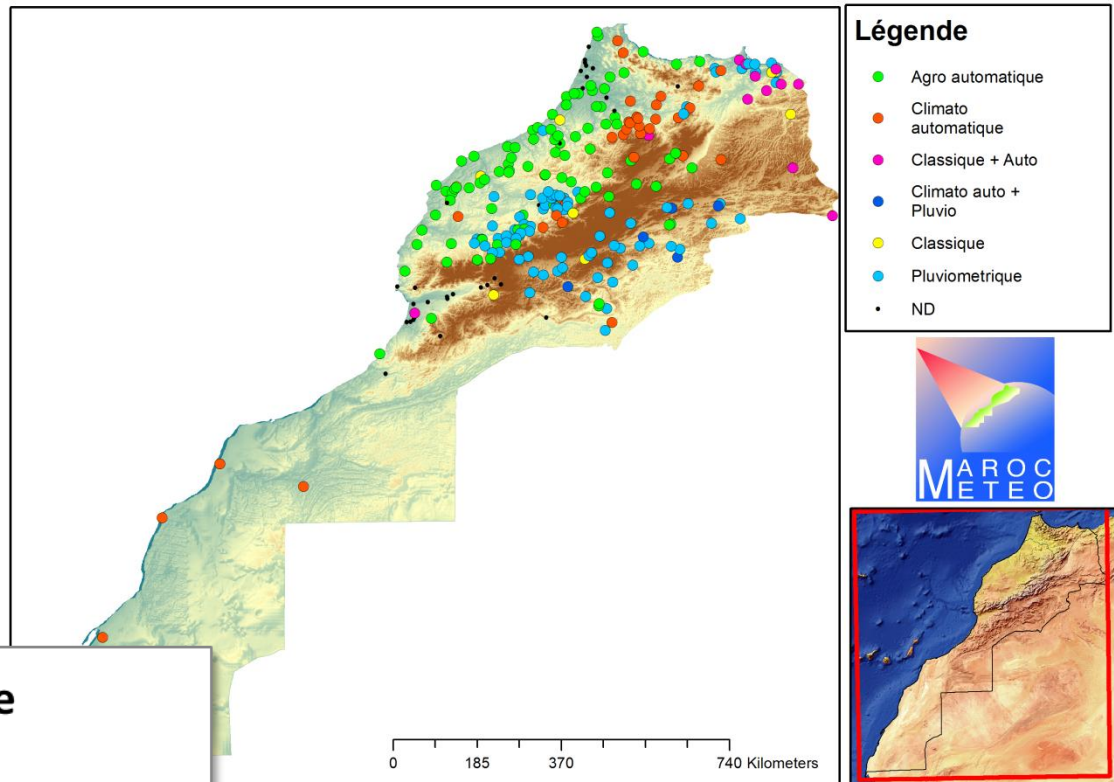
- ❑ Owned by Ministry of Agriculture;
- ❑ Bilateral Agreement to manage the network;
- ❑ 285 observing sites including 165 AWS;
- ❑ Multiple suppliers/brands of AWS;
- ❑ A CIPS is available only for a part of this network;
- ❑ Detailed study of the current state of this network was established by DMN.



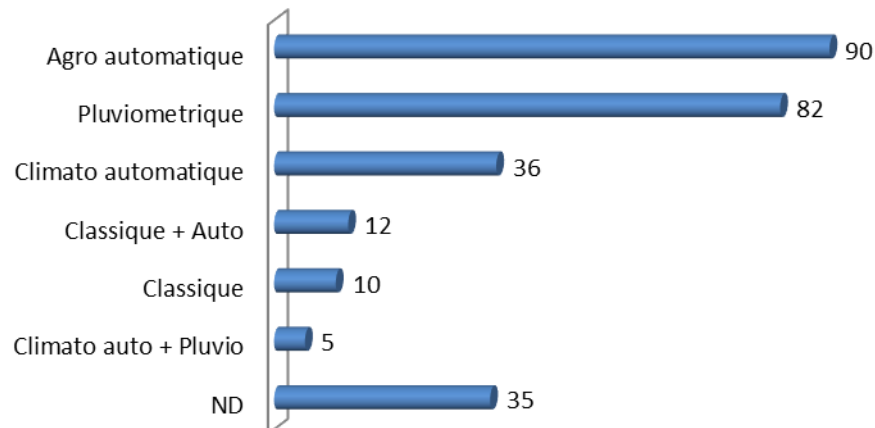
Partner Observing Capabilities

Ministry of Agriculture:

Répartition des stations météorologiques MAPM par type



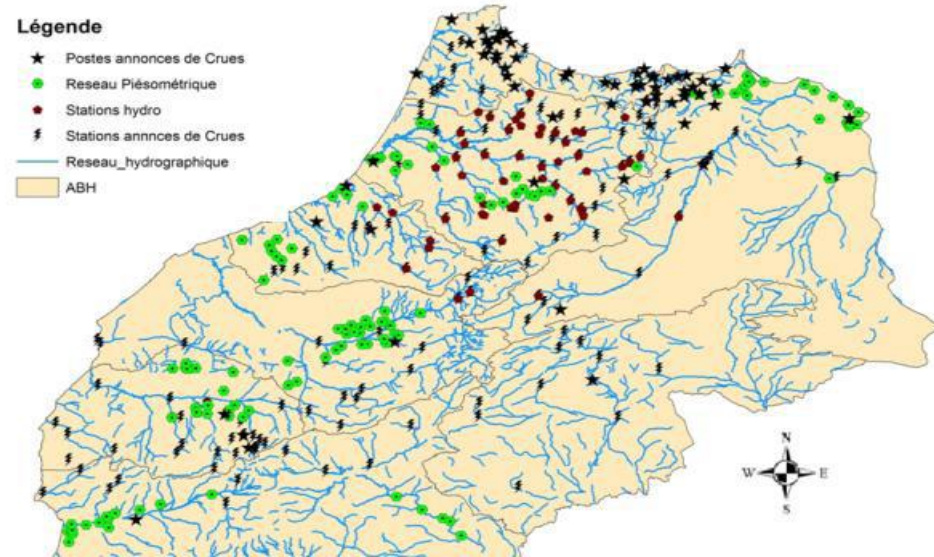
Nombre de stations par type



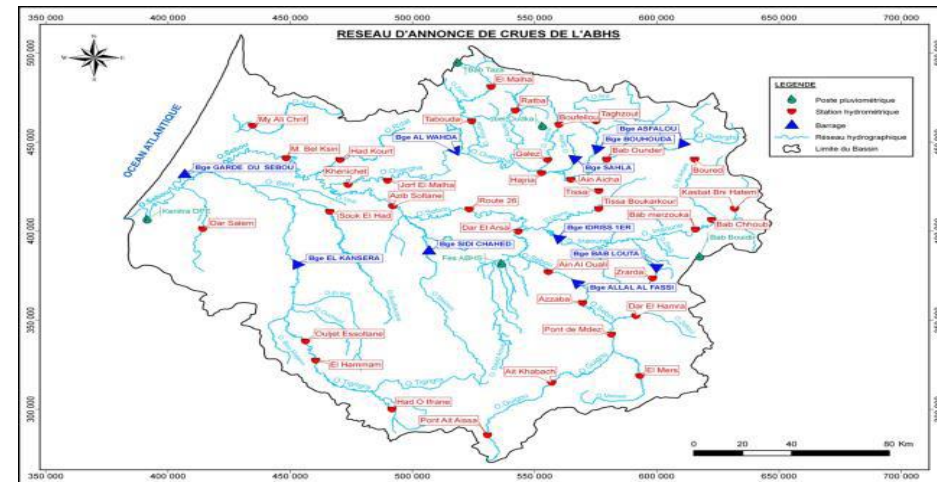
Partner Observing Capabilities

Ministry in charge of Water:

- hundreds of automatic stations have been deployed in the different water basins over the country.
- Each watershed agency has its own measuring network and its flood warning system especially for flash flooding events.
- This observing network is using, in the first place, the radio communications and, in the second place, the mobile communication means such as GSM and GPRS.
- The Flood warning network includes more than 226 observing sites following a hierarchic organization and using radiophone as principal mean of communication.



The observing network of the ministry of Water in the northern part of Morocco



An Example of the observing network of the ABHS watershed agency

Partner Observing Capabilities

Ministry of Forests and Fight against Desertification :

❑ **Finality:** Forrest researches, *Climlatic monitoring, fight against desertification, forest fires, forest health and biodiversity conservation.*

❑ **Organisation :**
Regional directions of water and forests managed by the Forest Reasearch Centre

❑ **Means** : 365 rainfall stations;
dozen of AWOS

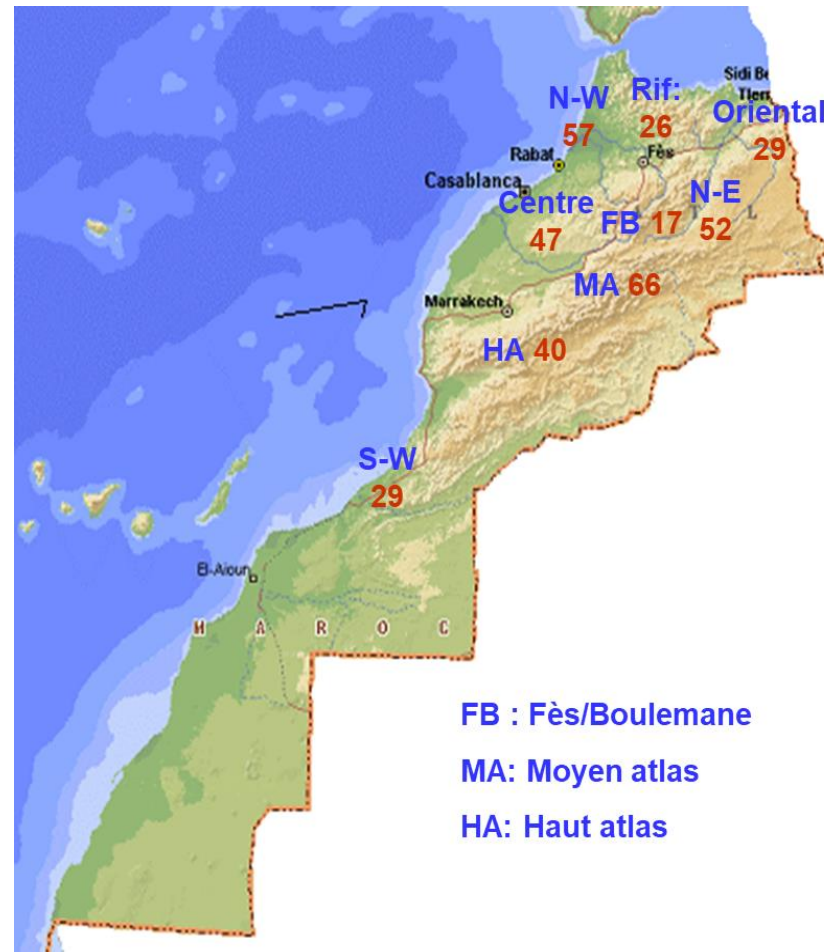
Measured parameters:

Rainfall mainly

Rainfall, temperature and wind direction

❑ **Data collection:** Manual

❑ **Data Transmission:** simple mailing



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Partner Observing Capabilities

Ministry of Interior:

- ☐ **Finality:** Rainfall monitoring, Warning
- ☐ **Organisation :** Wilaya and Provinces (provincial and local authorities)
Co-Managed by DMN
- ☐ **Means :** 470 Rainfall stations
- ☐ **Measured parameters:** Rainfall accumulation
- ☐ **Data Collection:** Manual
- ☐ **Data Transmission:** Radio, monthly mailing, Fax

Partner Observing Capabilities

Private sector: The Moroccan Agency for Solar Energy

- Dozen of automatic stations were acquired and implemented in different parts of the country especially in the South Est and South West of Morocco ;
- These stations are measuring, in addition to usual meteorological variables, direct, global and diffuse solar radiations,
- mobile telecommunication means are used such as GSM and GPRS ,
- A specific agreement was already established between MASEN and DMN that could be extended to include data exchange.



WRC of Morocco

- The WIGOS Regional Center (WRC) in Morocco is expected to play a key role in improving the functioning of the system and ensuring regional coordination and providing guidance, assistance and technical advice to members and regional the implementation of WIGOS at member country level, particularly in North Africa and West Africa.
- The DMN confirmed by official letter from the Permanent Representative that Morocco is willing to host the WIGOS Regional Pilot Center in Africa.
- National and regional Implementation plans were established and resources have been deployed to their achievement.

WRC of Morocco



List of available and requested resources :

	Installation	facilities and resources	Status
1	Five laboratories	Laboratory equipment for calibration of Barometers, thermometers, hygrometers, Rain gauge and solar radiation probes	Existing
2	Computational resources	HPC (8.3 TFlops now and 1 Petaflops by 2020), operational and development servers, archiving robot	Existing
3	Virtualization platform	Physical Servers, Disk Array, and Virtualization Tools	Existing
4	Observing systems test park	Various automatic and semi-automatic stations Alternative solutions applied in response to Minamata convention	Existing
5	Exhibition Park at DMN headquarter	Classic Park and various automatic stations	Existing
6	Training rooms	(for Face to face training sessions): two rooms available at the headquarter of DMN and at the observing Systems Department Training module (according to expertise required)	Existing
7	E-Learning fully equipped remote training room	Training modules to be developed in response to regional needs with possibility of use and / or translation of resources made available by WMO (Example: Uncertainties modules ...)	In project (for the year 2020)
8	Telecommunication Means	RMDCN Redundant High speed internet connexion VPN IP sec are in phase of implementation with African countries as part of the WIS implementation in RA I (GISC Casablanca)	Existing Existing First half of 2020

WRC of Morocco

Main activities to be conducted:

Mandatory activities as RWC	Actions to be conducted by DMN
Facilitate the collection and updating of metadata at the regional level	<ul style="list-style-type: none">• Update the list of WIGOS focal points;• Promote national experience in all RA-1 and WMO meetings;• Leverage DMN tools to facilitate the collection and updating of metadata at the regional level (share of excel sheet, web based dedicated application);• Pilot, for the interested member countries, the action of machine-to-machine exchange with OSCAR / surface.• Encourage the creation of a regional database of metadata
Ensure control of data as part of WIGOS	<ul style="list-style-type: none">• Identify DMN resources to support day-to-day data quality monitoring of WIGOS;• Encourage Regional Telecommunication Centers (RTHs) in the region to participate in this data quality assurance effort;• Apply the data quality incident management system to the concerned national centers in the region (one or two countries as a starting point).
Capacity Building activities	<ul style="list-style-type: none">• Hold a WMO regional workshop for the collection of metadata, the creation of WIGOS identifiers, Incident management system...;• Include in this workshop the WIGOS data quality control module;• Develop a website gathering documents and references useful for the completion of WIGOS activities at the national level.• Promote E-Learning actions: E-modules developed by the DMN or within the framework of the WMO.

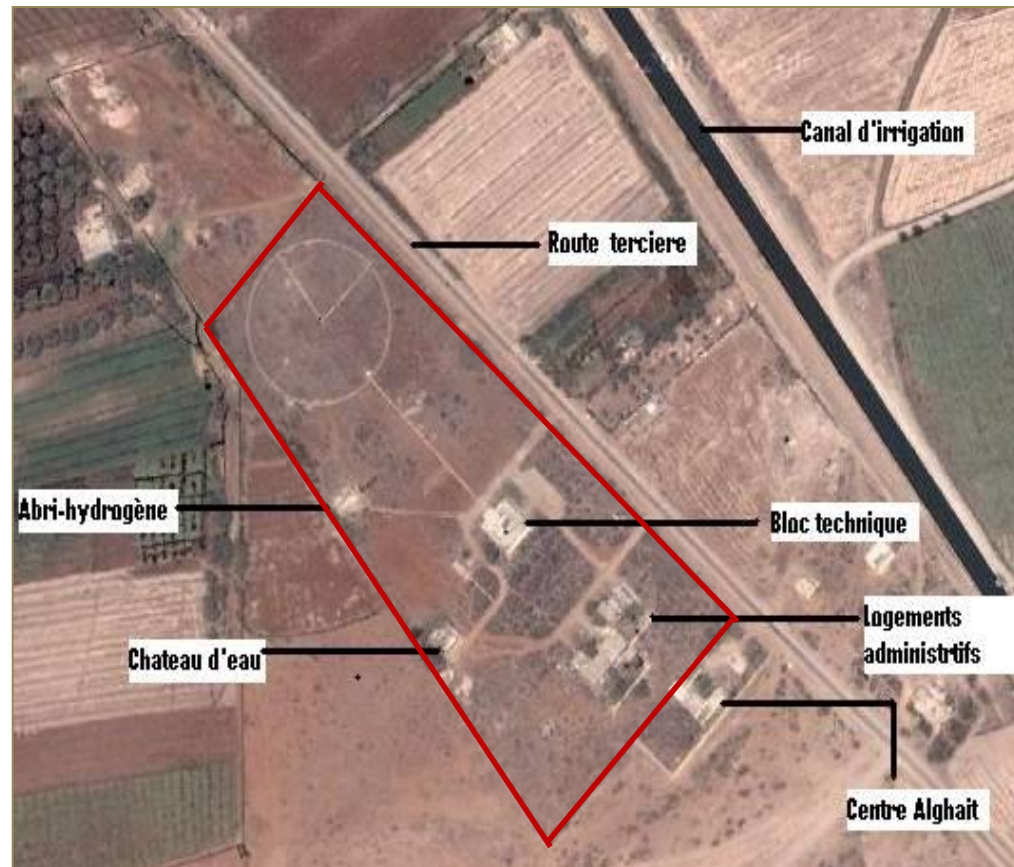
WRC of Morocco

Main activities to be conducted:

- A national committee is officially designated to lead the WRC implementation phase,
- A detailed and prioritized action plan is established for the national implementation of WIGOS,
- An action plan is also established for the implementation of the WRC,
- The two action plans are in the stage of assessment and approval by the top management,
- Actions related to the WIGOS data quality monitoring system need further adjustments depending on the inputs of the present workshop.

WRC of Morocco

Examples of the collected metadata and of the web based software developped :



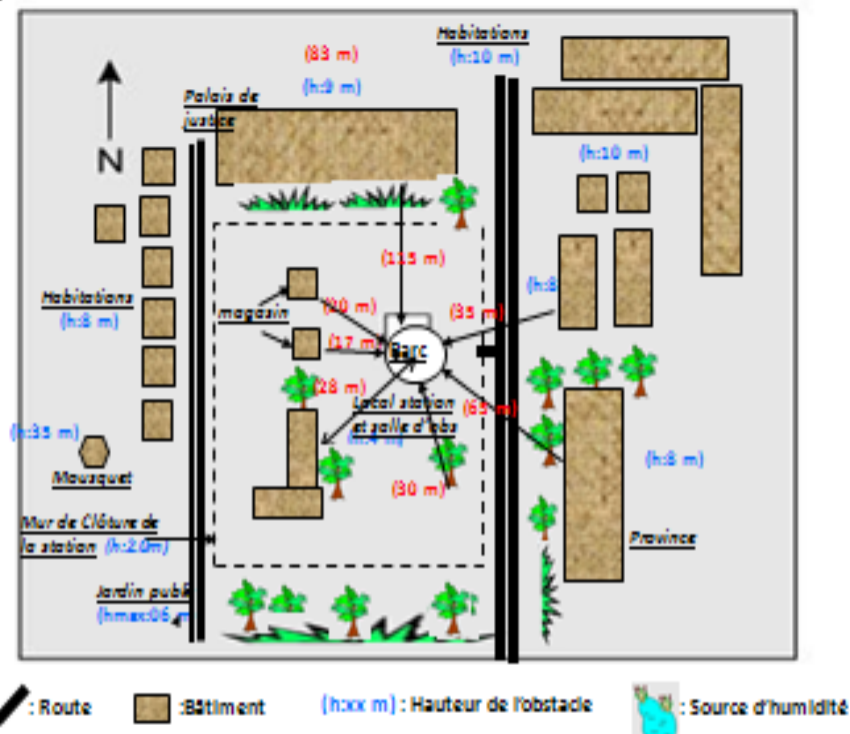
1. Coordonnées

Date de la mise à jour du document: le 18/06/2010

- Nom et code de la station: QUARAZATE (60265 - GMMZ)
- Altitude: 1136 m
- Latitude: 30°36'N

Longitude: 06°54'W

2. Plan de situation:



3. Abri

- Hauteur des capteurs de température et d'humidité: 2.5 m
- Ventilation artificielle: ☐ oui ☒ Non
- Type de surface en dessous de l'abri: Sol Gazonné

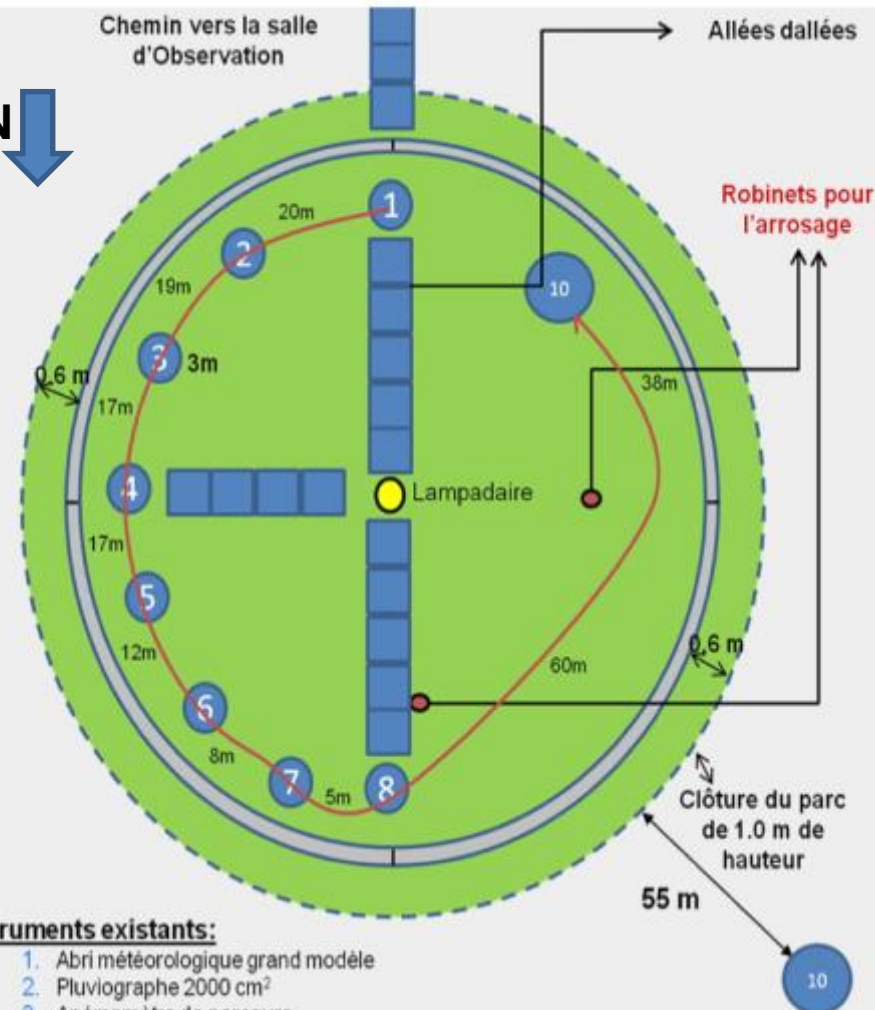
4. Précipitation

- Hauteur du pluviomètre: 1.0 m

5. Vent (Installé à l'aéroport)

- Hauteur de l'anémomètre: 10 m
- Classe* de rugosité du terrain: 03

*: Classe 1: mer ouverte Classe 2: terrain boueux plat, neige, pas de végétation et pas d'obstacles
 Classe 3: terrain plat ouvert, herbe rare, obstacle isolés Classe 4: cultures basses et larges obstacles occasionnels (4/h > 20) Classe 5: cultures élevées, obstacles dispersés 15-45/h > 20



Instruments existants:

- Abri météorologique grand modèle
- Pluviographe 2000 cm²
- Anémomètre de parcours
- Cuve ETR
- Héliographe Campbell
- Thermomètres dans le sol (5, 10, 20, 50 et 100cm)
- Thermomètres au sol (minima et +10 cm)
- Bac classe A
- Cuve ETP
- Pluviomètre Hellman
- Capteurs de mesure du vent à 10m

Dimension et servitude:

- Dimension du parc: ☒ circulaire (de diamètre d=37.5 m) ☐ rectangulaire (L=..m, l=..m)
- Toute la surface du parc est couverte de gazon ou d'herbe locale: ☒ oui ☐ non
- Le gazon est maintenu à une hauteur inférieure à 10 cm: ☒ oui ☐ non
- Eclairage nocturne: ☒ oui ☐ non
- Adduction d'eau: ☒ oui ☐ non

Système BADR v1.2

ACCUEIL

STATIONS

OBSERVATIONS

PARAMÉTRAGE

STATISTIQUE

DÉCONNEXION

Recherche rapide :

Générer un rapport de station par :

Nom du CPM

Réseau

Synop

Indicatif OMNI(OACI)

Région

Valider

DRM NORD-OUEST

DRM NORD-EST

DRM CENTRE-OUEST

DRM CENTRE-EST

DRM CENTRE

DRM SUD

Carte stations :

Plan

Satellite

BADR Copy-Right Maroc-Meteo@2017

Système BADR v1.2

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DRM CENTRE-EST

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DRM SUD

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Plan

Satellite

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Thank you

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WMO OMM

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Organisation météorologique mondiale