



Report on Installation of Automatic Weather Stations in Somalia



Location Somalia

Dates: 7th August -7th September 2023.

Summary

Down2Earth project aims to expand remote sensing and in situ observation capabilities to improve preparedness to water scarcity within Horn of Africa drylands (HAD). By expanding station networks, better preparedness to future risks to water scarcity within the HAD will be realized. The project has procured and installed 10 Automatic Weather Stations (AWS) within Somalia. The identified sites where installation was done are; Qardho in Bari region, Badhan in Sanaag region, Guriceel in Galmudug, Abduwaq in Galgaduud region, Hobyo in Mudug region, Dhobley in Lower Juba, Burao in Togdheer region, Erigavo in Sanaag, Hudur in Bakool region and Doloow.

The support between partners i.e., Ministry of Energy and Water resources, Somali Civil Aviation Authority and Ministry of Agriculture which has made installation run smoothly. All the AWSs have been installed and are operational. Some of the parameters being transmitted by the AWS are Wind speed and Direction, surface Air pressure, Air temperature and relative humidity, solar radiation, precipitation and soil moisture and temperature which are remotely accessed at 15-minute intervals from the AWS network.

Some of the challenges experienced include; Security threat due inter-clan fights or Alshabab fights in some areas. This forced the changes in originally selected sites; Difficulty to fully adhere to the procurement procedures since in most areas it was impossible to secure all materials in one store hence single sourced; Transport connectivity from one station to another was a challenge. In most cases, road transport was used which was very tiring due to the long distances covered and the poor state of some of the roads.

It is constraining to train staff at the same time conducting installation as was the case. There is need to have dedicated training for staff on maintenance of the stations for the data, data analysis and interpretation as this capacity is either low or lacking. Holding user forum from the different sectors (Water, Energy, Aviation, Agriculture and Disaster risk management) is necessary for common support and utilization of AWS products. Periodic sensor calibration of the stations and stocking some spare sensors for purposes of continuity in event of failure is required.

Table of Contents

Summary	2
1.0 Introduction	5
2.0 Training	6
Training on installation procedure of AWS at the Ministry of Energy and water Resource	6
3.1 Guriceel Airport station.	7
3.2 Abduwaq University station.	8
3.3 Qardho Airport station.	9
3.4 Badhan Airport station.	11
3.5 Hobyo Airport station.	13
3.6 Hudur Airport station.	15
3.7 Dhobley airport station.	17
3.8 Doloow Airport station	17
3.9 Buroa Airport station.	19
3.10 Erigavo Airport station.	20
4.0 Challenges during the mission	21
5.0 Conclusion	22
6.0 Recommendations	22

TABLE OF FIGURES

Figure 1: Guriceel data.....	8
Figure 2: Abudwaq data.....	9
Figure 3: Abudwaq data.....	9
Figure 4: Qardho data	10
Figure 5: Badhan data	12
Figure 6: Badhan data	12
Figure 7: Hobyo data	14
Figure 8: Hobyo data	14
Figure 9: Hudur data	16
Figure 10: Buroa data.....	19
Figure 11:Erigavo data.....	20

1.0 Introduction

Somalia is one of the most vulnerable regions in the horn of Africa because of the high degree of vulnerability of the society and the changing patterns of climate extremes such as droughts, floods etc. Somalia Government and the Meteorological Services lack meteorological observations and accurate long period climatological data. Reducing the risks associated with the climate extremes in the country has also been poor due to lack of national economic and development policies that directly incorporate issues related to Disaster risk reduction; and climate variability/change in the programmes and general plans of strongly climate sensitive sectors such as agriculture and food security, health, water resources, infrastructure, transport, energy and settlement, among others. Through theDown2Earth project, the Somalia Meteorological Service will be able to generate downscaled climate early warning information. This will enable key socioeconomic sectors to develop effective and actionable disaster mitigation strategies and contingency plans to facilitate reduction of weather and climate related disaster risks and build resilience and adaptive capacity of community. The project will also build the capacity of the Meteorological Services and sectoral experts, and contributes to building resilient community through community awareness and involvement in the use of climate services in disaster risk reduction. This will improve rural livelihood and enhance sustainable development.

The Automatic Weather Station is the main deliverable from WP4-Task 4.3 on expanding remote sensing and in situ observation capabilities to improve preparedness to water scarcity.

2.0 Training

Training on installation procedure of AWS at the Ministry of Energy and water Resource

The training of the officers from the ministry of Energy and Water resources was conducted for the first four days where the team was taken through the basic installation principles and one station procured by the **Ministry of Energy and water Resource** (MOEWR) under a different project was installed at the Ministry headquarters in Mogadishu town. The team was also trained on the configuration of the data logger and the gateway.



Onsite training at one of the stations and setting the antenna mast base at Buroa Airport station

3.0 Installations AWS stations

The process of installing an automatic weather station requires one to carry out a site survey to ensure that;

- The area is secure for physical security of the station before installations are done
- The area has to have good mobile internet connectivity as that is the medium for data transfer from the remote station to the servers.
- There need to be very little or no obstruction as per the World meteorological Organisation standards of setting up a weather station.
- The actual installation of an AWS station takes a minimum of three days excluding travelling days. The first day is for logistics getting the installation materials on site and fabrication of the enclosure gate and setting the base for the sensor mast. The second day is for the installation of the mast and the sensors. The third day is for the completion of the equipment enclosure, testing and training of the operators

3.1 Guriceel Airport station.

Travelled to Dhusmerab on 6th August and headed straight to the office of the Director General for briefing. We were in the company of Abdinassir Awesis and Abdinur awesis who are engineers from the federal government MOEWR. We headed to Guriceel the next day and held a meeting with the airport management for briefing and survey of the probable site on the installation. We then headed to the town for the procurement of the materials for the installation.

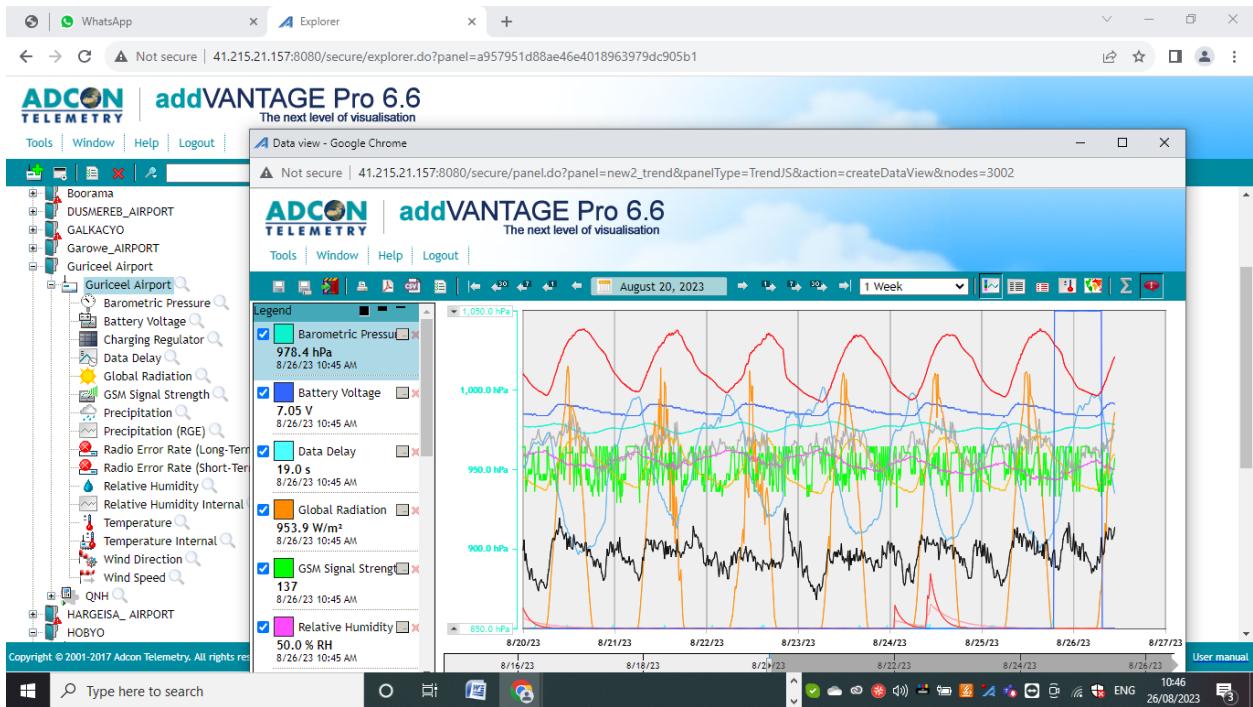


Figure 1: Guriceel data



Guriceel Airport station

3.2 Abduwaq University station.

We travelled from Dhusmerab by road to Abudwaq the distance about 90 Km but the road condition was very poor all the way. On arrival we paid a courtesy call to the university and first held a meeting with the head of the campus where we introduced the team and stated the importance of the Automatic weather station. Afterwards we surveyed the two

areas which they proposed for the installations. The installations went on well as we had carried most of the installation materials from Dhusmerab.

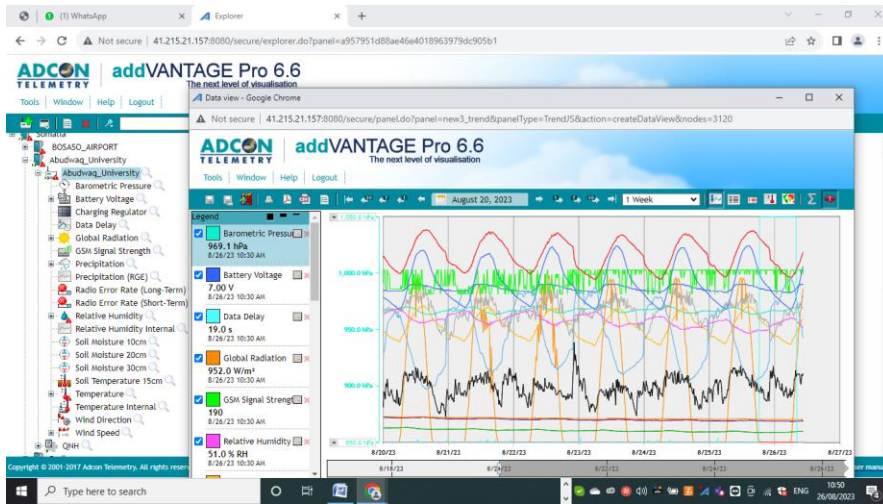


Figure 2: Abudwaq data



Figure 3: Abudwaq data

3.3 Qardho Airport station.

We travelled from Garowe by road to Qardho a journey that took four and half hours leaving Garowe at 6am and arriving at Qardho at 10.30am. The road between the two towns was fairly good the security situation with the area at the time was good. We took

time to get the airport manager who led us to the airport where we conducted a survey for the best location for placing the AWS based on the guiding principles of signal strength and prevalent touch down side of the runway. We there after took the measurements of the enclosure and directed the team embark on the preparation of digging the holes for the fence and base for the mast.

The next phase was for the procurement of the materials and were lucky to get only one hardware store that had the materials we required for the construction of the mast base and the enclosure. We also identified a welding place where we placed the design for the gate for the enclosure and was to be ready the next day.

On the third day we fixed the Mast and installed the seven sensors because of the very rocky and hard surface the soil moisture sensor was not installed. Functionality of the station was tested and we handed it over to the airport manager and conducted a basic maintenance training for the staff.

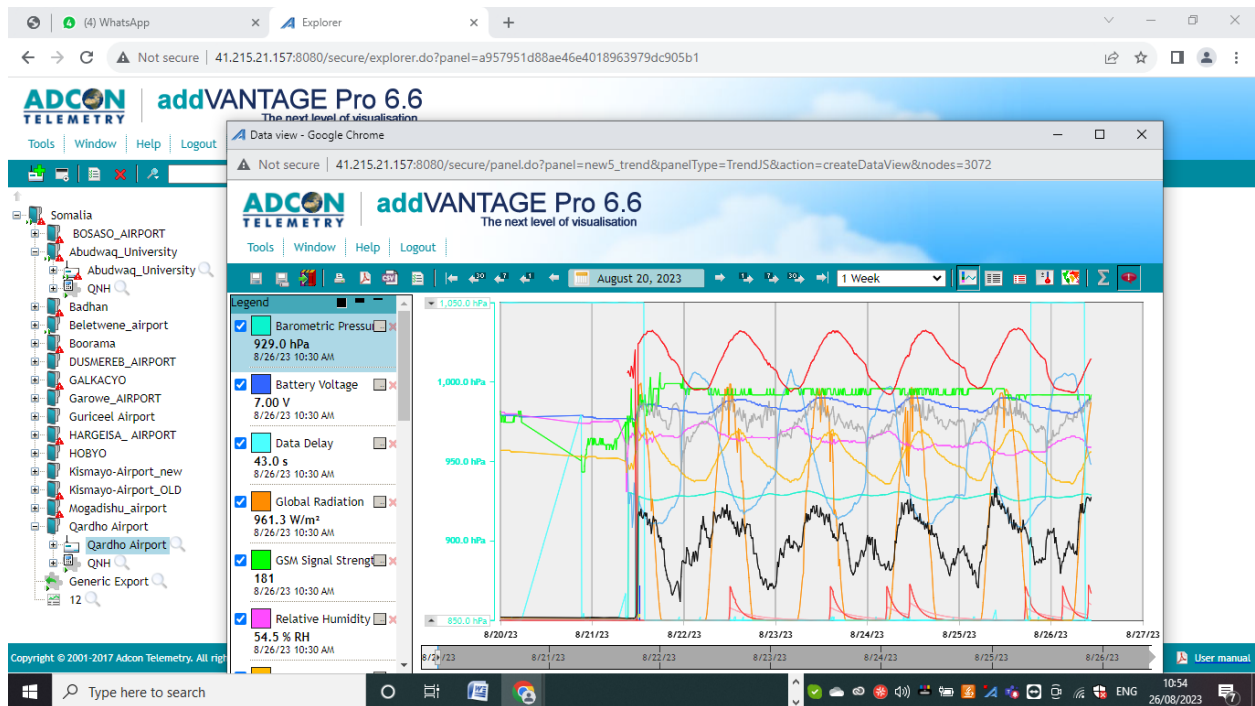


Figure 4: Qardho data



Qardho airport station

3.4 Badhan Airport station.

We travelled from Qardho by road to Badhan a distance of over 450km. We left Qardho at 7am and arrived at Badhan at 4pm in the evening half the distance had a good road network but half had a very rough road which took us three hours to cover a section of 80kms.

We however started the next day early first having a meeting with the airport manager then proceeding to the site for the survey. The rest of the process was as in Qardho airport.

The only slight challenge was on the day of return to Garowe there was clan fight in the neighbourhood of Las anod where there were casualties.

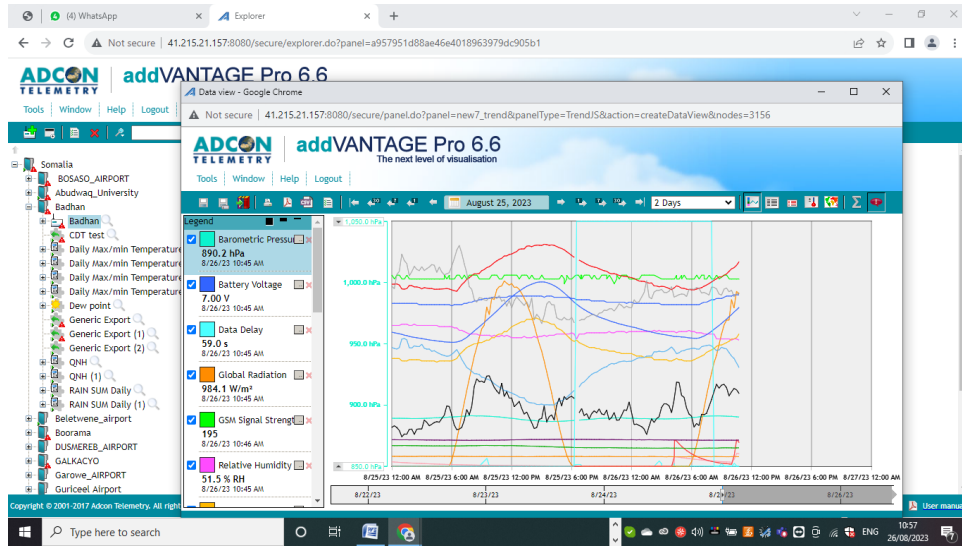


Figure 5: Badhan data

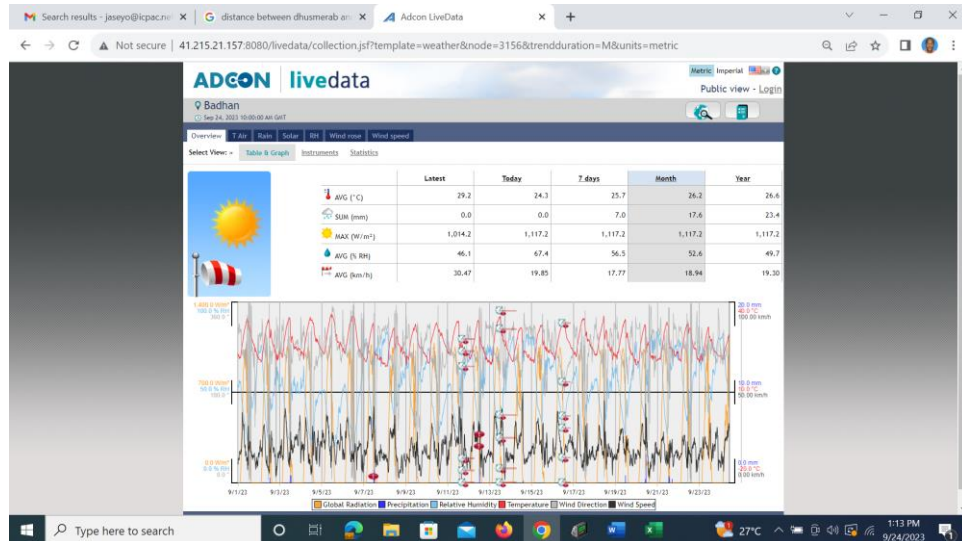


Figure 6: Badhan data



Badhan Airport station

3.5 Hobyo Airport station.

This station was installed by the team from ministry of energy and water resources (MOEWR) together with the team from the Somali civil aviation authority (SCAA). There were no direct flights to Hobyo hence the team had to travel to Galkaio then hire a vehicle to Hobyo 250km away. The road condition was bad and the team using a 4WD vehicle took six hours to the town. They also had to procure all the materials from Galkayo since they were not readily available in the town that was after enquiries. The other installation process went on well and the team was able to independently install and test the station.

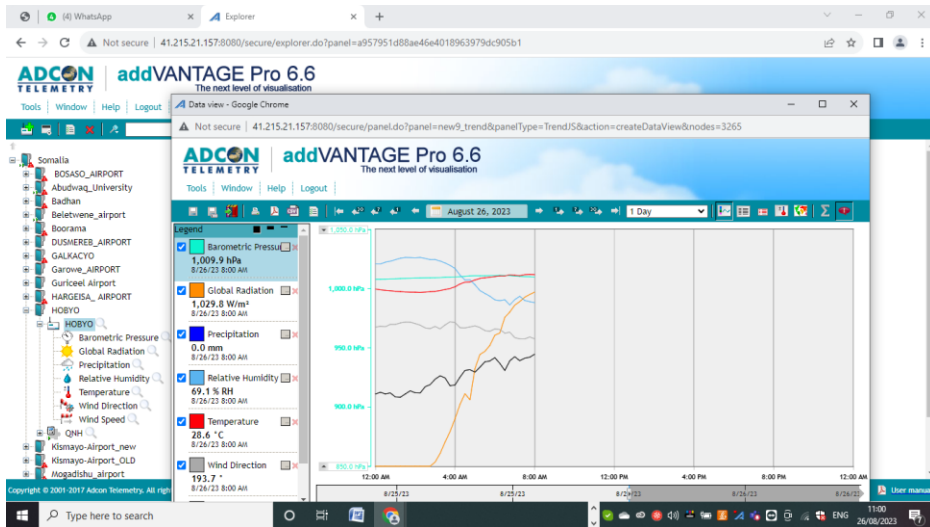


Figure 7: Hobyo data

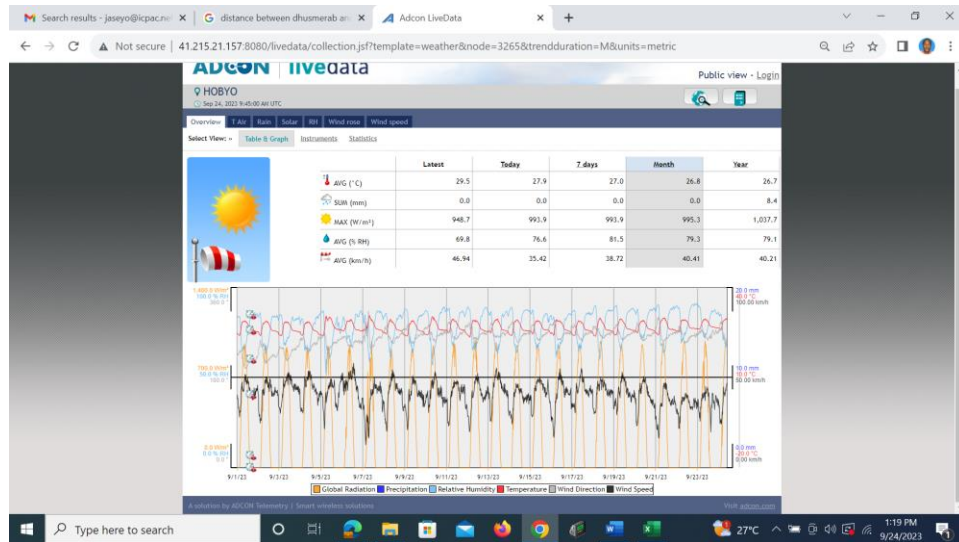


Figure 8: Hobyo data



Hoby station

3.6 Hudur Airport station.

This station was installed by the team from ministry of energy and water resources (MOEWR) together with the team from the Somali civil aviation authority (SCAA). The flew to Hudur after a two week wait because the area is served by only one weekly flight which happened to have been fully booked because the town can only be accessed by air since it is not fully liberated from Alshabab. All the materials were airlifted from Mogadishu making it very expensive. The was to stay in the area for week but were lucky to have gotten a chartered flight which had brought Hormuud telecom engineers to repair a broken telecommunications tower. The other installation processes went on well and the team was able to independently install and test the station.

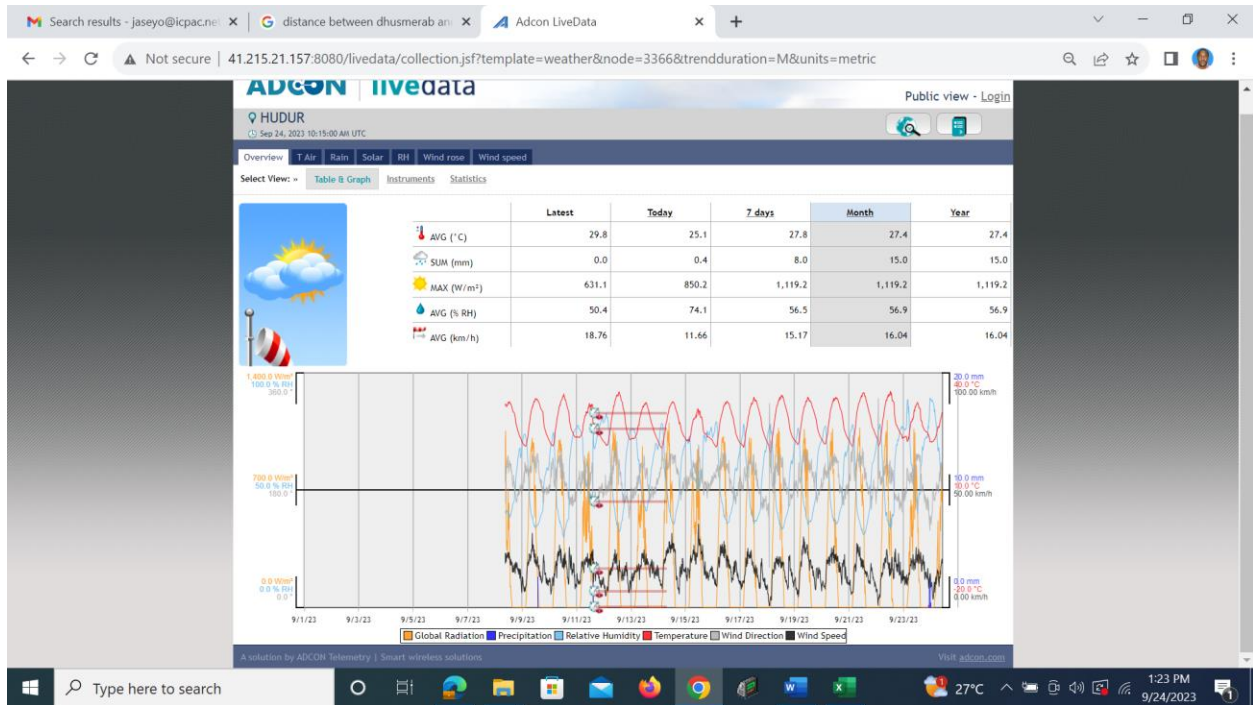


Figure 9: Hudur data



Hudur station

3.7 Dhobley airport station.

This station was installed by the team from ministry of energy and water resources (MOEWR) together with the team from the Somali civil aviation authority (SCAA). The flew to Dhobley there were no much challenges except that the materials were to source from Kismayo all other processes were smoothly done. The other installation processes went on well and the team was able to independently install and test the station.

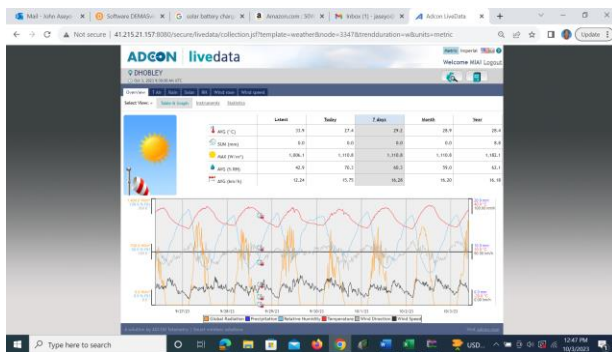


Figure :Dhobley data



Dhobley station

3.8 Doloow Airport station

This station was installed by the team from ministry of energy and water resources (MOEWR) together with the team from the Somali civil aviation authority (SCAA). The flew

to Doloow there were no much challenges except that the materials were to source from neighbouring town of Dolo Ethiopia all other processes were smoothly done except of one challenge where the telescopic boom was partly damaged during transportation and the team had to seek help to have it straightened which was done all ended well. The other installation processes went on well and the team was able to independently install and test the station.



Doloow station

3.9 Buroa Airport station.

We travelled from Hargeisa by road to Buroa a distance of over 340km. We left Hargeisa at 5am and arrived at Buroa at 11am in the Morning. The road from Hargeisa to Berbera was very good but the rest of the distance from Berbera to Buroa was in a bad state but parts of it are under construction. On arrival we went straight to the airport and held a meeting with the airport manager then did a site survey and settled on the preferred site. We went to the town for the procurement of the materials and the fabrication of the enclosure gate. All the installation works began the next day and was completed the day after with the installation of the sensors and the data logger. The station was tested and the staff trained thereafter on the basic maintenance and use of the data.



Figure 10: Buroa data



Buroa Airport station

3.10 Erigavo Airport station.

We travelled from Buroa by road to Erigavo a distance of over 360km. We left Buroa at 7am and arrived at Erigavo at 2pm in the afternoon. The road condition was fairly good all the way. Because of the security situation in the region at the time we were advice to have security escort from the specialized forces which we were accorded. This meant we had to use two vehicles of which one was from the RLAC project and the Ministry of Agriculture provided the two vehicles which we only had to fuel. The Director himself did accompany me to the two sites in Buroa and Erigavo. We did not encounter any challenges along the way to and from Erigavo.

Most of the installation materials were sourced from Buroa. The rest of the processes were like from the other station. The station was well installed tested and the staff trained.



Figure 11: Erigavo data



Erigavo Airport Station

4.0 Challenges during the mission

- i. Getting basic materials was a challenge in some of the towns which led to materials being bought and transported long distanced due to non-availability in some of the selected site.
- ii. Because of the nature of the installations, it was difficult to fully adhere to the procurement procedures since in most areas we seldom found more than one store that fully stocked the materials we required hence single sourced.
- iii. Transport connectivity from one station to another was a challenge. In most cases, road transport was used which was very tiring due to the long distances covered and the poor state of some of the roads.
- iv. The security threats in areas like Badhan, Erigavo and Hudur where there was either Clan fights or Alshabab but the areas were very important for the sake of climatological importance they had.
- v. The one-month time for installation was insufficient and led to exhaustion
- vi. Poor network connectivity at some sites made getting the best place for installing the stations a challenge since good network coverage was key to the choice of a site.
- vii. Very rocky ground in some sites made it difficult in earthing the stations and providing a good ground for lightening protection and also making it difficult to even install the perimeter fence of the enclosure.

5.0 Conclusion

All the ten Automatic Weather stations that were procured have been installed, tested and are currently operational transmitting data on hourly basis to ICPAC server. Two stations in Hudur and Doloow had delays during the installation period due to security challenges hence by the time we were handing over only eight stations had been installed hence the hand over report by the MOEWR indicates only eight stations. Data is being received and readily available to the stakeholders on a near real-time basis. Three staff each from the Ministry of energy and water resources and Somali civil aviation authority were trained and supported during installation of some stations.

6.0 Recommendations

- i. There is need for more long-term training for the meteorological staff in both the civil aviation, ministry of agriculture and other line ministries who requested the same during the mission.
- ii. There is need to train more staff not only on the installation and maintenance, but also on data processing and utilization.

Annexes:

Station list and location maps

Location of AWS installed under the Down2Earth project, Somalia			
No	District Name	Region	zones
1	Qardho	Puntland	Bari
2	Hafun	Puntland	Bari
3	Eragabo	Somaliland	Sanaag
4	Abud wak	Galmudug	Galgadud
5	Hobyo	Galmudug	Mudug
6	Bula-berde	Hirshebele	Hiiraan
7	Hudur	Southwest	Bakol
8	Bardhere	Juba land	Gedo
9	Barawe	juba land	lower shebele
10	Afmadow	juba land	lower juba

