Automatic Weather Station Data Tool (ADT) Installation and Training at ANACIM

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Workshop Report

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Accelerating the Impact of CGIAR Climate Research for Africa

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About AICCRA reports
Titles in this series aim to disseminate interim climate change, agriculture, and food security research and practices and stimulate feedback from the scientific community.

About AICCRA
Accelerating Impacts of CGIAR Climate Research in Africa (AICCRA) is a project that helps deliver a climate-smart African future driven by science and innovation in agriculture. It is led by the Alliance of Bioversity International and CIAT and supported by a grant from the International Development Association (IDA) of the World Bank. Explore AICCRA's work at aiccra.cgiar.org

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About the Authors

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Acronyms

AICCRA	Accelerating the Impact of CGIAR Climate Research for Africa project
ANACIM	*Agence Nationale de l'Aviation Civile et de la Météorologie*
AWS	Automatic weather station
IRI	International Research Institute for Climate and Society

Introduction

The recent expansion of meteorological observation networks has focused on the use of Automatic Weather Stations (AWS). Automatic Weather Stations offer a number of advantages including automated reporting at a very fine temporal resolution (15 minutes on average). The challenge many National Meteorological Services (NMS) have been facing with the exploitation of AWS data is that different initiatives and donors have been providing different types of AWS from different vendors, leading to different AWS systems and networks. The data collected by these different AWS systems are in different formats and may sit on different computers. Although there are applications that come with each AWS network to access and visualize AWS data, access to the data is still done manually and station by station. This complicates data access, processing, and use. In addition, data from the different AWS networks is in different formats, which makes it even more difficult to analyze all the data without additional tools or applications that can convert the data into a common format and combine the data from the different networks. As a result, accessing, processing, and using these data has been a major impediment to the use of data from these varieties of AWS.

The Automatic Weather Station Data Tool (ADT) is a web-based application developed to alleviate these and other related challenges with access and use of AWS data. ADT has an easy-to-use graphical user interface and enables NMS to access, process, quality control, analyze, visualize, and disseminate data from different AWS systems in one place. In November-December 2022, Rija Faniriantsoa worked with staff of Senegal's NMS, ANACIM, to install ADT to manage its AWS networks, and to train staff to maintain ADT.

Summary of Activities

ADT at ANACIM has been installed and operationally running. ANACIM has 2 AWS networks: ADCON[1] and PULSONIC.[2] The ADCON AWS network has 218 stations, 204 of which are rain gauges only and 14 have several meteorological parameters measurement. The PULSONIC AWS network has 16 stations measuring several meteorological parameters.

An advanced training on maintaining ADT was planned, but due to the late access to the server hosting the ADCON data, ADT implementation was way behind schedule, thus we were running out of time. In addition, only one ANACIM staff was introduced to the maintenance of ADT, many of the staff were not available at that time. The training given on the maintenance of ADT consists of the introduction of ADT structure, ADT web application and user creation. We had 2 hours remote training after I left Dakar to better understand the user creation procedure and the access level of each user. In the same way, the training for the use of ADT web application was not possible due to the time limitation we have and the staff unavailability, many of the staff interested to the training were on a mission outside Dakar at that time.

The screen shots below illustrate the ADT installation at ANACIM, and its use to process automatic weather dataion data.

[1] https://www.adcon.com
[2] http://www.pulsonic.com/en/home/

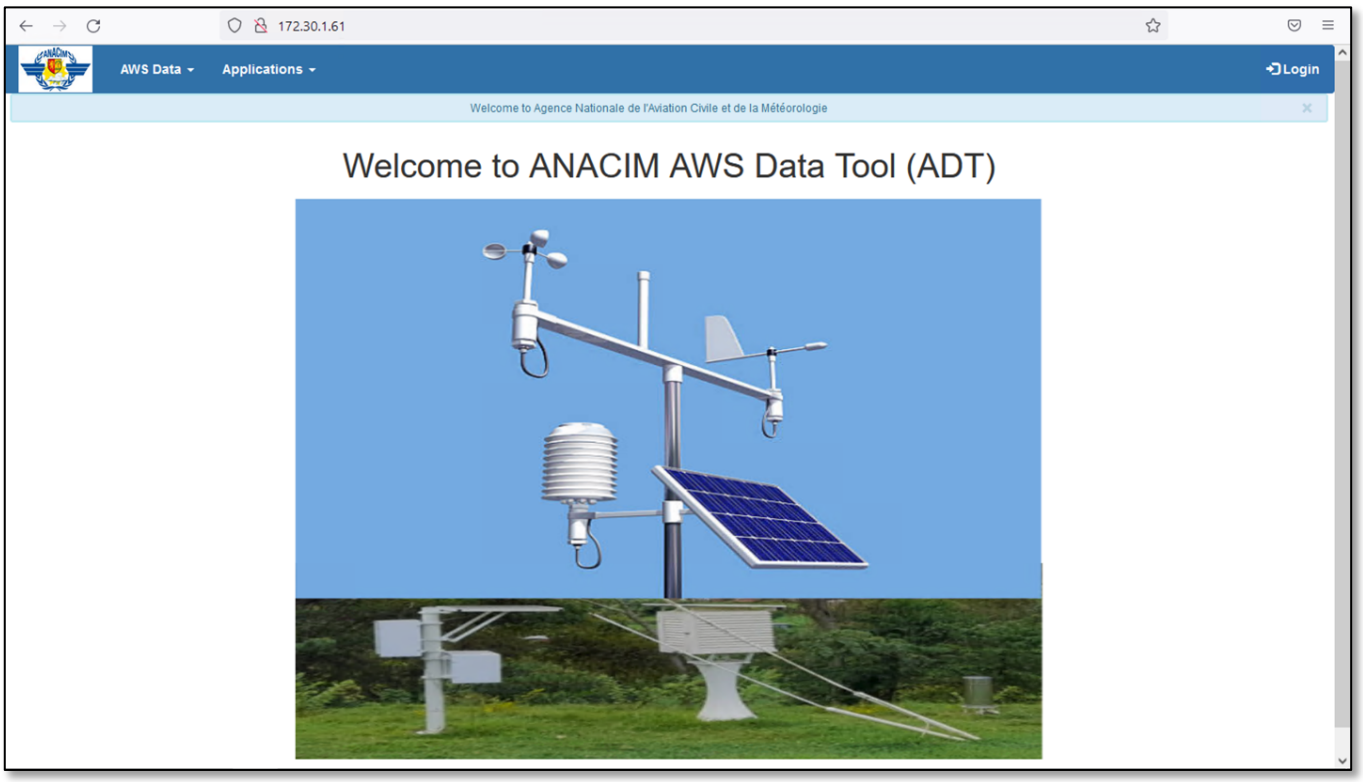

Figure 1. ANACIM ADT welcome page.

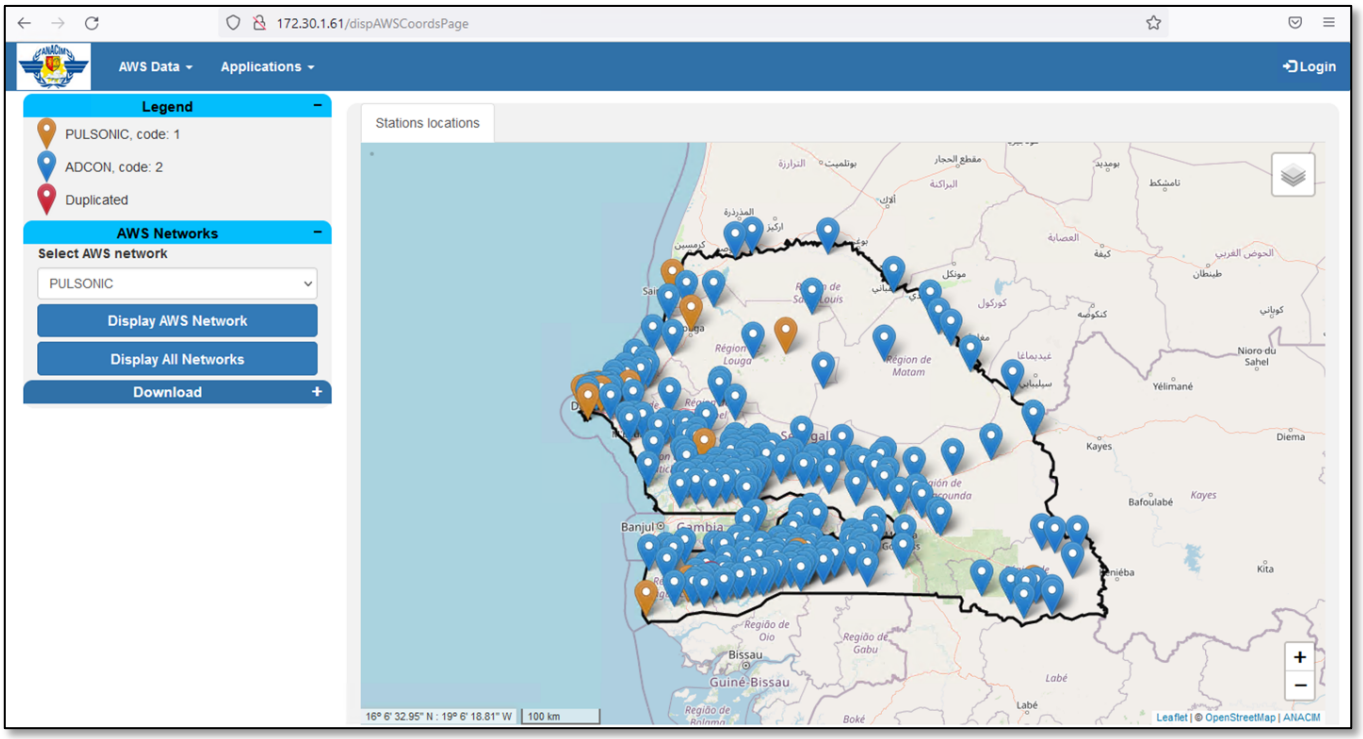

Figure 2. ANACIM AWS networks page.

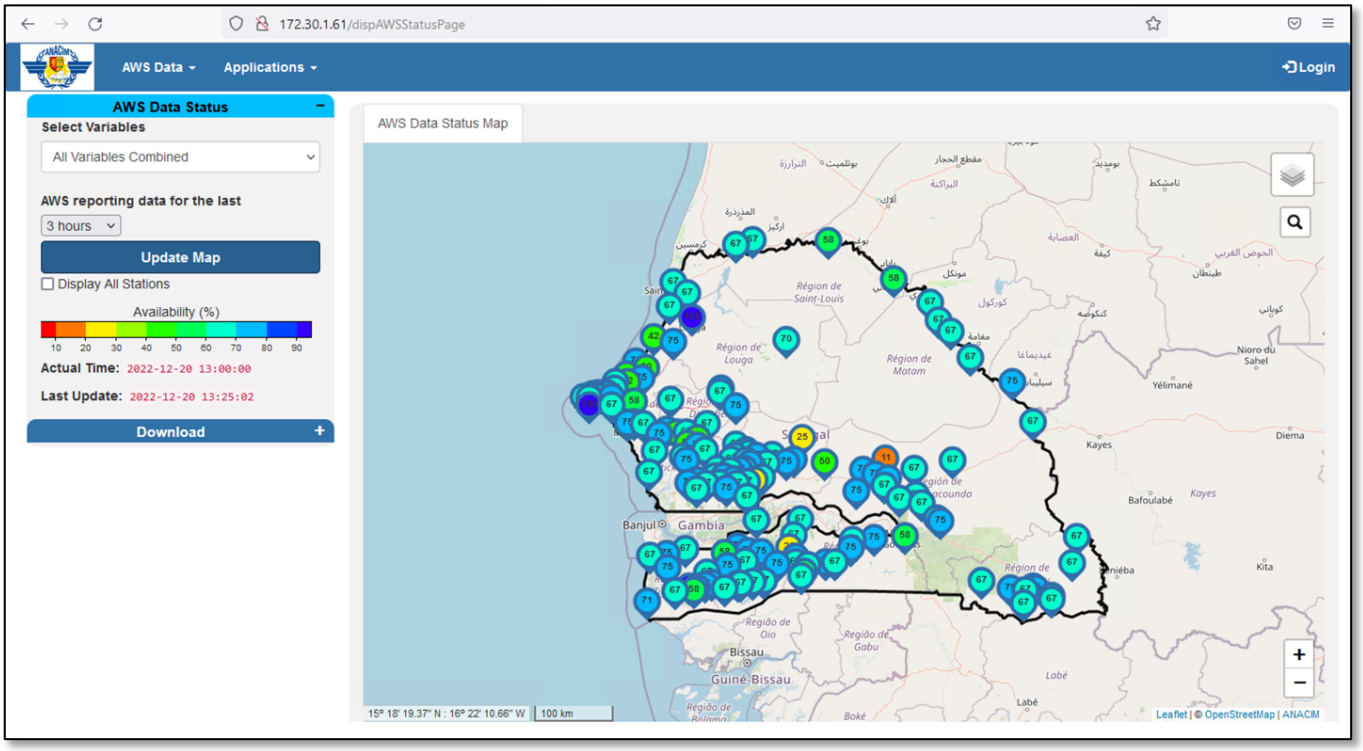

Figure 3. AWS data reporting status page.

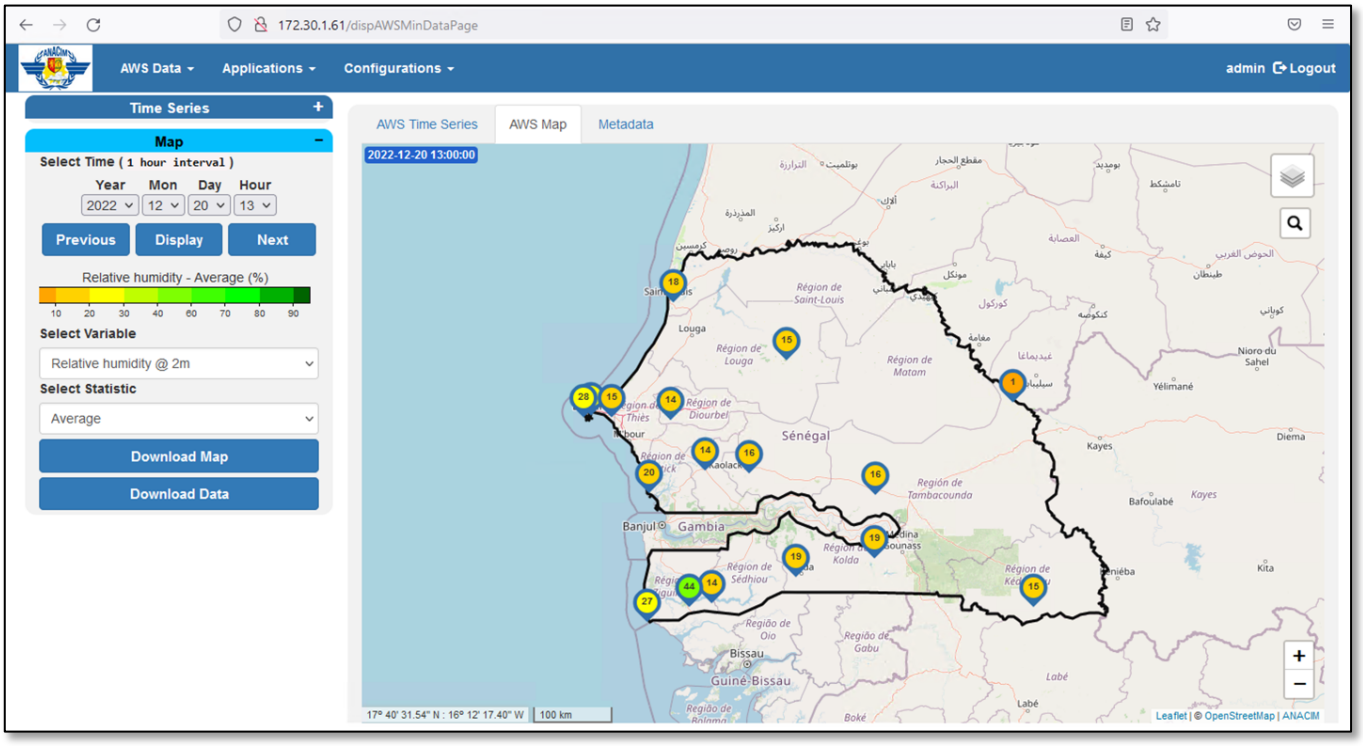

Figure 4. Map of relative humidity data at 2 meter above ground on 2022-12-20 13:00:00 UTC.

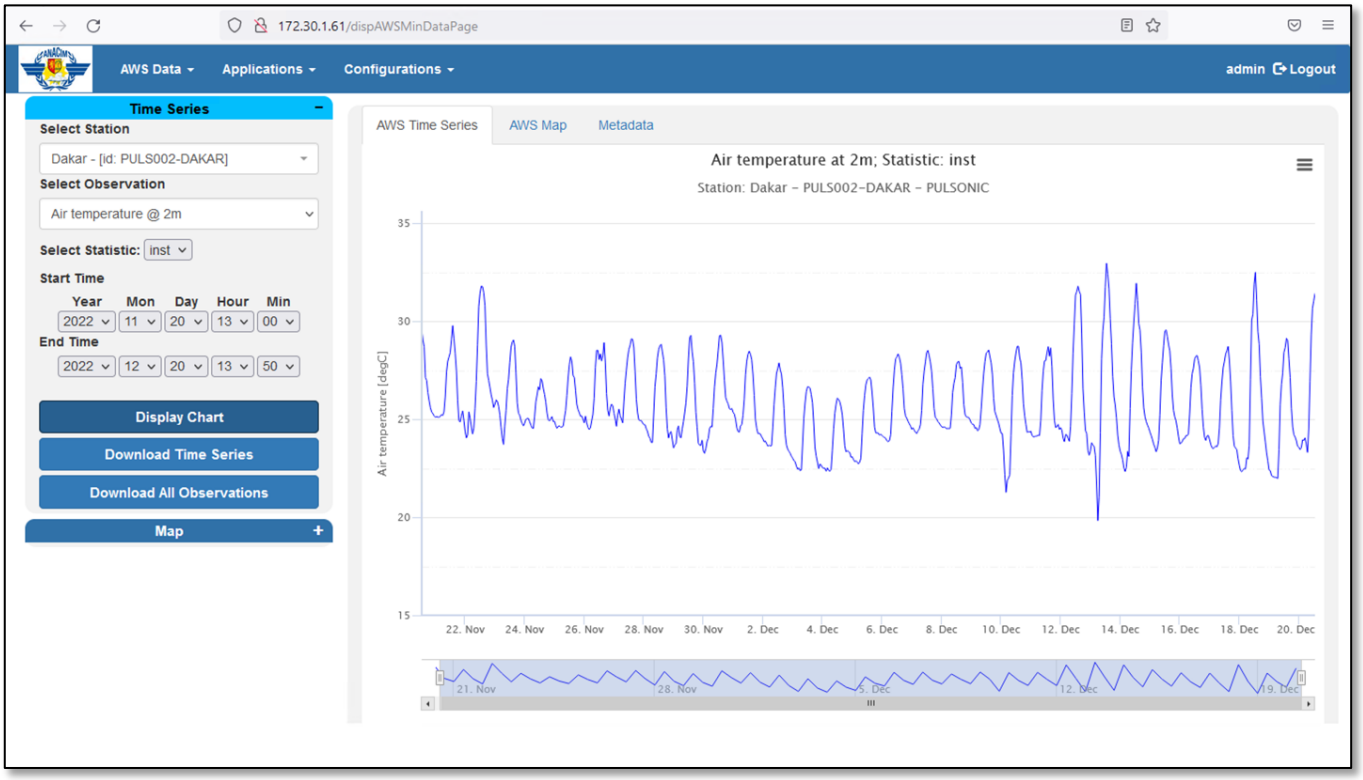

Figure 5. Chart of the instantaneous air temperature at 2 meter above ground for Dakar station from 2022-11-20 13:00:00 UTC to 2022-12-20 13:50:00 UTC.

Conclusions and Recommendations

ADT is web-based application with an easy-to-use graphical user interface allowing the user to

- visualize any data (times series and maps) from different AWS networks without going through the hustle of getting and formatting the data for each AWS and for each AWS network;
- download a standardized and quality controlled data from one or all AWS from the different AWS networks; and
- check which AWS is reporting data and whether each sensor is working.

ADT is fully operational at ANACIM, and accessible via ANACIM local network, and the internet with the URL http://213.154.77.59:8585/. The ADT installation ANACIM now allows ANACIM staff to easily visualize and access AWS data at once from their two different AWS networks. A user account is needed to access the data.

Time constraints and limited availability of ANACIM staff prevented in-depth training on ADT. Although ADT is fully operational, further training is meeded for staf to maintain the system, and to use the web application effectively. Two training programs are recommended for ANACIM staff.

Maintenance of ADT for IT Staff will cover the following topics:

- *Introduction to ADT*, covering: structure of ADT the ADT Web Application, and User creation;
- *ADT server*, covering: updating packages, and checking the system; and
- *AWS network servers*, covering: updating packages, editing the AWS list, and adding new stations and parameters.

Use of the Web Application for ANACIM users will cover the following topics:

- *Introduction to ADT*; and
- *Navigation and understanding maps and graphs*, covering: AWS metadata, AWS status, AWS original time steps, and AWS aggregated data, AWS aggregated selection, rainfall accumulation, wind data, and mean sea level pressure.

Appendix

Activity Participants

No	M/F	Organization	Location
1	M	Civil Aviation and Meteorology Service in Senegal (ANACIM)	Dakar
2	M	Civil Aviation and Meteorology Service in Senegal (ANACIM)	Dakar
3	M	IRI, AICCRA	New York

AICCRA
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The CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS) brings together some of the world's best researchers in agricultural science, development research, climate science and Earth system science, to identify and address the most important interactions, synergies and tradeoffs between climate change, agriculture and food security. For more information, visit us at https://ccafs.cgiar.org/.

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