

Angola Climate Data Rescue and Quality Control Flagging System: Period of 1961 to 1974

TASK 141



Nídia Loureiro¹; Carlos Ribeiro²; Sílvio Filipe³; Désia Nóbrega⁴

¹Data Rescue for Task 141, Instituto Superior Politécnico Tundavala (ISPT), Environmental Department, Contact: loureiro.nidia@gmail.com; ²Principal Investigator for the Task 141 “Development of Meteorological Observation Conditions in Angolan Southwest – Province of Namibe and Slopes of Serra da Chela” Head of ISPT’s Environmental Department, Contact: cribeiroenator@gmail.com; ³Data Rescue and AWS maintenance, Contact: silviogualtermanuel@gmail.com; ⁴Data Rescue for Task 141. Contact: desiadaiana@hotmail.com

Background

Climate data of Angola from the period of 1961 to 1974 was rescued by the Instituto Superior Politécnico Tundavala (ISPT) from the Coimbra University archives. The project is linked and sponsored by SASSCAL within the Task 141. The importance of assessing climate change is primordial to plan adaptive measures, to assure population livelihood around the globe, and to create resilience and sustainable development. Therefore, it is of high importance to assemble all the information to assess climate change regionally, and create a knowledge base for decision making.

Milestones

- # Digitize 14 years of Climate Data for Angola.
- # Compile the Data into a Database.
- +
- # Apply a Quality Control Flagging System.
- # Correct the Data from inconsistencies and Errors.

Methodology

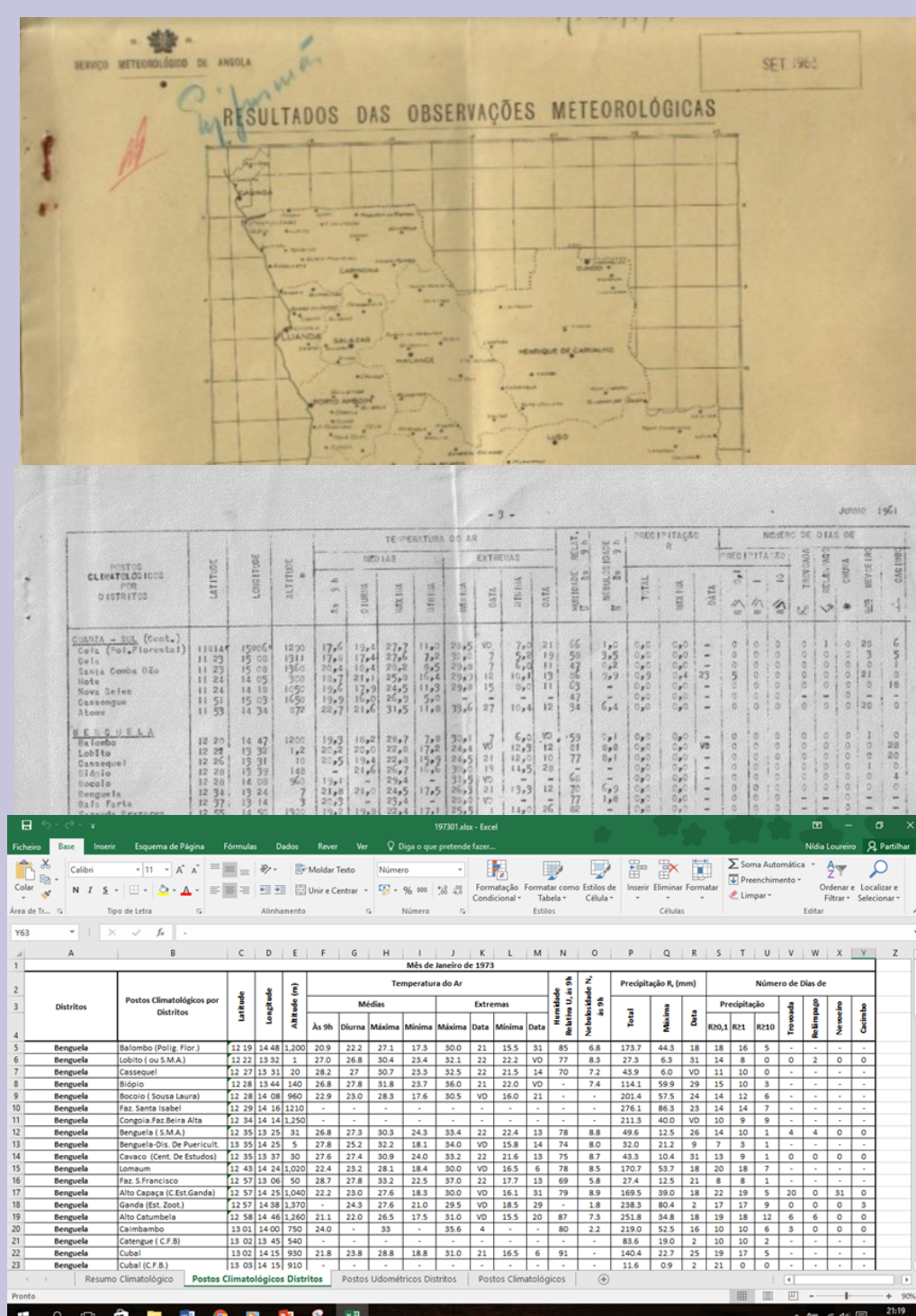


Figure 1. Original Verbatim Cover, Original Climatological Table, Excel spreadsheets with digitized data.



Table 1
Tolerance Test Discription, Intrinsic Test was created to be more acertive considering data characteristics.

Variables	TEST 1		TEST 2	
	Standard Range	Intrinsic Range		
Air Temperature	From - 80 to +60 °C (Daily) from 0 to 500.0	From -10 to + 45 (Monthly) 850.0 ≤ Prec.Total ≥ Prec. Maximum		
Precipitation	mm	mm		
Humidity	From 0 to 100 %	From 30 to 100 %		
Nebulosity	From 0 to 10	–		
Dates	1 to 31 (days in a month)	–		
Number of days	0 to 31	–		

The data gathers monthly summaries of recorded meteorological observations organized in three Tables. The first table stores measurements of climatological stations, the second stores rainfall data from udometric stations, the third stores evaporations estimates from the main hydrological basins. Each station is linked to its own District or Province and holds three geographical coordinates, latitude, Longitude and elevation.

All tables were digitized into Excel spreadsheets and compiled with R (R program Language) following data organization. A Quality Control was developed in R for flagging erroneous data. Consistency and Tolerance Tests were applied to the Data using WMO guidelines for Quality Control of monthly data.

Table 2
Consistency Test applied differently in each variable.

VARIABLE	Type	CONSISTENCY TESTS				
		Test 3	Test 4	Test 5	Test 6	Test 7
TEMPERATURA DO AR	tempMed.0h	tempMed.0h < tempMed.0h	tempMed.0h > tempMed.0h	–	–	–
	tempMed.0h	tempMed.0h < tempMed.0h	tempMed.0h > tempMed.0h	–	–	–
	tempMed.0h	tempMed.0h < tempMed.0h	tempMed.0h > tempMed.0h	–	–	–
	tempMed.0h	tempMed.0h < tempMed.0h	tempMed.0h > tempMed.0h	–	–	–
	tempMed.0h	tempMed.0h < tempMed.0h	tempMed.0h > tempMed.0h	–	–	–
	tempMed.0h	tempMed.0h < tempMed.0h	tempMed.0h > tempMed.0h	–	–	–
PRECIPITAÇÃO	prec.Total.mm	prec.Total.mm < prec.Total.mm	prec.Total.mm > prec.Total.mm	–	–	–
	prec.Total.mm	prec.Total.mm < prec.Total.mm	prec.Total.mm > prec.Total.mm	–	–	–
HUMIDADE	humidade.0h	–	–	–	–	–
	humidade.0h	–	–	–	–	–
NUBILIDADE	nebulosidade.0h	–	–	–	–	–
	nebulosidade.0h	–	–	–	–	–

Results

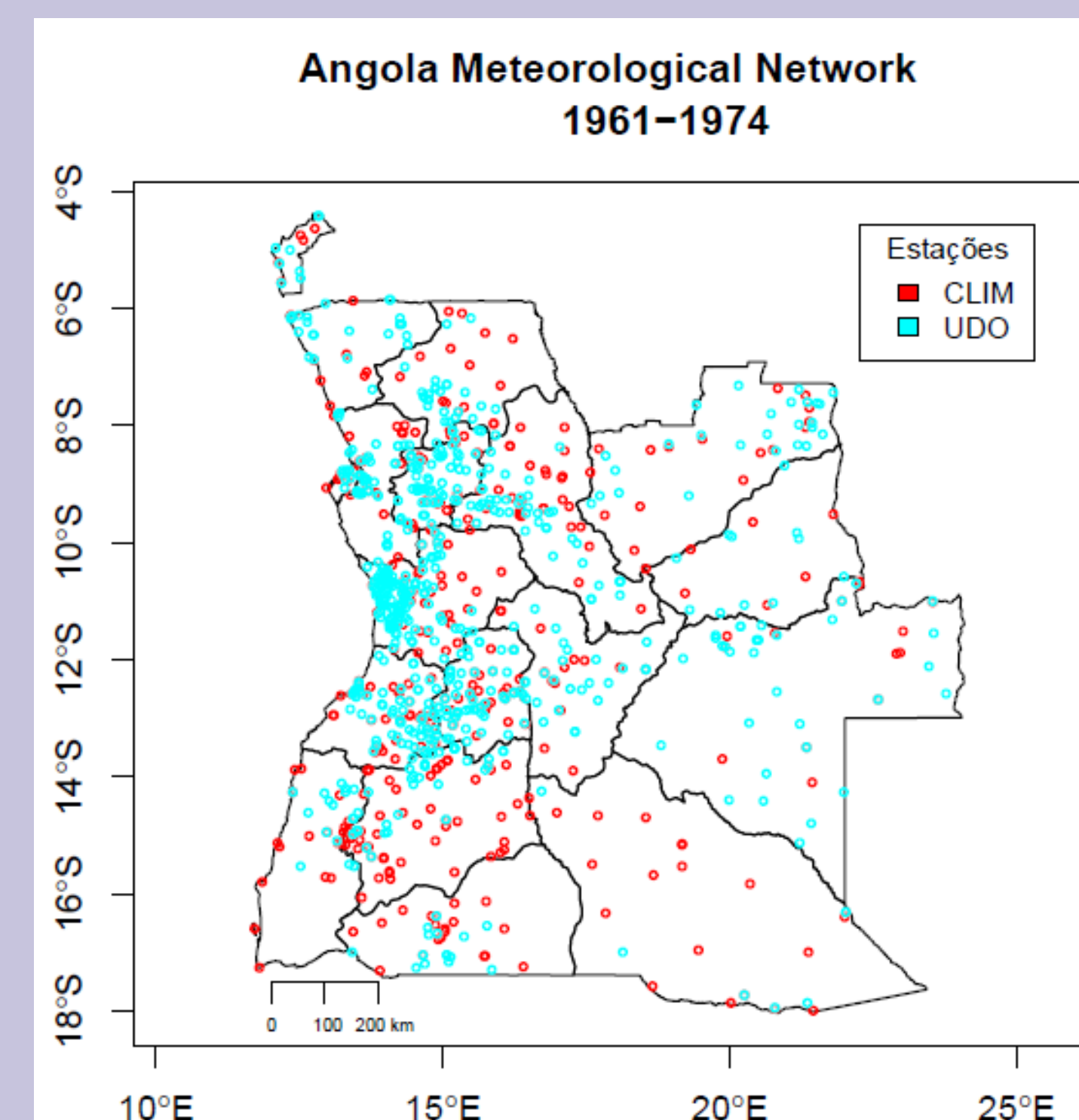


Figure 2. Angola Meteorological Network from the period of 1961 to 1964 with both Climatological and Udometric stations

By using R it was possible to compile the data into a database and apply algorithms to clean and correct the data inconsistencies and errors. Identifications (ID's) were assigned to Stations, Districts and Hydrological Basins. A unique station list was created to each type of station to quantify the Meteorological Network. Our assessment indicates the existence of 380 climatological stations, 686 udometric stations and 54 hydrological basins stations. Geographical coordinates were converted from (DMS) coordinates values to decimal degrees (dd).

Table 3
Unique Climatological station list with dates from first to last observations

Station_CLIM.ID	Station Name	District Name	District.ID	Start year	Start month	End year	End month	Total months
stCLIM180	Bimbe (Zoot.)	Huíla	dtCLIM17000	1971	1	1973	9	32
stCLIM259	Cupacaça	Huíla	dtCLIM17000	1961	10	1974	7	134
stCLIM260	Chipindo	Huíla	dtCLIM17000	1971	10	1974	7	31
stCLIM261	Caconda	Huíla	dtCLIM17000	1961	10	1974	5	142
stCLIM262	Caconda (Administração)	Huíla	dtCLIM17000	1966	8	1974	7	61
stCLIM263	Uaba 1	Huíla	dtCLIM17000	1961	10	1974	7	141
stCLIM264	Uaba 2	Huíla	dtCLIM17000	1961	10	1974	5	138

Table 4
Unique Climatological station list with dates from first to last observations

Station_UDO.ID	Station Name	District Name	District.ID	Start year	Start month	End year	End month	Total months
stUDO01	Tando Zinze	Cabinda	dtUDO1000	1961	10	1963	3	14
stUDO02	Luvo	Congo	dtUDO2000	1961	10	1973	6	61
stUDO04	Pedra do Felício	Congo	dtUDO2000	1961	12	1964	5	16
stUDO05	Porto Rico	Congo	dtUDO2000	1961	10	1963	3	21
stUDO06	Bungo	Congo	dtUDO2000	1961	10	1965	9	49
stUDO08	Fazenda Loge	Congo	dtUDO2000	1961	10	1974	7	139
stUDO09	Mabubas (ou Oledo)	Luanda	dtUDOS0000	1961	10	1972	9	108
stUDO10	Boavista (Tentativa)	Luanda	dtUDOS0000	1961	10	1974	7	102

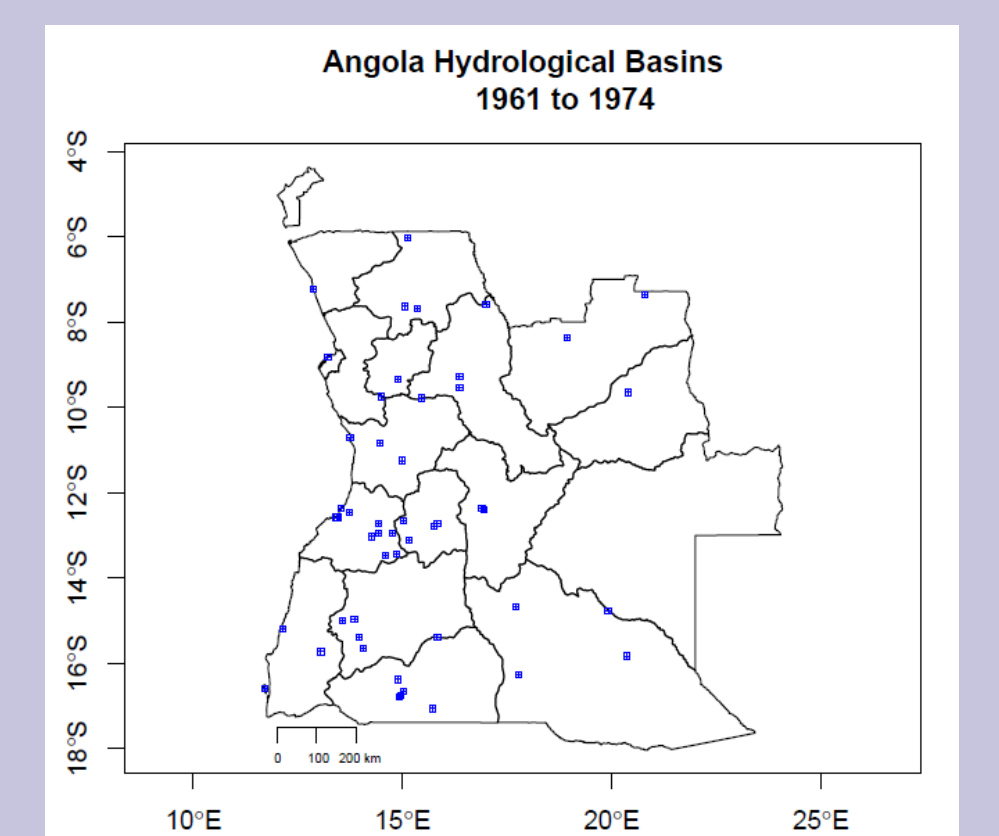


Figure 3. Hydrological Basins Locations

Table 4
Unique station with evaporation and evapotranspiration estimates for the main hydrological basins with dates from first to last observations

Station_EVAP.ID	Station Name	Hydro Basin Name	Hydro Basin ID	Start year	Start month	End year	End month	Total months
HEVAP01	AMBRIZETE	LITORAL	hBEVAP01	1966	1	1974	7	78
HEVAP02	LUANDA	LITORAL	hBEVAP01	1966	1	1974	7	102
HEVAP03	LOBITO	LITORAL	hBEVAP01	1966	1	1974	7	102
HEVAP04	MOÇIMEDES	LITORAL	hBEVAP01	1966	1	1974	7	101
HEVAP05	HEMOQUE DE CARVALHO	ZAIRE	hBEVAP02	1966	1	1974	7	94
HEVAP06	DUNDO	ZAIRE	hBEVAP02	1966	1	1974	7	102
HEVAP07	CARBONA (S.M.A)	LOJE	hBEVAP03	1966	1	1974	7	102
HEVAP08	Enxada Reg. De Camama	LOJE	hBEVAP03	1973	10	1974	5	16
HEVAP09	SILVA PORTO	CUANZA	hBEVAP04	1966	1	1972	6	73
HEVAP10	MALANGE	CUANZA	hBEVAP04	1966	1	1974	7	100
HEVAP11	ESTACAO REGIONAL DO AMBOM	QUEVE	hBEVAP05	1966	1	1974	7	73

Conclusion and Discussion

The Task 141, concludes with success, and with an extra step with respect to the milestones set at the beginning of the project, Data Rescue, Quality Control (Error Flagging System) and error Correction. The database will be available to all users from, ISPT, INAMET and SASSCAL weathernet sites. Taking into consideration that Data rescue is a time demanding process, the task fulfils it upon project's horizon. It is one step forward towards the full recovery of Angola's historical record.

Future

- * Analyse climate series.
- * Continue improving Quality Control.
- * Continue Data Rescue in Angola.
- * Collect/compile climate data of ships observations on the occidental African coast.
- * Reunite all Angola available data rescued by other projects.
- * Improve and apply QC and Homogenization to the rescued data.

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Metadata

A Metadata file was produced in order to inform the user of Data characteristics, however little information is provided in the original verbatim. All the procedures and changes executed in R are explained in detail in the Metada. All the scripts and codes produced during this process will be available at INAMET and ISPT for future use.