Algeria, 1991-2020 Climatological Normals

The WMO Member provided data for 47 stations in individual Comma Separated Values (CSV) files.

Users are advised to note that for stations above 750 meters in elevation, the values provided in the Mean Sea Level Pressure field (Parameter 6) were the average of the geopotential height at the level of the standard altitude 850 hPa rather than the average pressure at sea level. For these stations NCEI changed the Parameter 999, Mean_850hPa_Geopotential_Height, and there is no Mean Sea Level Pressure.

The list of all CSV files is provided below. Those providing geopotential height rather than MSLP are indicated in Bold font. Those at an elevation greater than 750 meters but not reporting this Parameter are indicated in italics font.

Excel Files	**CSV Files**
N/A	Adrar_60620.csv **AinSefra_60560.csv** AlgerDarElBeida_60390.csv Annaba_60360.csv *Batna_60468.csv* *BBArreridj_60444.csv* BBMokhtar_60686.csv **Bechar_60571.csv** BejaiaAeroport_60402.csv BeniAbbes_60602.csv BeniSaf_60518.csv Biskra_60525.csv Chlef_60425.csv Constantine_60419.csv **Djanet_60670.csv** **Djelfa_60535.csv** **ElBayadh_60550.csv** ElGolea_60590.csv *ElKheiter_60540.csv* ElOued_60559.csv Ghardaia_60566.csv HassiMessaoud_60581.csv Illizi_60640.csv InAmenas_60611.csv InSalah_60630.csv JijelAeroport_60351.csv **Mecheria_60549.csv** **Medea_60437.csv** Miliana_60430.csv Mostaganem_60457.csv

	Naama_60557.csv OranSennia_60490.csv Ouargla_60580.csv **OumElBouaghi_60421.csv** **Saida_60536.csv** *Setif_60445.csv* SidiBelAbbes_60520.csv Skikda_60355.csv **SoukAhras_60423.csv** **Tamanrasset_60680.csv** *Tebessa_60475.csv* **Tiaret_60511.csv** Timimoun_60607.csv Tindouf_60656.csv TiziOuzou_60395.csv TlemcenZenata_60531.csv Touggourt_60555.csv

Benin, 1991-2020 Climatological Normals

The WMO Member provided a single Excel file containing unformatted Monthly Normals values for six (6) stations containing 15 Parameters. NCEI reformatted the data for 13 parameters into the standard WMO Normals format (6 CSV files) with a naming convention in keeping with the standard. These 13 parameters are indicated in Bold font below. NCEI also computed annual Normals from the monthly Normals for the Primary parameters when all months were available with at least 24 years of data.

Precipitation Total
Number of Days with Precipitation
Daily Maximum Temperature
Daily Minimum Temperature
Daily Mean Temperature
Mean Sea Level Pressure
Vapor Pressure
Total Number of Hours of Sunshine
Mean Station Level Pressure
Wind Speed
Wind Direction
Relative Humidity
Evapotranspiration
Minimum Relative Humidity
Maximum Relative Humidity

Users are asked to note that for station Kandi, several Parameters were found to be clearly inaccurate. For example, temperatures were far too high in several months and the maximum, minimum, and mean temperatures were not comparable to each other. The parameters Vapor Pressure and Average Relative Humidity also appeared inaccurate. In consultation with the WMO, NCEI removed these parameters from the file Kandi_65306.csv.

The 1991-2020 Normals for Benin were formatted into the Standard Normals format by NCEI. The unformatted data are provided in the original Excel file.

Excel Files	**CSV Files**
normal 91-20.xls	Bohicon_65338.csv Cotonou_65344.csv Kandi_65306.csv Natitingou_65319.csv Parakou_65330.csv Save_65335.csv

Burkina Faso, 1991-2020 Climatological Normals

The WMO Member provided data for 10 stations in individual Comma Separated Values (CSV) files. Additional Explanatory information provided by the WMO Member is included below this table.

Excel Files	CSV Files
	BOBO-DIOULASSO_65510.csv BOGANDE_65504.csv BOROMO_65516.csv DEDOUGOU_65505.csv DORI_65501.csv FADA-NGOURMA_65507.csv GAOUA_65522.csv OUAGADOUGOU_65503.csv OUAHIGOUYA_65502.csv PO_65518.csv

AGENCE NATIONALE DE LA METEOROLOGIE (ANAM-BF)	météo Burkina	**NATIONAL METEOROLOGICAL AGENCY (NAMA-BF)**

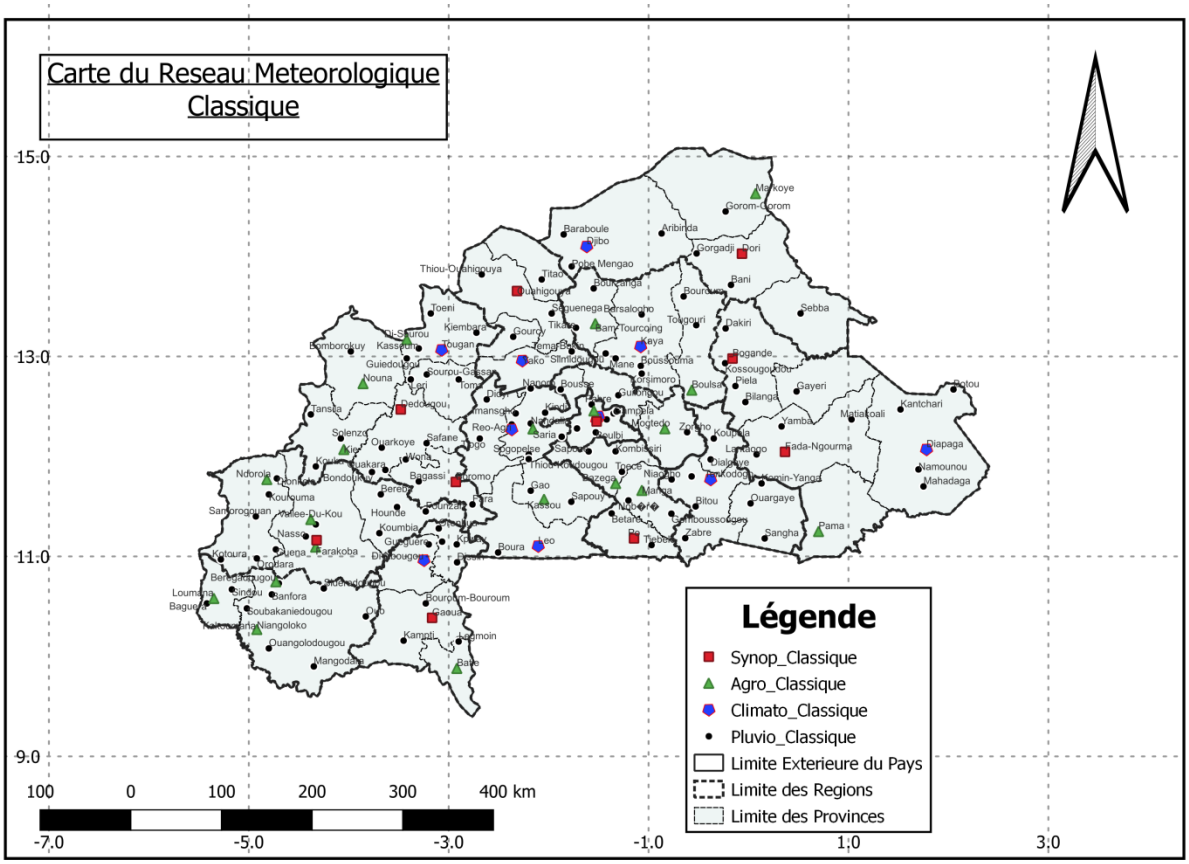
PROCEDURE POUR L'HOMOGENEISATION ET LE CALCUL DES NORMALES CILMATIQUES A L'AIDE DE L'OUTIL « CLINO.R »

I. HOMOGENEISATION DES DONNEES JOURNALIERES

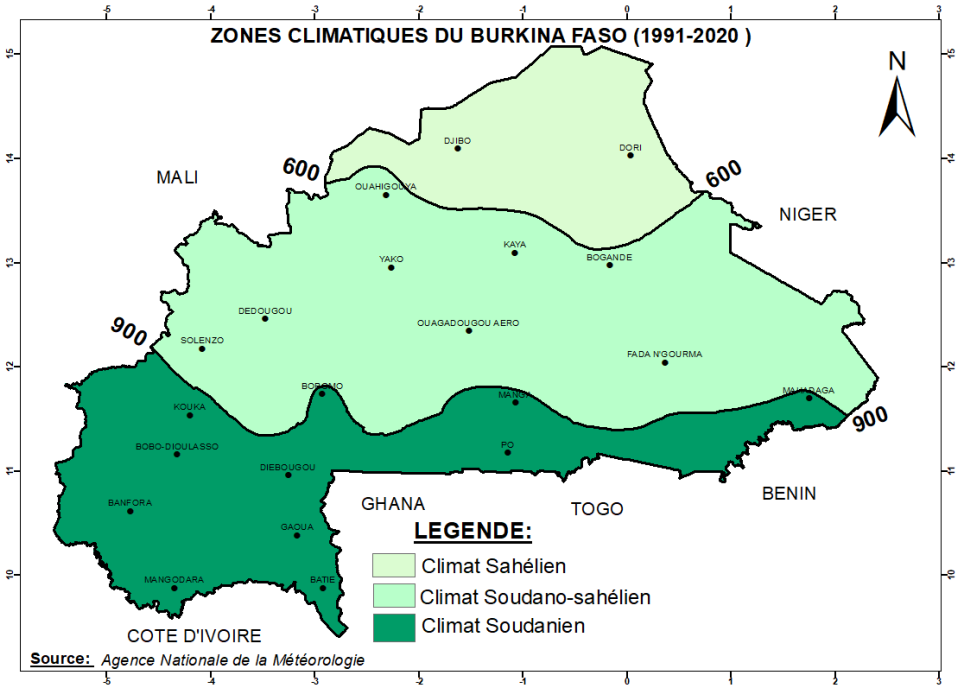
L'Agence Nationale de la Météorologie du Burkina Faso possède dans sa base de données une série qui remonte depuis les années 1902 pour la précipitation. Pour effectuer l'homogénéisation, les données de température minimale, maximale et moyenne, d'insolation et précipitation de 1980 à 2021 ont été utilisées ; par contre, vue la période de la bonne disponibilité des données de l'humidité relative minimale et maximale, elles vont de 1981 à 2021.

Les données de température, d'insolation et d'humidité sont uniquement disponibles au niveau des dix (10) stations synoptiques que compte le Burkina Faso (Voir Carte du réseau classique), pourtant les

données de précipitation sont l'ensemble des stations (Voir Carte météorologique du réseau classique, les stations synoptiques sont en carré rouge, les stations climatologiques en triangle vert, les stations agroclimatologiques en pentagone violet, et les postes pluviométriques en point noir).



L'ensemble des données de température, d'insolation et d'humidité sur les stations synoptiques ont été utilisé pour l'homogénéisation. Pour l'homogénéisation des données de précipitation, les stations ont été reparties par zones climatiques (Voir Carte des zones climatiques, période de référence 1991-2020).



Ci-dessous la codification par paramètres pour l'exécution de l'homogénéisation :

Homogeneisation des temperartures (minimales, maximales et moyennes)

csv2climatol('tmoy.csv',datacol = 1:5 ,stnfile = 'stations.csv', stncol = 1:5, varcli = 'tmoy',header= TRUE, sep= ",", dec=".", anyi = 1980, anyf = 2021,na.strings='NA')
dd2m('tmoy',1980,2021)
homogen('tmoy-m', 1980,2021,dz.max = 6)
homogen('tmoy',1980,2021,metad=T,dz.max=15)
dahstat('tmoy',1980,2021,stat='series')

Homogeneisation des humidites relatives minimales et maximales

csv2climatol('rh_min.csv',datacol = 1:5 ,stnfile = 'stations.csv', stncol = 1:5, varcli = 'rh_min',header= TRUE, sep= ",", dec=".", anyi = 1981, anyf = 2021,na.strings='NA')
dd2m('rh_min',1981,2021)
homogen('rh_min-m', 1981,2021,dz.max = 6,vmin=0,vmax=100)
homogen('rh_min',1981,2021,metad=T,dz.max=15,vmin=0,vmax=100)
dahstat('rh_min',1981,2021,stat='series')

Homogeneisation de l'insolation

csv2climatol('insolation.csv',datacol = 1:5 ,stnfile = 'stations.csv', stncol = 1:5, varcli = 'insolation',header= TRUE, sep= ",", dec=".", anyi = 1980, anyf = 2021,na.strings='NA')
dd2m('insolation',1980,2021)
homogen('insolation-m', 1980,2021,dz.max = 6,std=2)
homogen('insolation',1980,2021,metad=T,dz.max=12,std=2)
fix.sunshine('insolation',1980,2021)

```
dahstat('insolation',1980,2021,stat='series')

# Homogeneisation des precipitations de la zone sahelleienne
#setwd('/home/lazare/Documents/Homog_temp/Zone_sahelienne/')

csv2climatol('pluie_sahel.csv',datacol = 1:5 ,stnfile = 'zone_sahelienne.csv', stncol = 1:5, varcli =
'rr_1',header= TRUE, sep= ";", dec=",", anyi = 1980, anyf = 2021,na.strings='NA')

dd2m("rr_1",1980,2021)
homogen("rr_1-m",1980,2021,dz.max = 15,snht1 = 20, std = 2,gp = 4)
homogen("rr_1",1980,2021,dz.max = 25,nref= 1, std = 2,gp = 4,metad = TRUE)
dahstat('rr_1',1980,2021,stat='series')

######################### Homogeneisation des precipitations de la #zone soudano sahelienne
##############

setwd('/home/lazare/Documents/Homog_temp/Zone_soudano_sahelienne/')
csv2climatol('pluie_soudano_sahel.csv',datacol = 1:5 ,stnfile = 'zone_soudanno_sahelienne.csv', stncol =
1:5, varcli = 'rr_2',header= TRUE, sep= ";", dec=",", anyi = 1980, anyf = 2021,na.strings='NA')

dd2m("rr_2",1980,2021)

homogen("rr_2-m",1980,2021,dz.max = 15,snht1 = 20, std = 2,gp = 4)
homogen("rr_2",1980,2021,dz.max = 25,nref= 1, std = 2,gp = 4,metad = TRUE)
dahstat('rr_2',1980,2021,stat='series')

############################################################

#########################rr_3: zone soudannienne###############
#setwd('/home/lazare/Documents/Homog_temp/Zone_soudanienne/')

csv2climatol('pluie_soudanienne.csv',datacol = 1:5 ,stnfile = 'zone_soudanienne.csv', stncol = 1:5, varcli
= 'rr_3',header= TRUE, sep= ";", dec=",", anyi = 1980, anyf = 2021,na.strings='NA')
dd2m("rr_3",1980,2021)

homogen("rr_3-m",1980,2021,dz.max = 15,snht1 = 20, std = 2,gp = 4)
homogen("rr_3",1980,2021,dz.max = 25,nref= 1, std = 2,gp = 4,metad = TRUE)
dahstat('rr_3',1980,2021,stat='series')
```

II. FICHIERS INDISPENSABLES

Pour le calcul des normales climatiques avec l'outil « CLINO.R » (un code source en R fournie par l'OMM), il nous faut, en dehors des fichiers de données, cinq (5) fichiers principaux :

1. Le code source : « ***CLINO.R*** » ;
2. Le fichier descriptif des codes de calculs : « ***CLINO_calculations.csv*** » ;

3. Le fichier descriptif des codes de paramètres « ***CLINO_parameters.csv*** » (différent du code élément dans les bases de données climatiques), il a été adapté pour prendre en compte l'humidité relative minimale et maximale respectivement aux codes paramètres 993 et 992 ;
4. Le fichier descriptif des codes stations et leurs coordonnées : « ***CLINO_stations*** » ;
5. Le fichier descriptif des variables dont les normales seront calculées : « ***CLINO_variables*** », il a été adapté pour prendre en compte l'humidité relative minimale et maximale.

III. ADAPTATION DES FICHIERS

La période de données sélectionnée des dix (10) stations synoptiques va de 1991 à 2020.

IV. EXECUTION DE CLINO

Tous fichiers doivent être dans un même dossier.

- Lancer R ou Rstudio ;
- Pointer le dossier avec setwd("D:/Users/……") ;
- Saisisser « source('CLINO.R') » et exécuter ;
- Saisisser « CLINO() » et exécuter.

V. ENVOIE DES FICHIERS

Les normales climatiques sont à envoyer au secrétariat de l'OMM sous l'adresse email suivante : wcdmp@wmo.int. Veuillez utiliser l'objet suivant pour votre soumission: «CLINO [nom du pays/territoire]».

VI. Liste Des Stations

StCode	WMOid	WIGOSid	Latitude	Longitude	Elevation	StName	Country
200001S	65503	0-20000-0-65503	12.35	-2.18	303	OUAGADOUGOU	Burkina Faso
200026S	65501	0-20000-0-65501	14.03	-0.03	276	DORI	Burkina Faso
200035S	65502	0-20000-0-65502	13.58	-2.43	335	OUAHIGOUYA	Burkina Faso
200054S	65505	0-20000-0-65505	12.47	-3.48	299	DEDOUGOU	Burkina Faso
200085S	65504	0-20000-0-65504	12.98	-0.16	294	BOGANDE	Burkina Faso
200089S	65507	0-20000-0-65507	12.07	0.35	308	FADA NGOURMA	Burkina Faso
200099S	65510	0-20000-0-65510	11.17	-4.3	459	BOBO DIOULASSO	Burkina Faso
200107S	65516	0-20000-0-65516	11.73	-2.92	270	BOROMO	Burkina Faso
200114S	65518	0-20000-0-65518	11.17	-1.15	321	PO	Burkina Faso
200140S	65522	0-20000-0-65522	10.33	-3.18	292	GAOUA	Burkina Faso

Cabo Verde, 1991-2020 Climatological Normals

The WMO Member provided data for three (3) stations in individual Comma Separated Values (CSV) files.

The list of CSV files is provided below.

Excel Files	**CSV Files**
N/A	MINDELO_8583.csv PRAIA_8589.csv SAL_8594.csv

Cameroon, 1991-2020 Climatological Normals

The WMO Member provided data for five (5) stations in individual Comma Separated Values (CSV) files.

The list of CSV files is provided below.

Excel Files	**CSV Files**
N/A	DOUALA_64910.csv GAROUA_64860.csv MAROUA_64851.csv NGAOUNDERE_64870.csv YAOUNDE_64950.csv

Central African Republic, 1991-2020 Climatological Normals

The WMO Member provided three (3) Excel files. NCEI converted each of these files to Comma Separated Values (CSV) files to aid in quality control, mapping, and comparison to Normals from other countries.

Users are asked to note:

1) NCEI found the field for Latitude, Longitude and Elevation in each Excel file to be improperly formatted. e.g., 64650 04°24'N18°31'E 365 m. NCEI placed these fields into the proper format in the CSV files.
2) For station Bangui, the Annual totals for Precipitation and three additional Parameters (Number of Days with Haze/Smoke, Number of Days with Mist, and Number of Days with Fog/Mist) appeared to have been computed incorrectly. The latter three were all 81.2 while the annual total for Precipitation matched the correct annual total for a different station. The Annual Normal values for these Parameters were recomputed by NCEI as the sum of the monthly values and placed in the CSV files. The XLS files contain the originally reported values.
3) NCEI computed annual Normals for the three stations from the Monthly values and included them in the respective CSV files.

The original Excel files are provided along with the CSV files produced by NCEI.

Excel Files	**CSV Files**
Bangui_64650.xls Berberati_64600.xls Bouar_64601.xls	Bangui_64650.csv Berberati_64600.csv Bouar_64601.csv

Côte d'Ivoire, 1991-2020 Climatological Normals

The WMO member provided data for 14 stations in individual Excel files. NCEI converted these files to Comma Separated Values (CSV) files to aid in quality control, mapping, and comparison to Normals from other countries.

The original Excel files are provided along with the CSV files produced by NCEI.

Excel Files	**CSV Files**
ABIDJAN_65578.xlsx	ABIDJAN_65578.csv
ADIAKE_65585.xlsx	ADIAKE_65585.csv
BONDOUKOU_65545.xlsx	BONDOUKOU_65545.csv
BOUAKE_65555.xlsx	BOUAKE_65555.csv
DALOA_65560.xlsx	DALOA_65560.csv
DIMBOKRO_65562.xlsx	DIMBOKRO_65562.csv
GAGNOA_65557.xlsx	GAGNOA_65557.csv
KORHOGO_65536.xlsx	KORHOGO_65536.csv
MAN_65548.xlsx	MAN_65548.csv
ODIENNE_65528.xlsx	ODIENNE_65528.csv
SANPEDRO_65594.xlsx	SANPEDRO_65594.csv
SASSANDRA_65599.xlsx	SASSANDRA_65599.csv
TABOU_65592.xlsx	TABOU_65592.csv
YAMOUSSOUKRO_65563.xlsx	YAMOUSSOUKRO_65563.csv

Egypt, 1991-2020 Climatological Normals

The WMO Member provided data for 11 stations in individual Comma Separated Values (CSV) files.

Users are asked to note the following.

1) In the absence of annual normals, NCEI computed annual values for the Primary Parameters from the monthly Normals when all months were available.

The list of CSV files is provided below.

Excel Files	**CSV Files**
N/A	AbuSimbel_62419.csv AlexandriaNouzha_62318.csv Asswan_62414.csv CairoAP_62366.csv HurghadaAP_62463.csv Luxor_62405.csv MersaMatruh_62306.csv Minya_62387.csv PortSaidElgamil_62332.csv Salloum_62305.csv SharmElSheikhAP_62460.csv

Gambia, 1991-2020 Climatological Normals

The WMO Member provided data for 10 stations in individual Comma Separated Values (CSV) files.

The list of CSV files is provided below.

Excel Files	**CSV Files**
N/A	BANJUL_61711.csv BASSE_61731.csv FATOTO_61733.csv JANJANBUREH_61700.csv JENOI_61707.csv KAUR_61717.csv KEREWAN_61712.csv SAPU_61722.csv SIBANOR_61705.csv YUNDUM_61701.csv

Ghana, 1991-2020 Climatological Normals

The WMO Member provided data for 22 stations in individual Comma Separated Values (CSV) files.

The list of CSV files is provided below.

Excel Files	**CSV Files**
N/A	Abetifi_65450.csv Accra_65472.csv Ada_65475.csv Akatsi_65462.csv AkimOda_65457.csv Akuse_65460.csv Axim_65465.csv Bole_65416.csv Ho_65453.csv KeteKrachi_65437.csv Koforidua_65459.csv Kumasi_65442.csv Navrongo_65401.csv Saltpond_65469.csv SefwiBekwai_65445.csv Sunyani_65439.csv Takoradi_65467.csv Tamale_65418.csv Tema_65473.csv Wa_65404.csv Wenchi_65432.csv Yendi_65420.csv

Guinea Bissau, 1991-2020 Climatological Normals

The WMO Member provided data for three (3) stations in individual Comma Separated Values (CSV) files.

The list of CSV files is provided below.

Excel Files	**CSV Files**
N/A	BAFATA_61781.csv BISSAUAEROPORTO_61766.csv BOLAMA_61769.csv

Guinea, 1991-2020 Climatological Normals

The WMO Member provided data for nine (9) stations in individual Comma Separated Values (CSV) files.

Users are asked to note that NCEI corrected the original submission of LABE_61809.csv; Maximum Temperature was originally labeled as Minimum Temperature and vice versa.

The list of CSV files is provided below.

Excel Files	**CSV Files**
N/A	BOKE_61816.csv CONAKRY_61832.csv FARANAH_61833.csv KANKAN_61829.csv KINDIA_61818.csv KOUNDARA_61802.csv LABE_61809.csv MAMOU_61820.csv NZEREKORE_61849.csv

Libya, 1991-2020 Climatological Normals

The WMO member provided data for 10 stations in individual Excel files. NCEI converted these files to Comma Separated Values (CSV) files to aid in quality control, mapping, and comparison to Normals from other countries.

Users are asked to note that station Misurata annual Total Sunshine was incorrectly computed as a mean rather than a sum of the monthly values in the Excel file provided by the WMO member. NCEI recomputed the annual Total Sunshine value for this station by summing the monthly values and placed this recomputed value in the CSV file.

The original XLS files are provided along with the CSV files produced by NCEI.

Excel Files	**CSV Files**
BENINA_62053.xls	BENINA_62053.csv
GHADAMES_62103.xls	GHADAMES_62103.csv
GHAT_62212.xls	GHAT_62212.csv
HON_62131.xls	HON_62131.csv
MISURATA_62016.xls	MISURATA_62016.csv
NALUT_62002.xls	NALUT_62002.csv
SIRTE_62019.xls	SIRTE_62019.csv
TOBRUK_62062.xls	TOBRUK_62062.csv
YEFREN_62008.xls	YEFREN_62008.csv
ZUARA_62007.xls	ZUARA_62007.csv

Madagascar, 1991-2020 Climatological Normals

The WMO Member provided data for 23 stations in individual Comma Separated Values (CSV) files.

Additional information from the WMO Member is provided below the table of files.

Excel Files	CSV Files
N/A	AMBOHITSILAOZANA_67067.csv ANTALAHA_67025.csv ANTANANARIVO_67085.csv ANTSIRABE_67107.csv ANTSIRANANA_67009.csv ANTSOHIHY_67020.csv BESALAMPY_67037.csv FARAFANGANA_67157.csv FIANARANTSOA_67137.csv IVATO_67083.csv MAHAJANGA_67027.csv MAHANORO_67113.csv MAINTIRANO_67073.csv MANANJARY_67143.csv MOROMBE_67131.csv MORONDAVA_67117.csv NOSYBE_67012.csv RANOHIRA_67152.csv SAINTEMARIE_67072.csv SAMBAVA_67023.csv TAOLAGNARO_67197.csv TOAMASINA_67095.csv TOLIARA_67161.csv

Additional Information provided by the WMO Member

A. Homogeneity of underlying time series :

> Homogeneity test based on SNHT have been conducted using R Package - CLIMATOL 3.1.1

The main issue which can be reported is that due to the coarse spatial resolution of Observation network in Madagascar and complex topography, homogeneity test and data filling process didn't provide a better result. Severals unrealistic value have been detected specifically for data filling but also data correction. To correct that issue, homogeneity test have been limited to only outliers. A manual investigation was then done to correct or validate all suspected data.

The test have been done with series starting from 1961 till 2020.

> Gap of data in timeseries:

Many data gap was observed to some stations. A data estimation for Temperatures from ECMWF ERA5 (Reanalysis) have been used to fill all significat gap

(more than equal to 3 day).

> Implications of station automation :

No data from AWS have been used in the series

> This new climate normal 1991-2020 were calculated using the R Package CLINO ==

Mali, 1991-2020 Climatological Normals

The WMO Member provided data for 12 stations in individual Comma Separated Values (CSV) files.

Additional information from the WMO Member is provided below the table of files.

Excel Files	CSV Files
N/A	BamakoSenou_61291.csv Bougouni_61296.csv Kayes_61257.csv Kenieba_61285.csv Kita_61270.csv Koutiala_61293.csv Mopti_61265.csv Nara_61233.csv NIORORDUSAHELE_61230.csv San_61277.csv Segou_61272.csv Sikasso_61297.csv

Additional Information provided by the WMO Member

Bonjour
Je vous prie de bien vouloir recevoir les normales climatologiques en fichier joint.
Je remercie M.BARI et M.SEBARRI de m'avoir permis de calculer plus facilement ces normales grâce à leur application.
Je voulais donner une précision concernant le calcul des moyennes:
- pour la température c'est la moyenne des minimales et maximales,
- pour la pression c'est la moyenne des 8 observations (00h, 03h, 6h, 9h, 12h, 15h, 18h, 21h) de même que pour la tension de vapeur d'eau.
Je reste disponible pour tout renseignement qu'il vous plaira de me demander.
Cordialement

Mme BA Afoussatou DIARRA
Chef Bureau Archives et Données climatologiques
MALI-METEO

Translation:

Please receive the climatological normals as an attachment.

I thank M.BARI and M.SEBARRI for having allowed me to calculate these normals more easily thanks to their application.

I wanted to provide additional information concerning the calculation of the averages:

- for the temperature it is the average of the minimum and maximum,

- for the pressure it is the average of the 8 observations (12am, 3am, 6am, 9am, 12pm, 3pm, 6pm, 9pm) as well as for the water vapor pressure.

I remain available for any information you may ask me.

Cordially

Mrs. BA Afoussatou DIARRA
Head of Archives and Climatological Data Office
MALI-WEATHER

Mauritania, 1991-2020 Climatological Normals

The WMO Member provided daily precipitation data for each day of the 1991-2020 Normals period for 13 stations in a single Excel file. No 1991-2020 Normals were provided by the Member.

NCEI computed Monthly and Annual Precipitation Normals and obtained metadata for each station via OSCAR Surface. The data and metadata were combined into the standard WMO Normals format for Comma Separated Value files (CSV) and the data are provided in 13 CSV station files.

Users are advised that the Normals computed by NCEI could differ from official Normals if computed by the WMO Member.

Excel Files	**CSV Files**
Normale_91-2020_stations_Synoptiques_ONM_Mauritanie.xlsx	Aioun_61499.csv Akjoujt_61437.csv Atar_61421.csv Bir_61401.csv Boutilimitt_61461.csv Kaedi_61492.csv Kiffa_61498.csv Nema_61497.csv Nouadhibou_61415.csv Nouakchott_61442.csv Rosso_61489.csv Tidjikja_61450.csv Zouerate_61404.csv

Mauritius, 1991-2020 Climatological Normals

The WMO Member provided data for five (5) stations in one Excel file containing multiple spreadsheets. NCEI converted the spreadsheets in the Excel file to individual Comma Separated Values (CSV) files to aid in quality control, mapping, and comparison to Normals from other countries.

The original XLS file is provided along with the five CSV files produced by NCEI.

Excel Files	**CSV Files**
Mauritius_WMO_Normals_9120.xlsx	Agalega_61974.csv Plaisance_61990.csv Pointe_Canon_61988.csv St_Brandon_61986.csv Vacoas_61995.csv

Morocco, 1991-2020 Climatological Normals

The WMO Member provided data for 22 stations in individual Comma Separated Values (CSV) files.

Additional information from the WMO Member is provided below the table of files.

Excel Files	CSV Files
N/A	AGADIRINEZGANNE_60250.csv ALHOUCEIMA_60107.csv BENIMELLAL_60191.csv BOUARFA_60200.csv CASABLANCAANFA_60155.csv ERRACHIDIA_60210.csv ESSAOUIRA_60220.csv FESSAIS_60141.csv GUELMIM_60280.csv IFRANE_60160.csv KENITRA_60120.csv LARACHE_60105.csv MARRAKECH_60230.csv MEKNES_60150.csv MIDELT_60195.csv OUARZAZATE_60265.csv OUJDA_60115.csv RABATSALE_60135.csv SAFI_60185.csv TANTAN_60285.csv TAZA_60127.csv TETOUAN_60318.csv

Additional Information provided by the WMO Member

Related to WMO Normals 91-20 Calculation for Morocco

1. Homogeneity of underlying time series:

No homogenisation technique was applied to the raw data time series

2. Use of data estimation methods to fill data gaps in underlying time series:

- No data estimation method was used to fill data gaps
- Follwing the WMO guidelines related to data completeness, the monthly values were not calculated if either of the following criteria are satisfied:
  - Observations are missing for 11 or more days during the month;
  - Observations are missing for a period of 5 or more consecutive days during the month.
- The monthly normals were calculated where there are valid monthly values in at least 80 % of the years in the averaging period.

3. Observing time constraints:

None

4. Implications of station automation:

Observation automation impact not yet done.

5. Less than 30 years of observations:

For some synoptic stations, the period covers less than 30 years of observation due to the gaps or to the fact that an observation is found to be suspect or incorrect after undergoing quality control; thus, this observation is considered as missing.

6. The method of calculation for daily means of temperature, pressure and vapor pressure:

- The daily mean of temperature is calculated as the mean of the minimum and the maximum daily temperature.
- The daily mean of pressure is calculated as the mean of Six-hourly data at 06, 12 and 18 O'clock GMT.

7. The definition of the climatological day

- The climatological day is defined as [06H Day, 06H Day+1[for Precipitation and Maximum Temperature.
- The climatological day is defined as [18H Day-1, 18H Day[for Minimum Temperature.

Niger, 1991-2020 Climatological Normals

The WMO member provided data for 15 stations in individual Excel files. NCEI converted these files to Comma Separated Values (CSV) files to aid in quality control, mapping, and comparison to Normals from other countries.

The original XLS files are provided along with the CSV files produced by NCEI.

Excel Files	**CSV Files**
Agadez_61024.xlsx	Agadez_Aero_61024.csv
Bilma_61017.xlsx	Bilma_61017.csv
BirniNKonni_61075.xlsx	Birni_NKonni_61075.csv
Diffa_61085.xlsx	Diffa_61085.csv
Dosso_61053.xlsx	Dosso_61053.csv
Gaya_61099.xlsx	Gaya_61099.csv
Goure_61045.xlsx	Goure_61045.csv
Magaria_61091.xlsx	Magaria_61091.csv
MaineSoroa_61096.xlsx	Maine_Soroa_61096.csv
Maradi_61080.xlsx	Maradi_Aero_61080.csv
NGuigmi_61049.xlsx	NGuigmi_61049.csv
Niamey_61052.xlsx	Niamey_Aero_61052.csv
Tahoua_61043.xlsx	Tahoua_Aero_61043.csv
Tillabery_61036.xlsx	Tillabery_61036.csv
Zinder_61090.xlsx	Zinder_Aero_61090.csv

Nigeria, 1991-2020 Climatological Normals

The WMO Member provided data for 47 stations in one Excel file containing multiple spreadsheets. NCEI converted the spreadsheets in the Excel file to individual Comma Separated Values (CSV) files to aid in quality control, mapping, and comparison to Normals from other countries.

Users are asked to note that the following additions were made in the respective CSV files.

1) NCEI computed annual precipitation for Jalingo from the monthly values.
2) NCEI computed annual Mean Temperature (Parameter 5) for Kano from the monthly values.
3) NCEI computed annual Mean Minimum Temperature (Parameter 4) for IjebuOde and Port Harcourt from the monthly values.

The original XLS file is provided along with the five CSV files produced by NCEI.

Excel Files	**CSV Files**
Nigeria_WMO_Normals_9120.xlsx	Abeokuta_65213.csv Abuja_65125.csv AdoEkiti_65224.csv Akure_65232.csv Asaba_65282.csv Awka_65246.csv Bauchi_65055.csv Benin_65229.csv Bida_65112.csv Calabar_65264.csv Dutse_65048.csv Eket_65262.csv Enugu_65257.csv Gombe_65075.csv Gusau_65015.csv Ibadan_65208.csv IjebuOde_65210.csv Ikeja_65201.csv Ikom_65273.csv Ilorin_65101.csv Iseyin_65200.csv Jalingo_65170.csv Jos_65134.csv Kaduna_65019.csv Kano_65046.csv Katsina_65028.csv Lafia_65124.csv LagosRoof_65203.csv Lokoja_65243.csv Maiduguri_65082.csv

	Makurdi_65271.csv Minna_65123.csv Nguru_65064.csv Ogoja_65275.csv Ondo_65222.csv Oshogbo_65215.csv Owerri_65252.csv PortHarcourt_65250.csv Potiskum_65073.csv Shaki_65108.csv Sokoto_65010.csv Umuahia_65254.csv Uyo_65260.csv Warri_65236.csv Yelwa_65001.csv Yola_65167.csv Zaria_65030.csv

Republic of Congo, 1991-2020 Climatological Normals

The WMO Member provided data for 11 stations in individual Comma Separated Values (CSV) files.

The list of CSV files is provided below.

Excel Files	**CSV Files**
N/A	BRAZZAVILLE_64450.csv DJAMBALA_64453.csv DOLISIE_64401.csv GAMBOMA_64454.csv IMPFONDO_64459.csv MAKOUA_64456.csv MOUYONDZI_64402.csv MPOUYA_64452.csv OUESSO_64458.csv POINTENOIRE_64400.csv SIBITI_64405.csv

Senegal, 1991-2020 Climatological Normals

The WMO Member provided data for 24 stations in individual Comma Separated Values (CSV) files.

Additional information from the WMO Member is provided below the table of files.

Excel Files	CSV Files
N/A	Bakel_380072.csv Bambey_380084.csv CapSkirring_61697.csv Dakar_61641.csv Diourbel_61666.csv Fatick_380092.csv Goudiry_380095.csv Kaolack_61679.csv Kedougou_61699.csv Kolda_61698.csv Koungheul_380105.csv Linguere_61627.csv Louga_380051.csv Matam_61630.csv Mbour_380090.csv Nioro_380114.csv Podor_61612.csv Ranerou_380060.csv Saintlouis_61600.csv Simenti_380120.csv Tamba_61687.csv Thies_380075.csv Velingara_380118.csv Ziguinchor_61695.csv

Additional Information provided by the WMO Member

In our observation network, we have only twelve stations which have WMO codes. These are mainly synoptic stations (see excel file attached).

The rest of the stations are climatological or agrometeorological stations. The codes on these stations are internal (in reality most of these stations were created as part of the agrhymet program). They do not have a WMO code.

When we were doing the analysis, we didn't have the WIGOS codes. These can be provided later.

Seychelles, 1991-2020 Climatological Normals

The WMO member provided data for one (1) station in an Excel file. NCEI converted this file to a Comma Separated Values (CSV) file to aid in quality control, mapping, and comparison to Normals from other countries.

Users are asked to note that the number of days with precipitation greater than or equal to 10 mm (Parameter code 16) is suspect. While the mean monthly precipitation total for January is 426 mm, the average number of days with precipitation greater than or equal to 10 mm is only 0.3 for January. This value is questionable as are the values for the other months of this Parameter.

The original Excel file is provided along with the CSV file produced by NCEI.

Excel Files	**CSV Files**
SeychellesIntlAirport_63980.xlsx	SeychellesIntlAirport_63980.csv

South Africa, 1991-2020 Climatological Normals

The WMO member provided data for 15 stations in individual Excel files. NCEI converted these files to Comma Separated Values (CSV) files to aid in quality control, mapping, and comparison to Normals from other countries.

The original XLS files are provided along with the CSV files produced by NCEI.

Excel Files	**CSV Files**
Bethlehem_68461.xls	Bethlehem_68461.csv
BloemfonteinWO_68442.xls	BloemfonteinWO_68442.csv
CalviniaWO_68618.xls	CalviniaWO_68618.csv
CapeTown_68816.xls	CapeTown_68816.csv
DeAarWO_68538.xls	DeAarWO_68538.csv
EastLondonWO_68858.xls	EastLondonWO_68858.csv
GeorgeWO_68828.xls	GeorgeWO_68828.csv
GoughIsland_68906.xls	GoughIsland_68906.csv
KimberlyWO_68438.xls	KimberlyWO_68438.csv
MafikengWO_68242.xls	MafikengWO_68242.csv
MarionIsland_68994.xls	MarionIsland_68994.csv
PolokwaneWO_68174.xls	PolokwaneWO_68174.csv
PortElizabethWO_68842.xls	PortElizabethWO_68842.csv
SpringbokWO_68512.xls	SpringbokWO_68512.csv
UpingtonWO_68424.xls	UpingtonWO_68424.csv

Sudan, 1991-2020 Climatological Normals

The WMO member provided data for 28 stations in individual Excel files. NCEI converted these files to Comma Separated Values (CSV) files to aid in quality control, mapping, and comparison to Normals from other countries.

Users are asked to note:

1) Monthly and annual Normals of Total Number of Sunshine (TSUN) hours (Parameter 8) in the original XLS files appeared to be inaccurate; computed as the average number of sunshine hours per day for each month rather than the average of the total number of sunshine hours per month. NCEI recomputed the TSUN monthly values by multiplying the value by the number of days in each month (28 days for February) and have included these in the CSV files rather than the originally provided values. The original values remain in the XLS files.
2) NCEI found the fields for Latitude, Longitude and Elevation in each Excel file to be improperly formatted. e.g., 62600,21°49',31°21',190 M. NCEI placed these fields into the proper format in the CSV files.
3) NCEI recomputed annual Mean Maximum and Mean Temperature Normals (Parameters 3 and 5) for El Gedaref because the original values appeared inconsistent with the monthly Normals.

The original Excel files are provided along with the CSV files produced by NCEI.

Excel Files	**CSV Files**
AbuHamad_62640.xlsx	AbuHamad_62640.csv
AbuNaama_62795.xlsx	AbuNaama_62795.csv
Atbara_62680.xlsx	Atbara_62680.csv
Babnousa_62809.xlsx	Babnousa_62809.csv
Dongola_62650.xlsx	Dongola_62650.csv
EdDamazine_62805.xlsx	EdDamazine_62805.csv
EdDueim_62750.xlsx	EdDueim_62750.csv
ElFasher_62760.xlsx	ElFasher_62760.csv
ElGedaref_62752.xlsx	ElGedaref_62752.csv
ElNahoud_62781.xlsx	ElNahoud_62781.csv
ElObeid_62771.xlsx	ElObeid_62771.csv
Geneina_62770.xlsx	Geneina_62770.csv
HELGadeeda_62733.xlsx	HELGadeeda_62733.csv
Hudieba_62682.xlsx	Hudieba_62682.csv
Kadugli_62810.xlsx	Kadugli_62810.csv
Karima_62660.xlsx	Karima_62660.csv
Kassala_62730.xlsx	Kassala_62730.csv
Khartoum_62721.xlsx	Khartoum_62721.csv
Kosti_62772.xlsx	Kosti_62772.csv
Nyala_62790.xlsx	Nyala_62790.csv
Port-Sudan_62641.xlsx	Port-Sudan_62641.csv
Rashad_62803.xlsx	Rashad_62803.csv

Sennar_62762.xlsx	Sennar_62762.csv
Shambat_62723.xlsx	Shambat_62723.csv
Shendi_62700.xlsx	Shendi_62700.csv
UmBanein_62774.xlsx	UmBanein_62774.csv
WadiHalfa_62600.xlsx	WadiHalfa_62600.csv
WadMadeni_62651.xlsx	WadMadeni_62651.csv

Tanzania, 1991-2020 Climatological Normals

The WMO Member provided data for 14 stations in one Excel file containing multiple spreadsheets. NCEI converted the spreadsheets in the Excel file to individual Comma Separated Values (CSV) files to aid in quality control, mapping, and comparison to Normals from other countries.

The original Excel files are provided along with the CSV files produced by NCEI.

Additional information from the WMO Member is provided below the table of files.

Excel Files	CSV Files
Tanzania_WMO_Normals_9120.xlsx	BUKOBA_63729.csv DAR_ES_SALAAM_63894.csv DODOMA_63862.csv IRINGA_63887.csv KIGOMA_63801.csv KILIMANJARO_63791.csv MOROGORO_63866.csv MTWARA_63771.csv MUSOMA_63733.csv MWANZA_63756.csv SONGEA_63962.csv SUMBAWANGA_63881.csv TABORA_63832.csv ZANZIBAR_63870.csv

Tanzania Meteorological Authority

Explanatory Note for Submission of Climatological Standard Normal 1991-2020, for Tanzania, December, 2022

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1. Introduction

1.1 This Explanatory note has been prepared by the Tanzania Meteorological Authority (TMA), as per World Meteorological Organization (WMO) request to WMO-member countries including Tanzania to submit CLINO 1991-2020 by 31st December 2022.

1.2 The explanatory note has been developed to accompany the standard climatological normal for the period of 1991-2020 based on WMO_No.1203 guidance and definitions. The Authority prepared the CLINO for 14 meteorological stations located country wide. The whole process of computation

of climatological normal used rainfall and temperature data (i.e., Maximum & Minimum temperature data).

1.3 Indeed, the dataset used for computation of CLINO are really in senses that, they are originally observed data from 14 meteorological stations as mentioned before. No estimation method used in the whole process, instead, for the case of missing values with respect to WMO standards, the Guide to Climatological Practices (WMO, 2011) was adhered.

1.4 Moreover, the calculated normal and averages for all available data within 14 stations agreed with recommended Guide to Climatological Practice (WMO, 2011, percentage value i.e. 80%) of the years in the averaging period. This implies that, all data scored higher percent value required for computation of CLINO after subjected to quality control.

1.5 However, regardless of the sufficient data the Authority has, such as wind speed, relative humidity, pressure and sunshine, during homogeneity test the system failed to execute the outputs for the mentioned data above, provided that the data scored higher percent value in the CLINO system.

2. Preparation of the Input files

As explained in the user guide, two text files were used for analysis: a file containing the coordinates X (longitude, in degrees with decimals, Y (latitude in degrees with decimals, and Z (altitude in meters), codes and names of the stations. Another file is the data file containing data of the entire period of the first station, followed by those of the second, and so on, in the same order as they appear in the station file, using a dot as a decimal separator.

The overall data used in this analysis covered from January 1st of the year 1991 to December 31st of the final year 2020, padding with NA for all missing data. Both files are plain text and their data are separated by space.

3. Homogenization of the series

3.1 This process was used to make the data series uniform through the use of climatol (an R package).

3.2 All 14 meteorological stations containing rainfall and temperature daily data series were quality controlled, homogenized, and missing data infilling climatologically to obtain climatological summaries and grids from the resulted series.

3.3 The homogenization of the daily data series was done directly with climatol, in which the monthly data series were obtain from the daily series. Then,

3.4 the monthly data series were homogenized.

3.5 The daily data series were adjusted using the breakpoints obtained in the monthly homogenization, and hence climate normal (CLINO) was calculated.

4. Review of the Results

Case I: Precipitation

4.1 The 14 stations used for analysis were categorized into three (3) clusters namely; cluster 1: 1 2 3 5 6 11 13, cluster 2: 4 7 8 12 14 and cluster 3: 9 10

4.2 Given the rainfall parameter: for calculation of standard climatological normal, the series was homogenized and missing data were filled in. The values of the parameter of the homogenization function were as follows:

Paramters:
varcli=RR, anyi=1991, anyf=2020, test=snht, nm=NA, nref=1, std=2, swa=NA, ndec=1, dz.max=25, dz.min=-25, cumc=NA, wd=0 0 100, inht=0 0, sts=5, tol=0.02, maxdif=0.05, maxite=999, force=FALSE, wz=0.001, trf=0, mindat=NA, gp=4, ini=NA, na.strings=NA, vmin=0, vmax=NA, hc.method=ward.D2, nclust=300, cutlev=NA, grdcol=#666666, mapcol=#666666, expl=FALSE, metad=TRUE, sufbrk=m, tinc=NA, tz=UTC, cex=1.2, uni=NA, raway=TRUE, verb=TRUE, logf=TRUE, snht1=NA, snht2=NA

4.3 The standard normal homogeneity, test (SNHT), was performed on anomaly series, the results shows that minimum value was 3.9 (observed in Zanzibar Meteorological station), and the maximum value of snht was found to be 35.9 (observed in Mtwara Meteorological station), which is higher compared to be the recommended default value (i.e, snht= 25) . This variation assumed to be attributed by climatic variability, the degree of correlation between the series and their temporal frequency.

4.4 Likewise, the minimum root mean square error (rmse), was observed to be 8.126 whereas the maximum root mean square error was found to be 14.177. These values of rmse was found to be higher as compared to the recommended values (i.e., between 0.2 and 0.5). This implies that, our model was failing to account for some important features underlying our data.

4.5 However, regardless to the observed uncertainty on SNHT statistic and the RMSE to be higher as compared to the default values, the percentage of original data (POD), was found to be more than 80% as recommended (WMO, 2011), with minimum POD being 99.0% and maximum POD being 100.0%.

Case II: Maximum Temperature (TX)

1.1 Data matrix: 10958 data x 14 stations, and the 14 stations used for analysis were categorized into three (3) clusters namely; cluster 1: 1 2 3 5, cluster 2: 4 6 7 8 11 12 13 14 and cluster 3: 9 10

1.2 Parameters:

varcli=TX, anyi=1991, anyf=2020, test=snht, nm=NA, nref=10 10 4, std=3, swa=NA, ndec=1, dz.max=15, dz.min=-15, cumc=NA, wd=0 0 100, inht=0 0, sts=5, tol=0.02, maxdif=0.05, maxite=999, force=FALSE, wz=0.001, trf=0, mindat=NA, gp=3, ini=NA, na.strings=NA, vmin=NA, vmax=NA, hc.method=ward.D2, nclust=300, cutlev=NA, grdcol=#666666, mapcol=#666666, expl=FALSE, metad=TRUE, sufbrk=m, tinc=NA, tz=UTC, cex=1.2, uni=NA, raway=TRUE, verb=TRUE, logf=TRUE, snht1=NA, snht2=NA

1.3 The standard normal homogeneity, test (SNHT), was carried out on anomaly series, the results shows that minimum value was 57.80 (observed in Kigoma Meteorological station), and the maximum value of snht was found to be 1248.70 (observed in Sumbawanga Meteorological station), which is higher compared to be the recommended default value (i.e, snht= 25) . This variation assumed to be attributed by climatic variability, the degree of correlation between the series and their temporal frequency.

1.4 On the other hand, the reading for minimum root mean square error (rmse), was found to be 1.132 while the reading for maximum root mean square error was observed to be 2.045. This uncertainty in the values of rmse was found to be higher as compared to the recommended value or rmse which lies between 0.2 and 0.5. This implies that, our model was failing to account for some important features underlying our data.

1.5 Indeed, irrespective to the observed uncertainty on SNHT statistic and the RMSE to be higher as compared to the default values, the percentage of original data (POD) observed in the maximum temperature element was found to be more than 80% as recommended (WMO, 2011), with minimum POD being 91.0% and maximum POD being 100.0%.

Case III: Minimum Temperature (TN)

1.6 Data matrix: 10958 data x 14 stations, and the 14 stations used for analysis were categorized into three (3) clusters namely; cluster 1: 1 2 3 5 6 11, cluster 2: 4 7 8 12 13 and cluster 3: 9 10 14

1.7 Parameters
varcli=TN, anyi=1991, anyf=2020, test=snht, nm=NA, nref=10 10 4, std=3, swa=NA, ndec=1, dz.max=15, dz.min=-15, cumc=NA, wd=0 0 100, inht=0 0, sts=5, tol=0.02, maxdif=0.05, maxite=999, force=FALSE, wz=0.001, trf=0, mindat=NA, gp=3, ini=NA, na.strings=NA, vmin=NA, vmax=NA, hc.method=ward.D2, nclust=300, cutlev=NA, grdcol=#666666, mapcol=#666666, expl=FALSE, metad=TRUE, sufbrk=m, tinc=NA, tz=UTC, cex=1.2, uni=NA, raway=TRUE, verb=TRUE, logf=TRUE, snht1=NA, snht2=NA

1.8 The test statistic for standard normal homogeneity, test (SNHT), was carried out, the results shows that minimum value was 91.3 (observed in Dar es Salaam Meteorological observing station), and the maximum value of snht was found to be 2206.8 (observed in Songea Meteorological observing station), which is higher compared to be the recommended default value (i.e, snht= 25) . This variation assumed to be attributed by climatic variability, the degree of correlation between the series and their temporal frequency.

1.9 Then again, the reading for minimum root mean square error (rmse) of the estimated data was found to be 1.098 while the reading for maximum root mean square error of the same series of the estimated data was observed to be 2.234. This uncertainty in the values of rmse was observed to be higher as compared to the recommended value or rmse which lies between 0.2 and 0.5. This implies that, our model was unable to account for some important features underlying our data series.

1.10 As such, regardless of the practical uncertainty on SNHT statistic and the RMSE to be higher as compared to the default values, the percentage of original data (POD) observed in the maximum temperature element was found to be more than 80% as recommended (WMO, 2011), with minimum POD being 87.0% and maximum POD being 100.0%.

In conclusion, the data availability for all 14 stations met the prescribed requirement as per WMO- requirements for calculating standard climate normal (CLINO), as there should be 5 or more data available at every time step, or a

minimum of three, levels as marked with dashed green and red lines underneath figures as for precipitation- RR, figure 1(a,b), maximum and minimum temperature (TX-figure 2c,2d and TN-figure 3e,3f) , as indicated on the figures underneath.

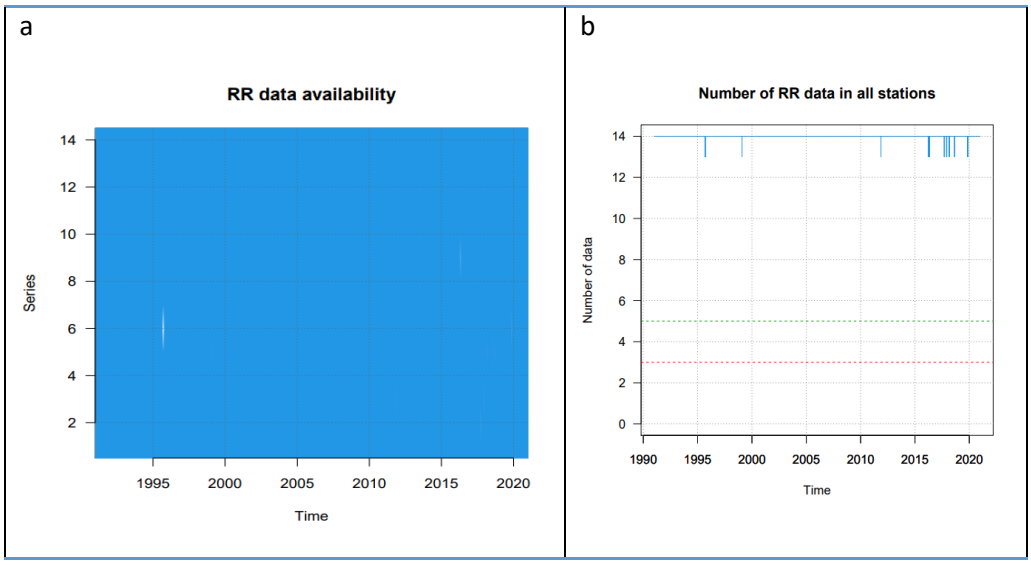

Figure 1: Data availability by station (left), and nationally (right)- RR

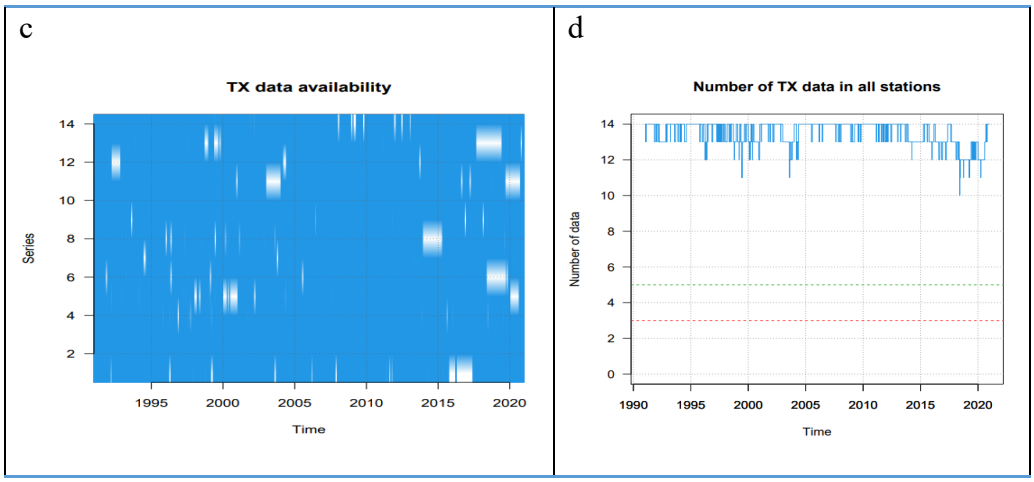

Figure 2: Data availability by station (left), and nationally (right)- TX

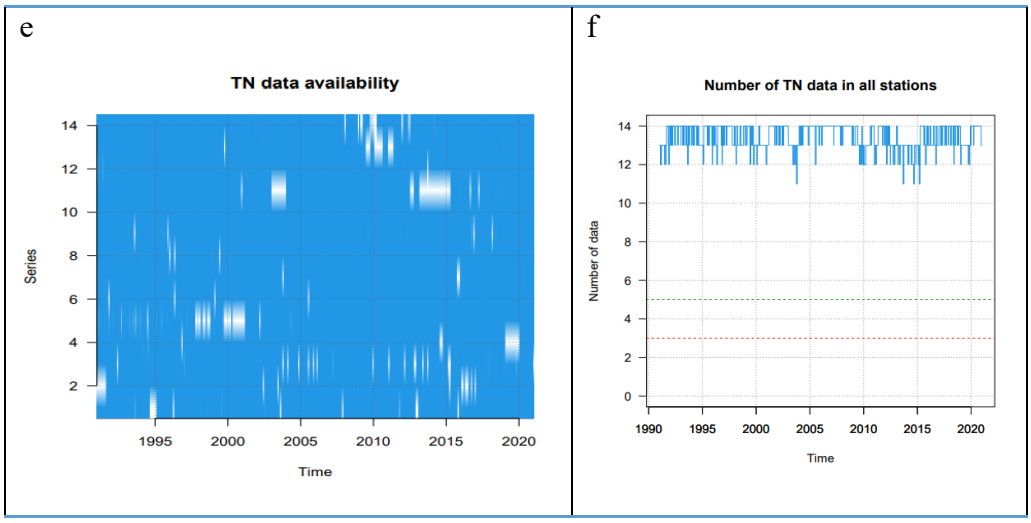

Figure 2: Data availability by station (left), and nationally (right)- TN

Additional Information for Tanzania provided by NOAA/NCEI

Data for 14 stations were provided by the WMO Member in one Excel file. The spreadsheets in the Excel file were converted to individual Comma Separated Values (CSV) files by NOAA/NCEI to aid in quality control, mapping, and comparison to Normals from other countries.

The original XLS file is provided along with the 14 CSV files, which are included as a service to the User Community, however no guarantees are provided regarding their fidelity with respect to the original XLS file provided by the WMO Member.

Excel Files	**CSV Files**
Country22Tanzania_WMO_Normals_9120.xlsx	BUKOBA_63729.csv DAR_ES_SALAAM_63894.csv DODOMA_63862.csv IRINGA_63887.csv KIGOMA_63801.csv KILIMANJARO_63791.csv MOROGORO_63866.csv MTWARA_63771.csv MUSOMA_63733.csv MWANZA_63756.csv SONGEA_63962.csv SUMBAWANGA_63881.csv TABORA_63832.csv ZANZIBAR_63870.csv

Togo, 1991-2020 Climatological Normals

The WMO Member provided data for 17 stations in individual Comma Separated Values (CSV) files.

The list of CSV files is provided below.

Excel Files	**CSV Files**
N/A	ANEHO_65445.csv ANIEMONO_65506.csv ATAKPAME_65376.csv DAPAONG_65351.csv GAPEKPEDJI_65399.csv KARA_65357.csv KOUMAKONDA_65378.csv KPALIMETOVE_65393.csv LOME_65387.csv MANDOURI_65344.csv MANGO_65352.csv NIAMTOUGOU_65355.csv PAGOUDA_65353.csv SOKODE_65361.csv SOTOUBOUA_65341.csv TABLIGBO_65380.csv TSEVIE_65394.csv

Tunisia, 1991-2020 Climatological Normals

The WMO Member provided data for 27 stations in individual Comma Separated Values (CSV) files.

Users are asked to note that for most monthly and annual normals, the values were provided to six or more decimal places. NCEI rounded these to a single decimal place for publication.

The list of CSV files is provided below.

Excel Files	**CSV Files**
N/A	Beja_60723.csv Bizerte_60714.csv ElBorma_60780.csv Gabes_60765.csv Gafsa_60745.csv Jendouba_60725.csv Jerba_60769.csv Kairouan_60735.csv Kasserine_60739.csv Kebili_60764.csv Kelibia_60720.csv LeKef_60732.csv Mahdia_60742.csv Matmata_60767.csv Mednine_60770.csv Monastir_60740.csv Nabeul_60728.csv Remada_60775.csv Sfax_60750.csv SidiBouZid_60748.csv Siliana_60734.csv Tabarka_60710.csv Tataouine_60772.csv Thala_60738.csv Tozeur_60760.csv TunisCarthage_60715.csv ZaghouanMogran_60729.csv

Zambia, 1991-2020 Climatological Normals

The WMO Member provided data for 30 stations in one Excel file containing multiple spreadsheets. NCEI converted the spreadsheets in the Excel file to individual Comma Separated Values (CSV) files (and named according to the WMO Normals naming convention) to aid in quality control, mapping, and comparison to Normals from other countries.

Users are asked to note:

1) Parameters 2 and 16 (Number of Days with Precipitation Exceeding thresholds) have been set to missing in all CSV files. NCEI found these to be erroneous or suspect.
2) For station Mpika (67477) maximum temperature appeared to have been mislabeled as minimum temperature and vice versa. These data were reassigned to the proper Parameter in the CSV files. The original data remain in the Excel file.
3) An errant character was found in the Minutes field of the Latitude and Longitude of each station in the original Excel file. These were removed.
4) Station Lundazi (67583) was incorrectly labeled with Northern Hemisphere Latitude. NCEI corrected this in the CSV file.
5) NCEI recomputed the Annual Mean Temperature (Parameter 5) Normal for Choma (67753) because the original value was greatly inconsistent with the Monthly Normals. The recomuted value is included in the CSV file.

The original Excel file is provided along with the CSV files produced by NCEI.

Excel Files	**CSV Files**
ZAMBIA-CLIMATOLOGICAL_NORMALS_1991-2020.xlsx	Chipata_67581.csv Chipepo_67754.csv Choma_67753.csv Isoka_67481.csv Kabwe01_67663.csv Kafironda_67563.csv Kalabo_67625.csv Kaoma_67641.csv Kasama_67475.csv Kawambwa_67403.csv Livingstone_67743.csv Lundazi_67583.csv LusakaCity_67666.csv LusakaInternational_67665.csv Mansa_67461.csv Mbala_67413.csv Mfuwe_67577.csv Misamfu_67476.csv Mongu_67633.csv Mpika_67477.csv

	Msekera_67580.csv MtMakulu_67667.csv Mumbwa_67655.csv Mwinilunga_67441.csv Ndola_67561.csv Senanga_67631.csv Serenje_67571.csv Sesheke_67741.csv Solwezi_67551.csv Zambezi_67531.csv