



**HAL**  
open science

## The ADHI dataset: African Database of Hydrometric Indices: new perspectives for African hydrology studies

Nathalie Rouché, Yves Trambly, J.-E. Patrel, Gil Mahe, Jean-François Boyer, Ernest Amoussou, Ansoumana Bodian, Honoré Dacosta, Hamouda Dakhlaoui, A. Dezetter, et al.

### ► To cite this version:

Nathalie Rouché, Yves Trambly, J.-E. Patrel, Gil Mahe, Jean-François Boyer, et al.. The ADHI dataset: African Database of Hydrometric Indices: new perspectives for African hydrology studies. EGU General assembly 2021, European Geosciences Union, Apr 2021, Online, Germany. hal-04157490

**HAL Id: hal-04157490**

**<https://hal.science/hal-04157490v1>**

Submitted on 10 Jul 2023

**HAL** is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.



Distributed under a Creative Commons Attribution 4.0 International License

# The ADHI dataset: African Database of Hydrometric Indices: new perspectives for African hydrology studies

Nathalie Rouché<sup>1</sup>, Yves Trambly<sup>1</sup>, Jean-Emmanuel Paturel<sup>1</sup>, Gil Mahé<sup>1</sup>, Jean-François Boyer<sup>1</sup>, Ernest Amoussou<sup>2</sup>, Ansoumana Bodian<sup>3</sup>, Honoré Dacosta<sup>4</sup>, Hamouda Dakhlaoui<sup>5,6</sup>, Alain Dezetter<sup>1</sup>, Denis Hughes<sup>7</sup>, Lahoucine Hanich<sup>8,9</sup>, Christophe Peugeot<sup>1</sup>, Raphael Tshimanga<sup>10</sup>, Patrick Lachassagne<sup>1</sup>

1 HydroSciences Montpellier, Univ. Montpellier, CNRS, IRD, Montpellier, France

2 Département de Géographie et Aménagement du Territoire (DGAT) de l'Université de Parakou (UP), BP 123 Parakou, Bénin

3 Laboratoire Leïdi "Dynamique des Territoires et Développement", Université Gaston Berger (UGB), BP 234 - Saint Louis, Sénégal

4 Département de Géographie-FLSH, Université Cheikh Anta Diop de Dakar (UCAD), Sénégal

5 LMHE, Ecole Nationale des Ingénieurs de Tunis, University of Tunis El Manar, BP 37, 1002 Tunis le Belvédère, Tunisia

6 Ecole Nationale d'Architecture et d'Urbanisme, University of Carthage, Rue El Quods, 2026, Sidi Bou Said, Tunisia

7 Institute for Water Research, Rhodes University, South Africa

8 L3G Laboratory, Earth Sciences Department, Faculty of Sciences & Techniques, Cadi Ayyad University, BP 459, 40000 Marrakech, Morocco

9 Mohammed VI Polytechnic University (UM6P), Centre for Remote Sensing and Application, Morocco

10 Congo Basin Water Resources Research Center -CRREBaC, University of Kinshasa, Kinshasa, Democratic Republic of the Congo

# A lack of accessible river discharge data

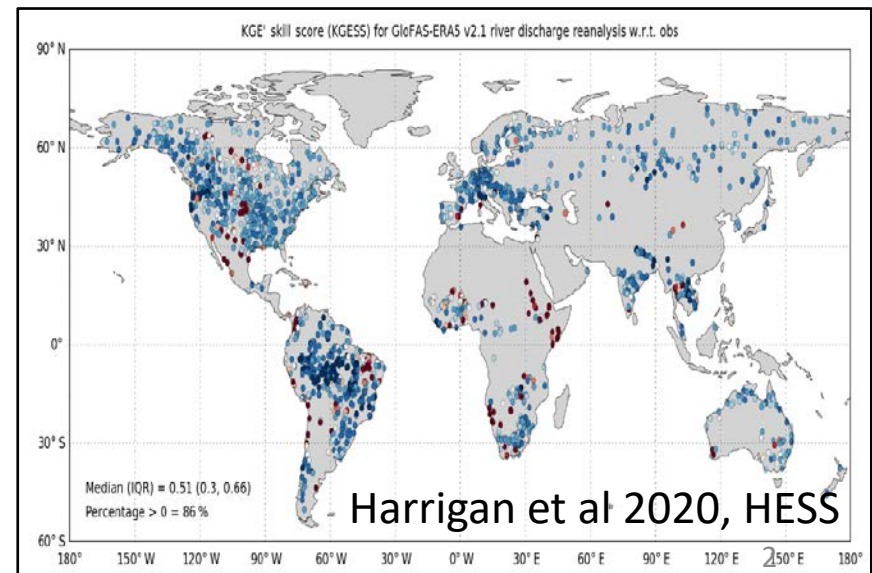
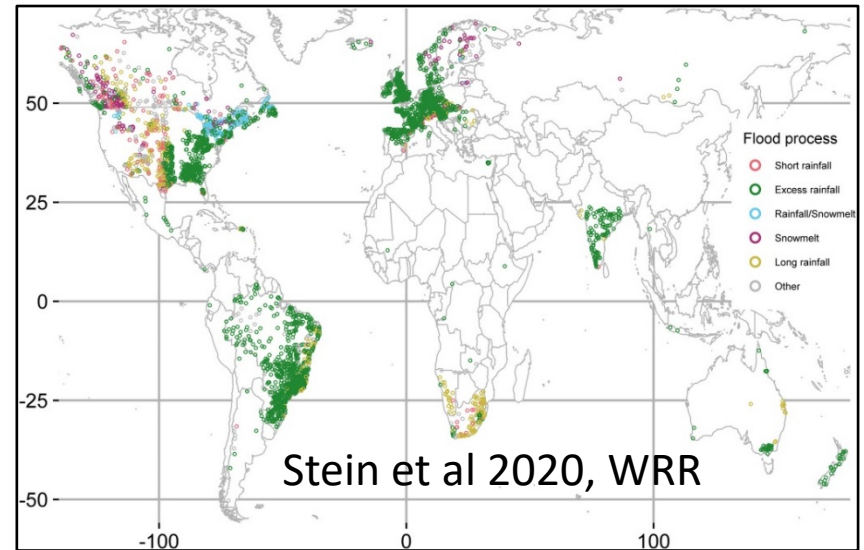
At the African scale, there is a lack of coordination for hydrological data collection and dissemination: hydrological data is often scattered, heterogeneous or incomplete

Numerous public, semi-public and private organizations produce and manage data, but often they do not have the resources to exchange, standardize, summarize and capitalize on the data they generate

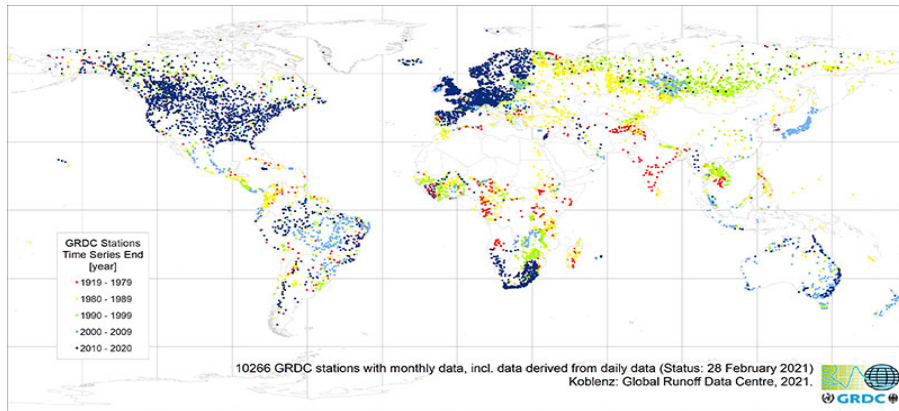
There is not enough partnership between the national hydrological services, in many countries licensing issues prevent the distribution of the data collected. There is also a more general problem of a widespread reluctance to share information

There is need to develop links between data producers and users to reinforce capacities for accessing, processing and take benefit from existing data.

As a consequence, the African continent is largely under-represented in global scale studies



# Data sources



## Global Runoff Data Center (<https://www.bafg.de/GRDC>)

9900 stations from 159 countries

Détail journalier - M BALI à BOALL POSTE  
Équivalent de débit dans le cadre de la coupe pour journalier

**Data access**  
Access the station metadata and graphic visualizations of time series.

**Photo Safari**  
Visit Africa, landscapes, vegetation, measuring stations and reservoirs and dams.

**Products**  
Download the free products (data, images, grid ...)

**Book-Map library**  
download documents, books, maps, yearbook etc.

**Use Google Earth**

- Stations classified by watershed
- Stations classified by countries
- Photo album



## SIEMER database (<http://www.hydrosciences.fr/siemer/>)

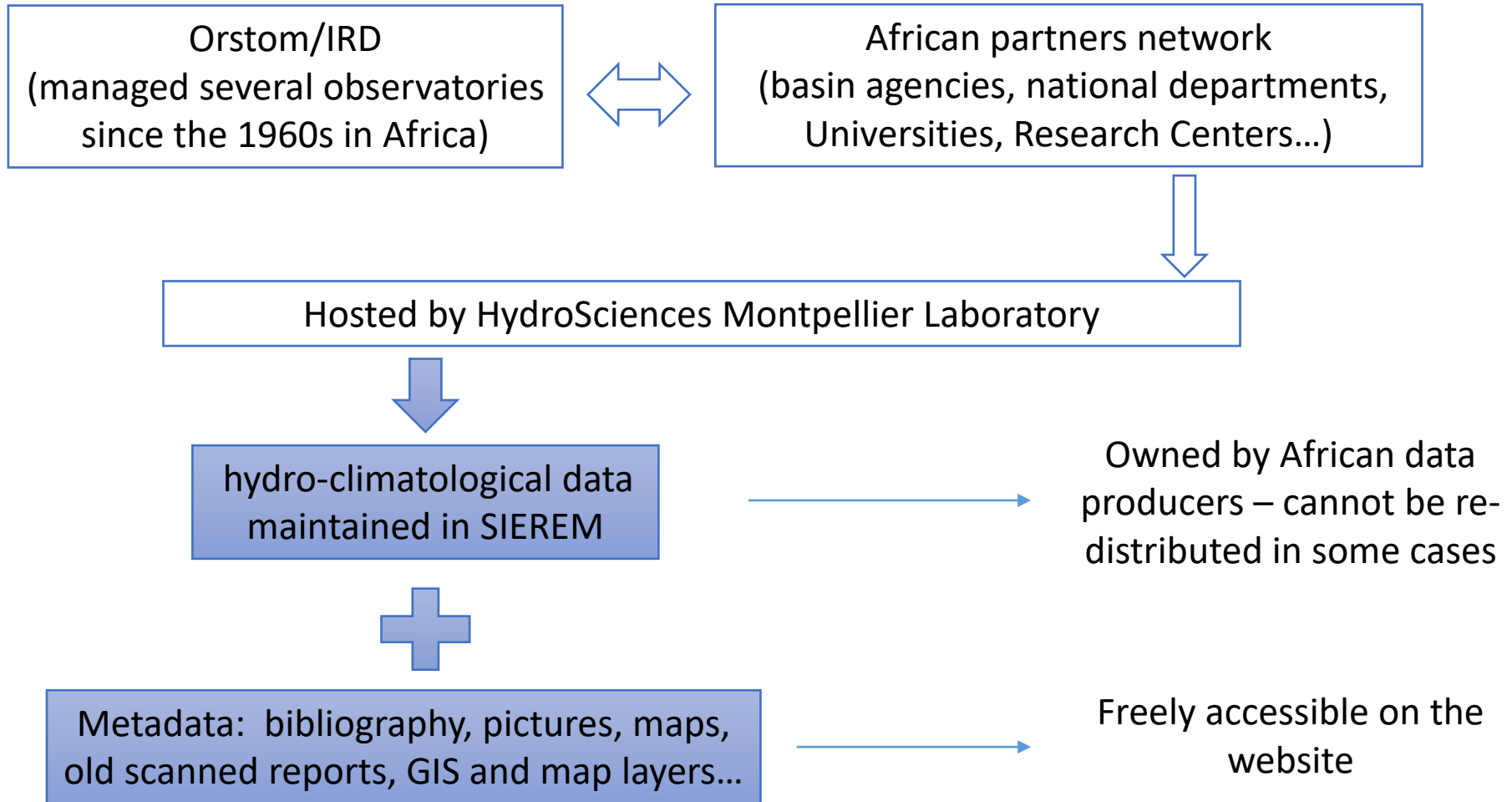
13000 stations in Africa (river discharge, water level, rainfall, temperature)

GIS database for catchment data

Scanned, geo-referenced documents recovered from historical hydrological archives (1342 pictures, 391 geo-referenced albums).

# The SIEREM database

**SIEREM** = **S**ystème d'**I**nformations **E**nvironnementales pour les **R**essources en **E**au et leur **M**odélisation - *Environmental Information System for water resources and modeling for Africa* -



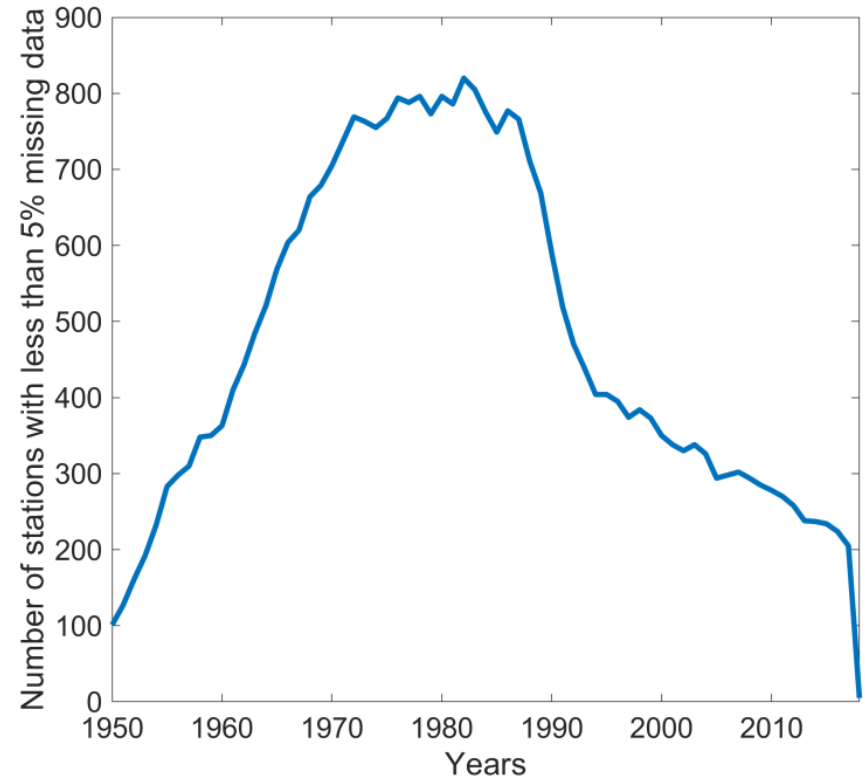
# The largest assembled database of daily discharge data in Africa - ADHI

A new streamflow dataset of about 1500 gauging stations, from station data of GRDC and SIEM databases with a minimum of 10 years of daily discharge

It extends from 1950 to 2018

Accessible to the scientific community

Most complete existing dataset of the African continent.



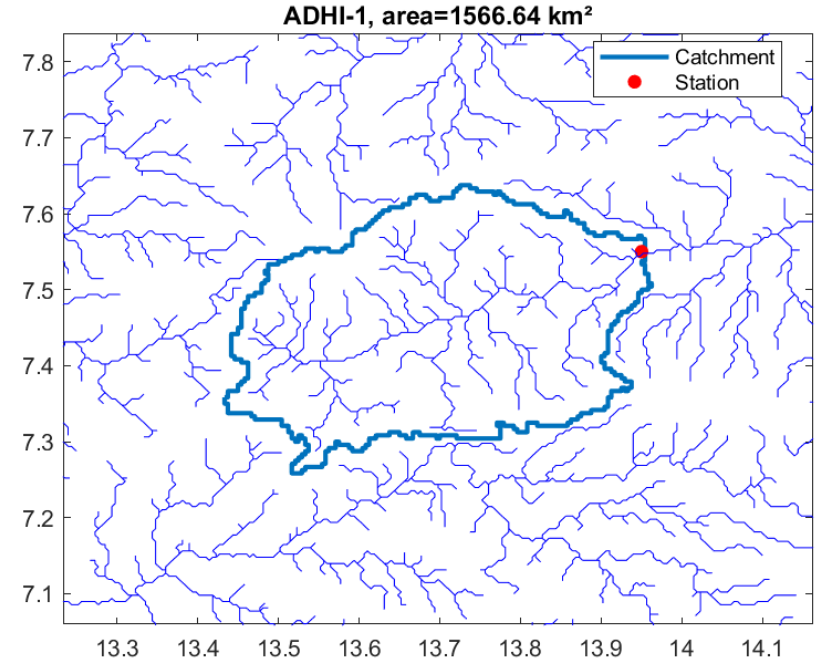
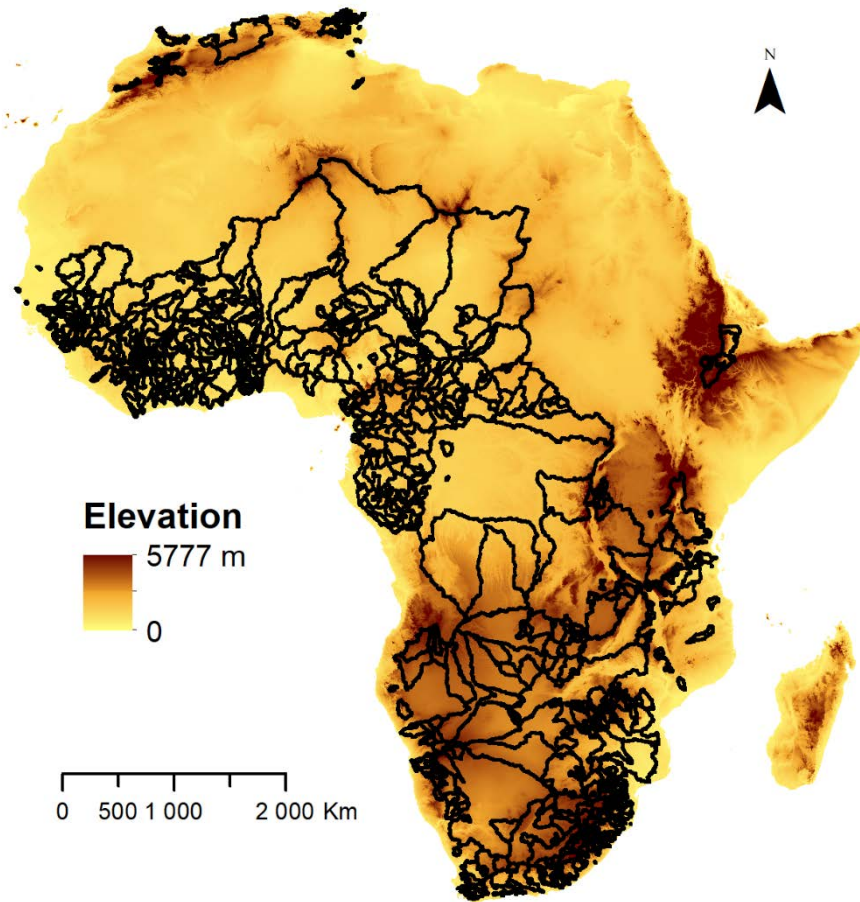
# Hydrometric indices and signatures

Different indices and signatures are representing mean flow characteristics and extremes (low flows and floods) are provided in ADHI, allowing to :

- study the long-term evolution of hydrology in Africa
- characterize of the hydrological regime and applications linked to the management of water resources and hydrological risks
- support the modelling efforts that aim at reducing the vulnerability of African countries to hydro-climatic variability.

<b>Basic indices</b>	Mean, Max, Min, STD, percentiles of daily streamflow, mean monthly runoff...
<b>Hydrologic signatures</b>	Baseflow index, half-flow date, autocorrelation of runoff, flow duration curve, Flashiness index, variability index, master recession curves, Skewness, rising limb density....
<b>Time series</b>	Annual mean, max, min of 7-day runoff Monthly mean, max, min runoff

# Catchment delineation, with automated procedures and manual verification



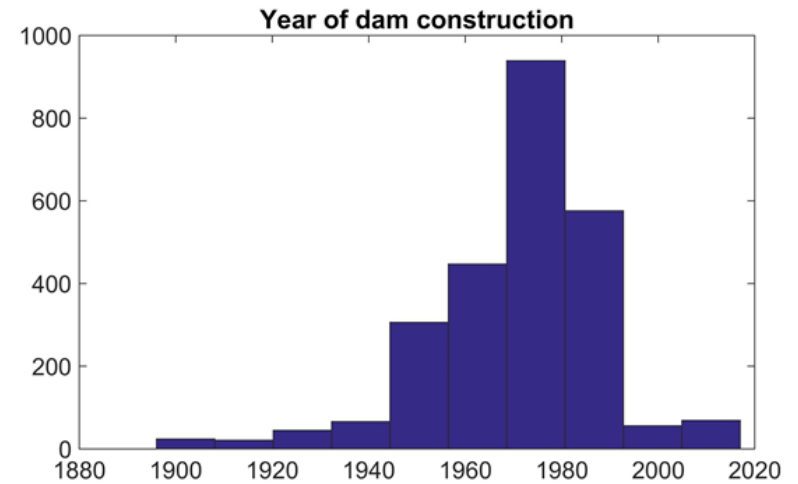
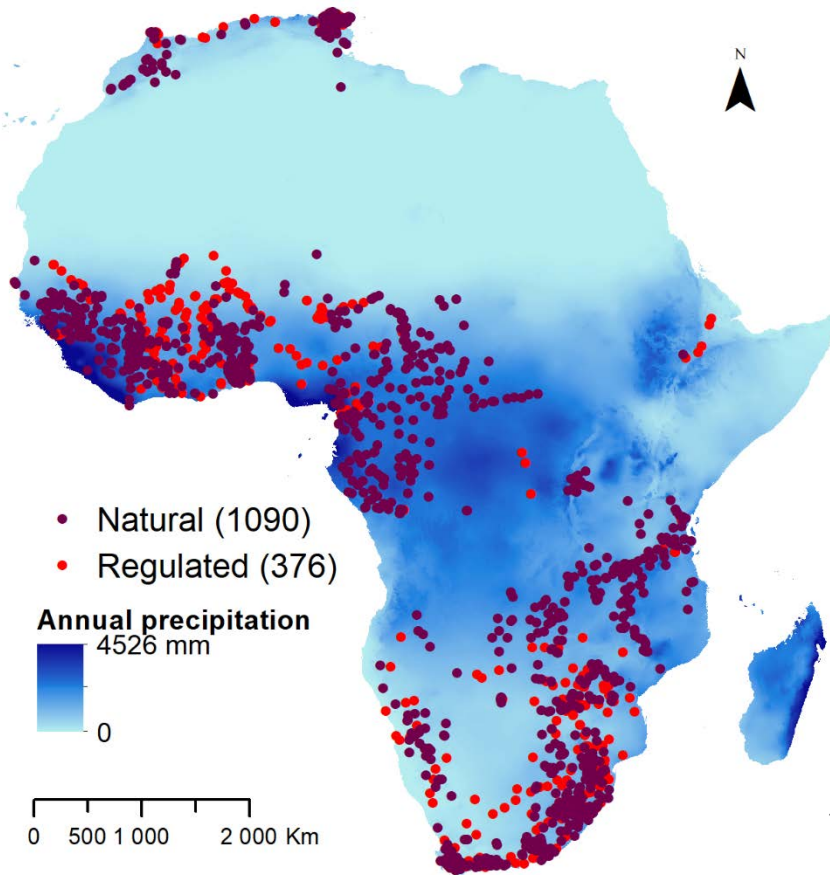
1. Topotoolbox (Matlab)=  
<https://topotoolbox.wordpress.com/>
2. Semi-manual with Arcmap
3. Verification with metadata and historical reports :  
<https://horizon.documentation.ird.fr>



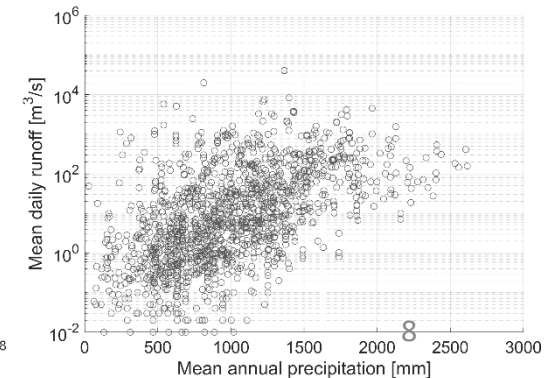
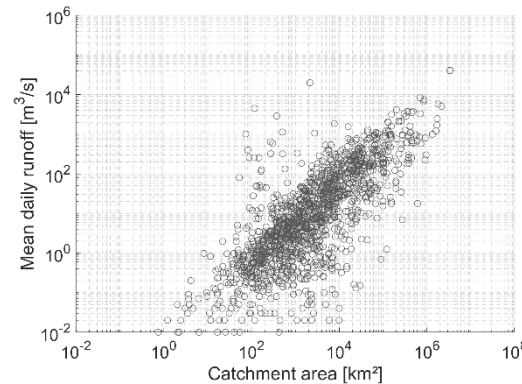


# Catchment attributes

1. Precipitation, temperature, evapotranspiration (CRU TS4)
2. Elevation (HydroSheds 300m)
3. Land cover (38 classes from ESA CC 2015)
4. Dams and reservoirs (GrandD)



Global Reservoir and Dam Database (GRanD v1.3)



ADHI is available  
online at:  
<https://doi.org/10.23708/LXGXQ9>

No login required,  
100% accessible,  
Open Data licence



**HSM** UMR HydroSciences Montpellier (CNRS, Université de Montpellier, IRD) → site web

DataSuds > UMR HydroSciences Montpellier > ADHI: African Database of Hydrometric Indices

### ADHI: African Database of Hydrometric Indices

Version 4.0

Tramblay, Yves; Rouché, Nathalie, 2020, "ADHI: African Database of Hydrometric Indices", <https://doi.org/10.23708/LXGXQ9>, DataSuds, V4, UNF:6:+/hcxglYr5VFI5f5skI5sw=[fileUNF]

Citer le jeu de données

Pour en savoir plus, consultez le document [Data Citation Standards](#).

Statistiques du jeu de données  
302 Téléchargements

**Description** This database contains different hydrometric indices, describing runoff characteristics, seasonality, floods and low flows, for about 1500 rivers covering all regions of Africa between 1950 and 2018. (2020-08-10)

**Sujet** Computer and Information Science; Earth and Environmental Sciences

**Mot-clé** Africa, River, Discharge, Runoff, Flows, Afrique, Rivière, Débit, Ecoulement

**Related Publication** Tramblay Y., Rouché N., Paturel J.-E., Mahé G., Boyer J.-F., Amoussou E., Bodian A., Dacosta H., Dakhlaoui H., Dezetter A., Hughes D., Hanich L., Peugeot C., Tshimanga R., Lachassagne P.: ADHI: The African Database of Hydrometric Indices (1950-2018). Earth System Science Data. doi: 10.5194/essd-2020-281

**Remarques** For more details, please read the file "ADHI\_README.txt"

Fichiers MétaDonnées Conditions d'utilisation Versions

Changer l'affichage Tableau Arborescence

Chercher dans ce jeu de données... Trouver

Filtrer par  
Type de fichier : Tout Accès : Tout Libellé du fichier : Tout Trier

1 à 10 de 12 Fichiers Télécharger

<input type="checkbox"/>		<b>ADHI_Annual7DayMin.zip</b> ADHI/ Archive compressée ZIP - 472.3 Ko - 19 janv. 2021 - 2 Téléchargements MD5: c301839d7d47bae697d83fa418c39e7f Time series for annual minimum of 7-day discharge, one file per station. <b>Data</b>	Télécharger
<input type="checkbox"/>		<b>ADHI_AnnualMax.zip</b> ADHI/ Archive compressée ZIP - 473.8 Ko - 19 janv. 2021 - 2 Téléchargements MD5: 217b980f7842ff7f5d1cbf0d15cd4208 Time series for annual maximum runoff, one file per station. <b>Data</b>	Télécharger
<input type="checkbox"/>		<b>ADHI_AnnualMean.zip</b> ADHI/ Archive compressée ZIP - 425.6 Ko - 19 janv. 2021 - 2 Téléchargements MD5: 8f7bbbe3105d31fa3c91c33004b8540f Time series for mean annual runoff, one file per station. <b>Data</b>	Télécharger
<input type="checkbox"/>		<b>ADHI_AnnualPercentiles.zip</b>	

9