



# *GRDC (Global Runoff Data Centre)*

## *Presentation at Data Storage Solution Workshop*

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Federal Institute of Hydrology (BfG) Koblenz, Germany*

# *GRDC operational environment*

*Operates under the auspices of the  
World Meteorological Organisation (WMO)*



*with the financial support of the  
Federal Republic of Germany*



*within the  
Federal Institute of Hydrology (BfG)*



# GRDC Data in WMO Catalogue for Climate Data



## WMO Catalogue for Climate Data

The **WMO Catalogue for Climate Data** is a trustworthy source for climate data. The datasets have been assessed through an internationally agreed maturity evaluation process. An initial 18 global climate datasets have been so far submitted by international domain Subject Matter Experts (SMEs) and assessed. The content of the catalogue is expected to expand quickly in the future with the addition of other global datasets as well as regional and national climate datasets.

• Temperature: NOAA GlobalTemp

• Temperature: HadCRUT4

• Temperature: GISTEMP

• Precipitation: GPCC

• Precipitation: CoCoRaHS

• Sea level: GLOSS

• Sea level: CCI-SeaLevel

• Sea level: C3S SeaLevel

• Sea Ice: SeaIce Index

• Ice sheets: GLAS-DEM-500m

• Ice sheets: GLAS-DEM-1km

• Ice sheets: Antarctica-GRACE

• Ice sheets: Greenland-GRACE

• Glaciers: GLIMS

• Climate indices: HadEX2

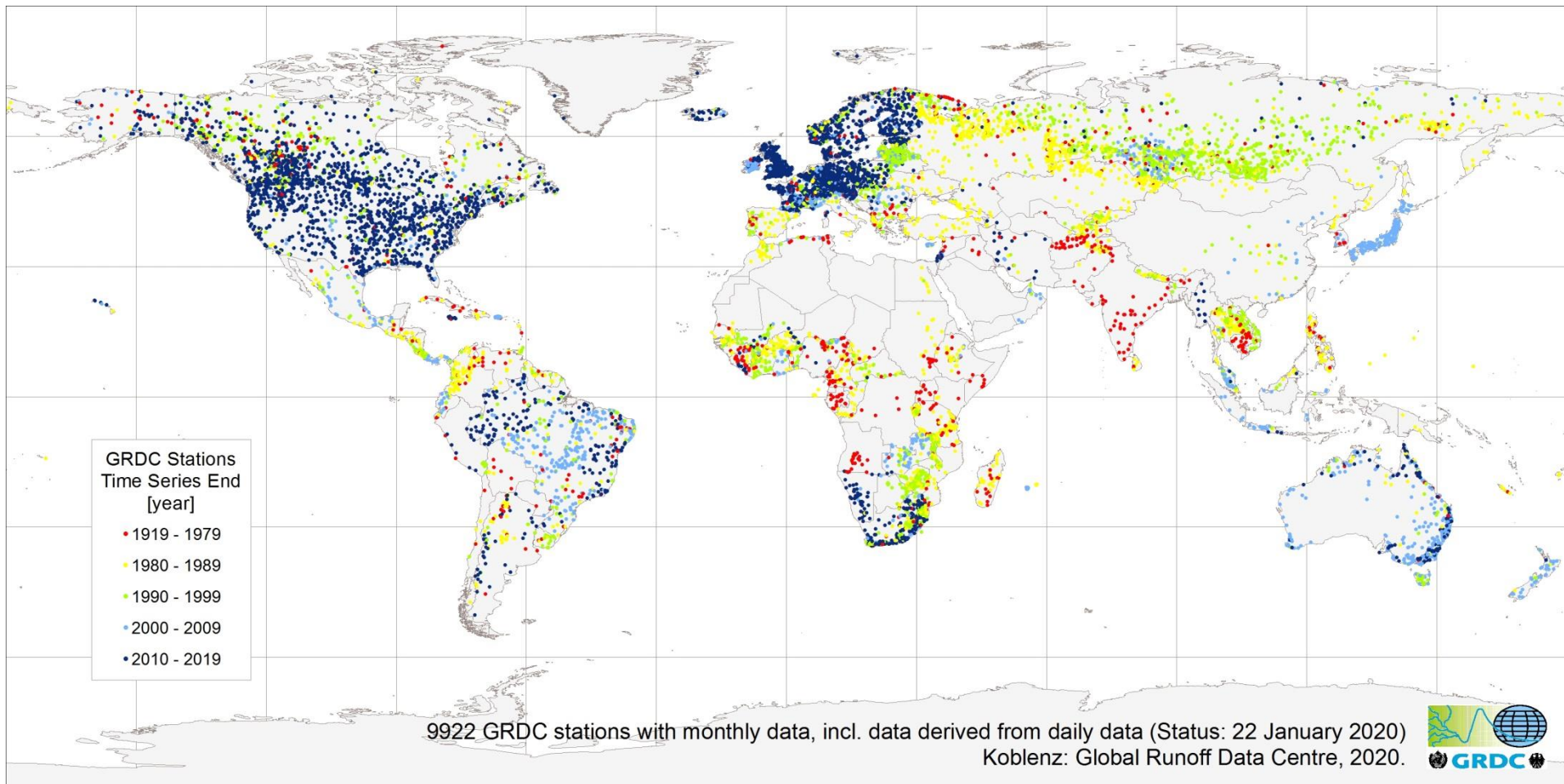
• Hydrology: GRDC

• Marine: WOD13

• Marine: ICOADS

# Current status of the Global Runoff Database

*Global Coverage of GRDC Stations indicated by **time series end***



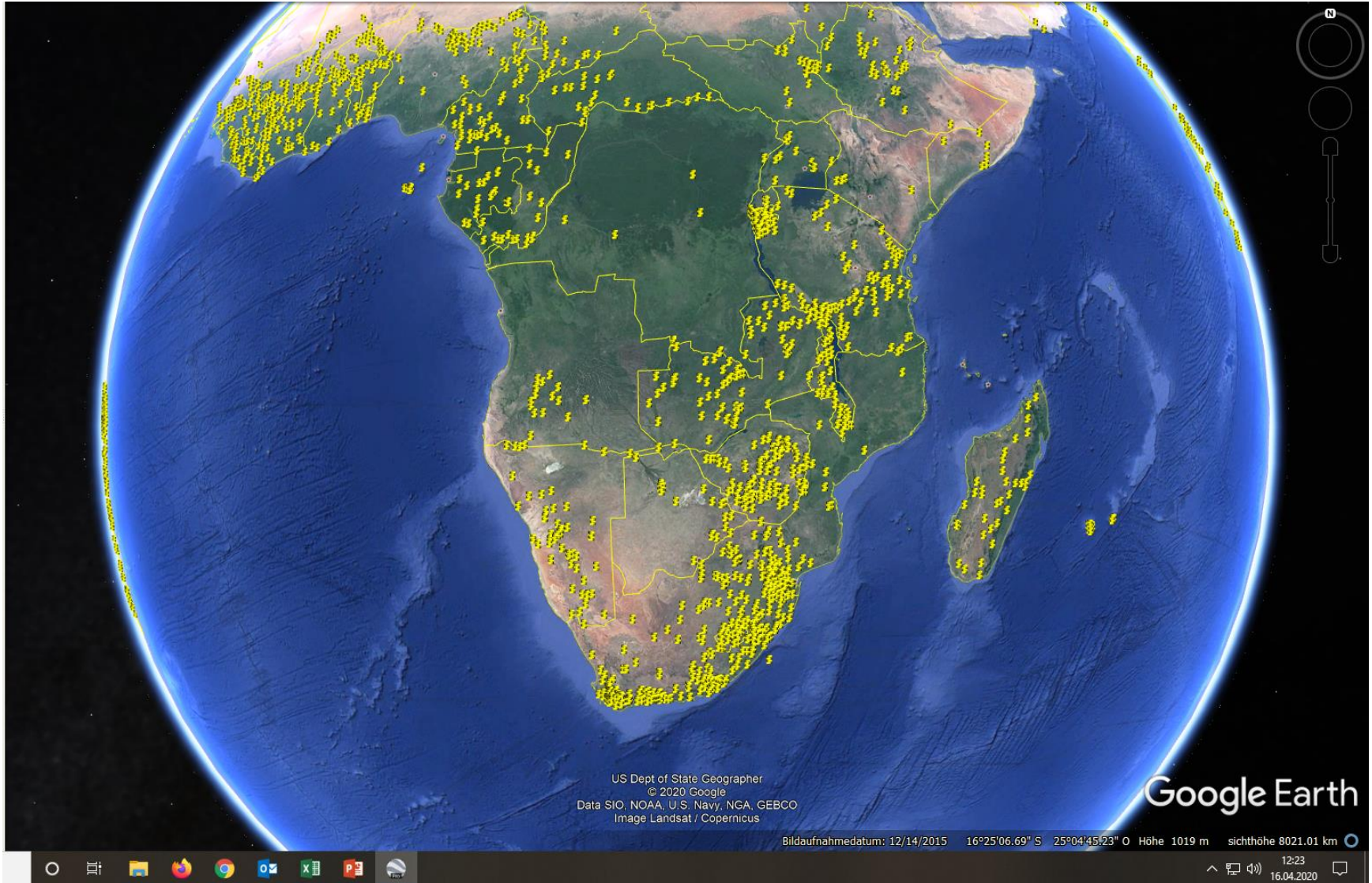
# *Current status of the Global Runoff Database*

*Quality controlled mean daily and mean monthly discharge data*

	<i>World</i>	<i>Africa</i>
<i>Number of stations</i>	9,922	1,568
<i>Station years</i>	436,678	44,014
<i>Average length</i>	44.01	28.07
<i>Longest timeseries</i>	212	116
<i>Earliest timeseries</i>	1806	1869
<i>Latest timeseries</i>	2019	2019



# Data availability for Southern Africa



# Data availability for SADC Member Countries

Country	# of stations	Earliest data	Latest data
Angola	19	1963	1974
Botswana	24	1933	2001
Comoros	-	-	-
DRC	6	1903	2010
Eswatini	37	1953	1993
Lesotho	23	1964	1993
Madagascar	35	1948	1988
Malawi	50	1951	1991
Mauritius	6	1976	1988
Mozambique	19	1951	1993
Namibia	50	1942	2018
Seychelles	-	-	-
South Africa	317	1904	2019
Tanzania	96	1940	1991
Zambia	75	1941	2005
Zimbabwe	121	1948	1990

# Data acquisition

*Based on: WMO Resolution 21 (Cg XII, 1995) Support to GRDC*

*WMO Resolution 25 (Cg XIII, 1999) Exchange of Hydrological Data and Products*

- *Primary data providers are the National Hydrological Services*
- *Ownership of the data remains with original data provider*
- *No institutionalised data provisioning*
- *No payment for offered data*
- *Data requests to National Services at intervals*
- *Opportunistic data acquisition strategy*
- *Individual contact often essential for successful data acquisition*
- *Data only offered by GRDC with authorisation by National Authorities*



# GRDC Data Acquisition



WORLD BANK GROUP

bfg

GRDC Presentation, Data Storage Solution Workshop, 22 April 2020



# GRDC data providers 2019

## Recent Updates



### 2020-01-20 Update Sweden (121 stations, 39 new)

The GRDC has updated the Global Runoff Database for 121 stations from Sweden with daily data.

[More ...](#)



### 2019-12-16 Update Iceland (21 stations, 2 new)

The GRDC has updated the Global Runoff Database for 21 stations from Iceland with daily discharge data.

[More ...](#)



### 2019-11-04 Update Canada (1113 stations)

The GRDC has updated the Global Runoff Database for 1113 stations from Canada with daily discharge data.

[More ...](#)



### 2019-11-04 Update USA (984 stations)

The GRDC has updated the Global Runoff Database for 984 stations from the United States of America with daily discharge data.

[More ...](#)



### 2019-10-31 Update Latvia (4 stations)

The GRDC has updated the Global Runoff Database for 4 stations from Latvia with daily discharge data.

[More ...](#)



### 2019-10-01 Update Greenland (1 station)

The GRDC has updated the Global Runoff Database for 1 station from Greenland (DK) with daily discharge data.

[More ...](#)



### 2019-08-27 Update Finland (136 stations, 31 new)

The GRDC has updated the Global Runoff Database for 136 (31 new) stations from Finland with daily discharge data.

[More ...](#)



### 2019-08-20 Update Jamaica (9 stations)

The GRDC has updated the Global Runoff Database for 9 stations from Jamaica with daily discharge data.

[More ...](#)



### 2019-08-16 Update Great Britain (225 stations)

The GRDC has updated 225 stations from Great Britain with daily discharge data.

[More ...](#)



### 2019-07-25 Update Denmark (31 stations, 16 new)

The GRDC has updated the Global Runoff Database for 31 stations from Denmark with daily discharge data.

[More ...](#)



### 2019-07-25 Update Liberia (7 stations)

The GRDC has updated the Global Runoff Database for 7 stations from Liberia with daily discharge data.

[More ...](#)



### 2019-07-25 Update Slovak Republic (15 stations)

The GRDC has updated the Global Runoff Database for 15 stations from the Slovak Republic with daily data.

[More ...](#)



### 2019-07-25 Update Czech Republic (30 stations)

The GRDC has updated the Global Runoff Database for 30 stations from the Czech Republic with daily discharge data.

[More ...](#)



### 2019-07-08 Update Azerbaijan (2 stations)

The GRDC has updated the Global Runoff Database for 2 stations from Azerbaijan with monthly discharge data.

[More ...](#)



### 2019-07-04 Update Peru (4 new stations)

The GRDC has updated the Global Runoff Database for 4 stations from Peru with daily discharge data.

[More ...](#)



### 2019-07-04 Update Bolivia (4 new stations)

The GRDC has updated the Global Runoff Database for 4 stations from Bolivia with daily discharge data.

[More ...](#)



### 2019-06-25 Update Estonia (54 stations, 50 new)

The GRDC has updated the Global Runoff Database for 54 stations from Estonia with daily data.

[More ...](#)



### 2019-06-25 Update Israel (8 stations, 2 new)

The GRDC has updated the Global Runoff Database for 8 stations from Israel with daily data.

[More ...](#)



### 2019-06-25 Update Poland (99 stations, 49 new)

The GRDC has updated the Global Runoff Database for 99 stations from Poland with daily data.

[More ...](#)



### 2019-05-15 Update Latvia (58 new stations)

The GRDC has updated the Global Runoff Database for 58 new stations from Latvia with daily discharge data.

[More ...](#)



### 2019-05-15 Update Lithuania (64 new stations)

The GRDC has updated the Global Runoff Database for 64 new stations from Lithuania with daily data.

[More ...](#)



### 2019-05-11 Update Belarus (46 new stations)

The GRDC has updated the Global Runoff Database for 46 new stations from Belarus with daily discharge data.

[More ...](#)



### 2019-04-23 Update Namibia (52 stations)

The GRDC has updated the Global Runoff Database for 52 stations from Namibia with daily discharge data.

[More ...](#)



### 2019-04-22 Update Iran (21 stations)

The GRDC has updated the Global Runoff Database for 21 stations from Iran with daily discharge data.

[More ...](#)



### 2019-02-26 Update Jordan (3 Stations, 1 new)

The GRDC has updated the Global Runoff Database for 3 stations (1 new) from Jordan with daily discharge data.

[More ...](#)



### 2019-02-07 Update South Africa (207 Stations)

The GRDC has updated the Global Runoff Database for 207 stations from South Africa.

[More ...](#)

# *GRDC Data Access Policy*

*based on RESOLUTION 25 (Cg-XIII, 1999)*

*Exchange of Hydrological Data and Products*

*GRDC data are available to users free and unrestricted under specific conditions*

*Data requests must be in writing: e.g. E-mail, letter or facsimile  
Data users must sign a user declaration stating that:*

- Data may not be used for commercial purposes*
- Data may not be transferred to third parties*
- Data users agree that the GRDC may inform data providers about the use of their data*
- The source of the data must be acknowledged in all publications*

# GRDC data portal coming soon

GRDC

Data Download

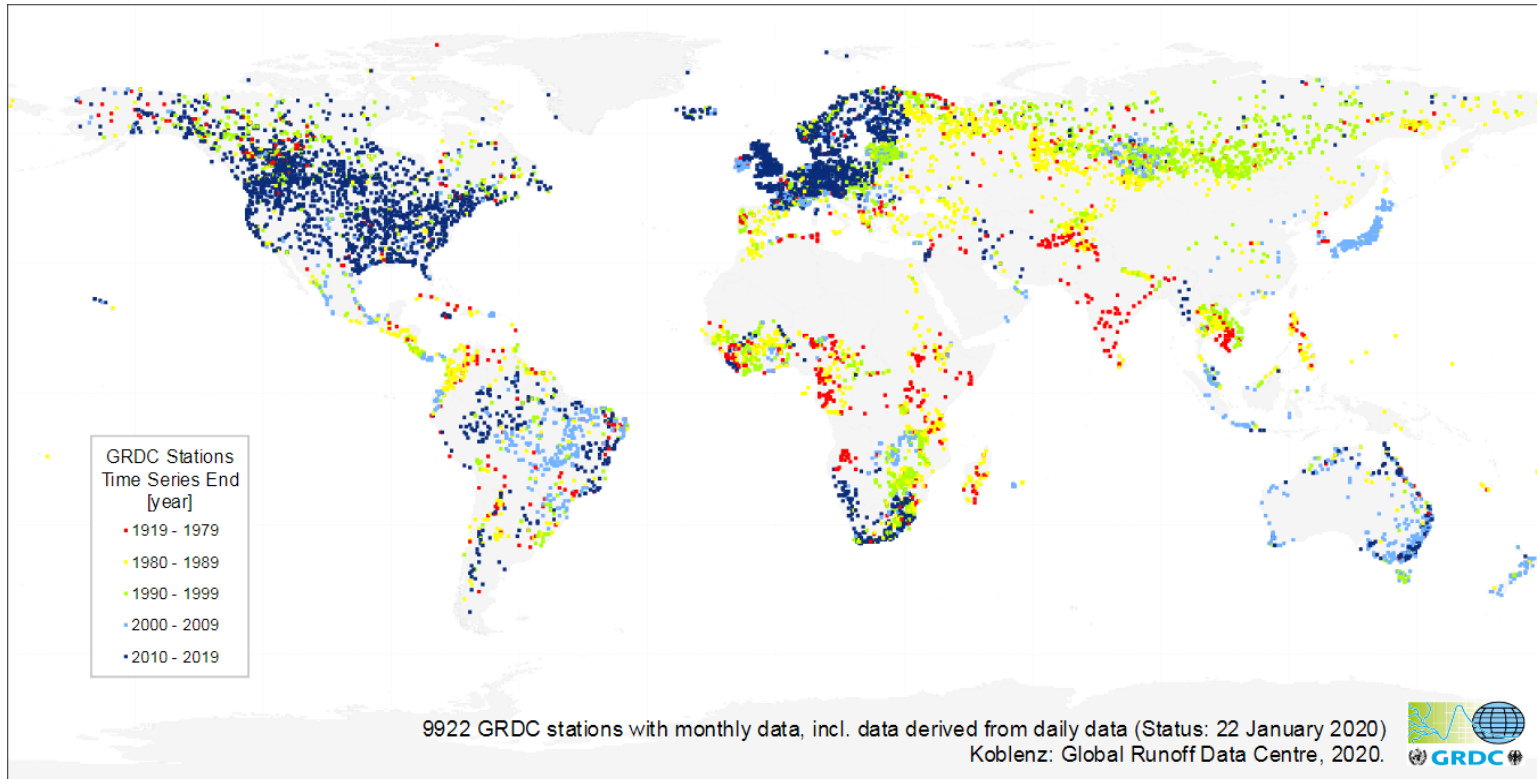
Home

Download by Subregion

Download by Station

Download GRDC Station Catalogue

Contact GRDC



## The GRDC

30 years of serving international  
programmes and trans-national projects



# Multiple station selection options

GRDC

Data Download

Home

Download by Subregion

Download by Station

Download GRDC Station Catalogue

Contact GRDC

Download by Station



Filter

9,922 / 9,922  
Stations

Clear filter

Station Name or Number

Search

Water Body Name

All

Find by alternative names

Region

All

Sub-region

All

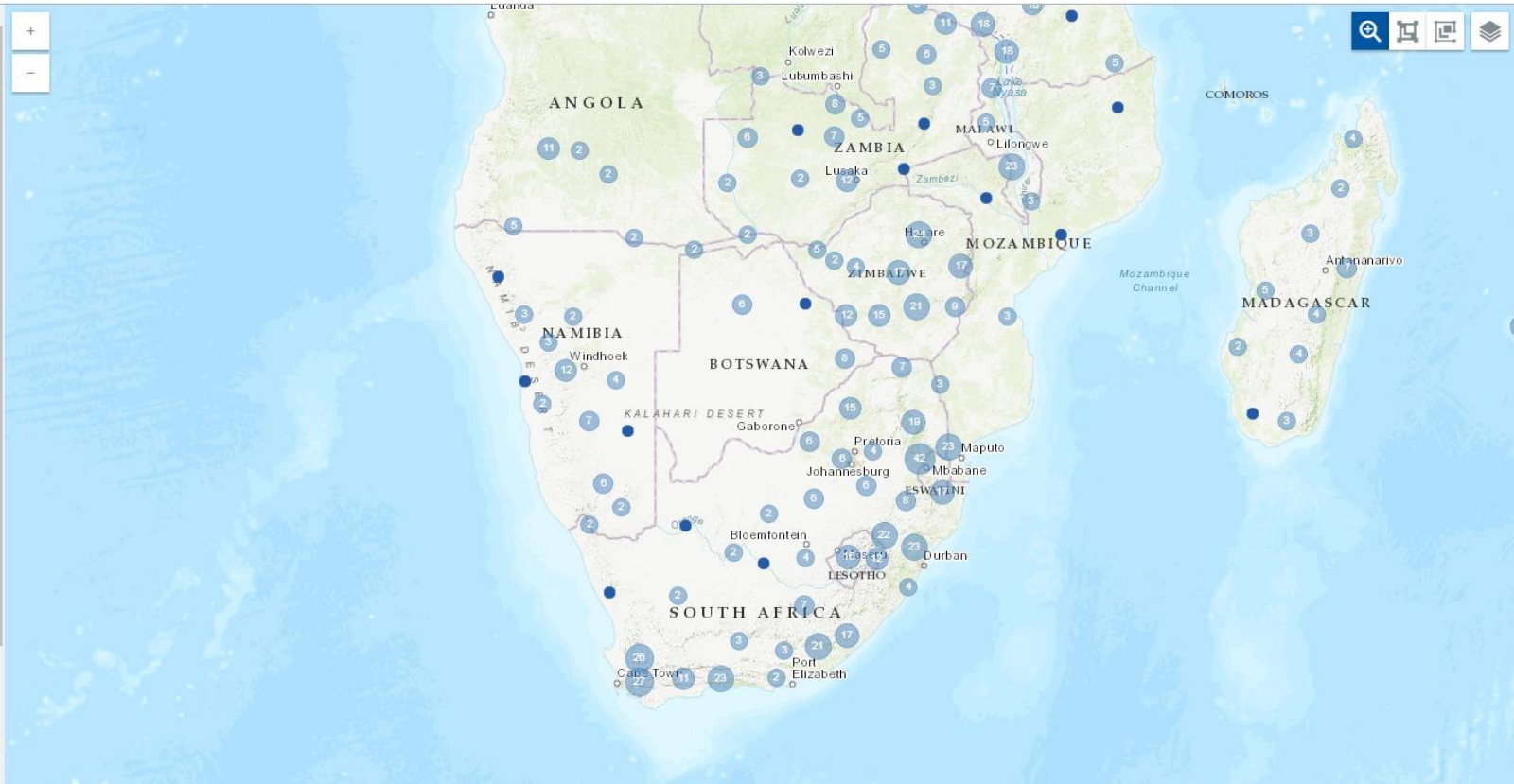
Country

All

Time Period

All

1931 - 1960



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All time stamps in time zone: UTC+00:00



GRDC Presentation, Data Storage Solution Workshop, 22 April 2020





# Multiple station selection options

**GRDC** Data Download

[Home](#) [Download by Subregion](#) [Download by Station](#) [Download GRDC Station Catalogue](#) [Contact GRDC](#)

**Download by Station**

Map Table

**Filter**

9,922 / 9,922 Stations

Clear filter

Station Name or Number

Water Body Name

All

Find by alternative names

Region

All

Sub-region

All

Country

All

Time Period

All

1931 - 1960

**VIOOLSDRIF (27811003) | 1159100**  
River: ORANGE RIVER  
Daily Start: 1935  
Daily End: 2018  
Daily Missing (%): 2.71  
Monthly Start: 1935  
Monthly End: 2001  
Monthly Missing (%): 1.64

1 Stations selected

[Deselect all](#) [Download](#)

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All time stamps in time zone: UTC+00:00

# Data policy integrated in data request

## Download Discharge Data for 1 Stations



Please provide your contact information and details for the requested download.  
A download link for the requested data will be sent to the email address entered.

Last name, First name

Ulrich Looser

Email address

Looser@bafg.de

Institution

GRDC at BfG

Working sector

Academic Institution

Country

Germany

GRDC Export Format (daily data only)

GRDC Export Format (monthly data only)

**GRDC Export Format (daily and monthly data)**

GRDC Statistics Format (statistics only)

WaterML2 (monthly data only)

ZRXP (daily data only)

ZRXP (monthly data only)

ZRXP (daily and monthly data)

GRDC Export Format (daily and monthly data)



Download Watershed Boundaries (Polygons in GeoJSON format)



The selected format is estimated to be around 2 files with a total download size of 0.02 MB. If you choose to submit, your download will be processed and an email will be sent to you when it is ready.



I, as the representative of the requesting organisation accept the general [Terms of Use](#) and the [Data Protection Regulations](#)



I, as the representative of the requesting organisation, specifically agree to the following [Data Sharing Conditions](#).

Cancel

Request download

# GRDC data formats for daily and monthly discharge data

```
TextPad - D:\Users\looser\AppData\Local\Temp\Temp1_2020-01-24_10-33 (1).zip\1159100_Q_Day.Cmd...
File Edit Search View Tools Macros Configure Window Help
1159100_Q_Day.Cmd.txt x
# Title: GRDC STATION DATA FILE
# Format: DOS-ASCII
# Field delimiter: ;
# missing values are indicated by -999.000
# file generation date: 2020-01-24
# GRDC-No.: 1159100
# River: ORANGE RIVER
# Station: VIOOLSDRIF (27811003)
# Country: ZA
# Latitude (DD): -28.757778
# Longitude (DD): 17.721389
# Catchment area (km²): 866486.0
# Altitude (m ASL): 152.0
# Next downstream station: -
# Remarks:
# Owner of original data: South Africa - Department of Water and Sanitation (DWA)
# Data Set Content: MEAN DAILY DISCHARGE (Q)
# Unit of measure: m³/s
# Time series: 1935-11 - 2018-12
# No. of years: 84
# Last update: 2019-02-14
# Table Header:
# YYYY-MM-DD - Date
# hh:mm - Time
# Value - original (provided) data
# Data lines: 30350
# DATA
YYYY-MM-DD;hh:mm; Value
1935-11-01;--:--; 1.348
1935-11-02;--:--; 1.290
1935-11-03;--:--; 0.852
1935-11-04;--:--; 0.710
1935-11-05;--:--; 0.700
1935-11-06;--:--; 0.584
```

```
TextPad - D:\Users\looser\AppData\Local\Temp\Temp1_2020-01-24_10-33 (1).zip\1159100_Q_Month.txt
File Edit Search View Tools Macros Configure Window Help
1159100_Q_Month.txt x
# Title: GRDC STATION DATA FILE
# Format: DOS-ASCII
# Field delimiter: ;
# missing values are indicated by -999.000
# file generation date: 2020-01-24
# GRDC-No.: 1159100
# River: ORANGE RIVER
# Station: VIOOLSDRIF (27811003)
# Country: ZA
# Latitude (DD): -28.757778
# Longitude (DD): 17.721389
# Catchment area (km²): 866486.0
# Altitude (m ASL): 152.0
# Next downstream station: -
# Remarks:
# Owner of original data: South Africa - Department of Water and Sanitation (DWA)
# Data Set Content: MEAN MONTHLY DISCHARGE (MQ)
# Unit of measure: m³/s
# Time series: 1935 - 2018
# No. of years: 84
# Last update: 2019-02-14
# Table Header:
# YYYY-MM-DD - Date (DD=00)
# hh:mm - Time
# Original - original (provided) data
# Calculated - GRDC calculated from daily data
# Flag - percentage of valid values used for calculation from daily data
# Data lines: 998
# DATA
YYYY-MM-DD;hh:mm; Original; Calculated; Flag
1935-11-01;--:--; 70.988; 88.506; 100
1935-12-01;--:--; 39.949; 39.769; 100
1936-01-01;--:--; 164.277; 221.539; 100
1936-02-01;--:--; 220.706; 291.772; 100
```

# GRDC Data Products

## Examples from GRDC Website



### Major River Basins of the World (GRDC, 2007)

The *Major River Basins of the World* is an ongoing GIS project of the Global Runoff Data Centre (GRDC) that aims at the provision of a set of shape files for the use with Geographic Information

Systems (GIS). This dataset was created for the generation of GRDC map products and will be updated from time to time whenever extensions are required by future GRDC projects. At present the dataset comprises the GIS layer of 405 river basins and 687 associated rivers.

[➤ More ...](#)



### Watershed Boundaries of GRDC Stations (GRDC, 2011)

Modern GIS technology allows for the delineation of basins for

almost every point on the Earth's surface. Against this background, GRDC is repeatedly asked for the provision of watershed boundaries for the gauging stations represented in the Global Runoff Data Base. The watershed boundaries of more than 7000 GRDC stations were generated using the HydroSHEDS drainage network.

[➤ More ...](#)



### WMO Regions and Subregions (GRDC, 2004)

The meteorological and related activities within WMO are coordinated by the WMO Regional Associations (RAs), composed of the WMO-Members from the respective regions of the world. The WMO regions basically coincide with the outlines of the continents.

[➤ More ...](#)

*Apart from river discharge timeseries GRDC offers related data products which are listed on the GRDC Website <http://grdc.bafg.de>*

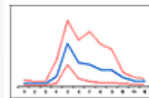
### GRDC Data and Map Products



#### Global Freshwater Fluxes into the World Oceans (GRDC, 2014)

The *GRDC Global Freshwater Fluxes into the World Oceans* are re-calculated and displayed for land areas associated with the UNEP GIWA Regions (UNEP, 2014) and as well freshwater fluxes from the 5° cells along the continent's coastlines. Freshwater fluxes calculated per 5° and 10° latitude bands show how much freshwater flows from a specific continent into a specific ocean.

[➤ More ...](#)

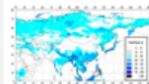


#### Annual Characteristics and Long-Term Statistics of GRDC Timeseries Data

Basic hydrological statistics of timeseries data of the gauging stations being represented in the Global Runoff Database. Annual characteristics are derived from monthly discharge data, either aggregated daily data or originally provided monthly data. Long-term statistics and long-term variability are derived from

annual characteristics

[➤ More ...](#)



#### Global Composite Runoff Fields (CSRC-UNH and GRDC, 2002)

The Global Composite Runoff Fields product was developed in a cooperation between the Water Systems Analysis Group (WSAG) at CSRC of University of New Hampshire (UNH) and the GRDC. It demonstrates the potential of combining observed river discharge information with a climate-driven water balance model

in order to develop composite runoff fields which are consistent with observed discharges.

[➤ More ...](#)

# *...more than 31 years GRDC*

*Global Runoff Data Centre (GRDC)*

*Ulrich Looser (Head, Liaison, Data Acquisition)*

*Thomas de Couet (Requests & GIS Products)*

*Irina Dornblut (Data & Metadata QC, Website, Portal Development)*

*Thomas Recknagel (Product Development)*

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*web: <http://grdc.bafg.de>*

*Thank you for your attention!*