



Global Runoff Data Centre (GRDC)

Database Status and Data Products

3rd Annual Meeting of CEOP
19 – 21 August 2009
Melbourne Australia

by Ulrich Looser

Global Runoff Data Centre (GRDC)

1. Status of the Global Runoff Data Base
2. Data Products and Services

Global Runoff Data Centre (GRDC)

GRDB database summary statistics (June 2009)

WMO Region		data from 156 countries*	number of stations	station-years	individual values	average time series length	shortest record	longest record	earliest data	latest data	latest import
			[-]	[-]	[-]	[years]	[years]	[years]	[year]	[year]	[year]
all	World	monthly data (total)	7,349	283,179	3,398,148	38.5	1	197	1807	2009	2009
		original monthly data	5,573	160,094	1,921,128	28.7	1	192	1807	2004	
		original daily data	4,917	197,838	72,210,870	40.2	1	192	1812	2009	
1	Africa (44 countries)								1869	2007	2007
2	Asia (26 countries)								1865	2004	2008
3	South and Central America (13 countries)								1901	2005	2006
4	North America (16 countries)								1860	2009	2009
5	Australia and Oceania (14 countries)								1886	2009	2009
6	Europe (43 countries)	monthly data (total)	1,225	52,726	632,712	43.0	1	197	1807	2008	2009
		original monthly data	965	33,474	401,688	34.7	1	192	1807	2003	
		original daily data	833	34,720	12,672,800	41.7	1	192	1812	2008	

Number of stations: 7,349 (4,917 with daily data)

Average time series length: 39 years

Longest record: 197 years (Vaenern-Goeta)

Earliest data: 1807 (Vaenern-Goeta)

Latest records: 2009 (AU, US)

Latest imports: 2009 (AT, AU, CA, CZ, DE, NL, SI, US)

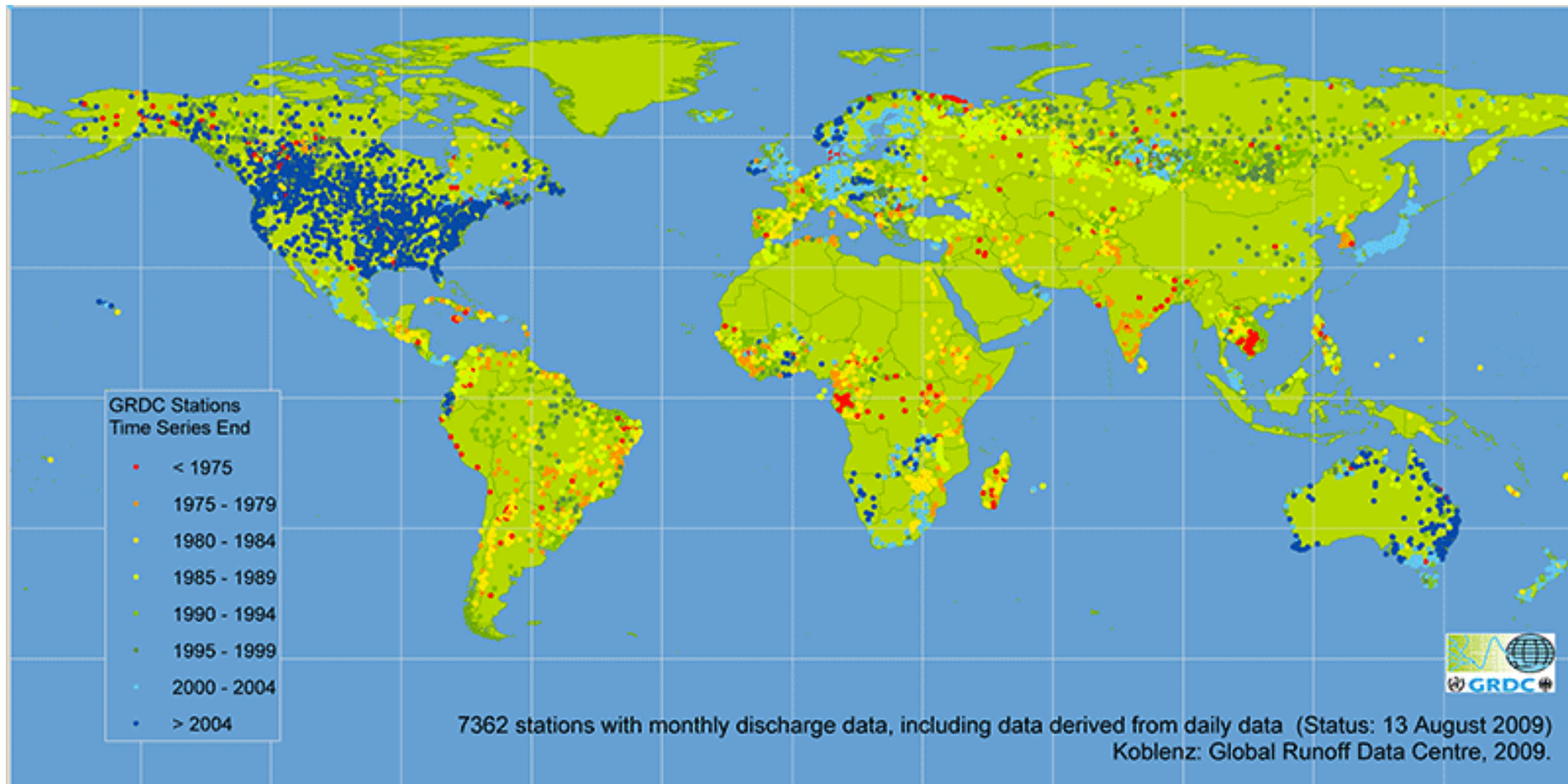
* countries as given in ISO 3166-1

Source:

http://www.bafg.de/GRDC/EN/01_GRDC/03_Database/database_node.html

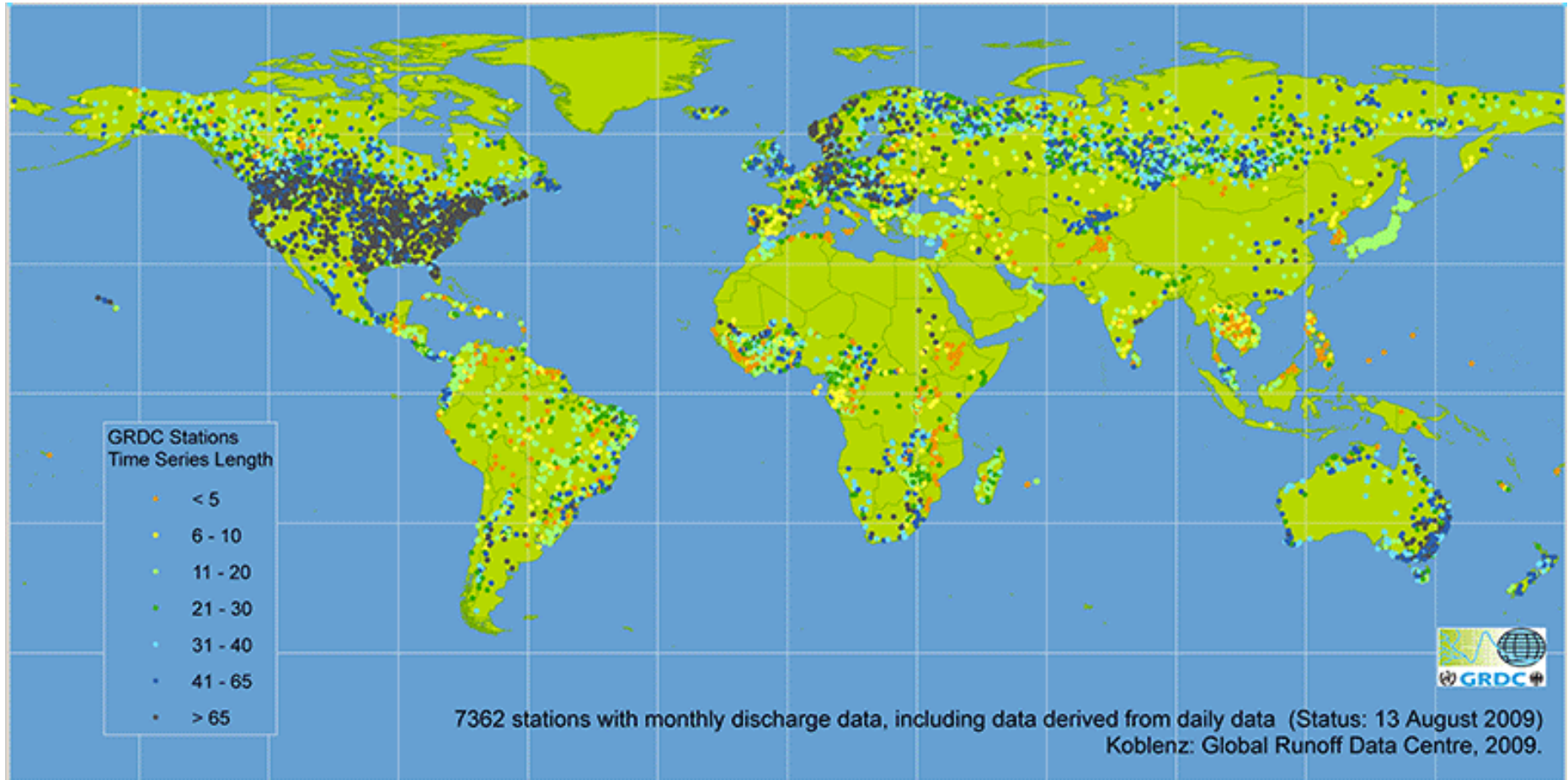
Global Runoff Data Centre (GRDC)

Global Coverage of GRDC Stations indicated by **time series end**,
(monthly discharge data including data derived from daily discharge data)



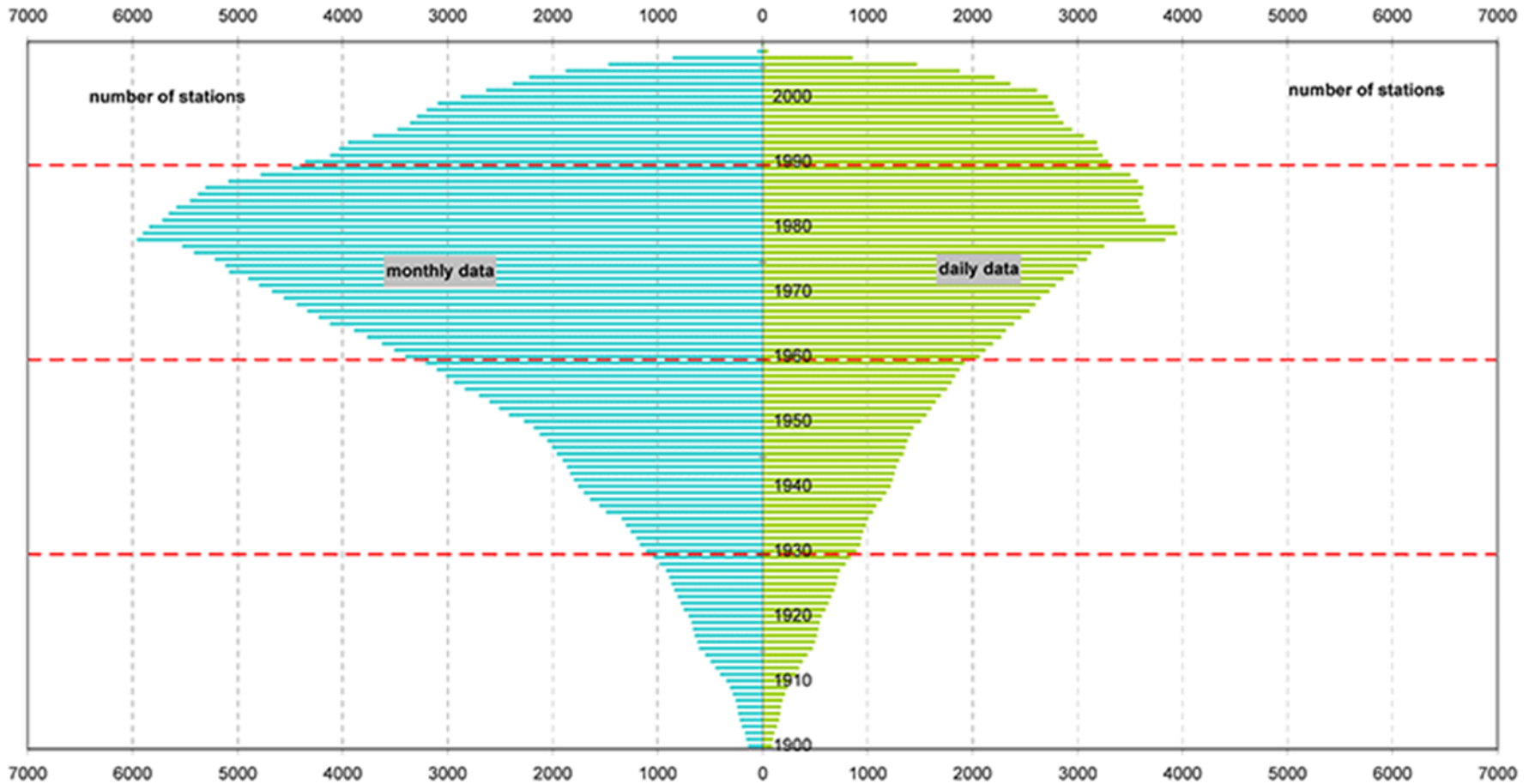
Global Runoff Data Centre (GRDC)

Global Coverage of GRDC Stations indicated by **time series length**,
(monthly discharge data including data derived from daily discharge data)



Global Runoff Data Centre (GRDC)

Availability of historical discharge data in the GRDC database
Number of stations per year currently represented in the GRDC database



Global Runoff Data Centre, Koblenz, Germany, 2009

Global Runoff Data Centre (GRDC)

GRDC data dissemination policy

(based on WMO Resolution 25 (Cg XII, 1995))

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

Data requests must be in writing: e.g. letter, facsimile or E-mail

Data users must sign a user declaration stating that:

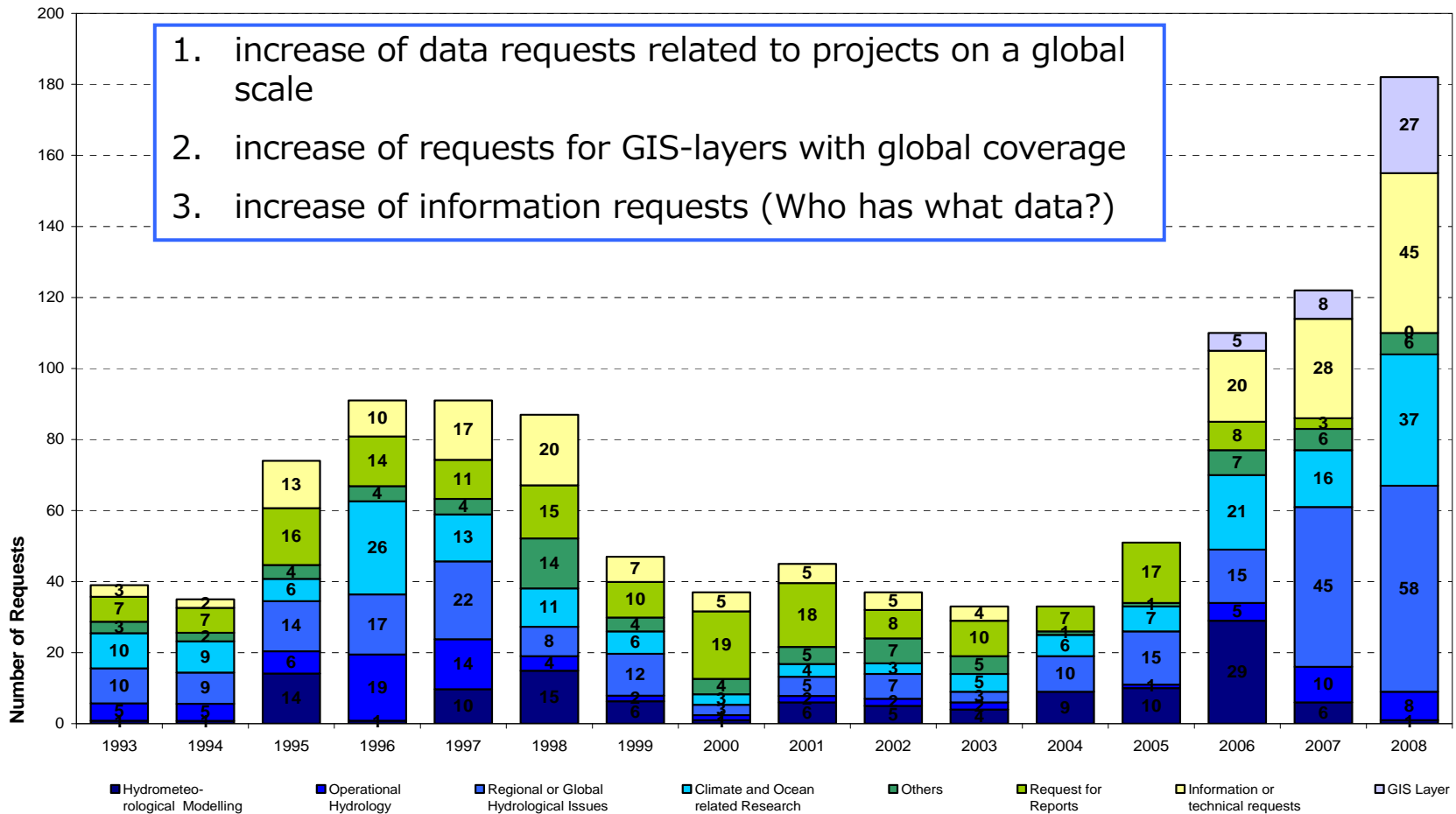
- Data is not transferred to third parties without the written consent of the GRDC
- GRDC data may not be used for commercial purposes without the prior consent of the data providers to the GRDC
- Data users agree that the GRDC may inform data providers about users and the use to which their data have been put
- After completion of the studies, two copies of the results will be provided to the GRDC
- The source of the data must be acknowledged in all publications

Global Runoff Data Centre (GRDC)

Data Dissemination



Data delivery requests directed to GRDC, 1993 - 2008



Global Runoff Data Centre (GRDC)

European Terrestrial Network for River Discharge (ETN-R)

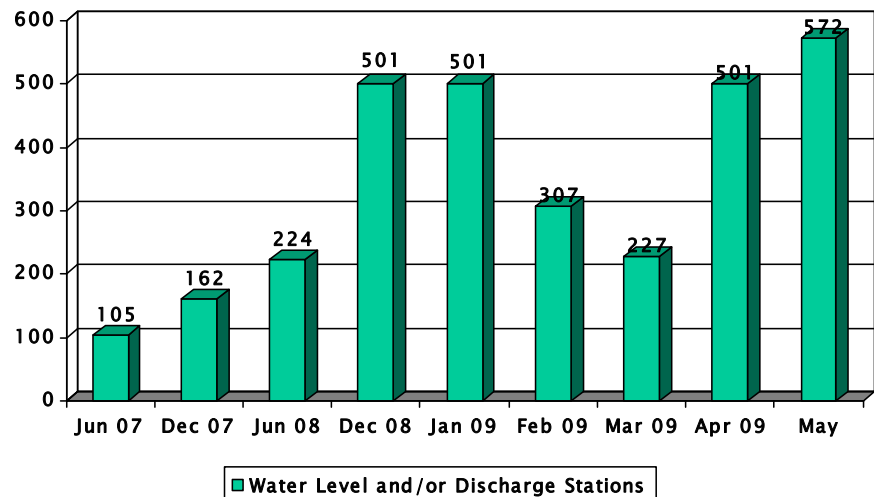
- Service to support the European Flood Alert System (EFAS) of the EC-JRC by the regular provision of river gauging data in near-real time
- Software system for the automated collection, harmonisation, processing and re-distribution of real-time water level and discharge data
- Mapping of stations in Google Earth used for process monitoring
- Provision of system modules for the Global Terrestrial Network River Discharge

- Snapshot 29 May 2009:

water level/discharge data

- 572 stations
- 22 national data providers
- 16 countries

transmission to EU-JRC twice a day

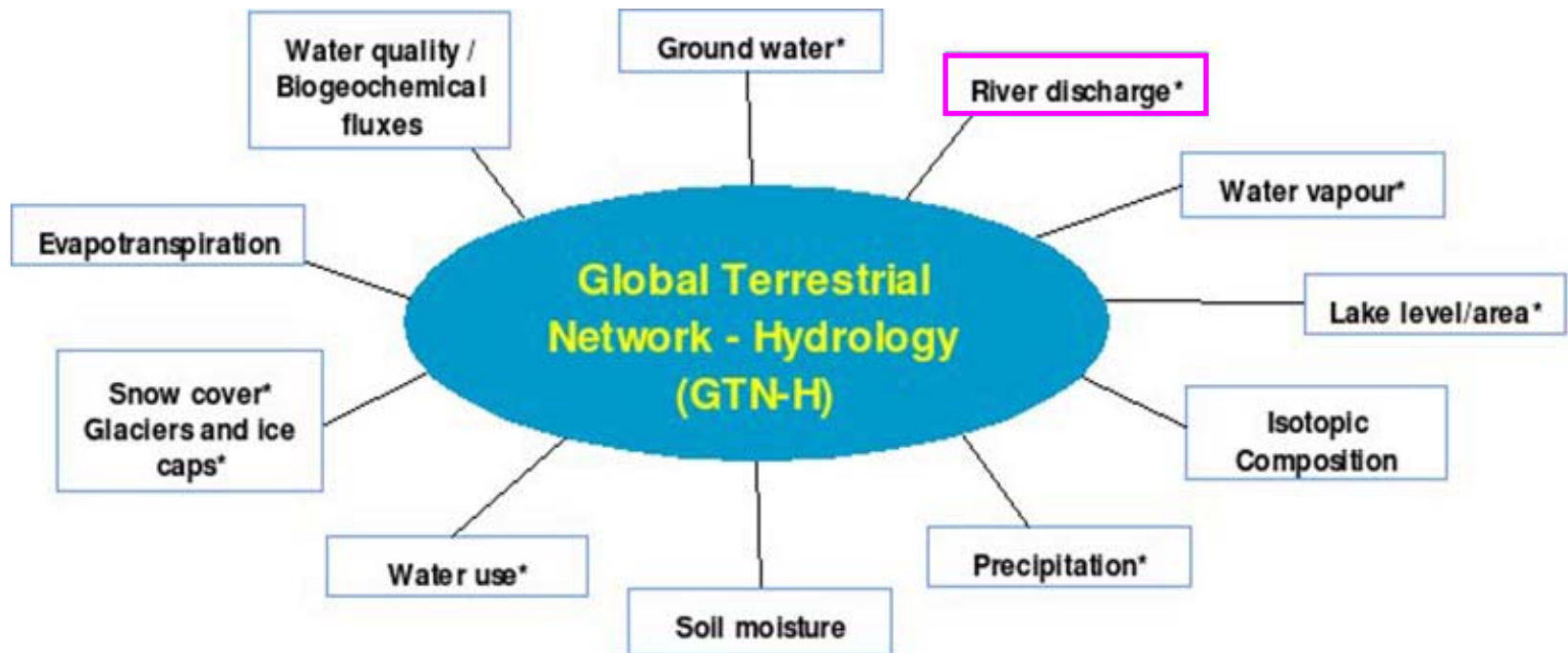


Global Runoff Data Centre (GRDC)

Global Terrestrial Network for River Discharge (GTN-R)

Contribution to GTN-H: “River discharge” component

- global dataset of discharge data, capturing major freshwater fluxes to the oceans
- automatically collected data in near-real time, regularly updated



18 February 2009

GRDC

Welcome to the Global Runoff Data Centre

The GRDC Website has undergone a complete makeover. This step became necessary to meet requirements from both our customers and our IT support infrastructure.

We are proud to release the new Website in the year of the **20th Anniversary of the GRDC**. As part of the celebrations the GRDC is planning a Colloquium during the 4th week of June 2009, to coincide with the next Steering Committee Meeting. At the Colloquium research based on GRDC data will be showcased.

For further news, new products and the latest database developments please visit us from time to time. Together with the GRDC team I hope that you enjoy the new GRDC Website. (Ulrich Looser, Head of the GRDC)

This is the Global Runoff Data Centre, a repository for the world's river discharge data and associated metadata.



- Up-to-date station catalogues, KMZ files for use with Google Earth
- Information on Hydrological and Hydro-Meteorological Services
- Shape files for the use with GIS provided
- Long-term Monthly Means of River Discharges updated
- Freshwater Fluxes to the World Oceans re-calculated
- "Abbreviation-Guide" re-compiled

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the GRDC in Koblenz near the confluence of the Moselle and Rhine rivers.



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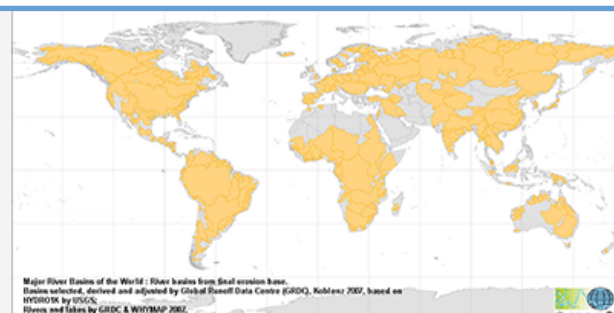
Major River Basins of the World (GRDC, 2007)

- Introduction
- Polygons of 405 river basins from the river mouths at the erosion base level (GRDC, 2007)
- Polylines of 687 rivers, associated to the basins from the river mouths (GRDC and WHYMAP, 2007)
- Polylines of 687 rivers, classified by discharge (GRDC, BGR and University of Frankfurt, 2007)

Recommended citation: Global Runoff Data Centre (2007): Major River Basins of the World / Global Runoff Data Centre. Koblenz, Federal Institute of Hydrology (BfG), 2007.

Introduction

- GIS layer of 405 river basins and 687 associated rivers
- drainage basins are derived from the flow direction data set of the HYDRO1k
- associated river network generated in cooperation with BGR in Hanover, Germany
- classified by mean river discharge values as calculated with WaterGAP 2.1 (University of Frankfurt, Germany, 2007)
- provided on request as ESRI shape files



Based on the concept that a river basin covers all area of land that drains to the point of the lowest elevation, the delineation procedure starts at the rivers outlet (pour point), which coincides with the location of the confluence with a river, the mouth into an ocean or an endorheic sink. These "pour points" represent the locations above which the drainage basin is derived from the flow direction grid using the ESRI ARC/INFO software. We used the flow direction data set of the HYDRO1k Elevation Derivative Database on Africa, Asia, North and South America and Europe. As HYDRO1k does not include flow direction data from Australia, there we used the basin boundaries as defined in Australia's River Basins 1997 (<http://www.ga.gov.au/nmd/products/thematic>).


Background

- >> Basin delineation and river network generation
- >> Column key of attribute tables
- >> GRDC User Declaration for GIS Layer (pdf, 15 KB)
- >> GRDC Order Form for GIS Layers (pdf, 120 KB)
- >> Abbreviation Guide



- The GRDC
- Standard Services
 - > River Discharge Data
 - > Data Products
 - >> Freshwater Fluxes into the World Oceans
 - >> Long-Term Mean Monthly Discharge
 - >> **Major River Basins**
 - >> Global Composite Runoff Fields
 - > GRDC Report Series
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Long-Term Mean Monthly Discharges and Annual Characteristics of GRDC Stations

Recommended citation: Global Runoff Data Centre (2008): Long-Term Mean Monthly Discharges and Annual Characteristics of GRDC Station / Global Runoff Data Centre. Koblenz, Federal Institute of Hydrology (BfG), 2009.

The »Long-Term Mean Monthly Discharges and Annual Characteristics« offer basic statistics of 3.567 stations draining basins larger than 2.500 square kilometres [km²], and being represented in the Global Runoff Database by a time series longer than ten years. On the basis of daily discharge values from years of at least ten months and months with less than ten days missing, we calculated:

- annual series of the mean, the lowest, and the highest monthly discharges,
- long-term mean, lowest, and highest monthly discharges of consecutive years with at least nine monthly values,
- long-term inner-annual mean, lowest and highest monthly discharges of consecutive years with at least five values of a specific month, and their standard deviations.

- basic statistics of 3.567 stations represented in the GRDB
- annual series of mean, lowest, and highest monthly discharges
- long-term mean, lowest, and highest monthly discharges
- long-term inner-annual mean, lowest and highest discharges, and their standard deviations
- for download (ASCII-text files)

5	Australia & Pacific	112	Download (0,2 MB)
6	Europe & Mediterranean Asia	542	Download (0,6 MB)
		Total: 3,567	

Background

- » Example pvm-file (plain, 6 KB)
- » Abbreviation Guide

The GRDC

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Global Runoff Data Centre (GRDC)

Global Dataset of GRDC River Discharge Data

- *under development*
- dataset with global coverage
- based on station selection used for calculation of “Global Gridded Runoff Fields”, 2002
- revision of the initial station selection
 - 2,5° grid coverage
 - basin area capturing more than 10,000 km²
 - length of available time series greater than 20 years
 - regularly updated station

River Discharge Data
GRDC Global Dataset
Status: 18 June 2009
Time Series End

- < 1975
- 1975 - 1979
- 1980 - 1984
- 1985 - 1989
- 1990 - 1994
- 1995 - 1999
- 2000 - 2004
- > 2004

674 stations with daily discharge data, including data derived from monthly data (Status: 18 June 2009)
Koblenz: Global Runoff Data Centre, 2009.





Freshwater Fluxes into the World Oceans (GRDC, 2009)

Recommended citation: Global Runoff Data Centre (2009): Surface Freshwater Fluxes into the World Oceans / Global Runoff Data Centre. Koblenz, Federal Institute of Hydrology (BfG), 2009.

Freshwater input from continents into the oceans is of major interest in research concerned with global monitoring of freshwater resources, the flux of matter into coastal areas and the sea, or the influence of freshwater fluxes on circulation patterns. GRDC calculated the mean annual »Surface Freshwater Fluxes into the World Oceans« on the basis of a 0.5° source grid optimised for flow path detection. By application of GIS analysis procedures, the specific catchments of 12.000 individual grid cells that form the fringe of the continents were determined so much as all adjacent continental grid cells were co-registered with their respective fringe grid cell through which they drain to the oceans.

Background

- ›› Comparisons with other estimates (pdf, 16 KB)
- ›› GRDC User Declaration for Discharge Data (rtf, 11 KB)
- ›› Order Form (rtf, 604 KB)
- ›› Abbreviation Guide

The GRDC

Standard Services

› River Discharge Data

› Data Products

›› Freshwater Fluxes into the World Oceans

›› Long-Term Mean Monthly Discharges

›› Major River Basins

›› Global Composite Runoff Fields

› GRDC Report Series

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- catchment-derived annual runoff volume
 - from land areas that coincide with GIWA regions (map)
 - from 5° -/10° -grid cells along the continents coastline (table)
- basis of a 0.5° source grid, optimised for flow path detection
- over 5° -latitudinal bands (table)
- freshwater fluxes through 12.000 continental coastline cells
- use of mean river discharges calculated with WaterGAP 2.1 (*University of Frankfurt, Germany, 2008*)
- application results provided for download



Special application of GRDC's Surface Freshwater Fluxes into the World Oceans (GRDC, 2009) which calculates the annual freshwater inputs to the oceans over 5° or 10° latitudinal bands.

Global Runoff Data Centre (GRDC)

GRDC: Freshwater Fluxes from land areas associated with GIWA Regions



National Hydrological and Hydro-Meteorological Services







- WMO Region 1: Africa
- WMO Region 2: Asia
- WMO Region 3: South America
- WMO Region 4: North America, Central America and the Caribbean
- WMO Region 5: South-West Pacific
- WMO Region 6: Europe

The National Hydrological and Meteorological Services are responsible for the collection and processing of hydrologic data varies from country to country. In some countries, the responsibility of the energy, agricultural and meteorological data is shared among different institutions.

When responsibility is shared and no designated institution exists, the link is to that institution designated. Please see the »Country Representatives with WMO and the »Country Assessment is not formally established. Some countries have special facilities or climate change (South America).

Source of flag graphics: <https://www.federalreserve.gov>

WMO Region 1: Africa

 Algeria	 Angola
 Cameroon	 Cape Verde
 Chad	 Congo

Czech Republic

The Hydrological Adviser of the Permanent Representative with WMO has been designated by:

Czech Hydrometeorological Institute
Na Šabatce 17
14306 PRAGUE KOMORANY 4

National Hydrological Service:

Czech Hydrometeorological Institute
Na Šabatce 17
14306 PRAGUE KOMORANY 4

Updates:

- > 2009-02-10 Update Czech Republic (12 stations)
- > 2009-02-13 Update Czech Republic (EWA: 18 stations)

Online data:

- > real-time water level and discharge data

Background

- >> Composition of WMO (pdf, 3 MB)
- >> Members of WMO
- >> Abbreviation Guide

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- > GRDC Report Series
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- > Data Acquisition
- > Collaboration
- >> **National Services**
- >> River Basin Authorities
- >> Partner Data Centres
- > Abbreviation Guide

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A B C D E F G H I J K L M N O P Q R S T U V W X Y Z #

Long names are given in the original language. An English equivalent will be provided as far as it is known to GRDC. If available, an URL will be provided which will guide you to the respective external presentation, usually the Website of the organisation, programme or project. These Hyperlinks are provided as a convenience only. They imply neither responsibility for, nor approval of, the information contained in those Websites.

Abbreviation	
G3OS	the Three Global Observing Systems of UN: GCOS, GOOS and GTOS
GAME	GEWEX Asian Monsoon Experiment
GAPP	GEWEX American Prediction Project, followed by CPPA
GARP	Global Atmospheric Research Programme 1967-1982

... more than 500 acronyms and abbreviations of institutions, organisations, programmes, projects in the field of Earth observation and data management. Links are provided wherever possible.

GCIP	GEWEX Continental-Scale International Project
GCMD	US Global Change Master Directory
GCOS	Global Climate Observation System, one of three global observing systems (G3OS) of the UN
GCOS IP	Implementation Plan for the Global Observing System for Climate, 2004
GCRIO	US Global Change Research Information Office
GDI-DE	Geodateninfrastruktur Deutschland (Spatial data infrastructure for Germany)
GEF	Global Environment Facility
GEIN	German Environmental Information Network, renamed to Portal U
GEMET	General Multilingual Environmental Thesaurus of EIONET
GEMS	Global and regional Earth-system (Atmosphere) Monitoring using Satellite and in-situ data, focused on Europe, coordinated by ECMWF
GEMStat	Global Water Quality Data and Statistics of GEMSWater Programme
GEMSWater	GEMSWater Programme of UNEP

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Global Runoff Data Centre (GRDC)

Draft (GRDC) Metadata Profile for Hydrologic Datasets GRDC Report No. 39

http://www.bafg.de/cIn_015/nn_294112/GRDC/EN/02_Services/04_Report_Series/reports_node.html?_nnn=true

- semantic structure to describe
 - hydrologic data as special geographic data
 - observation that generated the data
 - hydrologic feature (water body) represented by the data
- high abstraction hierarchy level (“WMO-CHy community”)
- applicable to other hydro-features and variables related to GTN-H
- consideration of relevant ISO standards and OGC specifications

Global Runoff Data Centre (GRDC)

Discussion and action on data sharing:

- Data sharing starts to be discussed at many levels
- Reaffirmation of WMO Res. 25 (Cg-XIII-1999) at CHy (XIII-2008)
- 3rd United Nations World Water Development Report (WWDR3)
- Special Theme on “Data for all” at the 5th World Water Forum
- Many countries are changing their restrictive data policies
- Many countries are prepared to provide near real-time data
- Technology ready for easy sharing of electronic data
- Discussion on data sharing is picking up momentum...

Global Runoff Data Centre (GRDC)

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Thank you for your attention!