



Global Runoff Data Centre (GRDC)

Status Report

GEWEX - GHP Panel Meeting
10 - 13 December 2014
Pasadena, USA

by Ulrich Looser

GRDC operational environment

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



on the advice of an
International Steering Committee

with the financial support of the
Federal Republic of Germany



within the
Federal Institute of Hydrology

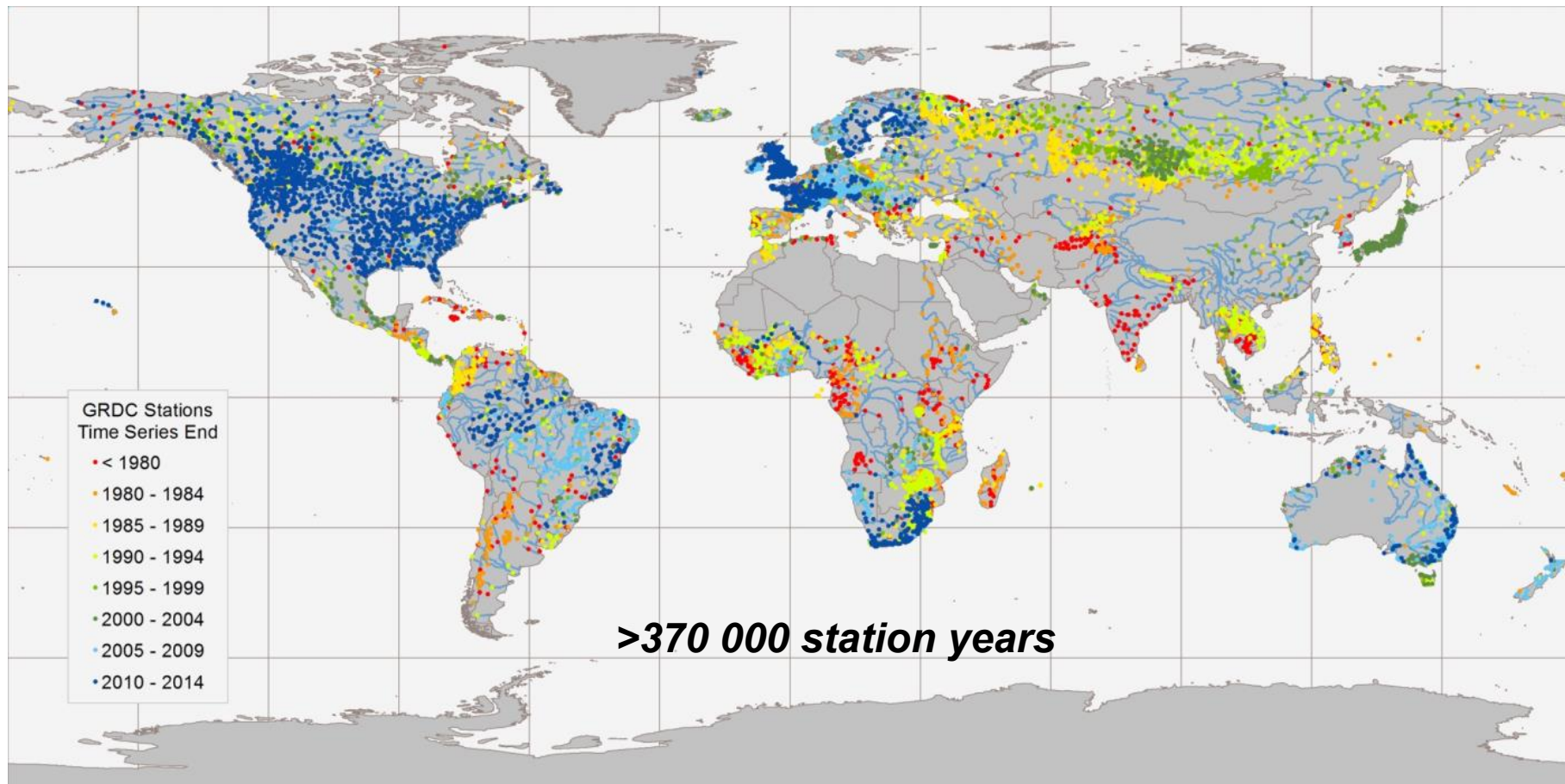


GRDC Main functions

- Acquisition and storage of global historical discharge data and associated metadata
- Dissemination of historical discharge data (370 000 station-years) and derived products from currently ~ 9000 stations in 160 countries (“One-stop shop”)
- Support to the water and climate related programmes and projects of the United Nations and their specialised agencies
- Service to the international research community on global change and climate services
- Cooperation and participation in international projects and programmes such as:
 - GCOS (Global Climate Observing System)
 - GEWEX (Global Energy and Water Exchanges)
 - UNESCO IHP FRIEND-Water (Flow Regime from International Experimental and Network Data)
 - GEO (Group on Earth Observations)
 - OGC (Open Geospatial Consortium) Hydrology Domain Working Group
 - etc.
- The GRDC is **not** substituting the functions of the National Hydrological Services
- Ownership of the data remains with the original Data Provider

Status of the Global Runoff Database

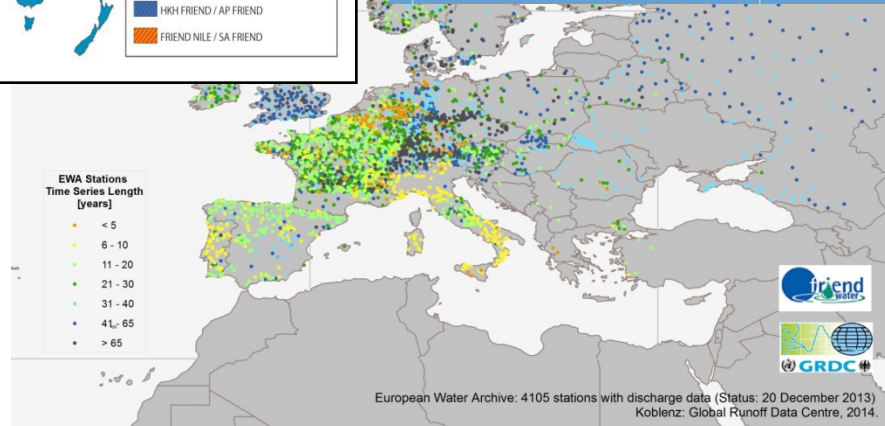
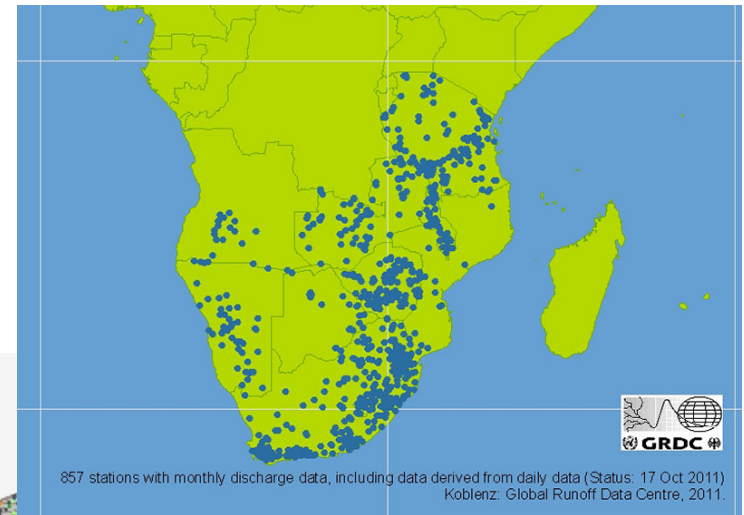
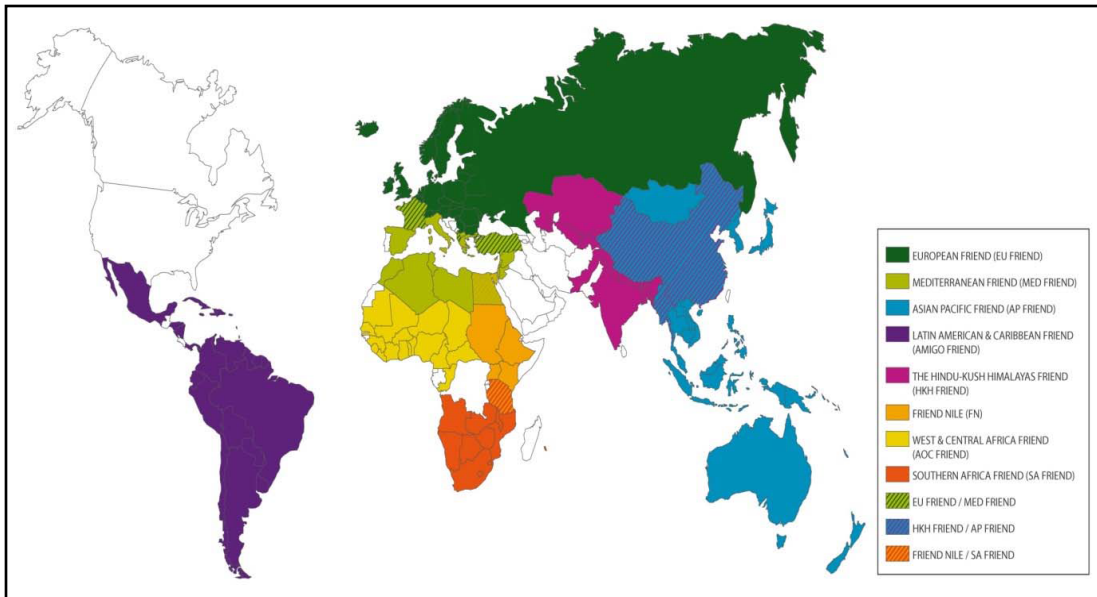
Global Coverage of GRDC Stations indicated by **time series end**



9009 GRDC stations with monthly data, incl. data derived from daily data (Status: 24 June 2014)
Koblenz: Global Runoff Data Centre, 2014.

Future of UNESCO FRIEND-Water Databases

FIGCC (FRIEND-Water Intergroup Coordinating Committee) decision in Montpellier (Oct 2014) to integrate FRIEND-Water Databases into GRDC database

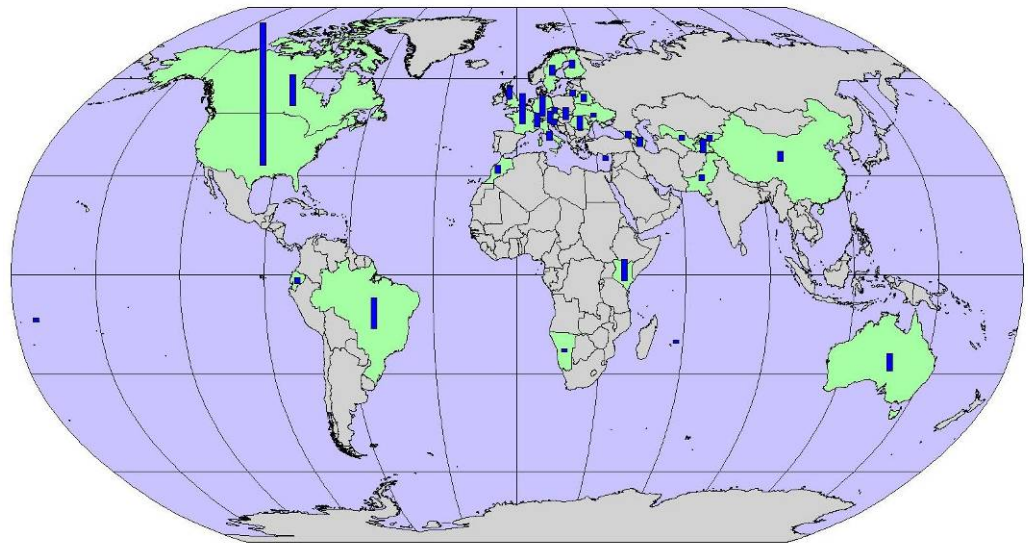


Climate Sensitive Stations Dataset under development

- Identification of stations representing climate sensitive river basins having minimal disturbance
- WMO selection criteria (
<http://www.wmo.int/pages/prog/hwrp/Hydroclimate/hydroclimate2.htm>)
- Access under the conditions of the GRDC data policy

Project Status October 2014:

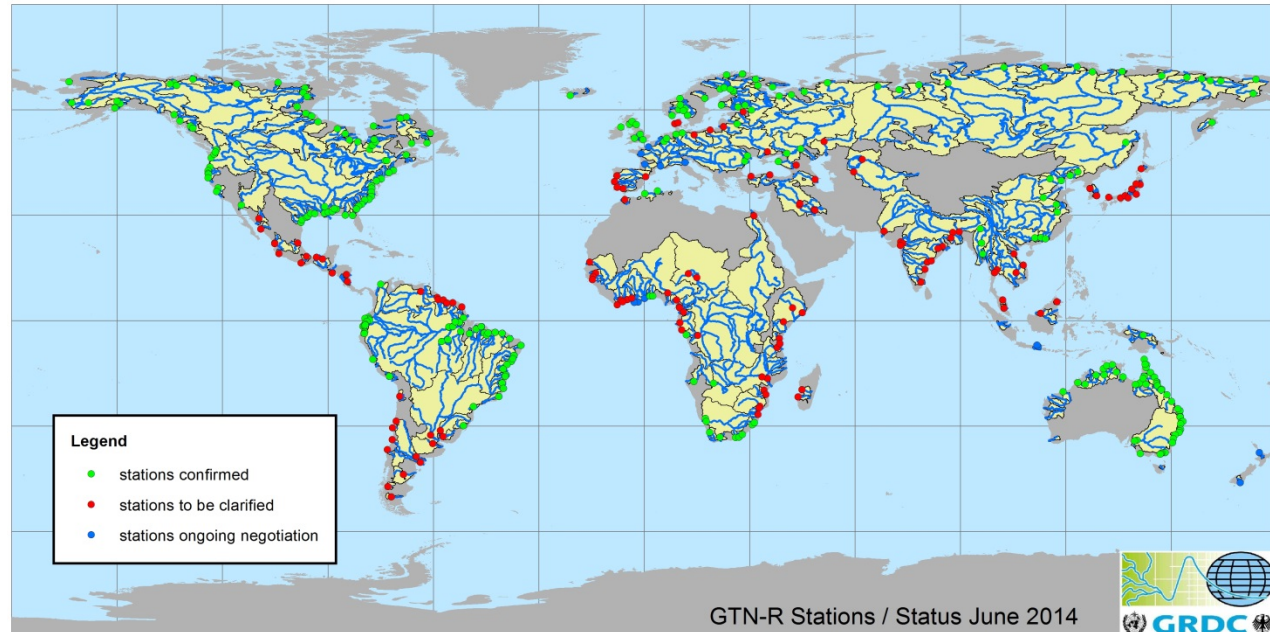
- 2,482 identified stations
- 1,175 GRDC stations confirmed
- 34 countries contributed
- daily / monthly streamflow records / station metadata



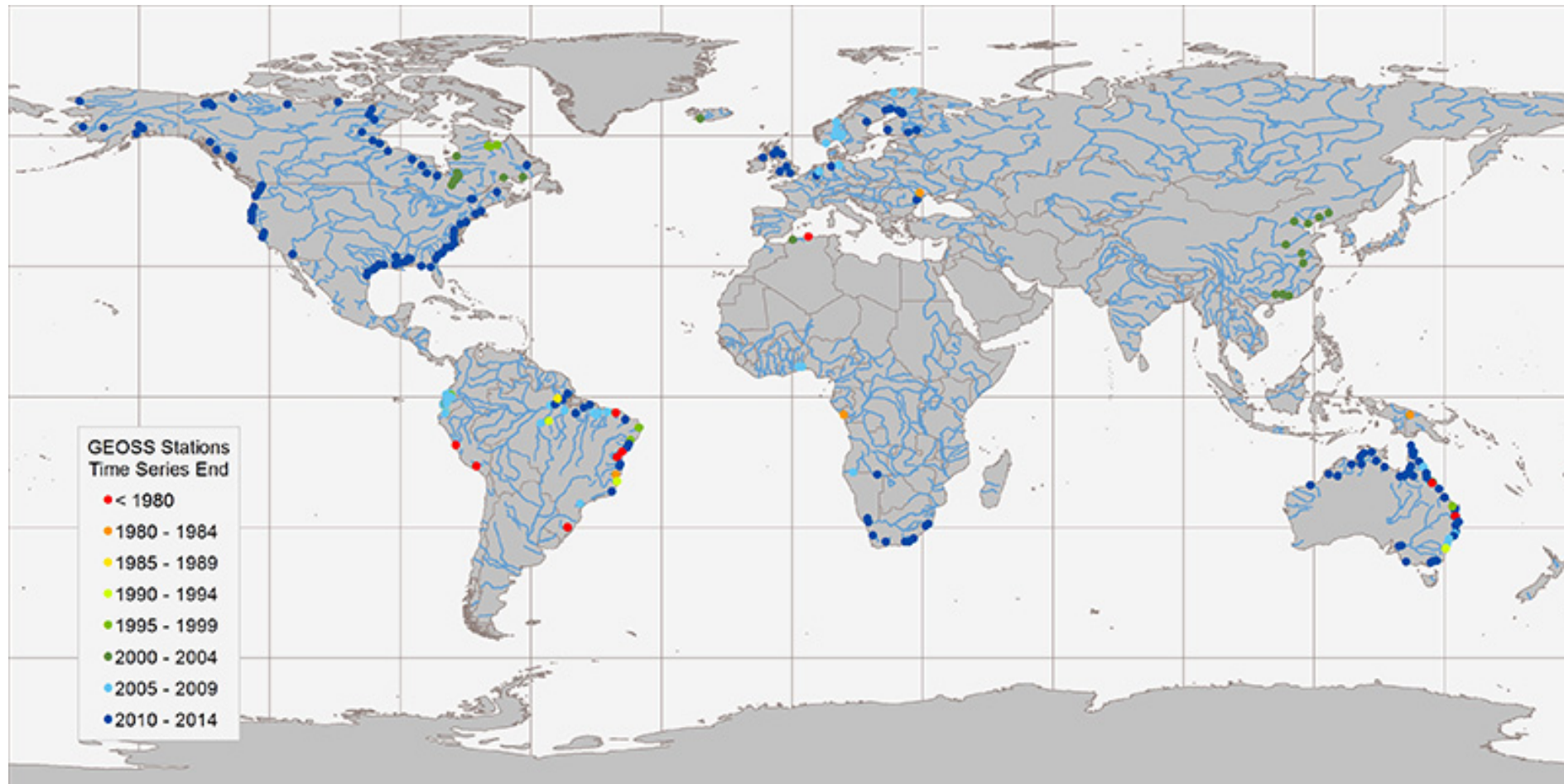
Global Terrestrial Network for River Discharge (GTN-R)

- Compilation of the GCOS Baseline River Network (T6 of GCOS-IP [IP-04 T4])
- Regular provision of near real-time data to the evolving GTN-H
- Service for an automated provision of river discharge data via web services, e.g. GEOSS Common Infrastructure (GCI)

- Status October 2014:
- daily discharge data
- ~ 280 confirmed stations
- 14 national data providers
- 19 countries ongoing negotiations



GTN-R Stations freely available through GEOSS and web services



245 GRDC stations provided for the GEOSS (Status: 4 Dec 2014)
Koblenz: Global Runoff Data Centre, 2014.

GRDC Data Products



The GRDC Standard Services **Data Products** Special Datasets Collaboration News and Updates

You are here: GRDC > Data Products > Long-Term Mean Monthly Discharges

- Freshwater Fluxes into the World Oceans →
- Long-Term Mean Monthly Discharges ↓
- Global Composite Runoff Fields →

- Services**
- ▶ Global Runoff Database
 - ▶ River Discharge Data
 - ▶ GIS Layers
 - ▶ BFG Homepage

Long-Term Mean Monthly Discharges and Annual Characteristics of GRDC Stations (GRDC, 2013)

Recommended citation: Global Runoff Data Centre (2013): Long-Term Mean Monthly Discharges and Annual Characteristics of GRDC Station / Global Runoff Data Centre. Koblenz, Germany: Federal Institute of Hydrology (BFG), 2013.

The *Long-Term Mean Monthly Discharges and Annual Characteristics* offer basic statistics of 3.843 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 means
- long-term mean
- long-term inner

Long-Term Mean Monthly Discharges and Annual Characteristics of GRDC Stations

These monthly primary values are provided station by station as ASCII-text files (see example on the right margin), named with *pvm*-prefix and station numbers. For download, all files are grouped by WMO Regions.

WMO Region	Coverage	Number of stations	Archive
1	Africa	413	Download (0,7 MB)
2	Asia	945	Download (1,7 MB)
3	South America	476	Download (1,3 MB)
4	North & Central America	1334	Download (3,3 MB)

GRDC Data Products



The screenshot shows the GRDC website interface. At the top, there are navigation links: IMPRINT, SITEMAP, CONTACT. Below these are several images: the GRDC logo, a world map, the United Nations logo, a photo of a person in a field, a line graph, and a photo of a river. The main navigation bar includes: The GRDC, Standard Services, Data Products, Special Datasets, Collaboration, News and Updates. A search bar is located on the right. The breadcrumb trail reads: You are here: GRDC > Data Products > Freshwater Fluxes into the World Oceans. A left sidebar contains a tree view for 'Freshwater Fluxes into the World Oceans' with sub-items: Long-Term Mean Monthly Discharges, Global Composite Runoff Fields, and a 'Services' section with links to Global Runoff Database, River Discharge Data, GIS Layers, and BfG Homepage. The main content area displays the title 'Global Freshwater Fluxes into the World Oceans (GRDC, 2014)' and a recommended citation. A large black-bordered box is overlaid on the page, containing the text: 'Global Freshwater Fluxes to the World Oceans', 'Web services', 'Tables', 'Graphs', 'Comparisons', and 'Report'. Below the box, the text continues with 'The GRDC hydrological fluxes of fluxes from much of the world's rivers and lakes. The annual relevant comparison. The GRDC replaces. The application. Umweltforschungs- und Datenanalyse, Neustadt / Weinstrasse, Germany (Wilkinson et al., 2014). This workflow will be used to regularly re-calculate the freshwater fluxes, at least when the WaterGAP inputs are updated by the team at the University Frankfurt, Germany. [GRDC Report 44](#) describes input data and methodical steps.' At the bottom, there are links for 'GRDC Global Freshwater Fluxes into the World Oceans:' and 'Global Freshwater Fluxes - 5° and 10° latitudinal zones (tables)'.

Global Freshwater Fluxes to the World Oceans

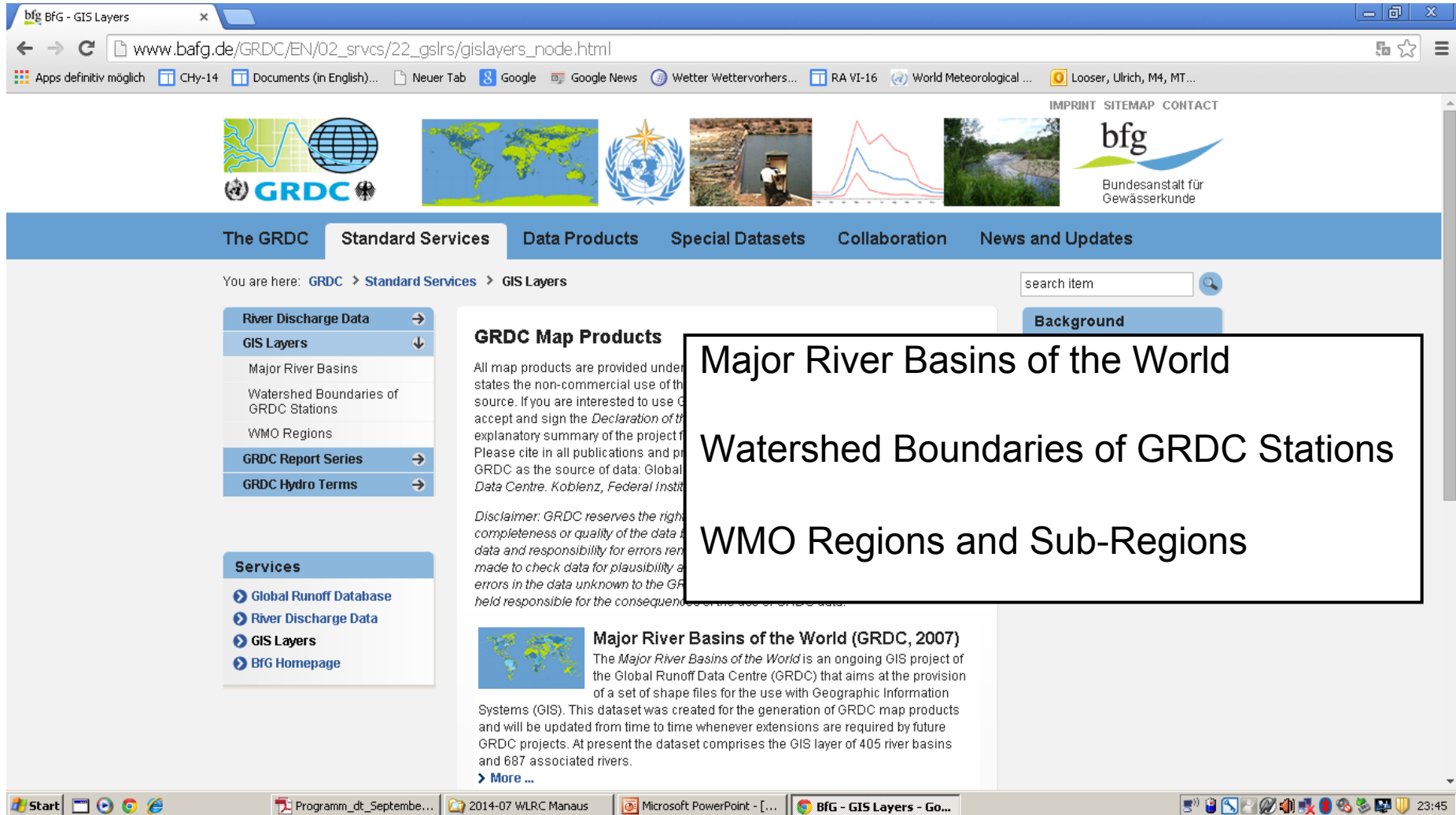
50 years data (1960 – 2009) for 0.5° grid cell resolution based on WaterGAP results
 GIWA regions (UNEP - Global International Waters Assessment)

5° Cells along the coast lines

5° and 10° Latitude bands



GRDC Map Products



The screenshot shows a web browser window displaying the GRDC website. The browser's address bar shows the URL: www.bafg.de/GRDC/EN/02_srvcs/22_gslrs/gislayers_node.html. The website header includes the GRDC logo and navigation links for IMPRINT, SITEMAP, and CONTACT. A main navigation bar contains links for The GRDC, Standard Services, Data Products, Special Datasets, Collaboration, and News and Updates. Below this, a breadcrumb trail indicates the current location: GRDC > Standard Services > GIS Layers. A search bar is visible on the right. On the left, a sidebar menu lists various data products and services, with 'GIS Layers' selected. The main content area features a section titled 'GRDC Map Products' with a sub-section for 'Major River Basins of the World (GRDC, 2007)'. A large white box with a black border is overlaid on the page, containing the following text:

Major River Basins of the World

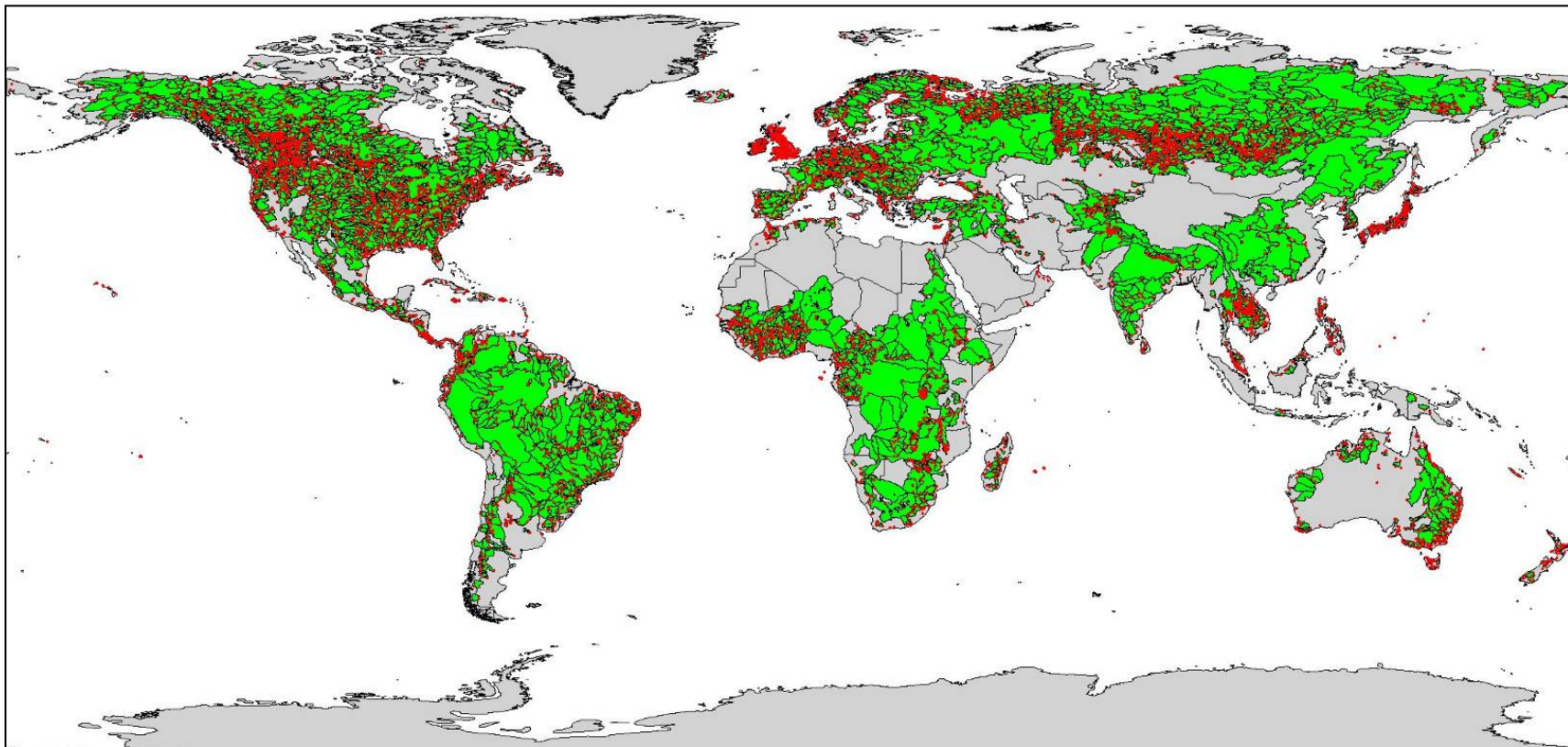
Watershed Boundaries of GRDC Stations

WMO Regions and Sub-Regions

The 'Major River Basins of the World' section includes a small world map icon and a paragraph describing the project's goal to provide a set of shape files for use with GIS. It also mentions that the dataset is updated as needed and currently includes 405 river basins and 687 associated rivers. A 'More ...' link is provided at the bottom of the section.

Watershed boundaries of GRDC stations

- **Watershed Boundaries of more than 7000 GRDC Stations provided as GIS Shapefiles**
- **Delineation based on *HydroSHEDS* drainage network (Lehner et al., 2008)**
- **Delineation done by Bernhard Lehner (McGill University, Canada)**
- **Methodology used is published as Report 41 in the GRDC Report Series**
- **GRDC Data Policy applies: non-commercial use and citation of GRDC as the source**



Contributions to GEWEX Science Questions

- The GRDC contributes to the GSQ 2, 3 & 4
- The GRDC is recognised since 1995 by GEWEX as an affiliated Global Organisation
- The GRDC provides river discharge data to GEWEX activities
- The GRDC aims to provide quality assured discharge data to the research community
- The GRDC offers to include GHP discharge data and products after project termination

Interactions with other GEWEX Panels or parts of WCRP and others:

- **CLiC** - Maintaining the Arctic Runoff Database (ARDB) as a subset of the GRDC database in support of CliC, ACSYS and the evolving ArctichYCOS
- **UNESCO IHP FRIEND-Water** – Integrating river discharge databases in to GRDC with country permission (SA FRIEND completed, European FRIEND busy, more to follow)
- **Global Climate Observing System (GCOS)** – Maintaining and expanding the Global Terrestrial Network for River Discharge (GTN-R) as a baseline network in support of GCOS, UNFCCC, GTN-Hydrology and Group on Earth Observations (GEO)
- **WMO Commission for Hydrology (CHy)** – Maintaining and expanding the river discharge data for WMO defined "Climate Sensitive Stations"

Plans for next 1 – 3 years

Standardisation

- Standardisation of hydrologic data exchange formats and hydrologic feature models within the hydrological community in support of the WMO CHy and National Hydrological Services (results from WMO/OGC Hydrology Domain Working Group activities)

Updating GRDC Operations

- Investigate and implement new operational system to support GRDC functionality
- Implementation of WMO/OGC HDWG developed standards
- Implement and improve web services for data provisioning

Data acquisition

- Historical discharge data updates for under-represented regions
- Institutionalisation of data provision
- Near real-time data for GTN-R
- Integration of FRIEND-Water databases

...more than 25 Years GRDC

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Thank you for your attention!