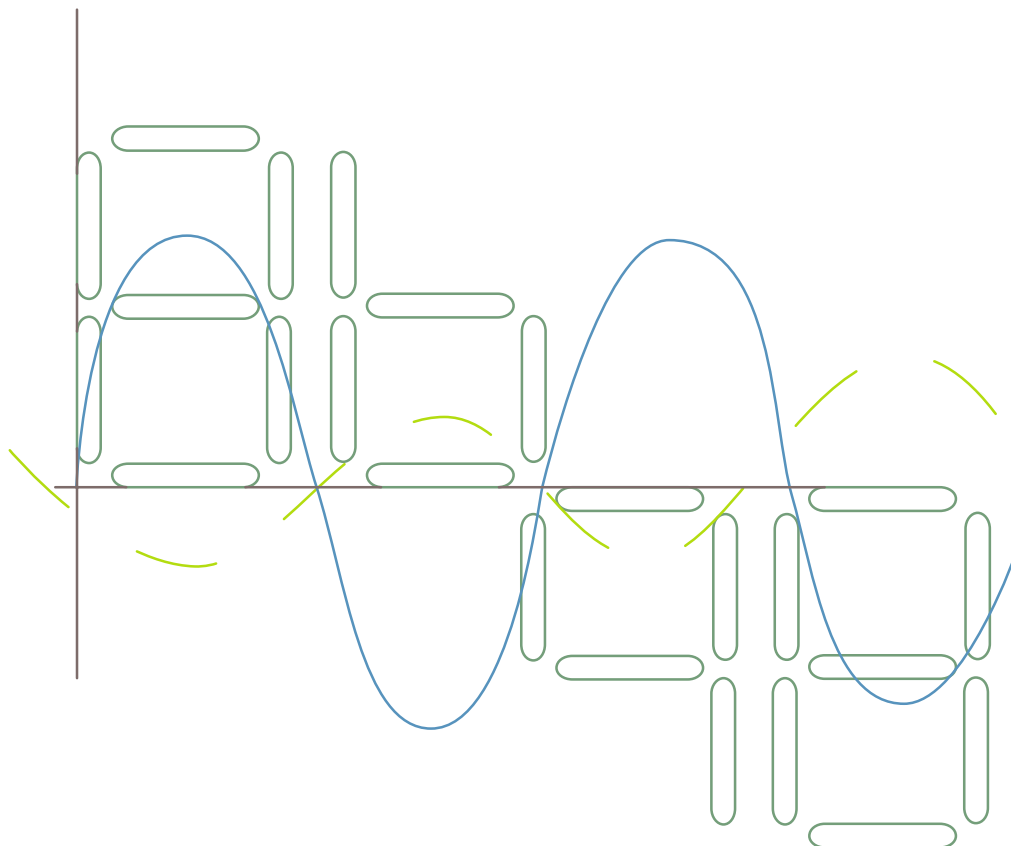




GRDC Report Series

Tenth Meeting of the GRDC Steering Committee

15 - 17 June 2011, Koblenz, Germany



Report 42

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Global Runoff Data Centre

GRDC operates under the auspices of the World Meteorological Organization (WMO) with the support of the Federal Republic of Germany within the Federal Institute of Hydrology (BfG)

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Report of the 10th GRDC Steering Committee Meeting

15 – 17 June 2011, Koblenz, Germany

Executive Summary

The biennial Global Runoff Data Centre (GRDC) Steering Committee Meeting was held in Koblenz, Germany from 15 to 17 June 2011.

The objective of the Steering Committee Meeting was to discuss progress and status of the various projects and activities of the GRDC made over the past two years. This was also a chance to fully inform the steering committee on potential future plans and at the same time the Steering Committee had to give advice, comment and sanction planned actions.

During the reporting period the following progress was made:

Since the previous Steering Committee Meeting data have been received from 23 countries and almost half of the stations in the GRDC database could be updated. In the first months of 2011 new data have been received from Brazil, Republic of Korea, Germany, Sweden, Slovakia, Lithuania, Afghanistan, The Netherlands and South Sudan. The overall number of stations in the GRDB has increased by 448 to 7797.

The number of data requests for river discharge data has increased by 15% compared to 2009 and the requests for GIS layers have increased by 10%. Global coverage datasets are in high demand and showed a 50% increase.

In reaction to this increasing demand for a global discharge dataset, the GRDC has developed a new dataset consisting of currently 718 stations suitable for global scale modelling which have been selected to comply with the following criteria:

- Representing a cell in a global 2.5° grid
- Minimum basin size of 10,000 km²
- Length of time series at least 20 years.

This GRDC Reference Dataset is being well received.

Since the appointment of the Head of the GRDC as a co-chair of the WMO/OGC Hydrology Domain Working Group in 2009, substantial time has been invested by GRDC staff in activities of the Hydrology Domain Working Group. In the HDWG representatives from numerous countries, administrations, scientific organisations and private vendors are engaged in developing standards for hydrological data exchange and conceptual models which support standardisation and domain specific metadata models. The activities within the HDWG have been presented and discussed and the GRDC has been tasked to continue with these activities and feed back the information to the WMO Information System and the WMO Commission for Hydrology.

The BfG and GRDC are partners in a new EU funded project called GEOWOW, which aims to provide data from domains weather, ocean and water in a standardised way to the GEOSS Common Infrastructure. The involvement of the BfG and GRDC in this project should support and enhance the activities on standardisation that have been started in the Hydrology Domain Working Group.

Little progress has been made with the Global Terrestrial Network for River Discharge (GTN-R). It will now be attempted to revitalise the GTN-R project with the limited resources available at the GRDC. The station selection process has been completed in time for another letter prepared in collaboration with the GCOS secretariat to seek support from WMO member states to contribute data to the GTN-R.

The GRDC managed to negotiate a follow-up contract for the European Terrestrial Network for River Discharge (ETN-R) Project for the years 2010 and 2011. The current contract for the collection, harmonisation, plausibility checking and re-distribution of near real-time runoff data from European trans-boundary basins to the JRC runs until the end of 2011. The JRC is busy with the preparation of a tender for the next Phase of the EFAS (European Flood Alert System). The BfG and GRDC are planning to submit an offer, once the tender documents have been published. The near real-time runoff data collected in the ETN-R are utilised as an input to the EFAS. It is envisaged to re-use programmes, techniques and experiences gained in the ETN-R project for the GTN-R project.

The European Water Archive (EWA), a specialised database for the EURO-FRIEND community is operating successfully and both data updates and requests for data have shown an increase.

Recommendations, based on the presentations and discussions during the Steering Committee have been summarised in tabular form in a work plan and are listed in Chapter 11.

Introduction

The GRDC was established at the Federal Institute of Hydrology (BfG), Koblenz, Germany in 1988 under the auspices of the World Meteorological Organization (WMO). It is a contribution of the Federal Republic of Germany to the World Climate Programme Water (WCP-Water) of the WMO. The WMO mandates and directly supports GRDC by its Resolutions 21 (Cg XII, 1995: Request to the member states to provide GRDC with river discharge data) and 25 (Cg XIII, 1999: Free and unrestricted exchange of hydrological data), which both have been confirmed by WMO Congress XVI held in May/June 2011 in Geneva.

An International Steering Committee is guiding and directing the activities of the GRDC. This Steering Committee convenes every two years to review past developments of the GRDC and related international organisations, programmes and projects. At the same time the GRDC informs the Steering Committee on planned future projects and activities and is obtaining guidance from the Steering Committee.

1. Welcome and Opening of the 10th GRDC Steering Committee Meeting

The 10th GRDC Steering Committee meeting was opened on 15 June 2011 at 10:00 by Mr Behrendt, Director- General of the Federal Institute of Hydrology. He welcomed the representatives from WMO, UNESCO, UNEP and GEO together with the representatives from the international programmes FRIEND and GWSP, the heads of participating partner data centres and all other participants and observers.

For more than 20 years the Federal Institute of Hydrology has hosted and supported the GRDC and Mr Behrendt ensured the meeting that this support has been secured for the future, even in difficult budgetary conditions.

He emphasised that the provision of data for non-commercial purposes as done by the GRDC is important for the scientific assessment of changing global conditions, but at the same time the

provision of the data must also keep pace with the changing technological requirements. Only this way the GRDC will be able to continue to be an efficient and effective data centre. He wished all participants a successful meeting and an enjoyable stay, which should include a visit to the Buga, the 2011 Federal Horticultural Show, which this year is being held in Koblenz.

2. Introduction of participants and adoption of the agenda

Prof. Dr. Moser, Head of the Division Quantitative Hydrology and Chair of the GRDC SC welcomed all participants to the meeting and gave all present an opportunity to introduce her or himself, stating name, organisation and linkages to the GRDC.

The list of the participants is included in Annex II.

After a short discussion the agenda was adopted by the meeting.

Prof. Dr. Moser briefed the meeting on the GRDC personnel resources, budget and infrastructure. He informed the meeting on the continuing support to the GRDC by the German Government.

This was highly appreciated by the participants as it ensures long-term stability for the operation of the GRDC.

3. WMO-Briefing on outcomes of the 16th WMO Congress and other developments at the WMO relevant to the GRDC

Dr. Grabs informed the meeting that the WMO Congress XVI and the Executive Council Meeting LXIII have been held in May and June 2011 in Geneva and he presented an overview of the outcomes which have a direct or indirect impact on GRDC activities.

Congress recognized the important role which the WMO Hydrology and Water Resources Programme (HWRP) can play in helping Members in better understanding the impacts of climate change on the management of water resources and the risks linked to hydrological extremes, such as floods and droughts. Based on this recognition, key findings relevant to the Hydrology and Water Resources Programme and the GRDC are listed here:

- Congress expressed the continued need for facilitating access to hydrological observations for global studies, particularly in downscaling climate information for water management and recognized the important role played by GTN-H, through the Global Runoff Data Centre (GRDC), International Groundwater Resources Assessment Centre (IGRAC) and the International Data Centre on the Hydrology of Lakes and Reservoirs (HYDROLARE) and the valuable contributions made by it in the generation of derived products and in support of climate change studies.
- Congress decided to keep Resolution 21 (Cg-XII) – Global Runoff Data Centre in force.
- Congress noted the continued contribution of the HWRP towards the Integrated Global Water Cycle Observations (IGWCO) Community of Practice of the Group of Earth Observations (GEO) through its regular programme activities. Congress welcomed these contributions towards activities in the GEO Societal Benefit Area - Water and in particular support of the Water Tasks described therein.
- Congress noted the CHy Statement on the scientific basis for, and limitations of, river discharge and stage forecasting. The Statement is available on the Website (http://www.wmo.int/pages/prog/hwrrp/chy/documents/CHy_Statement_101008_en.pdf) and provides a perspective on the current state of hydrological forecasting, including an overview and a summary of factors affecting forecast accuracy and lead-time.
- Congress noted the disappointing outcomes of the surveys carried out on hydrological data rescue and on hydrological networks through INFOHYDRO.
- Congress reaffirmed the importance of continuing efforts to meet the needs of Members to preserve their historical data records and to maintain their basic hydrological networks.
- Congress was pleased to note the number of HYCOS projects being implemented and under preparation in various regions (Carib-HYCOS, Congo-HYCOS, Hindu Kush Himalaya HYCOS, IGAD-HYCOS, Mekong-HYCOS, Niger-HYCOS phase II, Pacific-HYCOS, SADC-HYCOS phase II and III, SEA-HYCOS, Senegal-HYCOS and Volta-HYCOS).
- Congress noted that, as a legacy of the International Polar Year, Canada has offered to host the next Arctic-HYCOS meeting in the second half of 2011. Arctic-HYCOS is an important component of the work of the Executive Council Panel of Experts on Polar Observations, Research and Services (EC-PORS). Congress urged Members to participate in the Arctic-HYCOS meeting.
- Congress requested the Secretariat to continue its effort in keeping the status of the hydrologic networks of the Member countries under review especially with respect to assistance in developing the HYCOS components.
- Congress welcomed the adoption by the Commission for Hydrology of Resolution 6 (CHy-XIII) - WMO Integrated Global Observing System and WMO Information System, and the integration of SADC-HYCOS and the Southern Africa Region Flash Flood

Guidance System (SARFFG) as pilot projects under WIGOS/WIS to demonstrate their benefits for the information flows and outputs, including associated metadata, in the realm of hydrology.

- Congress noted that the following publications were issued during the fifteenth financial period: 6th edition of the Guide to Hydrological Practices, 2nd edition of the Manual on Stream Gauging, Manual on Low Flow Estimation and Prediction, and Manual on Estimation of Probable Maximum Precipitation (PMP). Congress also noted that the 3rd edition of the UNESCO/WMO International Glossary of Hydrology had been published.
- Congress noted that the cooperation with the International Organization for Standardization (ISO) had increased during the last financial period, especially in the areas of water data transfer formats and Acoustic Doppler Current profilers and encouraged further cooperation in the future.
- **Relevant Resolutions of XVI Congress**
 - Resolution 3.4/1 (Cg-XVI) – **Hydrology and Water Resources Programme**
 - Resolution 3.4/2 (Cg-XVI) – **Quality Management Framework - Hydrology**
 - Resolution 3.4/3 (Cg-XVI) – **World Hydrological Cycle Observing System (WHYCOS)**
 - Resolution 3.4/4 (Cg-XVI) - **Establishment of an Advisory Group for the WMO Flood Forecasting Initiative**

As part of Resolution 3.4/1 (Cg-XVI) Congress XVI reaffirms Resolution 25 (Cg-XIII) and urges members to comply with the same resolution.

4. Status report: 9th GRDC Steering Committee Meeting Action List

Mr Looser used the Action List decided at the 9th GRDC SC Meeting in June 2009 to give an overview on progress and status of individual actions.

Task	Action by	Due date	Status June 2011
UNESCO			
FRIEND Databases- Investigate strategy for runoff data exchange and integration amongst FRIEND databases (GRDC EWA and IRD FRIEND and other FRIEND databases)	GRDC, UNESCO, FRIEND	Oct 2010	Done EWA Metadata reported to FRIEND Database Portal under development by IRD
ETN-R			
ETN-R – Comply with contractual obligations	GRDC	Dec 2009	Done Project completed on time
ETN-R –Negotiations to continue with the ETN-R NRT data collection and dissemination in 2010 and 2011	GRDC/ BfG/ JRC	End 2009	Done “ETN-R Continuation Project” Contract signed to continue with data collection and dissemination until Dec 2011

Task	Action by	Due date	Status June 2011
Report of ETN-R in GRDC Report Series	GRDC		OPEN
GTN-R			
GTN-R – Contact NHSs again to obtain cooperation in the GTN-R project, try to speed up data delivery for identified stations independent of HARON	WMO, GRDC		In Progress, Letters translated by WMO, country details included by the GRDC, ready for distribution
GTN-R – Finalise design of network	GRDC		In progress
GTN-R – NRT data monitor, adapt ETN-R system and include stations as being made available	GRDC		OPEN Components have been developed within the ETN-R project. Now they have to be adjusted for the GTN-R. Currently no resources
GTN-R linkage to HARON, Provide data acquisition and data management functions. Runoff data originating from the HARON project must be incorporated into the GRDC database	GEO, GRDC		No funding for HARON. Continuation with GTN-R irrespective of HARON funding
GRDC Metadata profile			
Metadata – Finalise GRDC Metadata Profile for incorporation into WMO standard	GRDC, BfG		GRDC Metadata Profile published in July 2009. Further work within the WMO/OGC/Hydrology Domain Working Group
+Metadata – Software - Assess availability of stand alone metadata capturing software suitable for distribution to NHSs	GRDC, BfG		Within WMO/OGC/HDWG
Pristine Basins (Climate Sensitive Stations)			
Pristine Basins – compilation of available data and metadata into GRDC database flagged as Pristine Basins subset	GRDC		Done - Ongoing Data acquisition now includes request for “Pristine Basins”

Task	Action by	Due date	Status June 2011
Information and data products			
Investigate joint information products with partner data centres,	GRDC Partner Data Centres,		Workshop with GEMS/Water on inputs to Global Water Quality Modelling
Investigate joint information products prepared by the research institutions with datasets from GRDC and partner data centres	GRDC Partner Data Centres, IHP/HWRP Sec., others...		Ongoing – studies launched with German IHP/HWRP Secretariat
Investigate the preparation of a global baseline dataset on river discharge for easy distribution	GRDC		Done (GRDC Reference Dataset)
Update GRDC freshwater flux product and publish on the GRDC website	GRDC		Done Available on GRDC Website
Miscellaneous			
Investigate cooperation between WWAP, GTN-H and related data Centres for contributions to WWDRs	GTN-H, GRDC, IGRAC, GEMS/Water, GPCC, HYDROLARE, WWAP		Inputs given to WWAP Expert Group on Indicators, Monitoring and Databases (EG-IMD) No further request received
Discuss with World Bank the potential to provide runoff data to the GRDC from monitoring infrastructure that has been financed by the World Bank. Potential assistance from the GEO Secretariat	GRDC, GEO		No progress
Schedule of reporting on progress to SC and President of CHy	GRDC	Twice a year?	OPEN
Provide GRDC database back-up copy in ASCII format to WMO at regular intervals	GRDC	Dec 2008	Done – Ongoing
Regular update GEMS/Water flux stations	GRDC	Every 6 months	Done – Ongoing
Investigate transfer of Greifswald study reservoir data to HYDROLARE, once HYDROLARE becomes operational	GRDC	Once HYDROLARE established	OPEN Greifswald dataset now part of “Global Reservoir and Dam (GRanD) database”; GWSP coordination

Task	Action by	Due date	Status June 2011
Public Relations			
Promote GRDC through publications and PR activities	GRDC	Ongoing	Ongoing New Flyer Several papers published on data and data centres

Discussion on the Action list will be done either in the relevant Special Focus Session or after the presentations on the Status of the GRDC database, user and acquisition activities and the report on GRDC products and services.

5. Status report on GRDC Databases, User and Acquisition Activities

Ms Dornblut, the Deputy Head of the GRDC gave a presentation on the status of the Global Runoff Database, the Special Datasets, Data Acquisition and Public Relations as well as an overview on Database and Information Requests to the GRDC:

- Summary statistics on the status of the Global Runoff Database including the development of stations in the database over time and the spatial distribution of the stations were presented. Since the previous GRDC SC meeting in 2009 more than 440 stations have been added to the database. Now river discharge data for 7797 stations are available, adding up to approximately 310000 station years with an average time-series length of 40 years per station. In 2011 alone updates have been received for the following countries: Brazil, South Korea, Germany, Sweden, Slovakia, Lithuania, Afghanistan (old yearbook data), The Netherlands and South Sudan (old Nile Journal data).
- An overview on the status of the special databases operated by the GRDC was given and included the
 - Arctic Runoff Database (ARDB)
 - European Water Archive (EWA)
 - Southern Africa FRIEND database,
 - Climate Sensitive Stations Dataset
 - GRDC reference dataset
 - Global Terrestrial Network for River Discharge (GTN-R) a GTN-H and GCOS baseline monitoring network
 - European Network for River Discharge (ETN-R), a network of stations reporting in near real-time for the European Flood Alert System (EFAS).

Some of the datasets are subsets of the main GRDC database and are captured in a special project to represent the required network. Important additions to the special databases of the GRDC are the hosting of the Southern African FRIEND database, which should become operational in 2012. Secondly the addition of the GRDC reference dataset, a dataset consisting of currently 718 stations suitable for global scale modelling, which have been selected to best comply with the following requirements:

- representing a cell in a global 2.5° grid
- basin capturing an area more than 10,000 km²
- time series available longer than 20 years

- An overview of statistics on data acquisition activities (emails, letters etc.) was presented in relation to the successfully received datasets. It was noted that for many data deliveries the communication effort can be considerable and there are also a number of cases where extensive communication results in no data provided. The importance to capture the data acquisition activities in a structured way was emphasised, as this information is required for report back to the WMO and the steering committee.
- The efforts to promote the GRDC have been given in a brief summary indicating the number of presentations at various workshops, conferences etc., published papers co-authored by GRDC staff, new flyers prepared and related activities. As a special non-scientific highlight the GRDC GIS layers on global rivers have been used to illustrate maps in a Special Edition of “National Geographic Magazine” on Water.
- Statistics on data dissemination activities have been presented. The need for global monitoring information can be clearly deduced from an increase of 50% for data related to projects on a global scale. But also information requests for the African and European continents have increased markedly. The requests for global GIS layers increased by 10% and general information requests showed a positive trend with a 15% increase. In total GRDC has handled ~ 280 data requests successfully during 2010.
- An average hit rate of approximately 3000 hits per month was recorded for the GRDC webpage.

6. Report on GRDC Products and Services

In her second presentation Ms Dornblut gave an overview of the services and data products that are being offered by the GRDC. The most important aspects are summarised here:

- The GRDC is offering a number of data services to enable the users to select the stations suitable for their studies. These services include the provision of station catalogues and kmz files to filter desirable stations and visualize their spatial position in Google Earth. Furthermore the GRDC data services include the provision of requested data and products via Email, FTP or in future via Sensor Observation Services (SOS).
- Special services maintained by the GRDC include the provision of an Abbreviation Guide for acronyms, initialisms and designations belonging to national institutions responsible for operational hydrology and international organisations, programmes and projects in the field of Earth observation and data management and a vocabulary containing English terms commonly used in the domain of hydrology. It comprises the English terms as published in the online version of the UNESCO-WMO International Glossary of Hydrology (IGH) and the keywords of a tentative "WMO Keyword List", compiled by the WMO Expert Team on Integrated Data Management (ET-IDM) in 2004.
- The three main GRDC data products were presented, namely Long-Term Monthly Means for more than 3800 stations, the GIS layers of the Major River Basins of the World and the 2009 calculated Freshwater Fluxes to the World Oceans.

To round of the GRDC presentation, the GRDC’s involvement in the Open Geospatial Consortium Hydrology Domain Working Group (WMO/OGC HDWG) was mentioned. Here the GRDC has two responsibilities namely to represent the interests of the WMO within this working group - the

WMO CHy President has nominated the Head of the GRDC as a co-chair for the HDWG to ensure this – and to collaborate in the development of hydrology domain specific standards for data transfer and the conceptual development of a hydrologic feature models and ontologies ultimately supporting the WMO Core Metadata Profile.

7. Special Focus Session: OGC Hydrology DWG and related activities

7.1. WMO/OGC Hydrology Domain Working Group

Since the establishment of the WMO/OGC Hydrology Domain Working Group (HDWG) within the Open Geospatial Consortium (OGC) the main activity has been focused on the development and testing of standards for data exchange in the hydrological domain.

After introducing his company, Dr. Fuest from the Kisters AG gave an overview of the standardisation activities within the HDWG. He paid particular attention to one of the use cases where time series data from selected GRDC stations have been made available via web services employing the new standards.

Additionally he focussed on the advantages for NHSs and for the GRDC to utilise web services for the exchange of standards, both in terms of data provisioning and also data ingestion.

Dr. Fernandez raised concerns related to the use of proprietary software but all the standards developed within the HDWG are Open Standards which also have to be used by vendors to utilise the advantages.

Dr. Grabs pointed out that in communicating these new technological concepts and their advantages to NHSs and other users the language must be chosen carefully, because all the technical terms could be overwhelming and confusing.

The work of the HDWG was commended and it was appreciated that a very diverse community in terms of organisations and countries are working closely together to further the development of hydrological standards. Furthermore Dr. Grabs stated that these developments need to be communicated to the WMO WIS Group and the CHy Advisory Working Group.

7.2. GEOWOW

The BfG-GRDC has responded together with the partners Kisters, 52°North and University of Bonn to the EU FP7 call ENV.2011.4.1.3-1 “Interoperable integration of shared Earth Observations in the Global Context.” These partners will be responsible to carry out the planned work for the “Water” work package within the overall project called “GEOSS interoperability for Weather, Ocean and Water “(GEOWOW). The reason for responding to the call was to support and enhance the standardisation efforts for hydrological data exchange within the HDWG.

Dr. Nyenhuis from the University of Bonn informed the Steering Committee on the background of the overall GEOWOW project coordinated by ESA, and the planned work within the “Water” work package.

The overall objectives of the GEOWOW project are to:

Further enable global access to EO data and resources through the GEOSS Common Infrastructure (GCI) for GEOSS Earth Science users.

Develop new tools, processes, procedures and protocols to remove obstacles to the sharing of EO data at global level and address data & product providers identified concerns.

Develop operational capabilities of the GCI through applications in three Societal Benefit Areas (SBAs):

Weather; with a focus on hazard and extreme meteorological events.

Water; with a focus on hydrological applications and run-off processes.

Ecosystem; with a focus on GOOS and access to Ocean data via the GCI.

Include research on developing and testing adequate mechanisms to encourage reuse and re-dissemination of EO data and products.

Within the Water work package the main emphasis will be focused on the following aspects:

Improve the interoperable exchange of hydrological data on a global scale.

Test the GCI architecture against the specific needs of hydrological applications.

Ensure for the first time the availability of a common global exchange infrastructure for hydrological data.

Develop new datasets (e.g. “Global Freshwater Fluxes” to the oceans at selected gauging stations of the GTN-R) accessible in an interoperable way.

GEOWOW project expectations are to address necessary enhancements of the GCI to respond to GEOSS users and SBAs needs and to provide a very good cooperation opportunity that can bring GEOSS a significant step forward towards the GEO 2015 strategic targets. Additionally it should also accelerate the standardisation activities of the HDWG and ultimately it is hoped that the GRDC operations can be improved through more efficient data ingestion and provision services.

8. Session on status of collaborating UN Specialised Agencies and Programmes, Initiatives and Partner Data Centres

8.1. GEO

Dr. Cripe from the Group on Earth Observations (GEO) secretariat reported on GEO activities which are of relevance to the GRDC. Special emphasis was put on the GEO Water Task which aims to “produce comprehensive sets of data and information products to support decision-making for efficient management of the world's water resources by 2015, based on coordinated, sustained observations of the water cycle on multiple scales”.

Various subtasks have been presented such as the establishment of “Integrated Water-cycle Information Products and Services” based on dedicated river gauging networks of existing hydrological stations forming a global runoff observation network. The collected data should be made available using WML 2.0 and other standardised formats through the GCI. Here the connections to the HDWG activities and the GEOWOW are noticeable.

Dr. Cripe focussed also on some initiatives related to “Data System Development, Implementation and Capacity Building” such as the African Water Cycle Coordination Initiative (AfWCCI) which already has utilised GRDC datasets for the Niger Basin countries to showcase advantages in sharing data for improved integrated water resources management.

Free access to EO data is another objective that is strongly promoted amongst GEO members.

8.2. GWSP

Dr. Vielhauer gave feedback on the activities of the Global Water System Project (GWSP), which supports and coordinates global assessments of water, and the development of adaptation strategies to global change with the appropriate scientific basis.

He explained in particular the “Digital Water Atlas” which was launched by the GWSP in 2008. This atlas contains 50 global maps and datasets on water-related topics and more than 100 links to other data and information sources.

Furthermore Dr. Vielhauer presented the Global Reservoir and Dam (GRanD) Database which has been initiated by the GWSP as an international effort to collate the existing dam and reservoir data sets with the aim of providing a single, geographically explicit and reliable database for the scientific community.

As the funding of the GWSP beyond the year 2012 was uncertain, discussions were started to look at the GRDC as a potential host for the Digital Water Atlas. The GRanD database should be included in the dataset of HYDROLARE, the International Data Centre on the Hydrology of Lakes and Reservoirs hosted by the Russian State Hydrological Institute in St. Petersburg, Russian Federation.

8.3. GCOS

Dr. Grabs presented the slides from the GCOS secretariat on behalf of the GCOS director Dr. Carolin Richter who unfortunately could not attend due to other commitments.

Special focus was put on the newly released update of the GCOS Implementation Plan on systematic climate observations in support of the United Nations Framework Convention on Climate Change (UNFCCC) and the draft of the “Systematic Observation requirements for the satellite-based products for Climate (2011 Update)”, which is the supplement to the satellite-based component of the 2010 updated GCOS Implementation Plan. Furthermore the role of GCOS as a component of the Global Framework for Climate Services (GFCS) was highlighted.

8.4. GEWEX

Dr. Van Oevelen presented the latest developments within GEWEX and the GEWEX Panels. A Pan-GEWEX Meeting in October 2010 was instrumental in the realignment of the GEWEX programme. The new GEWEX imperatives outline the future direction of GEWEX.

The GEWEX Hydroclimatology Panel (GHP, erstwhile known as Coordinated Energy and Water-Cycle Observations Project, CEOP) is also undergoing realignment and is taking action to reinvigorate Regional Hydrological Programmes (RHP).

The GRDC is an affiliated data centre to the GEWEX GHP. It is encouraging to see that GRDC data services are more frequently being utilised by the GEWEX RHPs.

8.5. UNESCO FRIEND Water

Prof. Dr. Demuth from the UNESCO, Division of Water Sciences gave an overview of the UNESCO activities related to the International Hydrological Programme before Prof. Dr. Henny van Lanen, Chairman of the FRIEND InterGroup Coordination Committee (FIGCC) provided feedback on the FRIEND Water activities. Key objectives of the FRIEND Water global hydrological research programme are:

- A better understanding of hydrological regimes across time and space in different geographical regions
- The development of analytical tools to improve water resource management and mitigation & adaption of hydro-hazards (e.g. drought, floods)
- To collect data, and share data, knowledge and techniques (transboundary)
- Capacity building: PhD, MSc, training courses, textbooks and manuals
- Dissemination: conferences, technical workshops and expert meetings

The collection of hydrological data within FRIEND databases is part of the programmes core business. The GRDC is hosting the European Water Archive for the EURO-FRIEND Water group. At the FRIEND Water International Conference in Fez 2010, the GRDC was tasked to include all the hydrological data from the Southern Africa Flow Database of SA FRIEND into the GRDC database. The GRDC is currently busy with the transfer of the data, a task that is scheduled to be completed in a year's time. Furthermore the GRDC has been tasked at a FRIEND database meeting in July 2010 at UNESCO in Paris to provide all EWA station metadata ISO conform for the development of a joint FRIEND Data Portal. This has been successfully completed and further metadata updates are planned with changes in the EWA.

8.6. GEMS/Water – GPCC – IGRAC

The Heads of the partner data centres GEMS/Water, GPCC and IGRAC gave presentations on their centres latest activities in terms of data acquisition and product development.

Dr. Norberto Fernandez, the incoming UNEP – GEMS/Water coordinator informed the meeting that the responsibility for GEMS/Water lies now with the UNEP Sub-Programme 3, Ecosystem Management. Support for the GEMS/Water Programme within UNEP is coming from different parts of the UNEP Sub-Programmes and is based on Matrix Management. Environment Canada continues to fund 3 full time employees for the implementation and management of the GEMStat database and data integrity activities.

Dr. Richard Robarts, the head of the UNEP GEMS/Water Office in Canada presented the latest developments of the GEMStat Software that allows users to obtain global water quality data and statistics.

Dr. Andreas Becker from the Global Precipitation Climatology Centre (GPCC) informed the meeting on current product development, which focuses to provide “First Guess” products just 5 days after month end and daily precipitation totals by 2012.

Dr. Kukuric from the International Groundwater Resources Assessment Centre (IGRAC) focussed on the Global Groundwater Monitoring Network with web-based tools for the collection, analysis and dissemination of information. The tools have been developed under the supervision of IGRAC. Data collection should now be formalised as a long term programme, led by IGRAC and supported by WMO, UNESCO, GEO, IAH and others.

8.7. GTN-H

Dr. Fekete from the Environmental Crossroads Initiative of the City University of New York reported on the status of the Global Terrestrial Network for Hydrology (GTN-H). He gave an overview on recent publications including an article on State of the Climate in the “Bulletin of the American Meteorological Society” (BAMS) and a paper that is being prepared

together with GEMS/Water, Environment Canada and GRDC on the differences between in situ and satellite based discharge monitoring.

The GTN-H website, still hosted by the University of New Hampshire, needs to find another host and as potential candidates GWSP or JAXA have been identified.

8.8. GTN-R

Ms Hohmann, project coordinator at the GRDC presented the latest developments on the Global Terrestrial Network for River Discharge (GTN-R). Although the GTN-R serves as a baseline network for GCOS and GTN-H, its coordination and establishment has never been properly resourced. GRDC staff is managing the GTN-R network, whenever there is some spare capacity.

In a renewed effort station proposals have been reworked recently. They are supposed to accompany a renewed WMO request to relevant member countries for the participation in the GTN-R. This letter of support has been developed by the GRDC in cooperation with the GCOS secretariat. The dispatch of the WMO support letter is scheduled for the second half of 2011.

9. Special Focus Session: Data Services and Products

The following topics were addressed:

- Differences between EWA FRIEND and GRDC data policies have been discussed again. For the time being no solution is in sight, as some of the EWA data have been obtained from providers specifically under EWA data policy conditions. At this stage the GRDC can still handle the EWA requests separately with a limited amount of extra effort.
- Mr Looser informed the meeting that data provision from the Southern Africa FRIEND database that is now being hosted by the GRDC will be done according to GRDC data policies. All data in the SA - FRIEND database have originally been provided by the NHSs of the respective countries. These NHSs will be approached to inform them, that the data provision will be done according to the GRDC data policy. This arrangement was welcomed by the SC.
- Availability of different databases for reservoir and lakes were briefly discussed after Mr Looser informed the meeting that the Greifswald dataset has now been included into a larger dataset called GRand (Global Reservoir and Dam database), which is being hosted by McGill University in Canada. The GWSP was coordinating the development of this database with contributions from different organisations. The information on the databases for lakes and reservoirs will be communicated to HYDROLARE at the 3rd HYDROLARE SC meeting in July 2011.
- Efficient promotion of the GRDC would require an overarching communication strategy so that target audiences can better be addressed. Such a communication strategy is essential but it was also realised that additional resources are needed for developing and implementing an efficient communication strategy. For the time being the GRDC will continue to promote its activities using various means (posters, flyers, papers, presentations, articles in news letters, GRDC website and last but not least an efficient service) as it has a relative good idea on the data user community. More effort will be done to address different audiences according to their specific needs.

10. GRDC Strategy Discussion

The GRDC Strategy discussion focused on the development of a work plan and the determination of milestones for the 2011-2013 period.

The GRDC was requested to investigate the preparation of data products together with partner data centres and the IHP/HWRP Secretariat. Furthermore collaboration with the emerging African Water Cycle Coordination Initiative was proposed. It was realised that the GRDC involvement in the activities related to the HDWG are time consuming and that resource constraints are a limiting factor.

11. Adoption of key recommendations and action list

Based on the running activities at the GRDC and the emerging trends as discussed by the GRDC SC the following tasks and activities have been considered. Taking note of the resource constraints of the GRDC, the following action list was recommended by the 10th GRDC Steering Committee Meeting.

GRDC action list as recommended at the 10th GRDC Steering Committee Meeting, June 2011

Task	Action by	Due date
UNESCO related activities		
IRD to develop FRIEND portal for station metadata. GRDC to contribute EWA metadata on a regular basis once portal is completed	GRDC, UNESCO, FRIEND, IRD	End 2011
Develop SA-FRIEND database and integrate data into GRDC database structure similar to EWA. Prepare SA FRIEND Website and provide SA FRIEND data according to GRDC data policy	GRDC	Jun 2012
ETN-R		
ETN-R – Comply with contractual obligations	GRDC	Dec 2011
ETN-R –Negotiations to continue with the ETN-R NRT data collection and dissemination in 2012 and 2013. Tender to be issued by JRC in July 2011.	GRDC/ BfG/ JRC	Sep 2011
Information sheet on ETN-R for WIAG Meeting (lesson learned and experiences)	GRDC	Dec 2011

Task	Action by	Due date
GTN-R		
GTN-R – Contact NHSs again to obtain cooperation in the GTN-R project	WMO, GRDC	Jul 2011
GTN-R – Finalise design of network	GRDC	Depends on Feedback received
GTN-R – NRT data monitor, prepare statement on current status considering ETN-R system and latest technological developments	GRDC	Dec 2011
Investigate to utilise the EFAS data monitor for GTN-R	GRDC, JRC	Dec 2011
GTN-R linkage to HARON, Provide data acquisition and data management functions. Runoff data originating from the HARON project must be incorporated into the GRDC database	GEO, GRDC	Update at next GRDC SC Jun 2013
WMO/OGC/HDW activities		
GRDC activities within WMO/OGC/HDWG	GRDC	Ongoing
Represent WMO CHy position and continue with role of Co-Chair at WMO/OGC HDWG	Head GRDC, WMO, CHy	Ongoing
Develop conceptual hydrologic metadata profile and related components within the WMO/OGC/HDWG	GRDC, WMO/OGC/HDWG, WMO, CHy	Ongoing
Continue within the WMO/OGC/HDWG for incorporation of HDWG developments into WMO standards Break down into individual components e.g. WaterML 2.0, Common Hydrologic Feature Model etc. Mark progress status of individual components	GRDC, BfG, WMO/OGC/HDWG	Depends on progress within HDWG
Introduce Hydrologic Feature Model (OGC discussion document) to WIS and CHy AWG	GRDC	Nov 2011
Development of Web Services for exchange of data and information	GRDC, WMO/OGC/HDWG	Depends on progress within HDWG

Task	Action by	Due date
Pristine Basins (Climate Sensitive Stations)		
Pristine Basins – compilation of available data and metadata into GRDC database flagged as Pristine Basins subset	GRDC	Ongoing
Provide scientific statement on use of data from pristine basins (Braunschweig declaration, ERB info, Paul Whitfield paper, Data Archives paper)	UNESCO-ERB, EURO-FRIEND V, WMO	
Data Products		
In cooperation with GTN-H develop concept brief on joint products (GRDC, GPCC, GEMS/Water, IGRAC)	GTN-H, GRDC, GPCC, GEMS/Water, IGRAC, GEO, WMO	Dec 2011
Investigate joint information products prepared by the research institutions with datasets from GRDC and partner data centres (e.g. Hydrological Normals, within Framework of WMO Climate Services: Methodological assessment of world water resources – use of GRDC data, products useful for policy issues)	GRDC Partner Data Centres, IHP/HWRP Sec., others...	Ongoing
Update GRDC freshwater flux method and product and publish on the GRDC website	GRDC	Depends on GEOWOW progress expected date 2012
Miscellaneous		
Schedule of reporting on progress to SC and President of CHy	GRDC	Once a year
Provide GRDC database back-up copy in ASCII format to WMO on regular intervals	GRDC	Once a year
Regular update GEMS/Water flux stations	GRDC	Every 6 months
Investigate GRanD data for transfer to HYDROLARE	GRDC	July 2011
Inform on the status of ARDB at the Arctic-HYCOS Meeting	GRDC	Oct 2011
Investigate with GWSP hosting of the Digital Water Atlas	GWSP, IHP Sec, GRDC	
Geo-reference WHYCOS Stations in Google Earth	WMO,GRDC	Dec 2011

Task	Action by	Due date
Public Relations		
Promote GRDC through publications and PR activities	GRDC	Ongoing

12. Any other business

No further items were raised under this point.

13. Date and Venue of next GRDC SC Meeting

The interval of the GRDC SC meetings was reviewed and it was decided to stick to the biennial meeting cycle. The tentative date for the next GRDC SC meeting was set for June 2013 after the WMO Executive Council Meeting. Koblenz as the venue was accepted by the SC Meeting. Dates will be circulated to the GRDC Steering Committee as soon as possible.

14. Closure of the meeting

At the closing of the meeting Dr. Grabs informed everybody that the work of the GRDC is well recognised by the Commission for Hydrology. He mentioned that the water sector is included in the WMO Global Framework for Climate Services and that the GRDC should in principle be prepared to contribute to this framework.

Furthermore he expressed the gratitude of the WMO towards the German Government and in particular to the Federal Institute of Hydrology for their continued support by hosting the GRDC.

The Steering Committee members and observers were thanked for their constructive and positive contributions and willingness to support the GRDC.

While wishing everybody a safe journey back home, Dr. Grabs closed the GRDC Steering Committee Meeting at 12:30.

ANNEX I Agenda

Wednesday, 15 June 2011

09:30 – 10:00 Registration

10:00 – 16:00 (Lunch 12:30 – 13:30, Afternoon Coffee Break 14:45 – 15:15)

- **Opening of the 10th GRDC Steering Committee Meeting** (Behrendt)
- **Introduction of participants and adoption of the agenda** (Moser)
- **Briefing on GRDC personnel resources, budget and infrastructure; BfG activities relevant to GRDC and its partners** (Moser)
- **WMO-Briefing on outcomes of the 16th Congress and other developments relevant to GRDC** (Grabs)
- **Discussion: 9th GRDC Steering Committee Action List** (Looser)
- **GRDC Status Report** (Dornblut)
- **GRDC Data Products and Services** (Dornblut)
- **Special Focus: WMO/OGC Hydrology DWG and related activities** (Fuest, All)
- **Special Focus: GEOS Interoperability for Weather, Oceans and Water (GEOWOW)** (Nyenhuis)

16:30 – late Social Event

Thursday, 16 June 2011

09:00 – 17:00 (Coffee Break 10:30 – 11:00, Lunch 12:30 – 13:30, Coffee Break 14:45 – 15:15)

- **Reports on collaborating UN Specialised Agencies and Programmes, Initiatives and Partner Data Centres (Presentations and Discussion)**
- **Special Focus Session Data Services & Products**

Friday, 17 June 2011

09:00 – 12:30 (Coffee Break 10:30 – 11:00, Lunch 12:30 – 13:30)

- **GRDC Strategy Discussion**
- **Adoption of key recommendations and work plan for 2011-2013** (All)
- **Date and Venue of next GRDC SC Meeting** (All)
- **Any other business** (All)
- **Closure of the meeting** (Moser/Grabs)

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ANNEX III Composition of the GRDC Steering Committee

Chairman:

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Secretariat:

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Members:

- WMO: World Meteorological Organization
- CHy: Commission for Hydrology of WMO
- HWRD: Hydrology and Water Resources Department of WMO
- HWRP: Hydrology and Water Resources Programme of WMO
- UNESCO: United Nations Educational, Scientific and Cultural Organization
- UNESCO Water: UNESCO Water Programmes
- UNEP DEWA: UNEP Division of Early Warning and Assessment
- ICSU: International Council for Science / IAHS: International Association of Hydrological Sciences
- BfG: Federal Institute of Hydrology
- GPCC: Global Precipitation Climatology Centre
- GWPO: UN GEMS/Water Programme Office of UNEP/DEWA
- IGRAC: International Groundwater Resources Assessment Centre
- HYDROLARE (in course of implementation)
- FRIEND: Flow Regimes from International Experimental and Network Data
- WCRP: World Climate Research Programme sponsored by IOC, WMO, ICSU
- Government of Japan, represented by the River Bureau of the Ministry of Land, Infrastructure and Transport of Japan (MLIT)

Observers:

- WWAP: World Water Assessment Programme
- IHP/HWRP German Secretariat of the IHP of UNESCO and the HWRP of WMO
- GCOS: Global Climate Observing System sponsored by IOC, WMO, ICSU and UNEP
- GEO: Secretariat of the Group on Earth Observation
- GWSP: Global Water System Project, International Project Office

ANNEX IV Acronyms

AfWCCI	African Water Cycle Coordination Initiative
ARDB	Arctic Runoff Database
ASCII	American Standard Code for Information Interchange
AWG	CHy Advisory Working Group
BAMS	Bulletin of the American Meteorological Society
BfG	Bundesanstalt für Gewässerkunde (German Federal Institute of Hydrology)
Buga	Bundesgartenschau (Federal Horticultural Show)
CEH	Centre for Ecology & Hydrology
CESR	Center for Environmental Systems Research
Cg	WMO Congress
CHy	Commission for Hydrology (WMO)
CSIRO	Commonwealth Scientific and Industrial Research Organisation
CUAHSI	Consortium of Universities for the Advancement of the Hydrologic Sciences, Inc.
DCPC	WMO WIS Data Collection or Production Centre
DWD	Deutscher Wetterdienst
EC-PORS	Executive Council Panel of Experts on Polar Observations, Research and Services
ECV	Essential Climate Variable
EFAS	European Flood Alert System
ENSO	El Niño/La Niña-Southern Oscillation
EO	Earth Observation
ERB	European Representative Basins (UNESCO – FRIEND)
ESA	European Space Agency
ET-IDM	WMO Expert Team on Integrated Data Management
ETN-R	European Terrestrial Network for River Discharge
EU	European Union
EURO-FRIEND	European Flow Regimes from International Experimental and Network Data Sets
EWA	European Water Archive
FIGCC	FRIEND InterGroup Coordination Committee
FP7	European Union Seventh Framework Programme for research and technological development
FRIEND	Flow Regimes from International Experimental and Network Data Sets
FTP	File Transfer Protocol
GCI	GEOSS Common Infrastructure
GCOS	Global Climate Observing System
GEMStat	Global Water Quality Database of GEMS/Water
GEMS/Water	Global Environmental Monitoring System for Water
GEO	Group on Earth Observations
GEOSS	Global Earth Observation System of Systems
GEOOW	GEOSS interoperability for Weather, Ocean and Water

GEWEX	Global Energy and Water Cycle Experiment
GEWEX CEOP	GEWEX Coordinated Energy and Water Cycle Observation Project
GEWEX GHP	GEWEX Hydroclimatology Panel
GFCs	Global Framework for Climate Services
GIS	Geographic Information System
GMES	Global Monitoring for Environment and Security
GPCC	Global Precipitation Climatology Centre
GRanD	Global Reservoir and Dam Database
GRDB	Global Runoff Database
GRDC	Global Runoff Data Centre
GTN-H	Global Terrestrial Network - Hydrology
GTN-R	Global Terrestrial Network for Rivers
GTOS	Global Terrestrial Observing System
GWPO	UN GEMS/Water Programme office
GWSP	Global Water System Project
HA	WMO Hydrological Advisor
HARON	Hydrological Applications and Run-Off Network
HDWG	Hydrology Domain Working Group within the OGC
HWRP	Hydrology and Water Resources Programme (WMO)
HYCOS	Hydrological Cycle Observing System
HYDROLARE	International Data Centre on the Hydrology of Lakes and Reservoirs
HydroSHEDS	Hydrological data and maps based on Shuttle Elevation Derivatives at multiple Scales
IAH	International Association of Hydrogeologists
IAHS	International Association of Hydrological Sciences
ICSU	International Council for Science
IGAD-HYCOS	Intergovernmental Authority on Development (Djibouti, Eritrea, Ethiopia, Kenya, Sudan, Uganda) Hydrological Cycle Observing System
IGH	UNESCO-WMO International Glossary of Hydrology
IGWCO	Integrated Global Water Cycle Observations Theme
IGRAC	International Groundwater Resources Assessment Centre
IHP	International Hydrological Programme
INFOHYDRO	The WMO Hydrological Information Referral Service
IRD	L'Institut de recherche pour le développement
ISO	International Organization for Standardization
JAXA	Japan Aerospace Exploration Agency
JRC	Joint Research Centre
KMZ	Keyhole Markup Language
MoU	Memorandum of Understanding
NE-FRIEND	Northern European FRIEND
NHS	National Hydrological Service
NMHS	National Meteorological and Hydrological Service
NRT	Near real time
OGC	Open Geospatial Consortium, Inc.®
PMP	Probable Maximum Precipitation
PR	Public Relations

Res.	Resolution
RHP	GEWEX Regional Hydrological Programmes
SADC-HYCOS	South African Development Community Hydrological Cycle Observing System
SA – FRIEND	Southern Africa FRIEND
SARFFG	Southern Africa Region Flash Flood Guidance System
SBA	Societal Benefit Areas
SC	Steering Committee
SEA-HYCOS	South East Asia HYCOS
SIP	Strategic Implementation Plan
SOS	Sensor Observation Services
TOPC	Terrestrial Observation Panel for Climate
UN	United Nations
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNFCCC	United Nations Framework Convention on Climate Change
USGS	United States Geological Survey
WCP	World Climate Programme (WMO)
WCRP	World Climate Research Programme
WHYCOS	World Hydrological Cycle Observation System
WIAG	WHYCOS International Advisory Group
WIGOS	WMO Integrated Observing System
WIS	WMO Information System
WML 2.0	Water Markup Language 2.0
WMO	World Meteorological Organization
WWAP	World Water Assessment Programme

Report No. 1 (May 1993)	Second Workshop on the Global Runoff Data Centre, Koblenz, Germany, 15 - 17 June, 1992.
	(17 pp, annex 73 pp)
Report No. 2 (May 1993)	Dokumentation bestehender Algorithmen zur Übertragung von Abflußwerten auf Gitternetze. (incl. an English abstract in English by the GRDC: Documentation of existing algorithms for transformation of runoff data to grid cells) / G.C. Wollenweber.
	Out of print (71 pp)
Report No. 3 (Jun 1993)	GRDC - Status Report 1992.
	(5 pp, annex 5 pp)
Report No. 4 (Jun 1994)	GRDC - Status Report 1993.
	(16 pp, annex 34 pp)
Report No. 5 (Nov 1994)	Hydrological Regimes of the Largest Rivers in the World - A Compilation of the GRDC Database.
	(275 pp)
Report No. 6 (Dec 1994)	Report of the First Meeting of the GRDC Steering Committee, Koblenz, Germany, June 20 - 21, 1994.
	(10 pp, annex 38 pp)
Report No. 7 (Jun 1995)	GRDC - Status Report 1994.
	(12 pp, annex 20 pp)
Report No. 8 (Jul	First Interim Report on the Arctic River Database for the Arctic Climate System Study (ACSYS).

1995)		
		(34 pp)
Report No. 9 (Aug 1995)	Report of the Second Meeting of the GRDC Steering Committee, Koblenz, Germany, June 27 - 28.	
		(17 pp, annex 34 pp)
Report No. 10 (Mar 1996)	Freshwater Fluxes from Continents into the World Oceans based on Data of the Global Runoff Data Base / W. Grabs, Th. de Couet, J. Pauler.	
	Out of print	(49 pp, annex 179 pp)
Report No. 11 (Apr 1996)	GRDC - Status Report 1995.	
		(16 pp, annex 45 pp)
Report No. 12 (Jun 1996)	Second Interim Report on the Arctic River Database for the Arctic Climate System Study (ACSYS).	
		(39 pp, annex 8 pp)
Report No. 13 (Feb 1997)	GRDC Status Report 1996.	
		(25 pp, annex 36 pp)
Report No. 14 (Feb 1997)	The use of GRDC - information. Review of data use 1993/1994. Status: January 1997.	
		(18 pp, annex 34 pp)
Report No. 15 (Jun 1997)	Third Interim Report on the Arctic River Data Base (ARDB) for the Arctic Climate System Study (ACSYS): Plausibility Control and Data Corrections (Technical Report).	

		(3 pp, annex 20 pp)
Report No. 16 (Aug 1997)	The GRDC Database. Concept and Implementation / J. Pauler, Th. de Couet.	
		(38 pp, annex 4 pp)
Report No. 17 (Sep 1997)	Report on the Third Meeting of the GRDC Steering Committee, Koblenz, Germany June 25-27, 1997.	
		(30 pp, annex 137)
Report No. 18 (Jul 1998)	GRDC Status Report 1997.	
		(13 pp, annex 37 pp)
Report No. 19 (Aug 1998)	Evaluation of Statistical Properties of Discharge Data of Stations Discharging Into the Oceans - Europe and Selected World-Wide Stations / F. Portmann.	
		(80 pp)
Report No. 20 (Jul 1998)	Water Resources Development and the Availability of Discharge Data in WMO Region II (Asia) and V (South-West Pacific) W. Grabs, J. Pauler, Th. de Couet.	
		(51 pp, annex 68 pp)
Report No. 21 (Sep 1998)	Analysis of long runoff series of selected rivers of the Asia-Pacific region in relation with climate change and El Niño effects / D. Cluis.	
		(23 pp, annex 58 pp)
Report No. 22 (April 1999)	Global, Composite Runoff Fields Based on Observed River Discharge and Simulated Water Balances / B. M. Fekete, C. Vörösmarty, W. Grabs.	
		(36 pp, annex 77 pp)

Report No. 23 (Oct 1999)	Report of the fourth Meeting of the GRDC Steering Committee, Koblenz, Germany, 23-25 June 1999.	(29 pp, annex 140 pp)
Report No. 24 (Nov 1999)	Use of the GRDC Data 1993-1999: A Comprehensive Summary.	(48 pp)
Report No. 25 (Jun 2000)	GIS-related monthly Balance of Water Availability and Demand in Large River Basins - case study for the River Danube / I. Dornblut.	Out of print (27 pp, annex 46 pp)
Report No. 26 (Nov 2000)	Modelling raster-based monthly water balance components for Europe / Carmen Ulmen.	(133 pp)
Report No. 27 (Jul 2002)	Water Resources Management Country Profile Germany. A contribution to the Global Water Information Network WWW.GLOBWINET.ORG / R. Winnege and T. Maurer.	(32 pp)
Report No. 28 (Nov 2002)	Report of the Fifth Meeting of the GRDC Steering Committee, Koblenz, Germany, 25-28 June 2001.	(36 pp, annex 300 pp)
Report No. 29 (Feb 2003)	GRDC Status Report 2002.	(28 pp, annex 32 pp)
Report No. 30 (Dec)	Development of an Operational Internet-based Near Real Time Monitoring Tool for Global River Discharge Data / T. Maurer.	

2003)		
		(23 pp, annex 5 pp)
Report No. 31 (Oct 2004)	Globally agreed standards for metadata and data on variables describing geophysical processes. A fundamental prerequisite to improve the management of the Earth System for our all future / T. Maurer.	
		(43 pp, annex 28 pp)
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