

Report 40

# GRDC Report Series

Ninth Meeting of the GRDC Steering Committee

23 – 25 June 2009, Koblenz, Germany



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)

# Global Runoff Data Centre

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# Report of the 9<sup>th</sup> GRDC Steering Committee Meeting

23 – 25 June 2009, Koblenz, Germany

## Executive Summary

The biennial Global Runoff Data Centre (GRDC) Steering Committee Meeting was held in Koblenz, Germany from 23 to 25 June 2009.

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.

In addition a half- day Colloquium was held to celebrate the 20<sup>th</sup> Anniversary of the GRDC with presentations based on GRDC data.

During the reporting period the following progress was made:

Since the previous Steering Committee Meeting approximately one third of the stations in the GRDC database could be updated. In the first months of 2009 new data have been received from Austria, Australia, Canada, Czech Republic, Germany, The Netherlands, Slovenia and the United States. The overall number of additional stations increased marginally by 32 to 7349.

The number of data requests for river discharge data has increased by 30% compared to 2007 and the requests for GIS layers have substantially increased by more than 300%. Especially the coverage on the Major River Basins of the World was much in demand.

A new GRDC website has been launched in February 2009 and together with the website a number of new products and features are offered. The following is a selection of the most important features and products:

- Up-to-date station catalogues for GRDC and EURO-FRIEND archives
- KMZ files for all stations
- Updated Long Term Mean Monthly River Discharges
- Re-calculated Freshwater Fluxes to the World Oceans
- Contact Information for Hydrological and Hydrometeorological Services
- Re-compiled Abbreviation Guide.

Little progress has been made with the Global Terrestrial Network for River Discharge (GTN-R). It was hoped that the FP7 funding requests for the HARON project would be successful to boost the GTN-R, but this has not materialised. It will be now attempted to revitalise the GTN-R project with the limited resources available at the GRDC.

The GRDC managed to negotiate a follow-up contract for the European Terrestrial Network for River Discharge (ETN-R) Project. The new 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 2009 and the GRDC is looking to negotiate another contract to extend the ETN-R project into the years 2010 and 2011. The near real-time runoff data collected in the ETN-R are utilised as an input to the European Flood Alert System (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.

The President of the Commission for Hydrology has nominated the Head of the GRDC as the WMO representative on the OGC Hydrology Domain Working Group that deals with the standardisation of exchange formats for hydrologic data and metadata.

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).

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 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 9<sup>th</sup> GRDC Steering Committee Meeting**

The 9<sup>th</sup> GRDC Steering Committee meeting was opened on 23 June 2009 at 10:00 by Dr. Heininger, Head of the Division Qualitative Hydrology. He welcomed all participants on behalf of Dr. Moser, Head of the Division Quantitative Hydrology and official Chair of the GRDC SC, who made apologies due to illness and Mr Behrendt, the Director-General of the Federal Institute of Hydrology, and wished everybody a successful meeting.

### **2. Introduction of participants and adaptation of the agenda (Cullmann)**

Dr. Cullmann from the German IHP/HWRP Secretariat was asked by the meeting to take the chair in the absence of Dr. Moser.

The chairman asked everybody present to introduce her or himself, stating name, organisation and linkages to the GRDC.

The list of the participants is included in Annex II.

The agenda was accepted by the meeting.

Dr. Cullmann briefed the meeting on the GRDC personnel resources, budget and infrastructure and the continuing support to the GRDC by the German Government. He stated that more scientific evaluation of the GRDC data is required and that additional posts have been requested to be shared between the GRDC and the German IHP/HWRP Secretariat. This would enable the BfG to better respond to requests coming from the Ministry and from Politicians. The Ministry for Transport, which is also financing the GRDC, is taking an active role to prepare for climate change. KLIWAS, a major project on the impact of climate change on shipping has been launched, and the BfG was able to appoint 18 scientists for this particular project. In the context of climate change the GRDC has an important role to play and is well positioned.

### **3. WMO-Briefing on outcomes of the Technical Commission for Hydrology (CHy XIII) and other development relevant to GRDC (Grabs)**

Dr. Grabs gave an overview of the outcomes of the CHy-XIII held in November 2008 and Programme activities where GRDC will contribute in the period 2009-2012.

Key findings relevant to the GRDC are listed here:

- Strengthen activities undertaken by GTN-H in support of the provision of climate-relevant hydrologic data and information for climate research and applications, and in support of adaptation to climate variability and change in the water sector
- Members to maintain and strengthen the hydrological networks and observational capabilities which are a prerequisite for the development of adaptation strategies and related activities – seek for extra budgetary resources
- Review, in close collaboration with GCOS the data exchange requirements at regional and global levels
- Regularly exchange data at regional and global levels to support regional and global research, under conditions such as those specified by Resolution 25 (Cg-XIII)
- Resolution 25 (Cg-XIII) reaffirmed by CHy-XIII
- Further develop (meta) data standards
- Sharing of Hydrological Data
- Promote data rescue and protection
- Develop standards, formats and protocols for data transfer; GRDC & CSIRO to head OGC Hydrology Domain Working Group
- Design and coordinate a project that will develop hydrological data transfer standards protocols and formats in support of WIGOS and WIS;
- Complete identification of climate sensitive stations and analysis of their data (including obtaining the data) and undertaking the trend detection studies.
- GRDC and GEO links: Main contribution is through the Global Terrestrial Network – Hydrology (GTN-H)
- GTN-H is the observational component of the Integrated Global Water Cycle Observations (IGWCO) theme of GEO;
- In particular, GRDC is a key partner in the planned Hydrological Applications Runoff Project (HARON);
- HARON is a joint WMO/GEO project initiative (under development);
- GRDC is a recognized hydrological observational component of GEO.
- CHy decided that the collaboration between CHy and the Water Tasks of GEO should be largely facilitated through IGWCO.
- Support to global data centres such as the GRDC and the Global Terrestrial Network – Hydrology (GTN-H);
- GRDC to become a DCPC in support of WIS

Discussion: A discussion on data acquisition, dissemination, data policies and related topics was held.

All present are aware of the sensitivities involved related to data acquisition and data sharing. The need for data sharing to better address global issues must be raised at many levels. The special session on “Data for All” at the World Water Forum in Istanbul was a step into the right direction to focus the attention of science and politics on the need for improved data sharing. At the same time it was recognised that the rights of data owners (e.g. National Hydrological Services) need to be respected and protected through appropriate data policies for the distribution of data sets.

Metadata on stations for which data are existing in the data centres are to be shared with relevant portals (e.g. GEO and WIS).



#### 4. Status report: 8<sup>th</sup> GRDC Steering Committee Meeting Action List (Looser)

Mr Looser used the Action List decided at the 8<sup>th</sup> GRDC SC Meeting in September 2007 to give an overview on progress and status.

Task	Action by	Due date	Update June 2009
EWA – Meeting with NE- FRIEND coordinator	GRDC, IHP, NE-FRIEND	Oct 2007	Done
EWA – Development of a new data model	GRDC	Oct 2008	Done
EWA – Transfer data into new data model	GRDC	2008	Done
ETN-R – Comply with contractual obligations	GRDC	Dec 2008	Done Project completed on time
ETN-R – Operational phase - Negotiations to continue with the ETN-R NRT data collection and dissemination beyond the development phase	GRDC/ BfG/ JRC	End 2007	Done “ETN-R Continuation Project” Contract signed to continue with data collection and dissemination until Dec 2009 in R&D mode, not in operational mode
Report of ETN-R in GRDC Report Series	GRDC	Spring 2009	<b>OPEN</b>
GTN-R – Contact NHSs again to obtain cooperation in the GTN-R project	WMO, GRDC	Dec 2007	<b>OPEN</b> Discussed at CHY XIII in November 2008 together with HARON. Follow-up in 2009
GTN-R – Finalise design of network	GRDC		<b>OPEN</b> To be done together with the previous action item
GTN-R – NRT data monitor	GRDC	Dec 2008	<b>OPEN</b> Components have been developed within the ETN-R project. Now they have to be adjusted for the GTN-R. Currently no resources
Metadata – Finalise GRDC Metadata Profile for incorporation into WMO standard	GRDC, BfG	June 2008	In progress Aug 2008 draft GRDC Metadata Profile released through the WMO to interested parties. CHY XIII recommends that GRDC continues with the development of a metadata profile. Semantic structure (UML model) of metadata profile prepared for approval by GTN-H in July 2009
Metadata – Software - Assess availability of stand alone metadata capturing software suitable for distribution to NHSs	GRDC, BfG	Dec 2008	<b>OPEN</b> No such tool developed as part of ETN-R project. Currently no resources.
Publish new GIS layers of WMO Regions and Sub-regions on GRDC website	GRDC	Oct 2007	Done Available on GRDC website
Update GRDC freshwater flux product and publish on the GRDC website	GRDC		Done Available on GRDC website
Visualise GRDC stations and selected metadata using Google Earth	GRDC	Dec 2007	Done Available on GRDC website
Website restructuring	GRDC	2008	Done

Task	Action by	Due date	Update June 2009
Investigate the preparation of a global baseline dataset on river discharge	GRDC		<b>OPEN</b>
Investigate joint information products with partner data centres	GRDC Partner Data Centres	Ongoing	Cooperation with German IHP/HWRP Secretariat to encourage scientists from universities.
Provide GRDC database back-up copy in ASCII format to WMO on regular intervals	GRDC	Dec 2008	Done Proper back-up strategy followed including off site storage
Transfer Greifswald study reservoir data to HYDROLARE, once HYDROLARE becomes operational	GRDC	Depends on establishment of HYDROLARE	<b>OPEN</b> Awaiting HYDROLARE operational status
Mechanism to regular update GEMS/Water flux stations	GRDC	Twice a year	Done Updates sent at six month intervals
Publications – list planned publications with due dates	GRDC		Done
Explore possibilities to adapt GEMSoft software for GRDC purposes (Distribution of free software for plausibility check, graphing and statistics)	GRDC	Time permitting	<b>OPEN</b> No resources available at this stage
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		HARON has been identified as a GEO task. Proposal for EU funding in preparation
BfG to support GEO initiative, HARON	BfG	Ongoing	Ongoing
Pristine basins Ongoing coordination of contributions from various countries	GRDC	Ongoing	Ongoing Metadata as far as available presented to TOPC
Pristine basins meeting	WMO, UNESCO	Nov 2007	<b>OPEN</b> No meeting was held; wait for applications to define data needed
Pristine basins – letter to data providers	WMO	2008	<b>OPEN</b>
Pristine basins – compilation of data and metadata	GRDC	Ongoing	Provided metadata and data compiled by GRDC
Data acquisition – Increase Efforts	GRDC	Ongoing	Ongoing
Investigate potential to have a Side event at the November 2008 CHy Meeting on runoff data provision	CHy, WMO, GRDC	Nov 2008	Done No side event on runoff data at the CHy XIII. Four sessions on data sharing at the 5th WWF, March 2009 in Istanbul
Promote GRDC at regional WMO hydrology sessions whenever possible	WMO	Ongoing	CHy XIII confirms Resolution 25 (Cg-XIII), GRDC attendance at CHy XIII and WMO RA VI Working Group on Hydrology
Invite GRDC to WHYCOS meeting	WMO, WHYCOS	Next WHYCOS Meeting	Done GRDC attended the WHCOS Technical Conference in Feb 2009

Task	Action by	Due date	Update June 2009
Publications to increase GRDC visibility in journals, newsletters, etc. IAHS newsletter and website	GRDC, UNH	Ongoing	Publication in Water 21
Schedule of reporting on progress to SC and President of CHy	GRDC	Twice a year	<b>OPEN</b>
Data Policy – Apply as done in the past. Identified access, no commercial use, no substantial parts of the database without cooperation agreement	GRDC	Ongoing	Current GRDC data policy applied
Rewording of data policy	GRDC	2008	<b>OPEN</b>
UNESCO to approach FRIEND community to supply info on the potential of runoff data exchange and integration	UNESCO, FRIEND, GRDC	Ongoing	Discussed at EURO-FRIEND Database Group Workshop in May 2008 in Koblenz. Alignment of FRIEND and GRDC data policies are being addressed
Investigate cooperation between WWAP and GRDC	GRDC, WWAP	Ongoing	Contribution to WWDR3 provided. Negotiations on contributions for WWDR4 initiated
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		<b>OPEN</b> Contact established with World Bank to access flow data stored by World Bank. No results at this stage

## 5. Status reports: GRDC Databases, Data Products and Website (Dornblut)

Ms Dornblut, the Deputy Head of the GRDC gave a presentation on the status of the GRDC databases, the data acquisition activities related to the various projects and the dissemination of data, GIS layers and reports.

Data acquisition activities were hampered by resource constraints. The continuation of the ETN-R project also required the core GRDC staff to appoint and assist new ETN-R co-workers to maintain the ETN-R project.

However, thanks to the positive trend amongst the data providers to make discharge data available for downloads over the Internet, approximately one third of the GRDC stations could be updated. Updates for the following countries were already done in 2009: Austria, Australia, Canada, Czech Republic, Germany, The Netherlands, Slovenia and United States.

The continuation of the ETN-R resulted in increased communication with the data providers in Europe. The ETN-R project has benefited most of these increased communication efforts, but the provision of additional data to the GRDC main database was still marginal.

A positive trend can be seen amongst data users. In 2008 the number of data requests has increased substantially compared to 2007 and in 2009 already 58 requests have been received up until May. The following has been noted:

- increase of data requests related to projects on a global scale by 30%
- increase of requests for GIS-layers with global coverage by more than 300%
- increase of information and technical requests by more than 60%

The number of hits on the newly released GRDC website resulted initially in almost 3000 hits per month but has decreased to around 1600 hits in June 2009.

The website was completely restructured and the following new products have been made available:

- Up-to-date station catalogues, KMZ files for use with Google Earth
- Shape files for the use with GIS provided
- Long-term Monthly Means of River Discharges updated
- Freshwater Fluxes to the World Oceans re-calculated

Furthermore the abbreviation guide has been re-compiled and detailed information on National Hydrological Services is available in a comprehensive country list sorted according to WMO Regions.

## **6. Special Focus: Metadata**

**(GRDC, All)**

Ms Dornblut, the Deputy Head of the GRDC gave a presentation on the requirements for a prototype definition of an ISO-conform metadata profile and a prototype web-based service for the management of metadata. In the context of this presentation she highlighted the need to specify the requirements for hydrologic metadata, the standardisation efforts for metadata in the context of ISO and WMO WIS/WIGOS and finally the GRDC's activities relevant to hydrologic metadata.

Discussion: Dr Grabs informed the Steering Committee that the WMO has a formal agreement with ISO and that WMO is now a standard setting body. At the same time he informed the meeting that a MoU between WMO and Open Geospatial Consortium (OGC) is in preparation. At the OGC a Hydrology Domain Working Group (HDWG) was formed earlier in 2009 and the President of the WMO Commission for Hydrology has nominated Mr Looser from the GRDC and Dr David Lemon from CSIRO to co-chair the Working Group. The third co-chair is Dr Ilya Zaslavsky from the University of California's Super Computing Centre. The OGC HDWG is an open forum for work on water data interoperability. Specifications for hydrological data transfer using open source and web based technologies are to be developed and tested with the aim that these new technologies are endorsed by the WMO CHy and made available to the international hydrologic community.

The Steering Committee appreciated the work done by the GRDC and encouraged the continuation of the work on hydrological data exchange and metadata standardisation through the OGC HDWG.

## **7. Special focus: Generation of Data Products**

**(GRDC, All)**

A discussion on generation of GRDC data products based on GRDC data was held. The following two data products were initially suggested by the GRDC based on user requirements:

- A Global river discharge dataset
- Global Freshwater Fluxes to the World Oceans

A global river discharge dataset, suitable for global scale modelling needs to be assembled as a subset of all GRDC stations. This would be a product that can be offered and distributed with relative ease and it will assist scientists in the station selection process as the most suitable stations would have been selected based on a certain set of criteria.

The Global Freshwater Fluxes to the World Oceans should not be a static product, but mechanisms to recalculate the fluxes at regular intervals need to be investigated.

Cooperation between the GRDC and the German IHP/HWRP Secretariat has already triggered a couple of projects and Dr Cullmann informed the meeting about the project by Mr Borges on “Hydrological Normals” based on GRDC data for the Rhine basin. This method could be extended to other GRDC stations and the information presented on the GRDC website.

Furthermore he mentioned possible joint projects with the University of Stuttgart on the development of a mathematical depth function to evaluate the GRDC discharge data and a study on tele-connections of flow regimes in Southern Africa and Southern Asia linked to ENSO and the Pacific oscillation.

The GRDC was urged by members of the steering committee to re-activate the GTN-R project irrespective of the progress of the HARON project proposal. The GTN-R baseline network is a critical dataset and the WMO would assist the GRDC by contacting the providers again with the request to contribute to the GTN-R project through the identification of suitable stations and by providing historical data, station metadata and NRT data. The GRDC resource constraints have been noted by the steering committee and it is hoped that lessons could be learned from the ETN-R project.

The GRDC was requested to collaborate with the Commission for Hydrology on the data rescue mission and WHYCOS activities. The GRDC will be involved in these activities in future by the CHy.

The continued compilation of the “Pristine Basins” dataset by the GRDC was well received by the steering committee and it requested the GRDC to continue with the efforts to obtain discharge time-series data for these climate sensitive stations.

#### Recommendations:

Develop Global River Discharge Dataset as a GRDC Product. Regular updates of the stations of this dataset needs to be envisaged.

Update GRDC freshwater flux product and publish on the website.

Continue with the collation of a “Pristine Basins” dataset.

## **8. Reports of collaborating UN Specialised Agencies and Programmes, Partner Data Centres and initiatives (Partner Data Centres, UNESCO, GEO, IAHS, All)**

Together with the partner data centres GEMS/Water, IGRAC and GPCC a note was drafted and sent to the World Water Assessment Programme (WWAP) who was currently meeting to discuss the next World Water Development Report (WWDR4). The note stated the willingness of the data centres to contribute to the WWDR4 but at the same time urged the WWAP to better specify and coordinate their requests and ideally involve the data centres at an early stage in the strategic discussions for inputs to monitoring and evaluation products for the WWDR4. It was also suggested that future requests for contributions to the WWDR4 should be channelled through the GTN-H.

Dr Hubert, secretary of the IAHS informed the meeting on IAHS activities and the successful sessions at the World Water Forum in Istanbul in March 2009 on the topic of “Data for All”. A planned International Conference on Hydrometry in August 2010 was announced to be held together with ANA and the WMO.

Mr Fuchs reported on behalf of Stephan Bojinski on the latest developments at the GCOS Office. Caroline Richter has been appointed as new GCOS director. In the latest GCOS implementation

status the progress on the GTN-R is marked moderate and the GCOS secretariat urges GRDC to strengthen its efforts on the GTN-R project and offered its assistance to draft a support letter to WMO member states to contribute to the GTN-R.

Dr Cripe informed on GEO activities and the efforts to motivate for funds for the HARON project through the EU funded FP7 space work programme which aims to support a European Space Policy focusing on applications such as GMES (Global Monitoring for Environment and Security). As part of the project proposal however in-situ data collection is focussed on 4 basins (Yellow/Mekong, Congo/Zambezi, La Plata, and Po) and not at the global level like GTN-R attempts to do.

Prof Dr Demuth informed the steering committee on the activities of the UNESCO IHP. After giving a general overview he focussed on the FRIEND activities, especially those involving FRIEND databases. UNESCO is attempting to align the various FRIEND databases and the GRDC and IRD have a major responsibility as amongst those two centres the majority of the FRIEND data is being hosted. Both IRD and GRDC will be involved in the future to facilitate standardised access to the UNESCO FRIEND databases. Prof Dr Demuth informed the meeting of the upcoming International FRIEND Conference in Fez in October 2010, and the GRDC is planning to be holding its next EURO-FRIEND database meeting in Fez as a side event.

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

Finally, Dr Grabs encouraged the GRDC to extend the collaboration with related data centres in the development of joint data products.

## **9. GRDC 20<sup>th</sup> Anniversary Colloquium**

The afternoon of the 24th June 2009 was dedicated to an Anniversary Colloquium held to celebrate 20 years of GRDC operation from within the hosting organisation Federal Institute of Hydrology (BfG) in Koblenz, Germany. The colloquium was co-sponsored by the IAHS.

For this occasion approximately 40 guests gathered, consisting of Guests of Honour, representatives from WMO, UNESCO, GEO Secretariat, IAHS, the partner data centres GEMS/Water, GPCC, IGRAC and an interested audience from science and technology.

Mr Benno Dröge welcomed all guests on behalf of the Director General of the BfG. He outlined the field of activities of the BfG and highlighted the special links to international activities including the operation of the GRDC. A special word of welcome was extended to the guests of honour, Dr Arthur Askew, Prof Dr Hans-Jürgen Liebscher, Prof Dr Karl Hofius, who all have been instrumental in establishing the GRDC, and the former heads of the GRDC Dr Wolfgang Grabs and Dr Thomas Maurer.

A special message from the WMO was conveyed by Dr Wolfgang Grabs. In addition he presented the GRDC with a copy of the document “The Global Water Runoff Data Project” which is outlining the scientific, technical and administrative implementation plan for the GRDC some 20 years ago.

Dr Arthur Askew entertained the audience with a retrospective view on the establishment of the GRDC and he supplemented his narratives with many anecdotes.

Before the start of a number of scientific presentations Mr Ulrich Looser informed the audience on the current status of the GRDC, the extent of the datasets and the range of products available. The involvement of the GRDC in international activities, project and programmes was also outlined.

This Anniversary Colloquium provided an opportunity to highlight the GRDC's progression in the role as facilitator between data providers and data users. It focused on the data collection, services and products provided by the GRDC such as the latest version of the "Freshwater Fluxes into the World Oceans". At the same time it gave selected researchers an opportunity to showcase their studies conducted with global river discharge datasets provided by National Hydrological Services through the GRDC.

The Anniversary Colloquium was aimed at science and administration professionals in hydrology, climatology, water resources management, and related fields who have an interest in trans-regional issues dealing with the water cycle and its relation to global change.

The Colloquium program is provided below and it is planned to publish the presentations in the GRDC Report Series.

- Welcome  
Mr Benno Dröge for the BfG
- Message from the WMO  
Dr Wolfgang Grabs, WMO, Geneva, Switzerland
- GRDC – the early days  
Dr Arthur Askew, Geneva, Switzerland
- History and status of the GRDC  
Mr Ulrich Looser, GRDC, Federal Institute of Hydrology (BfG), Koblenz, Germany
- WHYMAP – Looking at groundwater from a global point of view  
Ms Andrea Richts, Federal Institute of Geosciences and Natural Resources (BGR), Hannover, Germany (Presentation not given)
- Creation of a methodology for visualizing Hydrological Normals in the Rhine River Basin, Germany  
Mr Pablo Borges de Amorim, Technical University Dresden, Germany
- Loading Estimate from Selected Major Streams using GRDC discharge and GEMS/Water WQ datasets, combined with a continental-scale river basin model  
Dr Eng Yosuke Yamashiki, Disaster Prevention Research Institute, Kyoto University, Japan
- The role of the GRDC dataset in global water resources modelling  
Dr Frank Voß et al., Center for Environmental Systems Research (CESR), University of Kassel, Germany
- Value of discharge data for global hydrological modelling  
Prof Dr Petra Döll and Dr Martin Hunger, Institute of Physical Geography, Goethe University Frankfurt, Germany
- Freshwater Fluxes into the World Oceans  
Mr Thomas de Couet, GRDC, Federal Institute of Hydrology (BfG), Koblenz, Germany

After the Colloquium, Guests of Honour, presenters and Steering Committee members were invited to a guided tour through the basalt cellars in Mendig, followed by a dinner to complete the GRDC 20<sup>th</sup> anniversary celebrations.

## **10. Strategy discussion on GRDC projects and activities (Looser, All)**

The GRDC had numerous interactions with International Projects and Programmes with regards to data provision, data acquisition, data policy issues, data products and public relations.

The GRDC has been recognised by GEWEX-CEOP as a contributing data centre and the GRDC data have been offered to the GEWEX community, who in return was asked to provide data to the GRDC as well.

The GRDC is also an affiliated data centre to the Arctic Climate System Study (ACSYS) and maintains the Arctic Runoff Database as a subset of the GRDC database. Updates of arctic stations have been given a high priority.

Discussions with the EURO-FRIEND Project on Small Hydrological Research Basins and European Representative Basins (ERB) resulted in an offer to accommodate the discharge time-series data from these research basins in the EWA database together with project related metadata. Further discussions are necessary to establish the transfer of data to the GRDC.

The GRDC is a member of the Terrestrial Observation Panel for Climate (TOPC) of GCOS and GTOS. As part of the activities the ECV description for river discharge has been updated. The TOPC supports GRDCs activities to continue with the GTN-R and the extension of the Pristine Basin discharge dataset.

The discussion of accessibility of data and data policies issues resulted in the agreement to maintain the status quo of the existing GRDC data policy, both for the EWA and the GRDC data for the time being.

The GRDC was requested to investigate the preparation of data products together with partner data centres and the IHP/HWRP secretariat. The extension of the project on the Hydrological Normals has been suggested.

Furthermore the GRDC was requested to promote its activities e. g. by providing information leaflets, contributions to newsletters and journals. The GRDC had produced a poster on the Arctic Runoff Database Poster for an ACSYS Workshop in Svalbard, contributed to the GTN-H poster, placed an article in Water 21 and gave numerous talks at workshops meetings and conferences and to visitors to the BfG/GRDC on the activities of the GRDC. The new GRDC website can also help to raise the profile of the GRDC.

## **11. Adoption of key recommendations and work plan (All)**

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 9th GRDC Steering Committee Meeting.



<b>Task</b>	<b>Action by</b>	<b>Due date</b>
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
ETN-R – Comply with contractual obligations	GRDC	Dec 2009
ETN-R –Negotiations to continue with the ETN-R NRT data collection and dissemination in 2010 and 2011	GRDC/ BfG/ JRC	End 2009
Report of ETN-R in GRDC Report Series	GRDC	
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	
GTN-R – Finalise design of network	GRDC	
GTN-R – NRT data monitor, adapt ETN-R system and include stations as being made available	GRDC	
Metadata – Finalise GRDC Metadata Profile for incorporation into WMO standard	GRDC, BfG	June 2008
+Metadata – Software - Assess availability of stand alone metadata capturing software suitable for distribution to NHSs	GRDC, BfG	
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	
Pristine Basins – compilation of available data and metadata into GRDC database flagged as Pristine Basins subset	GRDC	
Investigate joint information products with partner data centres,	GRDC Partner Data Centres,	
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...	
Investigate the preparation of a global baseline dataset on river discharge for easy distribution	GRDC	
Update GRDC freshwater flux product and publish on the GRDC website	GRDC	
Investigate cooperation between WWAP, GTN-H and related data Centres for contributions to WWDRs	GTN-H, GRDC, IGRAC, GEMS/Water, GPCC, HYDROLARE, WWAP	

Task	Action by	Due date
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	
Schedule of reporting on progress to SC and President of CHy	GRDC	Twice a year?
Provide GRDC database back-up copy in ASCII format to WMO on regular intervals	GRDC	Dec 2008
Regular update GEMS/Water flux stations	GRDC	Every 6 months
Investigate transfer of Greifswald study reservoir data to HYDROLARE, once HYDROLARE becomes operational	GRDC	Depends on establishment of HYDROLARE and availability of Greifswald study reservoir dataset
Promote GRDC through publications and PR activities	GRDC	Ongoing

## 12. Date and Venue of next GRDC SC Meeting

(All)

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 2011. Koblenz as the venue was accepted by the SC Meeting.

## 13. Any other business

(All)

No further items were raised under this point.

## 14. Closure of the meeting

(Grabs)

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.

He considered the colloquium was a milestone to showcase some applications possible with GRDC data.

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 12:00.

## **ANNEX I                      Agenda**

### **Tuesday, 23 June 2009**

**10:00 - 17:00** (Lunch 12:30 – 13:30, Afternoon Coffee break 15:00 – 15:30)

- **Opening of the 9<sup>th</sup> GRDC Steering Committee Meeting**                      **(Heininger)**
- **Introduction of participants and adoption of the agenda**                      **(Cullmann)**
- **WMO-Briefing on outcomes of the Technical Commission for Hydrology and other developments relevant to GRDC**                      **(Grabs)**
- **Status report: 8<sup>th</sup> GRDC Steering Committee Action List**                      **(Looser)**
- **Status reports: GRDC Databases, Data Products and Website** **(Dornblut)**
- **Special focus: Metadata**                      **(GRDC, All)**
- **Special focus: Generation of Data Products**                      **(GRDC, All)**

### **Wednesday, 24 June 2009**

**08:00 – 11:30** (Coffee break 10:00 – 10:30, Lunch 12:00 – 13:00)

- **Reports of collaborating UN Specialised Agencies and Programmes, Partner Data Centres and initiatives (Partner Data Centres, UNESCO, GEO, IAHS, all)**

**13:00 – 17:30** (Afternoon Coffee break 14:45 – 15:15)

**GRDC 20<sup>th</sup> Anniversary Colloquium**

**17:45 – late: Social event**

### **Thursday, 25 June 2009**

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

- **Strategy discussion on GRDC projects and activities**                      **(Looser, All)**
- **Adoption of key recommendations and work plan**                      **(All)**
- **Date and Venue of the next GRDC SC Meeting**                      **(All)**
- **Any other business**                      **(All)**
- **Closure of the meeting**                      **(Grabs)**



## **ANNEX II                      List of Participants**

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## **ANNEX III                    Composition of the GRDC Steering Committee**

### **Chairman:**

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### **Secretariat:**

Global Runoff Data Centre  
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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**

BfG	Bundesanstalt für Gewässerkunde (German Federal Institute of Hydrology)
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
ECV	Essential Climate Variable
EFAS	European Flood Forecasting System
ENSO	El Niño/La Niña-Southern Oscillation
ERB	European Representative Basins (UNESCO – FRIEND)
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
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
GCOS	Global Climate Observing System
GEMS/Water	Global Environmental Monitoring System for Water
GEO	Group on Earth Observations
GEOSS	Global Earth Observation System of Systems
GEWEX	Global Energy and Water Cycle Experiment
GEWEX CEOP	GEWEX Coordinated Energy and Water Cycle Observation Project
GIS	Geographic Information System

GMES	Global Monitoring for Environment and Security
GPCC	Global Precipitation Climatology Centre
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 Systems 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 Centre of Data on Hydrology of Lakes and Reservoirs
HydroML	Hydrologic Markup Language
HydroSHEDS	Hydrological data and maps based on Shuttle Elevation Derivatives at multiple Scales
IAHS	International Association of Hydrological Sciences
ICSU	International Council for Science
IGOS	Integrated Global Observing System
IGWCO	Integrated Global Water Cycle Observations Theme
IGRAC	International Groundwater Resources Assessment Centre
IHP	International Hydrological Programme
IRD	L'Institut de recherche pour le développement
ISO	International Organization for Standardization
JRC	Joint Research Centre
KLIWAS	Impacts of climate change on waterways and navigation
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.®
PR	Public Relations
Res.	Resolution
SC	Steering Committee
SIP	Strategic Implementation Plan
TOPC	Terrestrial Observation Panel for Climate
UML	Unified Modeling Language
UN	United Nations
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNFCCC	United Nations Framework Convention on Climate Change
UNH	University of New Hampshire
USGS	United States Geological Survey
WB	World Bank
WCP	World Climate Programme (WMO)
WCRP	World Climate Research Programme
WHYCOS	World Hydrological Cycle Observation System
WHYMAP	World-wide Hydrological Mapping and Assessment Programme
WIGOS	WMO Integrated Observing System
WIS	WMO Information System
WMO	World Meteorological Organization
WWAP	World Water Assessment Programme
WWDR	World Water Development Report
WWF	World Water Forum
XML	Extensible Markup Language



<b>Report No. 1</b> (May 1993)	Second Workshop on the Global Runoff Data Centre, Koblenz, Germany, 15 - 17 June, 1992.
	(17 pp, annex 73 pp)
<b>Report No. 2</b> (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)
<b>Report No. 3</b> (Jun 1993)	GRDC - Status Report 1992.
	(5 pp, annex 5 pp)
<b>Report No. 4</b> (Jun 1994)	GRDC - Status Report 1993.
	(16 pp, annex 34 pp)
<b>Report No. 5</b> (Nov 1994)	Hydrological Regimes of the Largest Rivers in the World - A Compilation of the GRDC Database.
	(275 pp)
<b>Report No. 6</b> (Dec 1994)	Report of the First Meeting of the GRDC Steering Committee, Koblenz, Germany, June 20 - 21, 1994.
	(10 pp, annex 38 pp)
<b>Report No. 7</b> (Jun 1995)	GRDC - Status Report 1994.
	(12 pp, annex 20 pp)
<b>Report No. 8</b> (Jul	First Interim Report on the Arctic River Database for the Arctic Climate System Study (ACSYS).

1995)		
		(34 pp)
<b>Report No. 9</b> (Aug 1995)	Report of the Second Meeting of the GRDC Steering Committee, Koblenz, Germany, June 27 - 28.	
		(17 pp, annex 34 pp)
<b>Report No. 10</b> (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)
<b>Report No. 11</b> (Apr 1996)	GRDC - Status Report 1995.	
		(16 pp, annex 45 pp)
<b>Report No. 12</b> (Jun 1996)	Second Interim Report on the Arctic River Database for the Arctic Climate System Study (ACSYS).	
		(39 pp, annex 8 pp)
<b>Report No. 13</b> (Feb 1997)	GRDC Status Report 1996	
		(25 pp, annex 36 pp)
<b>Report No. 14</b> (Feb 1997)	The use of GRDC - information. Review of data use 1993/1994. Status: January 1997	
		(18 pp, annex 34 pp)
<b>Report No. 15</b> (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)
<b>Report No. 16</b> (Aug 1997)	The GRDC Database. Concept and Implementation / J. Pauler, Th. de Couet	
		(38 pp, annex 4 pp)
<b>Report No. 17</b> (Sep 1997)	Report on the Third Meeting of the GRDC Steering Committee, Koblenz, Germany June 25-27, 1997	
		(30 pp, annex 137)
<b>Report No. 18</b> (Jul 1998)	GRDC Status Report 1997	
		(13 pp, annex 37 pp)
<b>Report No. 19</b> (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)
<b>Report No. 20</b> (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)
<b>Report No. 21</b> (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)
<b>Report No. 22</b> (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)

<b>Report No. 23</b> (Oct 1999)	Report of the fourth Meeting of the GRDC Steering Committee, Koblenz, Germany, 23-25 June 1999	(29 pp, annex 140 pp)
<b>Report No. 24</b> (Nov 1999)	Use of the GRDC Data 1993-1999: A Comprehensive Summary	(48 pp)
<b>Report No. 25</b> (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)
<b>Report No. 26</b> (Nov 2000)	Modelling raster-based monthly water balance components for Europe / Carmen Ulmen	(133 pp)
<b>Report No. 27</b> (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)
<b>Report No. 28</b> (Nov 2002)	Report of the Fifth Meeting of the GRDC Steering Committee, Koblenz, Germany, 25-28 June 2001	(36 pp, annex 300 pp)
<b>Report No. 29</b> (Feb 2003)	GRDC Status Report 2002	(28 pp, annex 32 pp)
<b>Report No. 30</b> (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)
<b>Report No. 31</b> (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)
<b>Report No. 32</b> (Nov 2004)	Detection of change in world-wide hydrological time series of maximum annual flow / Z.W. Kundzewicz, D. Graczyk, T. Maurer, I. Przymusinska, M. Radziejewski, C. Svensson, M. Szwed	
		(36 pp, annex 52 pp)
<b>Report No. 33</b> (Nov 2004)	Trends in flood and low flow series / C. Svensson, Z.W. Kundzewicz, T. Maurer	
		(26 pp, annex 18 pp)
<b>Report No. 34</b> (Mar 2005)	Report of the Sixth Meeting of the GRDC Steering Committee, Koblenz, Germany, 11-13 June 2003	
		(27 pp, annex 85 pp)
<b>Report No. 35</b> (Nov 2006)	Report of the Seventh Meeting of the GRDC Steering Committee, Koblenz, Germany, 6 - 8 July 2005	
		(36 pp, annex 80 pp)
<b>Report No. 36</b> (Aug 2007)	The Global Terrestrial Network for River Discharge (GTN-R) : Real-time Access to River Discharge Data on a Global Scale. 1 <sup>st</sup> Interim Report / U. Looser, I. Dornblut, T. de Couet	
		(24 pp, annex 42 pp)
<b>Report No. 37</b> (Dec 2007)	Hydrology of the World's International River Basins: Hydrological parameters for use in global studies of international water-relations / K. Stahl (Oregon State University, Department of Geosciences, Corvallis, USA)	

		(36 pp, annex 16 pp)
<b>Report No. 38</b> (Apr 2008)	Report of the Eighth Meeting of the GRDC Steering Committee, Koblenz, Germany, 19 - 21 September 2007	
		(32 pp, annex 16 pp)
<b>Report No. 39</b> (Jul 2009)	Hydrologic Information – Metadata: Semantic structure for the description of hydrologic data (GRDC Metadata Profile – Final draft) / I. Dornblut.	
	withdrawn (April 2011) for review	(38 pp, annex 60 pp)
<b>Report No. 40</b> (May 2011)	Report of the Ninth Meeting of the GRDC Steering Committee, Koblenz, Germany, 23 - 25 June 2009	
		(27 pp, annex 9 pp)