

Report 38

GRDC Report Series

Eighth Meeting of the GRDC Steering Committee

19 - 21 September 2007, 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)

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Report of the 8th GRDC Steering Committee Meeting

19 – 21 September 2007, Koblenz Germany

Executive Summary

The biennial Global Runoff Data Centre (GRDC) Steering Committee Meeting was held in Koblenz, Germany from 19 to 21 September 2007.

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 progress of some of the activities of the GRDC has been limited due to resource constraints. For more than a year the post of the Head of the GRDC was vacant. In April 2007 a new Head of the GRDC was appointed.

The following progress was made:

Since the previous Steering Committee Meeting 75 new stations, mainly from Africa, could be added to the database. Approximately one third of the stations in the database could be updated.

In 2006 the number of data requests has more than doubled compared to 2005. This trend is continuing during 2007. The website is increasingly being used with an average hit rate of 680 per day for the first half of 2007.

Moderate progress has been made with the Global Terrestrial Network for River Discharge (GTN-R). A quarter of the 82 countries approached, signalled their intentions to contribute towards the objective of the GTN-R project, namely the provision of near real-time data. Currently three countries are providing near real-time as part of the GTN-R project. The development of a metadata standard made moderate progress. The development of a mapping tool was held back, because of plans to utilise tools developed as part of another project. The first interim report on the status of the GTN-R project was published in August 2007.

The GRDC managed to acquire the European Terrestrial Network for River Discharge (ETN-R) Project. The objective of this project is the collection, harmonisation, plausibility checking and re-distribution of near real-time runoff data from European trans-boundary basins. The near real-time runoff data is utilised as an input to the European Flood Alert System (EFAS), that is currently being developed by the JRC. The three year project is EU funded. Two project resources could be employed for the duration of the project. It is envisaged to re-use programmes, techniques and experiences gained in the ETN-R project for the GTN-R project.

New spatial products have been developed. Firstly the WMO Sub-Regions layer has been reworked and secondly the global river network and basins layers have been corrected and improved. These layers have already been used as the hydrological basis for the WHYMAP (World-wide Hydrological Mapping and Assessment Programme), which is produced by the Federal Institute of Geosciences and Resources (BGR). The updating of the “global fresh water fluxes into the oceans” product is currently being done.

The European Water Archive (EWA), a specialised database for the Northern European FRIEND community was transferred from CEH Wallingford to the GRDC. In July 2005 GRDC resumed responsibility for the EWA. The maintenance of the EWA data model was considered to be too complex. Therefore it was decided to develop an extended GRDB data model which could accommodate both GRDB and EWA, but still have the data in different datasets.

Recommendations, based on the presentations and discussions during the Steering Committee have been summarised in tabular form in Chapter 20, GRDC future work plan and priority action list.

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

The 8th GRDC Steering Committee meeting was opened on 19 September 2007 at 13:30 by Dr. Moser, Head of the Division Quantitative Hydrology. He welcomed all participants on behalf of the Director of the Federal Institute of Hydrology and wished everybody a successful meeting.

2. Organisational matters

Dr. Moser informed the meeting on personnel changes that occurred since the previous GRDC SC meeting.

Dr. Wilke, the former chairman of the GRDC, retired in early 2007 from the BfG and Dr. Moser has been nominated by the Federal Institute of Hydrology to be his successor. The meeting had no objections to this nomination.

Dr. Maurer, the previous Head of the GRDC was promoted in 2006 and is now heading the Department Water Balance, Forecasting and Predictions of the Federal Institute of Hydrology. The position of Head of the GRDC was vacant for most of 2006 and Mr Ulrich Looser was appointed as new Head of the GRDC in April 2007. The chairman informed the meeting of the continuing support of the German Government towards the GRDC and stated that the filling of the vacant post, Head: GRDC must also be seen in that light.

After these introductory remarks 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.

3. Adoption of the Agenda

The Agenda and the annotated Agenda were presented, discussed and adopted without changes, with the reservation to make changes at a later stage, if appropriate.

4. WMO and CHy activities impacting on the GRDC

Dr. Grabs gave an overview of the activities of the Hydrology and Water Resources Programme (HWRP) of the WMO, its contributions to activities in the field of hydrological monitoring, data gathering, assessment and coordination and linkages to other international activities. (Digital Annex)

The important role of the GRDC was highlighted in the context of global hydrological data gathering and dissemination.

5. Current GRDC activities

Mr Looser used the Action List of the 7th GRDC SC Meeting to give an overview of the GRDC activities. The reason for using the Action List was to:

- Ensure that all action items from the previous steering committee meeting have been identified with the accompanying action
- Inform on the status of the action
- Allocate action items to the relevant agenda point for detailed information and further discussion
- Identify potential risks that need to be addressed during the SC meeting.

Item 5: GRDC Self conception

Development of scoping paper on the possibilities of cross-programme or cross-project data acquisition as input to agenda for biannual UN Water meetings.

No scoping paper has been developed by the GRDC. The involvement of the GRDC in UN Water will depend on the new UN Water structure. With regards to the WWDR2, UNESCO and WMO took the lead and GRDC was not involved. Dr. Grabs stated that GTN-H is positioning itself with regards to GEO and GCOS and ready to cooperate. Inputs into UN Water reports are provided by the individual GTN-H programmes.

Seek assistance of water related activities and programmes to support GRDC data acquisition.

This is an ongoing activity with partner data centres.

Continue GRDC-GEMS/Water collaboration cross-promotion activities

This activity is ongoing and is going well.

Promote that specialised data centres should be recognised by UN Water, avoid duplication of efforts (e.g. in UN Statistical Division).

The promotion of specialised data centres is being done by the WMO HWRP office at suitable opportunities.

Establish contact with ICSU WDC.

Dr. Hubert stated that ICSU has no responsibility in the data collection process, but that the GRDC could be included as part of the hydro community. Information has been submitted to the former Head of the GRDC by the Council of Science.

NHS should send data to GRDC based on WMO Res 21/25.

Proposal to include the GRDC as member of the hydrological community by the representative from the WMO Commission of Hydrology.

Further develop metadata standards.

Referred to Agenda Item 10

Item 6: GRDC Public Relations

6.1 Aim at a Web site appearance independent from the government site (layout, embedding in BfG etc.)

6.2 *Change spirit of the GRDC web page: more appealing in order to more positively attract people. Consider involving a policy and marketing expert and a public relation specialist.*

6.3 *Search for examples of incentives that provide short term benefits.*

All items referred to Agenda Item 19

Item 8: Research Project Proposals

8.1 *Consider to prepare short information notes for research institutions and research consortia on what services it could/would like to provide in an international scope (trans-boundary basins, UN projects,...) what GRDC were able to deliver in such projects.*

8.2 *Conduct workshops in same research areas, trigger research coordination.*

Depending on the available capacity these initiatives might be considered.

Item 9: Data Acquisition activities

9.1 *WMO Hydrological Advisor (HA) of each member state to be asked by WMO to nominate an institution in the respective country as national Focal Point (NFP)*

Dr. Grabs stated that the Hydrological Advisors have not nominated focal points. The WMO has also no information on which countries have been contacted by different projects. Mr Wellens-Mensah added that the WMO Hydrological Advisors have no capacity to facilitate the data transmission to the GRDC. With the implementation of International River Basin Authorities who are also responsible for the collection of operational data, it becomes difficult to nominate additional focal points.

9.2 *Cg 2007 to prepare a decision to support international data centres and as Cg 2003 did, keep in force Res. 21 (1995). Consider having a parallel meeting of HA during Cg 2007.*

Res. 21 (1995) has been kept in force by Cg 2007. Plans for a parallel meeting with HA during Cg 2007 have been dropped as the Session of the WMO Commission of Hydrology 2008 has been identified as a more suitable occasion.

9.3 *WMO to contact HA periodical, e.g. once per year.*

Dr. Grabs informed the committee that WMO is not contacting its Hydrological Advisors at regular intervals. HA's are however contacted in the framework of special programmes and projects. HA's should be contacted during the next Session of CHY 2008.

9.4 *WMO to negotiate with UNESCO about unified access to their respective databases GRDC-FRIEND.*

WMO has contacted UNESCO on the status and future and the possible merging of the FRIEND and GRDC databases. Also referred to Agenda Items 8 and 9.

9.5 *Consider a session on data acquisition during 2006 FRIEND conference in Cuba.*

The NE-FRIEND database group had a meeting during the 2006 FRIEND conference in Cuba. Also referred to Agenda Item 8 and 9.

9.6 *Prepare a 2-3 pager on data issues to be discussed during UN-Water session covering topics such as:*

- *Update on types of difficulties encountered in data acquisition, (unsatisfying) opportunity driven nature of current approaches*
- *Communicate the need for a coordinated approach to UN-Water*
- *Mention meeting reports of UN Statistical Division*

No progress made.

- *Draw attention of the GEOSS community and partners to the need to resolve the long-standing problem of hydrological data acquisition and propose to include this in the two year work package for 2006-2007 (in cooperation with GEO secretariat).*
This is being done and an ongoing process. Also referred to Agenda Item 17.

Item 10: Database status and growth

10.1 WMO to officially ask UNESCO about status and future of FRIEND databases, discuss merging / unifying.

This has been done. Also referred to Agenda Item 8 and 9.

Item 11: Data dissemination and usage

11.1 Explore the opportunity to transfer the reservoir data from the GRDC Greifswald study to GTN-H.

Greifswald study reservoir data is data that should rather serve as an input to HYDROLARE and should not go to GRDC.

11.2 GRDC should not only have opportunity-driven research collaborations, but rather proactively trigger research based on a list of research topics to be identified by GRDC. Capacity permitting this will happen within reasonable limits

11.3 Consider having user workshops: in English rather than in German, better not attached to GRDC SC meeting but (in order to keep costs low) rather attached to other international meetings such as those of IAHS, EGS, ICSU, FRIEND, Stockholm Water Week. (WMO could fund a few people). Same approach could work for WCP-Water and GTN-H. The NE-FRIEND database group meeting was carried out using this approach and the GRDC is looking for opportunities for additional workshops. The language issue has been noted in order to attract a bigger audience.

11.4 Regional Workshops, e.g. linked to some East-Asian Session of e.g. the Japan Society of Hydrology and Water Resources which has members from Japan, Korea and China. The GRDC is looking for suitable opportunities and is also dependent on information provided by partners. Currently the GRDC is not in a position to organise regional workshops. Dr. Nakao mentioned annual meetings between Korea, China and Japan, which the GRDC could attend. Prof. Daniell also indicated that the GRDC should attend one of the PACIFIC-FRIEND regional workshops attended by 16 Australasian countries to further GRDC data acquisition objectives.

11.5 Consider introduction of a GRDC prize to stimulate research activities.
Referred to Agenda Item 19.

Item 12: Review of GRDC collection criteria for discharge stations

12.1 GRDC to take a suitable subset of guiding station selection criteria for individual acquisitions.

Data acquisition initiatives do consider regional aspects and adjust station selection criteria accordingly, where possible. Discharge data of good quality is not rejected on the grounds of “not fitting” station selection criteria.

12.2 GRDC to separate station selection criteria items by “or”

This has been done and the text on the website is now self explanatory.

Item 13: Review of GRDC data policy and acquisition strategy

13.1 Add “WMO” in user declaration item 5 before “GRDC”.

13.2 In addition, cite GRDC without the German address.

13.3 As the term “substantial part” is not well defined it is suggested to drop it.

13.4 Add “subtitle” to data policy: “Guidelines which have been endorsed by the WMO Commission of Hydrology...”

13.5 As data does not belong to the GRDC, point out that the ownership of the data remains with the data providers.

Many of the suggestions have not yet been carried out, but shall be done in future.

Item 14.1: Plausibility check methodologies / Quality assessment and quality control of GRDC data

14.1.1 Presentation Kinoshita to be forwarded for consideration in WMO Guide Hydrological Practices.

The presentation of Dr. Kinoshita has to be revised for inclusion in the WMO Guide on Hydrological Practices. This is not a GRDC issue.

14.1.2 GRDC to develop stand-alone software tool providing the plausibility check routines to data providers as an incentive for NHS.

This topic sparked a lively discussion on the pros and cons of providing software (plausibility check routines, statistics packages etc.) as an incentive to NHSs. Countries with functioning NHSs normally have the appropriate hydrological software, that include plausibility checks, statistics and graphing packages and don't require additional software from GRDC. Countries without access to hydrological software run the risk that provided software tools have to be adjusted to local conditions and might require financial resources to maintain. Language differences between software and users and differing operating platforms and operating systems would additionally complicate such an undertaking. A range of software tools were mentioned that would be partially suitable but later in the discussion it became clear that a GRDC software package for NHSs as an incentive would not be practical. Dr. Roberts mentioned GEMSoft, a software package used internally by GEMS/Water. He said to fully develop GEMSoft for GEMS/Water's use would require approximately US\$130000,- and at least six months development work. The cost to modify GEMSoft to handle hydrological data are unknown. The pros and cons of adapting GEMSoft should be looked at before making a decision.

14.1.3 Use free software “Khronostat” for statistical analysis to detect average variations in hydrological time series available from <http://www.hydrosciences.fr> (French and English).

This topic was discussed together with the previous point.

Item 14.2: Revision and harmonisation of station data export and data statistics

- 14.1.4 *Check threshold values for “zero discharge” with WMO and other standards.*
All GRDC 0 values in datasets are checked for plausibility. If not plausible, then -999 is inserted to indicate a missing value.

Item 14.5: Metadata and data infrastructure

- 14.5.1 *GRDC to be invited by WMO to Beijing World Weather Watch Meeting (1st Meeting of CBS Inter-Programme Expert Team on Metadata Implementation, 26-30 September 2005).*
Dr Maurer attended the Meeting.
- 14.5.2 *Accommodate GRDC metadata (currently yet in Excel-files) in the WMO metadata profile (ongoing process), Version 0.2 of WMO core metadata profile of ISO 19115.*
The first GRDC metadata profile has been included in Version 0.2 of the WMO core metadata profile. Further development of the GRDC metadata profile is being done. Also referred to Agenda Item 10.

Item 15.4: Long Term Mean Annual Freshwater Surface water Fluxes into the World Oceans

- 15.4.1 *Bring freshwater flux product to the attention of the WGCM/CLIVAR Working Group on Ocean Model Development.*
The GRDC freshwater flux product has been published in table format on the GRDC website. No final report has been produced. Currently the 3rd revised edition is in preparation.
- 15.4.2 *GRDC to compile a state-of-the-art overview of water related measurement methods from space.*
This task has not been tackled due to resource constraints. However, the M4 section of the BfG is currently looking into those issues and GRDC will be able to learn from their experience.

Item 16.1: GWPO (GEMS/Water Programme Office)

- 16.1.1 *GRDC to explore application of potential interfaces of software systems WorldWind, Google Map and Google Earth.*
GRDC is currently exploring to visualise the stations including metadata using Google Earth. Also referred to Agenda Item 19.
- 16.1.2 *GRDC to continue collaboration with GEMS/Water especially with regard to acquiring data for common stations and cross-promotion of data centres.*
This task is ongoing.

Item 17.1: UNESCO-IHP – FRIEND-EWA

- 17.1.1 *GRDC to contact the various FRIEND projects for discussion of the future of their databases, especially with regard to pristine basins.*
WMO has contacted UNESCO for further discussions regarding the pristine basins. The future of FRIEND databases has been discussed in Cuba and in Koblenz in March 2007. Also referred to Agenda Item 8 and 9.

17.1.2 GRDC to work on a common metadata catalogue with the FRIEND projects, also identifying overlapping stations.

A common metadata catalogue is not wanted by the FRIEND community. Also referred to Agenda Item 8 and 9.

17.2: WCRP – CliC, Arctic HYCOS and GEWEX GHP

17.2.1 SC reinforced its view that GEWEX Continental Scale Experiments (CSE) should provide their discharge data to GRDC.

Dr. Grabs stated that Asian GEWEX CSE projects have some data that is being stored in the ASIA FRIEND database, but no data has come to GRDC, because the CSE projects have mainly runoff data with short time-series.

Item 18: Opportunities for interactions in international programmes and projects

18.1 GRDC was advised to continue to pursue active data acquisition from HYCOS projects and also to explore the possibility to receive near real-time data from regional HYCOS data centres.

Up to now no data sharing has occurred between WHYCOS and GRDC. Mr Wellens-Mensah mentioned that HYCOS centres have no real-time data. He will try a call for the provision of WHYCOS data to the GRDC. Dr. Grabs stated that different formats made it difficult to exchange data amongst WHYCOS projects and that data sharing is not considered a high priority. WMO should increase its efforts to improve the data provision from HYCOS projects, including the provision of data to the GRDC.

18.2 GRDC should be invited as an observer in the WHYCOS meetings

Dr. Grabs informed the meeting that the GRDC has been unsuccessfully invited in 2005 to attend a WHYCOS meeting. The GRDC, however, will be invited again.

Item 19: Review of action list resulting from the previous SC meeting

19.1 List action which were taken to systematically address the Permanent Representatives of a country to WMO and their Hydrological Advisors with respect to data acquisition, possibly supported by the WMO HWRP Secretariat.

The contacts on country levels for the GTN-R project and the ETN-R projects were done through the countries Permanent Representatives to the WMO and their Hydrological Advisors. For the GTN-R project the letter were sent out through the WMO HWRP Secretariat.

19.2 Continue to produce a technical note on current GRDC river discharge data plausibility check procedures and to consider the development of an integrated stand-alone software for this purpose, which could be freely distributed to data providers and serve as an incentive to deliver more data in a timely fashion.

No technical note on plausibility check procedures have been published by the GRDC as no stand alone software is available for free distribution.

19.3 Continue collaboration with GCOS, especially in the extension of the 2AR to the GCOS Implementation Plan.

This task is ongoing. See also Agenda Item 17.

- 19.4 *Continue to foster joint marketing of GRDC, GEMS/Water, GPCC and IGRAC programs and to explore options to collaborate on a more institutionalised level. Specific suggestions were to produce joint flyers and letters, as well as a plan to hold a workshop with global focus on joint GRDC-GPCC and joint GRDC-GEMS/Water products on rainfall-runoff cross-validation and biochemical fluxes, respectively.*
The cross-promotion of partner data centres is done wherever possible.
- 19.5 *To develop closer contacts and collaboration with GWSP of ESSP.*
Cooperation is in the interest of both GRDC and GWSP.
- 19.6 *Develop products of gridded evapotranspiration and soil moisture, based on water balance model with input of precipitation and temperature from climate water balance.*
The development of gridded evapotranspiration produces residues with UNH as part of their GTN-H commitment. According to Dr. Endejan there might be mutual benefit in comparing outputs of various water balance models; there is an ongoing GWSP project chaired by Joseph Alcamo, CESR/University of Kassel, to compare various global water balance models (including WaterGAP and the one from UNH) using a harmonised set of climate and other input datasets.
- 19.7 *Consider the PILPS Land surface schemes inter-comparison (WCRP to provide GRDC with a list of names to whom to distribute SC Report).*
- 19.8 *Continue to ensure GRDC's collaboration and involvement in relevant international research and operational programmes and projects such as GEWEX, CliC, GCOS, GTN-H, WHYCOS etc.*
Ongoing – see also Agenda Item 17.
- 19.9 *Continue to proactively advance the topic of metadata, developing a concept, discussing this in the GTN-H panel and in expert groups, developing in the framework of a pilot study a prototype, that demonstrates the advantages and capabilities.*
Referred to Agenda Item 10.
- 19.10 *Actively extend contribution to the Global Terrestrial Network for Hydrology (GTN-H), especially by developing the GRDC Near Real-Time River Discharge Monitor.*
Referred to Agenda Item 12.
- 19.11 *Attract additional temporal staff by e.g. working with students and PhD candidates or seconded experts, send from their home organisations to GRDC.*
The GRDC is looking for suitable opportunities.
- 19.12 *Explore possibilities to scan earlier GRDC reports and make them available via the GRDC homepage.*
No requests have been received during the last two years for older printed only documents. In case of requests, hard copies will be provided.
- 19.13 *Publish GRDC contacts (address database of data providers and users) on the GRDC web page.*
Contact details of data providers will be made available at institutional level only. No data user detail will be posted on the web page due to privacy policy issues. Also referred to Agenda Item 19.
- 19.14 *Store a security copy of the GRDC database to reside at WMO. It is recommended to store an ASCII dump of all GRDC data and metadata at WMO IT security (address to be provided by WMO).*

An ASCII dump of the entire GRDC database was provided to Dr. Grabs for safekeeping at the WMO. ASCII database copies will be provided to WMO on a regular basis.

Item 20: Future GRDC activities – discussion of long term strategic development, work plan and priority list

20.1 *GRDC has a clear mandate for river discharge collection, should follow own visions and not get distracted by others.*

This still remains GRDC priority No.1.

20.2 *Besides GRDC routine work, development of GTN-R and the Metadata issues has first priority. GRDC in 5 years; largely improved access to near real-time data to eventually get more and more a operational function.*

20.3 *The collaboration with EFAS is strategically critical for the GRDC!*

Referred to Agenda Item 11.

20.4 *Real time data acquisition introduces new tasks for GRDC, i.e. especially the need for acquisition of water level data and rating curves.*

Acknowledged

20.5 *A good solution were finding funding for updating equipment of many of the around 400 envisaged GTN-R stations (estimate of max 8000 US\$ per station).*

Referred to Agenda Item 16.

20.6 *GRDC was strengthened in its view not to merge real-time data with the historical quality proofed data.*

Acknowledged and ongoing.

20.7 *GRDC was recommended to continue its collaboration in GCOS, GTN-H and IGOS-P.*

Acknowledged and ongoing. Referred to Agenda Item 17.

20.8 *Bring GRDC as an important international data centre in mind of the officials, brief GEO Secretariat. GEOSS is a intergovernmental structure potentially providing a more direct link to governmental levels.*

Acknowledged and ongoing. Referred to Agenda Item 17.

20.9 *GRDC to observe development regarding satellite derived data of hydrological interest (WatER initiative etc.).*

These developments are looked at within the M4 Department of the BfG, to which the GRDC belongs as well.

20.10 *Potential promising contacts are those of national IHP/HWRP committees as well as IAHS national representatives.*

Acknowledged and considered.

20.11 *GRDC was suggested to regularly send articles to newsletters such as Meteo-World of WMO and IAHS newsletter.*

This item needs further action.

20.12 *Raise GRDC visibility by sending brief material – to users, to providers, not as a link to web page but better paper (officials do not visit home pages!), e.g. prepare a number of one-page project briefs/sketches as suggestions.*

This item needs further action.

6. Status: Database and data acquisition and dissemination

Ms Dornblut, the Deputy Head of the GRDC gave a presentation (Digital Annex) 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.

She informed the SC that during the past two years the total increase in stations was modest with 75 additional stations mainly from Africa, but a substantial part of the stations in the database were updated.

Data acquisition activities were hampered by resource constraints. The implementation of the ETN-R project also required the core GRDC staff to assist the new ETN-R co-workers to get the ETN-R project off the ground.

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. The implementation of both the GTN-R and the ETN-R resulted in an increased communication with the data providers, especially 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 rather marginal.

A positive trend can be seen amongst data users. In 2006 the number of data requests has more than doubled compared to 2005 and this trend is also visible for 2007 with a total of 76 requests up until June.

The number of hits on the website has almost doubled since 2005 with an average of more than 680 hits per day in 2007.

Discussion: Dr. Grabs noted the increase in technical requests and wanted to know what was the cause for this. Ms Dornblut explained that an increasing number of requests are made for GIS layers and also in connection with the user declarations. This accounts for the higher number of technical requests.

7. GRDC GIS Layers (WMO Sub-Regions, WHYMAP, GRDC Major River Basins)

Mr de Couet, the GRDC GIS Specialist, presented three spatial products that have been developed by the GRDC, or are under development (Digital Annex).

The WMO Sub-Regions layer has been reworked and improved by superimposing various detailed layers of physiographical and political origin. The new WMO Sub-Regions map is much improved and assists the GRDC in assigning discharge stations to the correct WMO Sub-regions. The WHYMAP (World-wide Hydrological Mapping and Assessment Programme) is produced by the Federal Institute of Geosciences and Resources (BGR) and the GRDC has provided hydrological GIS layers for 398 river basins with the associated drainage network. These river network and basin GIS layers are corrected and manually improved versions and are based on the Hydro 1K dataset.

Update of the freshwater fluxes into the oceans and inland seas is a GIS product. Currently the existing layer of fresh water fluxes into the oceans is being enhanced. The improved basin and river network GIS layers, also used in the WHYMAP are the basis for the improved update.

Discussion:

Dr. Kinoshita asked whether climatological conditions are used for the delineation of the WMO sub-regions. Mr de Couet replied that no climatological conditions are used for the delineation, only an elevation model and hydro procedures from ArcGIS. In return Dr. Kinoshita said that gridded information could be superimposed on the GIS layers. Mr Wellens-Mesah stated that the GRDC has provided interesting new GIS products and Dr. Grabs supported him in suggesting that the GIS layers of the WMO sub regions should be widely publicised, especially in the WMO community. This was at the same time also an opportunity to create more publicity around the

GRDC and improve its visibility. Dr. Grabs stated that the WMO agrees to have the new WMO sub regions GIS layers published on the GRDC website.

Dr. Grabs stated that UNH has extensive experience with gridded assembling techniques and asked whether it would be able to transfer and exchange gridded products. Mr Fekete stated that the HydroSHEDS layer has been used by GRDC which has been developed by Bernhard Lehner (formerly Univ. Kassel, later WWF). HydroSHEDS is being widely used but the resolution of HydroSHEDS might pose a problem. Dr. Robarts suggested the publication of a semi-technical paper for a common understanding of the GIS products derived from gridded and other data sources.

Dr. Nakao suggested that products of decadal variations should be developed based on the freshwater fluxes into the oceans products. Mr Looser replied that this could be interesting after the methods for determining the freshwater fluxes have been developed, but that the methods are not available yet. Mr Fekete added that it is difficult to maintain global or baseline datasets of e.g. gridded fields and that various datasets are floating around (e.G. NCAR from Bruno Byron). However the GRDC is in a position to release subsets of the global datasets, provide comparable datasets on all available global datasets, define thematic subsets of large scale datasets and assemble such baseline datasets. Draft papers for review could be forwarded to Mr Fekete.

Recommendations:

Publish WMO sub regions GIS layers on the GRDC website.

8. NE-FRIEND: GRDC's current and future role

Mr Looser gave a presentation on the status of the of the European Water Archive (EWA) hosted by the GRDC for the Northern European Flow regimes from International Experimental and Network Data (NE-FRIEND) group.

The EWA was transferred from CEH Wallingford to the GRDC and after the completion of the transfer the GRDC resumed responsibility for the EWA in July 2005. Since then the NE-FRIEND database group had two meetings, one in Havana, Cuba in November 2006 and one in Koblenz in March 2007. The major findings of the meetings can be summarised as follows:

- There remains a need for the EWA.
- A research priority-driven data acquisition strategy has to be followed.
- Membership of the database group has to be reviewed and recomposed.
- The existing structure of Regional Data Centres does not work anymore for the task of data acquisition. A new approach has to be found.
- The load of data acquisition has to be put on many shoulders. Data acquisition procedures have to be re-organised, more active participation/involvement of data-users from the projects 2-5 is required.
- GRDC basically provides the service of triggering, coordinating and material preparation for data acquisition activities as well as managing the archive and the data dissemination.
- An effort of triggering participation and ownership by the NE-FRIEND researcher community will be made by the NE-FRIEND coordinator. Depending on its result, EWA will either start as a new effort of a research priority-driven data acquisition scheme (rather than a systematic approach), to be stored in a new database – or alternatively will become a “frozen” dataset, provided “as is” and in this way will slowly losing relevance over time.

A meeting with the NE-FRIEND coordinator is scheduled for October 2007 to discuss the future plan of action regarding the EWA and the associated data acquisition strategies. Irrespective of the outcome of the meeting, work by the GRDC database manager will continue to develop a common database structure for both the EWA and the GRDC database in order to streamline database management, but keeping the datasets completely separate.

The discussion of the EWA and NE-FRIEND activities was held after the following presentation.

9. NE-FRIEND: Status European Water Archive (EWA)

Mr Pauler, the GRDC database manager, informed the steering committee on the present status and the planned activities of the EWA data model. The current EWA data model differs from the GRDC data model and its structure makes the generation of data queries and data products complex and it would require the development of additional software for efficient management.

Therefore the migration of the EWA to the existing GRDB data model was decided. The development of an extended GRDB data model to cater for the additional information contained in the EWA would allow the efficient management of both databases. The application of the same tools and standards for data validation, management and reporting will optimise database management and still keep the datasets separate. The completion of the data model and the final migration of the databases into the new data model will be accomplished during 2008. Standardisation of river names, spell checking and the checking of the coordinates should also be completed during 2008.

Discussion:

Dr. Grabs was disappointed by the apparent crumbling support for EWA. However he was relieved to hear that the scientific coordinator of NE-FRIEND is actively involved in addressing the EWA situation. He also stated that the data policy of EWA should be reviewed together with UNESCO. Prof. Daniell added that basically each FRIEND database is different and that different groups are going at different rates. There is a need for a common database system but this cannot be achieved because already the update processes are not working. Mr Pauler stated that it appears that EWA does not necessarily fit the requirements of the project groups. Mr Schröder referred to the latest FRIEND report which states, that FRIEND is not a closed group and basically everybody can participate in FRIEND activities. Dr. Grabs saw similarities amongst FRIEND and HYCOS databases. Sharing of data is limited and most of the data can only be used in a regional context. This trend should be avoided. Mr Boyer reported that the AMY-FRIEND database is also dormant. It consists of historical data with no updates. He called as well for the review of the FRIEND data policy. Mr Looser suggested that a part of the FRIEND data could be integrated into the dataset of the Pristine Basins project. He also stated clearly that the data acquisition for the FRIEND data bases should reside with the FRIEND research group as this is not a GRDC responsibility. Dr. Rast encouraged the merging of datasets as GEO was also aiming at data sharing and would offer assistance as far as possible.

Mr Looser referred again to the planned meeting with the NE-FRIEND coordinator in October 2007 to decide on further actions. Dr. Grabs indicated that there are two ways to address the FRIEND database update issues, namely via the FRIEND community and via the data centres.

Recommendations:

Agree on further action after the meeting with the NE-FRIEND coordinator in October 2007.
Develop new data model for EWA and GRDB.
Transfer data into new model.

10. Status: Metadata compilation

Ms Dornblut gave a presentation on the latest developments regarding the compilation of metadata, the current associated challenges and a future outlook (Digital Annex).

As part of the GTN-H project 1.3 the GRDC undertook to propose a suitable metadata format for the description of hydrologic and hydrometric data. After wide consultation the GRDC prepared a draft proposal for a hierarchically structured metadata profile joining elements of the WMO 19115 core metadata profile, corresponding ISO-standards and further metadata definitions from various

organisations including GRDC requirements. This draft proposal of a description of the river discharge component is currently under review and needs to be discussed with experts before being transferred into XML. It is envisaged to integrate the metadata profile into the WMO 19115 core metadata profile. A suitable software platform to capture the metadata needs also to be found. Potentially a stand alone software product should be adjusted for this purpose as no reusable product from the ETN-R project is available.

Discussion:

Dr. Grabs said that the contact between GRDC and the ET-IDM (Expert Team on Integrated Data Management of WMO) should be renewed. He also enquired about the role of NOKIS++ and Ms Dornblut explained that NOKIS++ could potentially adjust and provide a suitable software platform to capture the metadata. Due to resource constraints this task can only be tackled by mid 2008.

Recommendations:

Finalise GRDC metadata profile and transfer it to XML format before incorporating it into the WMO 19115 core metadata profile.

Verify whether NOKIS++ would be able to tailor its existing software to the GRDC requirements. Assess costs and the possibilities to have this software as a stand alone system also for distribution to data providers.

11. Status ETN-R Project

Ms Hohmann (Overmann) gave an overview on the background and status of the European Terrestrial Network for River Discharge (ETN-R) (Digital Annex). The ETN-R is a EU funded three year project in support of the European Flood Alert System (EFAS). Two full time resources, Ms Hohmann (project coordinator) and Mr Bunschowski (computer scientist) are being funded through the project. The GRDC is facilitating access to hydrological data collected and maintained at national or regional scale. The hydrological data required for the EFAS comprises river discharge and water level data in near real-time (NRT), associated metadata and historical data. 33 basins in 38 countries are covered by the project.

The project centres around two major activities. Firstly the identification, establishment and maintenance of contacts with potential data providers through workshops and country missions with the aim to establish agreements (both formal and informal) for data transfers. Secondly the software development for the collection, quality control, harmonisation and handling of the NRT data plus the transfer of the data at set time intervals (every 12 hours) to the EFAS.

Two data suppliers workshops have already been held and a number of agreements for data provision have been concluded. The import of NRT data is also progressing.

A number of lessons for the GRDC data acquisition strategies can be learned from the ETN-R project.

Direct personal contact is invaluable. Especially through the specially arranged data provider workshops these contacts could be established and need to be deepened now with individual country missions.

The preparedness of the data providers to make data available is increased with a tangible benefit, such as an early warning that can be provided with EFAS. EFAS however, is not trying to substitute the responsibilities of the national hydrological services in terms of flood warning, but is providing a flood alert function, which can assist the national hydrological services to better prepare for potential flood situations.

Recommendations:

ETN-R is an externally funded project and deadlines need to be strictly adhered to.

12. Status: GTN-R Project

Ms Dornblut briefed the meeting on the project status of the three main aspects of the Global Terrestrial Network for River Discharge (GTN-R) (Annex III & IV). This project was delayed due to resource constraints and the requirement to get the ETN-R project team operational as soon as possible. Still some progress could be made on all aspects of the project.

Part 1: Designation of GCOS Baseline River Discharge Network.

The initial selection of 380 stations was done by the GRDC and in 2005 a WMO support letter was sent to 82 countries with the request to support the GTN-R initiative.

A 25% return on the letter was received and based on the information from the National Hydrological Services the Baseline River Discharge Network was amended and a subset of 185 stations could be confirmed. The status of another 265 stations still needs to be clarified. 10 countries have provided historical data and three countries are providing already NRT data.

Part 2: Definition of an ISO conform 19115/19139 conform metadata profile and a web-based infrastructure for the management of metadata.

This part has already been discussed in Agenda Item 10 where it is stated that the GRDC metadata profile needs to be completed, transferred to XML and integrated into the WMO 19115 core metadata profile.

Part 3: Development of a GRDC NRT Monitor as a pilot web application for the retrieval, integration and presentation of NRT hydrological data.

A prototype of a NRT Monitor and a map application have been developed. Based on this prototype the development of the software as part of the ETN-R NRT data collection, quality control and management could be developed. The software for data harvesting and management will now be first developed within the framework of the ETN-R project, before it will be adopted for the requirements of the GTN-R project. Negotiations on data provision and data transfer by the participating National Hydrological Services need to follow now.

Discussion:

It was noted that the GTN-R project made only moderate progress and that some of the planned deliverables are dependent on the progress made within the ETN-R project.

Recommendations:

As already discussed in the Session of the GTN-H Panel the following decisions on the GTN-R project were made and the Steering Committee was informed accordingly.

WMO and GRDC will prepare a follow-up letter on the 2005 letter to inform the participating countries of the status of the project and request the countries that have not responded to consider participating in the project. The Baseline River Discharge Network will then be adjusted accordingly.

The definition of the metadata profile and the incorporation into the WMO core metadata profile should be concluded by June 2008.

The adjustment of the ETN-R software for the collection of GTN-R NRT data will only be done after the completion of the ETN-R project at the end of 2008.

13. Review of GRDC data policy

Mr Looser gave a brief overview of the GRDC data policy, which is based on the WMO data policy. He focussed the attention on three items for clarification and approval by the steering committee.

1. Agree in principle that User Declarations can be completed and submitted online.
2. Define “Use of data for commercial purposes.”
3. Clarify handling of requests for large datasets.

Discussion:

The discussion quickly turned to the whole issue of unrestricted exchange of data. Dr. Rast from the GEO secretariat promoted the idea of making all data available without restrictions, as promoted by GEO. Dr. Grabs in contrary pointed out that this principle is not supported by the WMO. Data ownership remains with the data providers and the provision of data for products that are sold commercially should be approved by the individual data provider(s). The data remains intellectual property of the data providers. Research and education can be supplied with data, but also here the approval of the data provider needs to be sought, when commercially exploitable products are produced. According the Dr. Rast the focus should be on availability and quality of the datasets, instead of looking at restrictions.

The handling of requests for large datasets will continue as practiced in the past. Cooperation agreements between the data user and the GRDC will be negotiated, before the data is provided to the user. The restrictions as spelled out in the cooperation agreement are preventing the abuse of the provided data.

No objections to the principle of completion and submission of online User Declarations were noted. This service is currently not available, so the discussion is superficial at this stage.

Recommendation:

Apply data policy as in the past.

14. Activities at partner data centres GPCC, GEMS/Water & IGRAC plus presentation by representative from the International Project Office of the Global Water System Project

Global Water System Project (GWSP)

Dr. Endejan from the International Project Office of the Global Water System Project (GWSP) of the Earth System Science Partnership (ESSP) informed the meeting about the role of the GWSP and on HydroSHEDS (Digital Annex). Particular emphasis was given to the progress and status of the GWSP Digital Water Atlas which is planned for release at the end of 2007 (available at <http://atlas.gwsp.org>).

Further he informed the meeting on the HydroSHEDS (Hydrological data and maps based on Shuttle Elevation Derivatives at multiple scales). HydroSHEDS depicts a global river network derived from SRTM (Shuttle Radar Topography Mission) elevation data. One example of using the dataset was a river map in which the width of the rivers are proportional to the upstream basin area. Further information on HydroSHEDS is available online at www.worldwildlife.org/hydrosheds/.

Discussion:

Dr. Endejan suggested to link the GRDC gauging stations to HydroSHEDS. No decision was made on this suggestion.

Mr Wellens-Mensah and Dr. Grabs enquired about the source of the consumptive water use data in global hydrological models and Dr. Endejan replied that this information is obtained from global water use (withdrawal and consumption) models that take into account various water use sectors (including irrigation, households, industry and water for cooling power plants).

Consumptive water use is not related to the GRDC gauging stations.

GEMS/Water

Dr. Robarts reported on the activities of the GEMS/Water office (Digital Annex). The difficulties in obtaining data for the global water quality database are similar to those of the GRDC and GEMS/Water is now accepting water quality data from all sources, including universities. Close

ties remain with the GRDC especially on a number of common stations that are being used to calculate total chemical loads. Dr. Robarts also presented a short video on the use of GEMStat, a suite of web services allowing the user to visualise water quality parameters in graphical form linked to the spatial location of the monitoring points (www.gemstat.org).

Global Precipitation Climatology Centre (GPCC) and International Groundwater Resources Assessment Centre (IGRAC)

At this stage of the meeting no representatives from GPCC and IGRAC were present. Mr Looser was supposed to give the presentations on behalf of GPCC and IGRAC, but considering the time constraints it was agreed to post the presentations on the GRDC website at <http://grdc.bafg.de/servlet/is/15552> and to attach them in electronic format to the final documentation of the Steering Committee meeting (Digital Annex).

15. World Water Assessment Programme (WWAP)

Mr Koncagül from the World Water Assessment Programme Secretariat in Paris briefed the meeting on the status of the planned 3rd World Water Development Report (WWDR3) and the approach to present the findings in a newly structured document not exceeding 300 pages (Digital Annex). The very tight schedule to finish the WWDR3 in time for its planned release on the first day of the 5th World Water Forum in Istanbul, Turkey requires all parties involved to strictly stick to the set deadlines and targets. The meeting was also informed about the new office facilities at disposal to the WWAP in Perugia, Italy.

Discussion:

Mr Koncagül noted that the GRDC with its global dataset can be a reliable partner for the WWAP. He also had to explain that the WWAP is an umbrella programme working with many organisations, but is currently hosted by UNESCO. UNESCO is one of many partners and the WWAP is reporting directly to UN Water. Dr. Grabs noted that the new WWDR will be more relevant to policy and he enquired whether it will also be dealing with risk management. Mr Koncagül confirmed that risk management is being dealt with in various sections of the report. He also noted that global datasets presented in the WWDR series are renewed from time to time and the best effort is made to capture the most up-to-date information.

16. GEO and GEOSS activities and linkages between HARON (Hydrological Applications and Runoff Networks) and GTN-R

Dr. Rast from the GEO Secretariat in Geneva reported on GEO, GEOSS activities and the GEO initiative HARON and its linkages to the GRDC (Digital Annex)

Dr. Rast stated the need for a system which provides access to all Earth Observation data in standard interoperable formats. GEO aims to do this. The need for hydrological cycle information and monitoring is real, but at the same time the ability of many National Hydrological Services (NHS) is declining to provide information on status and trend of the water resources. In order to obtain a detailed understanding of all the components of the global water cycle in-situ and satellite observations must be brought together. Data from a dedicated gauging network of existing hydrological stations must be integrated into models.

HARON aims to integrate, in a phased approach, dedicated river gauging networks of existing hydrological stations into a global runoff observation network. This includes upgrading and maintenance of the major global runoff stations enable monitoring of continental freshwater fluxes.

Discussion:

On the question from Dr. Busskamp on existing projects in the frame of GEOSS Dr. Rast confirmed GEO projects in the area of disaster management and solar radiation database.

Currently no sponsors or donors are available for the upgrading and maintenance of the dedicated global runoff monitoring network. Mr Looser enquired about the engagement of the World Bank to fund runoff monitoring equipment. Dr. Grabs stated that the World Bank is partially funding the upgrade of WHYCOS stations. Dr. Kinoshita added that Japan is also supporting the upgrade of monitoring infrastructure and the skills development of hydrologists.

Mr Wellens-Mensah said that satellite derived data cannot substitute in-situ measurements. Dr. Rast indicated that the continuation of in situ monitoring is a question of funding. In situ observations are still needed and cannot be totally substituted with satellite observations. These data sets should be utilised in a complementary fashion as they have their own value. This was supported by Dr. Grabs who also added that a more active role of the German GEO Secretariat will be required in the GEO water sector.

Recommendation:

The GRDC plays an essential part in the success of HARON through the provision of data acquisition and data management functions. Runoff data originating from the HARON project must be incorporated into the GRDC database.

17. Interactions: International programmes and projects

Mr Looser informed the meeting on the current involvement of the GRDC in international projects and programmes. Initially a list with the related activities is presented, and then the discussion turned to potential cooperation.

UNESCO-IHP and NE-FRIEND – EWA

The GRDC support to the NE-FRIEND community and the future of the European Water Archive (EWA) has already been discussed in chapter 8. However, the future of the other FRIEND databases needs to be discussed as well.

Discussion:

Dr. Grabs indicated that the recent changes at the IHP office in Koblenz and at the UNESCO could open new opportunities to establish a closer cooperation between the GRDC and the FRIEND groups around the world.

Recommendation:

Try to establish new links to the global FRIEND community with the objective to look at data exchange and integration.

WCRP – CliC, Arctic HYCOS and GEWEX GHP (now CEOP)

The GRDC is hosting the Arctic Runoff database (ARDB) in support of the Climate and Cryosphere Programme (CliC). At the same time cooperation has been offered at the Arctic HYCOS inaugural meeting to incorporate runoff data into the GRDC database. This offer has not yet been utilised by the Arctic HYCOS community.

GRDC is part of the GEWEX GHP (Now CEOP (Coordinated Energy and water-cycle Observations Project)) and provided inputs to the CEOP Strategic Implementation Plan (SIP). The GRDC inputs have been included into the SIP and cooperation is ongoing.

GRDC has informed the GEWEX SCE (Continental Scale Experiments) on the GRDC infrastructure and offered its cooperation by providing runoff data and also receiving runoff data from these projects for incorporation into the GRDC database.

GTN-H (Global Terrestrial Network for Hydrology)

The GRDC contributes with the GTN-R project to the goals and objectives of the GTN-H and continues with the close cooperation. The GTN-R has already been discussed in detail in Chapter 12.

Discussion:

Dr. Grabs stated that the GRDC involvement in the GTN-H project exceed the sole running of the GTN-R but it involves also the cooperation opportunities for joint projects with the partner data centres.

Recommendations:

Investigate information products together with the GPCC such as a comparison between discharge and precipitation trends.

Additional joint products with partner data centres, UNH and others could be:

- Isotope signatures in rivers with IAEA,
- Time series statistics and trend analysis as done by Kundzewicz
- Detection of climate signals in pristine basins requires the availability of a global pristine basins runoff data set. This data set could be obtained as part of the WMO / UNESCO pristine basins database initiative
- Biochemical fluxes together with GEMS/Water
- Sediment fluxes through linkages with IHP and ISI (international Sediment Initiative)
- Investigate cooperation with GWSP (Global Water System Project) and LOICZ (Land-Ocean Interactions in the Coastal Zone)

EFAS (European Flood Alert System)

The GRDC has a contract to contribute with the ETN-R project to the goals and objectives of EFAS. A continuation of the cooperation is envisaged, even after the completion of the ETN-R development phase. The ETN-R project has been discussed in detail in Chapter 11.

GCOS (Global Climate Observing System)

The GRDC maintains close cooperation with GCOS through the national GCOS coordinator at the DWD. Contributions to the 15th GCOS SC Meeting have been submitted through the national GCOS coordinator.

GTOS (Global Terrestrial Observing System)

The GRDC maintains close cooperation with GTOS. The GRDC has recently contributed to the GTOS biennial report including ECV activities for discussion and distribution at the UNFCCC COP in December 2007.

TOPC (Terrestrial Observation Panel for Climate of GCOS and GTOS)

The Head of the GRDC has been invited by the directors of GTOS and GCOS to become a TOPC panel member. The invitation has been accepted and now the GRDC is contributing to the objectives of TOPC such as the review and revision of the ECV's and the preparation of the TOPC 2009 Progress Report.

GEO / GEOSS (Group on Earth Observations, Global Earth Observation System of Systems)

Close cooperation with GEO is maintained through the national GEO secretariat. The GRDC has contributed to the report on "Early Achievements" on GEO task WA-06-05 "In Situ Water Cycle Monitoring", for presentation at the GEO Plenary Meeting and Ministerial Summit in November 2007 in Cape Town, South Africa. The GRDC is also contributing a poster to the November 2007 GEO Summit.

Discussion:

Dr. Rast said that the GRDC should contact GEO with regards to cooperation concerning the GTN-R and the HARON initiatives. The contacts to GEO should also be used for data acquisition initiatives.

Recommendations:

Liaise with GEO concerning the GTN-R and HARON initiatives
Utilise GEO support for data acquisition activities.

18. Opportunities for cooperation in international programmes and projects

Mr Looser informed the meeting about the fact that due to limited manpower at the GRDC not all potential international opportunities for cooperation are explored. The members of the steering committee were requested to inform the GRDC on International Projects and Programmes where future cooperation would be beneficial to further the objectives of the GRDC. Mr Looser started the discussion with giving a couple of examples where cooperation is already in progress and where additional cooperation should be sought.

GTN-R – HARON

For the success of both GTN-R and HARON it is vital that these initiatives are linked to support each other.

Discussion:

GTN-R – HARON linkages have already been discussed in various contexts during the SC Meeting.

WHYCOS

The GRDC would like to strengthen its linkages to the various WHYCOS programmes.

Discussion: The WMO office can assist in strengthening the linkages between the GRDC and the WHYCOS programmes.

WWAP (World Water Assessment Programme) and WWDR (World Water Development Report)

The WWAP and the GRDC should look at common ground in order to improve the cooperation and timely provide the relevant data and information for the WWDR.

Recommendation:

Further cooperation between the WWAP and the GRDC need to be investigated and strengthened.

GRDC could tie in with the **WMO Data Rescue Project (DARE)**. Mr Looser suggested that the provision of runoff data should be linked to DARE activities so that data rescued from old archives and outdated electronic storage media can be maintained in the GRDC database and does not need to be rescued again at a later stage. This could prevent the loss of historical data from certain parts of the world and at the same time could enhance the availability of these datasets for global and regional assessments.

GRDC suggested that **World Bank** funding for discharge monitoring infrastructure should also be linked to the provision of the discharge data to the GRDC database.

Discussion:

Dr. Grabs indicated that it would be worth a try, but that it would be difficult to identify and contact the right WB task managers. Dr. Rast stated that GEO keeps quoting WB as a potential donor for monitoring infrastructure improvements. Dr. Rast also indicated that GEO could write to the World Bank to make such a suggestion, once the context in which GEO operates has been established.

Recommendations:

Try to discuss with WB the provision of runoff data to GRDC as part of the upgrade of monitoring infrastructure financed by the WB.

19. Planned GRDC activities on Data Acquisition Strategies, Website appearance and projects

Mr Looser presented to the SC Meeting an outline of future GRDC activities on Data Acquisition Strategies, Website developments and involvement in projects. These activities however, must be brought in line with the GRDC actions resulting from the activities discussed at the SC Meeting and the availability of appropriate resources.

Data acquisition strategies

The provision of hydrological data to the GRDC and its partner data centres are governed by WMO resolutions. In most of the cases the provision of the data from the data supplier to the GRDC is not institutionalised. Therefore GRDC has to rely on voluntary cooperation of the National Hydrological Services (NHS). This cooperation is best enhanced by establishing and maintaining good contacts to individuals within the NHSs and by opportunity driven data acquisition. This does not allow a strategic structuring of the data acquisition initiatives, because the GRDC constantly has to adapt to changing circumstances.

For a few countries the acquisition of the data is possible by downloading the data from the respective NHSs website. But these are rather exceptions.

Although it has been tried in the past, Mr Looser suggested to embark on a renewed data acquisition drive during 2008. He presented some thoughts that need to be considered during such an initiative.

- Regional focus: Approach data suppliers within one geographical region at a time to stimulate regional interest in the work of the GRDC and its objectives. At the same time data requests for different initiatives (GTN-R, pristine basins, GRDC main database, metadata, etc.) should preferentially be lumped together so that the data acquisition strategy appears well structured to the data provider and that he is not bombarded by different data requests within a relative short period of time.
- Incentives for data providers (Persuasion and Reasoning). The need for the sharing of hydrological data and the reasons must be brought under the attention of the NHSs once again and the data providers must be convinced that their work is of high relevance and importance, not only at a local scale, but also at a regional and global scale. Information on international projects and initiatives which are depended on the data must be communicated again to the data providers.
- Incentives to instil pride and a positive identification with the provision of the data to the GRDC. Thank you letters and emails after data provision is standard practice. But the GRDC could provide a platform to the data suppliers on the GRDC website as an way of staying in touch with the data suppliers and fostering friendships. The issuing of WMO quality certificates for data complying with WMO data quality standards could be issued and even Data Provider Workshops should be considered, a strategy that proved to be very successful in the ETN-R project.
- Incentives in the form of task specific tools (assisting both data providers and the GRDC). These incentives could include the provision of free software tools to capture metadata and discharge data. Other software tools for plausibility checks and basic statistics could be offered to the NHSs who don't have access to equivalent tools. The provision of the software utilised for the WMO Data Rescue Project (DARE) could also be considered.
- Incentives in the form of little rewards as part of a positive identification with the GRDC. Calendars, caps, uniforms, pens etc. with the GRDC logo could be used , but these kind of incentives are not always welcome and great care need to be exercised when making use of these incentives.
- Support to assist needy NHSs with the provision of equipment, computers and some funds to pay local observers could be facilitated.
- Support for local data capture initiatives could be facilitated.

Many of the proposed activities would require funds, which GRDC can't provide at this stage. The role of sponsors need to be investigated.

It is clear to the staff at the GRDC that the data acquisition strategy and an accompanying incentive programme needs to be discussed with representatives from the targeted NHSs so that together the most successful approaches could be discussed and implemented.

Therefore the Mr Looser proposes to approach the CHy to allow a side event on Data Acquisition during the next CHy Session in November 2008.

Discussion:

Mr Wellens-Mensah said that GPCC provides data products and information on data use statistics as feedback and incentive to data providers. Similar should be tried at the GRDC. Dr. Grabs suggested that yearly reports on data usage should be prepared and

distributed to data providers for them to see what is being done with their data. Co-production of reports with GRDC data is also encouraged for publication in the GRDC Report Series.

Dr. Grabs and Dr. Rast wished for increased funding for the GRDC and both stated that the German focus on GEO could possibly serve as a vehicle for additional funds for the GRDC.

Ms Hohmann stated from her ETN-R experience, that the language factor plays an important role in all data acquisition initiatives. Communication in a foreign language might lead to misinterpretation and reluctance by the data providers to supply data.

Recommendation:

A side event on data acquisition strategies at the CHy in November 2008 is recommended. GRDC should approach the President CHy, Mr Bruce Stewart to ask permission for such a side event. The request should be copied to Mr Wellens-Mensah, Mr Tyagi and Dr. Grabs. An Agenda for a side event at the CHy must be drafted by the GRDC. Mr Wellens-Mensah should raise the issue of a side event on data acquisition at the February 2008 meeting in preparation for the CHy meeting.

Website developments

The existing GRDC website has been developed over the last couple of years and the substantial increase in information contained on the website resulted in more complex structures and it became increasingly difficult to navigate the website. This has already been realised by the GRDC staff and currently a new Website structure is in an advanced state of development and should be ready for implementation during 2008.

A completely independent website, with own domain name, remains on the agenda, but cannot be realised currently.

All German Government and public institutions websites have been requested to be migrated to the web tool called Government Site Builder (GSB). The GRDC website has been developed with the aid of WebGenesis and at this stage it is not clear whether a migration to GSB is necessary and if so, how this would impact on the overall plans for the GRDC website.

Within the new GRDC website structure provision will also be made for the following:

- List of data suppliers
- Links to NHSs websites
- Contact details of data providers at institutional level only
- Possibility to post pictures of infrastructure and staff linked to NHSs

The provision of contact details of individuals from the data suppliers side will be avoided, unless wanted. The provision of contact details of individual data users is not possible due to data privacy policies.

The visualisation of the GRDC stations utilising the Google Earth functionality together with metadata information and graphs showing the primary values will also be expedited and improved.

Discussion:

The planned initiatives on the website found general approval. Additionally Dr. Rast suggested that the GEO web portal should be linked.

Tasks and Projects

The execution and continuation of ongoing tasks such as data acquisition, database management, metadata issues, GIS layers, publications, website maintenance and data dissemination must first be ensured before the GRDC can put its resources to other tasks.

The continuation of GRDC involvement in international projects and initiatives as well as partner data centres is part of the essential services. So is the continuation of the ETN-R project and all efforts should be made to comply with contract requirements.

20. GRDC future work plan and priority action list

During the discussion all the priority tasks for the GRDC were listed. The list below includes these tasks plus all the other action items as recommended by the Steering Committee through the course of the meeting.

Task	Action required by	Due date
ETN-R – Comply with contractual obligations	GRDC	Dec 2008
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
Report of ETN-R in GRDC Report Series	GRDC	Spring 2009
GTN-R – Contact NHSs again to obtain cooperation in the GTN-R project	WMO, GRDC	Dec 2007
GTN-R – Finalise design of network	GRDC	Ongoing for two years
GTN-R – NRT data monitor	GRDC	Dec 2008
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	Dec 2008
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	
BfG to support GEO initiative, HARON	BfG	Ongoing
EWA – Meeting with NE- FRIEND coordinator	GRDC, IHP, NE-FRIEND	Oct 2007
EWA – Development of a new data model	GRDC	Oct 2008
Transfer EWA data into new data model	GRDC	2008
UNESCO to approach FRIEND community to supply info on the potential of runoff data exchange and integration	UNESCO FRIEND, GRDC	Ongoing
Pristine basins Ongoing coordination of contributions from various countries	GRDC	Ongoing
Pristine basins meeting	WMO, UNESCO	Nov 2007
Pristine basins – letter to data providers	WMO	2008
Pristine basins – compilation of data and metadata	GRDC	Ongoing
Data acquisition – Increase Efforts	GRDC	Ongoing
Investigate potential to have a Side event at the November 2008 CHy Meeting on runoff data provision	CHy, WMO, GRDC	Nov 2008
Promote GRDC at regional CHy hydrology sessions whenever possible	CHy, WMO	Ongoing
Invite GRDC to WHYCOS meeting	WMO, WHYCOS	Next WHYCOS Meeting

Publish new GIS layers of WMO Regions and Sub-regions on GRDC website	GRDC	October 2007
Update GRDC freshwater flux product and publish on the GRDC website	GRDC	
Visualise GRDC stations and selected metadata using Google Earth	GRDC	December 2007
Publications – list planned publications with due dates	GRDC	
Publications to increase GRDC visibility in journals, new letters, etc. IAHS newsletter and website	GRDC, UNH	Ongoing
Website restructuring	GRDC	2008
Schedule of reporting on progress to SC and President of CHy	GRDC	Twice a year
Transfer Greifswald study reservoir data to HYDROLARE, once HYDROLARE becomes operational	GRDC	Depends on establishment of HYDROLARE
Data Policy – Apply as done in the past. Identified access, no commercial use, no substantial parts of the database without cooperation agreement.	GRDC	Ongoing
Rewording of data policy	GRDC	2008
Explore possibilities to adapt GEMSoft software for GRDC purposes (Distribution of free software for plausibility check, graphing and statistics)	GRDC	Time permitting
Provide GRDC database back-up copy in ASCII format to WMO on regular intervals	GRDC	December 2008
Investigate the preparation of a global baseline dataset on river discharge for easy distribution	GRDC	
Mechanism to regular update GEMS/Water flux stations	GRDC	Twice a year
Investigate joint information products with partner data centres	GRDC Partner Data Centres	Ongoing
Investigate cooperation between WWAP and GRDC	GRDC, WWAP	Ongoing
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	

21. Steering Committee membership review

The Steering Committee Membership needs to be reviewed from time to time to accommodate new developments and ensure the effective guidance of the GRDC.

The existing list of steering committee members was confirmed with no members removed and HYDROLARE provisionally added to the list, once the data centre becomes operational.

The list of observers was confirmed with D-GEO representing GEO and GWSP added to the list.

The Steering Committee membership is now as follows:

Chairman:

Dr. Hans Moser
Federal Institute of Hydrology
Am Mainzer Tor 1
56068 Koblenz
Germany

Secretariat:

Global Runoff Data Centre
Federal Institute of Hydrology (BfG)
Am Mainzer Tor 1
56068 Koblenz
Germany

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

22. Date and venue of the 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 2009. Koblenz as the venue was accepted by the SC Meeting.

23. New Item: Presentation by Dr. Kinoshita

Dr. Takeo Kinoshita representing Suimon Kankyo in Japan gave two presentations focusing on the Japanese experiences of “Quality Assurance of Hydrological Data” and the “Necessary Improvements of Water Gauge and River Discharge Observations in Japan”. Paper copies of the presented papers are available either from the author or from the GRDC. Electronic versions are not available.

24. Any other business and closure of the meeting

With no further items to discuss Dr. Moser thanked all steering committee members and observers for their constructive and positive contributions and willingness to support the GRDC.

While wishing everybody a safe journey back home he closed the GRDC SC Meeting at 12:00

ANNEX I Agenda

Wednesday, 19 September 2007

13:00	Registration	
13:30	1. Welcome and Opening	Moser
13:40	2. Organisational Matters	Moser
13:50	3. Adoption of the Agenda	Moser
14:00	4. WMO and CHy activities impacting on the GRDC	Grabs
14:30	5. Current GRDC activities	Looser
15:00	Coffee Break	
15:30	5. Current GRDC activities (continued)	Looser
16:30	Session adjourns	
18:00	Social Event (back at the BfG at ~22:30)	

Thursday, 20 September 2007

09:00	6. Status: Database and data acquisition and dissemination	Dornblut
09:20	7. GRDC GIS Layers (WMO Sub-Regions, WHYMAP, GRDC Major River Basins)	de Couet
09:40	8. NE-FRIEND: GRDC's current and future role	Looser
10:00	9. NE-FRIEND: Status European Water Archive (EWA)	Pauler
10:10	10. Status : Metadata compilation	Dornblut
10:30	Coffee Break	
11:00	11. Status ETN-R Project	Overmann
11:30	12. Status : GTN-R Project	Dornblut
12:00	13. Review of GRDC data policy	Looser, All

12:30	Lunch Break	
13:30	14. Activities at partner data centres (GPCC, GEMS/Water, Rudolf IGRAC)	Robarts Letitre
14:45	15. World Water Assessment Programme	Koncagul
15:00	Coffee Break	
15:30	16. GEO and GEOSS activities including linkages between Rast HARON and GTN-R	
15:50	17. Interactions: International programmes and projects	Looser, All
16:30	18. Opportunities for cooperation in international programmes and projects	Looser, All
17:30	Session adjourns	

Friday, 21 September 2007

09:00	19. Planned GRDC activities Data acquisition strategies Website Projects	Looser
10:30	Coffee Break	
11:00	20. GRDC future work plan and priority action list	Looser, All
12:30	21. Steering Committee membership Review	Looser, All
12:45	22. Date and Venue of the next GRDC SC Meeting	All
12:50	23. Any other business	All
12:55	24. Closure of Meeting	Moser
13:00	End of Session	

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ANNEX III Composition of the GRDC Steering Committee

Chairman:

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Secretariat:

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Federal Institute of Hydrology (BfG)
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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
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- 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 GRDC Metadata Project Report to the 3rd GTN-H Panel Session

GTN-H Project 1.3 Management of Metadata

Objective:

To propose a standardised detailed metadata format for selected GTN-H data types and demonstrate their use in enabling the user to discover and access data and related information (e.g. data quality).

Status:

On the 2nd GTN-H panel meeting 2005 the development of a web-based, multilingual software product for the exploration of metadata was announced, provided that a metadata standard, a standardised detailed metadata format, an adequate software product (off-the-shelf or internally re-usable) and funds to buy and adapt a software product by an external company are available.

The “management of metadata” in the sense of the description of hydrologic/hydrometric data by an appropriate set of metadata consists of two fundamental parts:

1. The standardised description of river discharge data using an ISO conform metadata profile
2. The collection, processing and management of metadata by standard rules offered in a web-based environment that enables the user to discover and access data.

GRDC has defined the version 3.0 of its Near Real-Time Data Format in 2006. It is already in use. In 2006, GRDC prepared a proposal for a hierarchically structured description of hydrologic/hydrometric data intended to integrate it in the WMO 19115 metadata profile. This (still internal) proposal combines the metadata requirements of current GRDC projects. It joins elements of the WMO 19115 profile with the corresponding ISO-standards, the metadata definitions, proposed by CUAHSI (Consortium of Universities for the Advancement of the Hydrologic Sciences, Inc.) and the Hydrologic Markup Language (HydroML) of USGS, and integrates some additional elements which GRDC considers as important, e.g. for the more detailed description of the providing institution or the results of observations (measurements / analysis procedure / model simulation). This draft proposal of a description of the river discharge component is currently under review and needs to be discussed with expert groups and transferred to XML (currently only available in XLS files).

In 2005, it was intended to engage in the German NOKIS++, a project which investigates the implementation of information infrastructures as part of the Integrated Coastal Zone Management. In the framework of NOKIS++ a web-based environment was developed by a German software company allowing the standardised metadata collection, processing and management. Nowadays this software is commercially distributed as a stand-alone product and is as such of high interest for future metadata management of the project. Currently, GRDC has no active part in the development and design of NOKIS++. Alternatively, it was intended by GRDC to re-use the metadata management structures developed internally within the envisaged European Terrestrial Network for River Discharge (ETN-R). Unfortunately, over the course of the ETN-R project, the development of the metadata management system was cancelled. Consequently, as of today, the ETN-R project does not provide a software product for the collection and management of hydrological metadata for GRDC purposes.

A web-based environment for the collection, processing and management of metadata portable to other platforms is still the most suitable solution. It would facilitate the metadata collection and processing on both the providers (NHS) and the processors (GRDC) side. With the web-based

environment, which was originally developed for the German NOKIS++, now a software product is available which meets the essential requirements of the GTN-R project. The customisation for the special needs of the GTN-R/GTN-H and the adjustment to the WMO 19115 core profile including the river discharge data component seems the most favourable solution at present.

Next Steps:

- Development of a hierarchical structure to describe hydrologic/hydrometric data, data transfer and exchange parameters by an appropriate set of metadata
- Identification and application of a software to implement metadata profile and search for data and products (GRDC to contact the contractor to , find out license and adjustment needs)
- Action by mid-2008

Project lead: Ms Irina Dornblut

ANNEX V GRDC Map Product on Real-Time Hydrological Conditions Project Report to the 3rd GTN-H Panel Session

GTN-H Project 2.2 Map Product on Real-Time Hydrological Conditions

Objective:

To develop a pilot web application that demonstrates the retrieval, integration and presentation of real-time hydrometric data for selected large rivers from several countries (Global Terrestrial Network for River Discharge, GTN-R, <http://gtn-r.bafg.de>)

Status:

GRDC is currently developing a service capable to automatically "harvest" real-time river discharge data, using FTP and HTTP servers via Internet protocols. In 2004 GRDC developed a prototype of an operative engine that continuously monitors online active data sources according to their download frequency attributes, visits them, downloads the relevant data files and stores them in an interim database for harmonisation. Based on the experiences gained with this prototype, GRDC started in 2006 within the ETN-R project to develop a software system that draws together the near real-time river water level and discharge data, with time steps of at least 1 hour, provided by individual NHS via Internet protocols.

Output/ deliverable:

This software system will be able:

- to process and store the data in a database,
- to check the plausibility of the data,
- to transform water level data into discharge data where required,
- to classify the data on the background of historic data, and
- to re-distribute all required data in a harmonised way via the Internet.

Within the ETN-R, the development of a customised mapping application is planned to display the current and forecasted hydrologic situation on a European map.

Since 2005, a prototype of a scaleable and interactive map is provided by the GRDC. Using the ArcReader software the maps display the stations of the initially proposed GTN-R network. Apart from this prototype no further activities regarding a web mapping application were made in 2006.

Schedule (resource-dependent):

GRDC intends to apply the ETN-R software system and corresponding mapping application to the GTN-R as soon as it is in regular operation, latest by the end of the ETN-R project in December 2008. Designed primarily for the ETN-R, the system must be adapted for the requirements of the GTN-R, considering the experiences of the ETN-R. This relates in particular with regard to changes in the spatial and temporal discretization of polled gauge data and a more generalized data plausibility analysis.

Project lead: Ms Irina Dornblut



ANNEX VI Reference Hydrological Dataset – pristine basins Project Report to the 3rd GTN-H Panel Session

GTN-H Project 4.1 Reference Hydrological Dataset – pristine basins (Harry Lins, Ulrich Looser, Wolfgang Grabs)

Objective:

To prepare a feasibility report and recommend path forward to develop a global reference hydrometric dataset for use in detecting climate change.

Status:

In June 2006 the WMO sent out a request to its member Hydrological Advisors to supply the WMO with a list of river discharge stations, which comply with seven selection criteria provided in the requesting letter. 23 countries have replied positively and 22 countries have provided the WMO with a list of river discharge stations representing pristine conditions in their respective countries. Information for three more countries is pending and one country indicated that it does not dispose of suitable stations as defined by the seven selection criteria.

The majority of the responding countries are situated in Eastern Europe and Asia, whereas Northern America is covered by the densest network with the majority of the stations. Southern America, Africa, and Australasia are still underrepresented. So far one country has provided river discharge data for the selected stations and for the North American countries the historical data is available from their websites. The metadata provided for the stations is of varying quality and a follow-up action is necessary to obtain additional metadata, historical discharge data and more participating countries.

Next Steps:

Workshop on use of pristine basins for climate analyses is planned for the first quarter in 2008. After this workshop another letter should be written to countries, to ask for their data.

Project Lead:

Harry Lins, Ulrich Looser, Wolfgang Grabs



ANNEX VII

Acronyms

2AR	Second Report on the Adequacy of the Global Observing Systems for Climate
BfG	Bundesanstalt für Gewässerkunde (German Federal Institute of Hydrology)
CBS	Commission for Basic Systems (WMO)
CEH	Centre for Ecology & Hydrology
Cg	WMO Congress
CHy	Commission for Hydrology (WMO)
CliC	Climate and Cryosphere (WCRP)
CLIVAR	Climate Variability and Predictability
COP	Conference of the Parties
CUAHSI	Consortium of Universities for the Advancement of the Hydrologic Sciences, Inc.
DARE	WMO Data Rescue Project
DWD	Deutscher Wetterdienst
ECV	Essential Climate Variable
EFAS	European Flood Forecasting System
EGS	European Geophysical Society
ESSP	Earth System Science Partnership
ET-IDM	Expert Team on Integrated Data Management of WMO
ETN-R	European Terrestrial Network for River Discharge
EWA	European water Archive
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
GEWEX CSE	GEWEX Continental Scale Experiment
GEWEX GHP	GEWEX Hydrometeorological Panel
GPCC	Global Precipitation Climatology Centre
GRDC	Global Runoff Data Centre
GSB	Government Site Builder
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
HWRP	Hydrology and Water Resources Department 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

IAEA	International Atomic Energy Agency
IAHS	International Association of Hydrological Sciences
ICSU	International Council for Science
IGOS	Integrated Global Observing System
IGRAC	International Groundwater Resources Assessment Centre
IHP	International Hydrological Programme
ISI	International Sediment Initiative
ISO	International Organization for Standardization
JRC	Joint Research Centre
LOICZ	Land – Ocean Interactions in the Coastal Zone
NCAR	National Center for Atmospheric Research
NE-FRIEND	Northern European FRIEND
NFP	National Focal Point
NHS	National Hydrological Service
NMHS	National Meteorological and Hydrological Service
NOKIS	North and Baltic Sea Coastal Information System
NRT	Near real time
Res.	Resolution
SC	Steering Committee
SIP	Strategic Implementation Plan
TOPC	Terrestrial Observation Panel for Climate
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
WatER	Water Elevation Recovery
WB	World bank
WCP	World Climate Programme (WMO)
WCRP	World Climate Research Programme
WDC	World Data Centre
WGCM	Working Group on Coupled Modelling
WHYCOS	World Hydrological Cycle Observation System
WHYMAP	World-wide Hydrological Mapping and Assessment Programme
WMO	World Meteorological Organization
WWAP	World Water Assessment Programme
WWDR	World Water Development Report
WWF	World Wildlife Fund
XML	Extensible Markup Language

Reference list of GRDC Reports



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.
	(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 1995)	First Interim Report on the Arctic River Database for the Arctic Climate System Study (ACSYS).
	(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
	(49 pp, annex 179 pp)



Reference list of GRDC Reports

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)
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