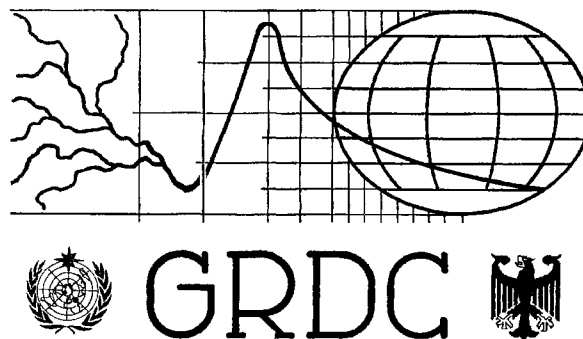


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Bundesanstalt für Gewässerkunde
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Global Runoff Data Centre
Federal Institute of Hydrology
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Report No. 4

GRDC - Status Report 1993



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GRDC - Status Report 1993

General

A global database of hydrological data is considered necessary for research and application-oriented hydrological and climatological projects which are undertaken on regional and global scales. These projects include basin-oriented, regional and global water balance studies, investigation of trends in long-term hydrological time series, flux of fresh water and matter into the oceans, the coupling of runoff with water quality data and the coupling of hydrological and meteorological models. The project A.5 of the World Meteorological Organization (WMO) under the World Climate Programme-Water (WCP-Water) provides a general service for the collection, storage and dissemination of internationally available sets of hydrological data. Since 1988, the Global Runoff Data Centre (GRDC) is performing this task.

The GRDC is a user-oriented service center for global runoff data. By itself, it does not engage at present in advanced data processing and scientific projects. By the services rendered to users, the GRDC stimulates and encourages the scientific exploitation of the data for a variety of scientific and applications - oriented programmes, namely the WCP-Water, the Global Energy and Water Cycle Experiment (GEWEX), the Operational Hydrology Programme (OHP) of WMO, the International Hydrology Programme (IHP) of UNESCO, the United Nations Environment Programme Global Environment Monitoring System - Water (UNEP GEMS-Water), and a considerable number of institutional research projects.

Data dissemination policy

At present, requests for GRDC data are in general free of cost provided, that the user indicates in detail the purpose for which the institution requests the data.

The researchers are requested to contribute copies of their research reports/results to the GRDC, as the GRDC is currently setting up a reference library which is aimed to provide reference of research results as feed-back information for the data suppliers. The GRDC expects data users to assist in the build-up of the GRDC database by supplying hydrological data sets. Only sub-sets of the databank can be ordered; requests for the contents of the total databank are not entertained. The access to the database system is strictly controlled and the commercial use of the data is excluded.

Summary of GRDC's main activities in 1993

After the organizational strengthening of the GRDC since January 1993, a series of measures are under way to improve the services of the GRDC for the user community:

Technical activities

1. The GRDC is implemented under SCO-UNIX on a PC-based INFORMIX data bank system. The databank is fully relational and allows complex queries. The databank facilities have been improved to simplify data retrieval and dissemination. The GRDC contains global daily and monthly runoff data for 3.347 stations from 2941 river basins (Status as of February 1994).
2. Beyond the set of currently available graphic and tabular presentations of the database contents, a set of standard hydrological graphical data products is being developed. These products will be available before the end of the year 1994.
3. The development of an "Intelligent Interface" allows the import of a variety of data formats into the GRDC.
4. The use and adaption of the GEMS/Water RAISON - software package to the GRDC allows the production of basin reports from GRDC-data (at present for 90 large basins worldwide)
5. The update of data holdings of the GRDC for data received in 1992 and 1993 has been finalized. An account of the update is attached to this report (Annex 1). Efforts are made to update the data sets currently contained in the GRDC and to close data gaps for a number of regions. The GRDC intends to update the GRDC catalogue twice a year. These efforts are made by the incorporation of recent hydrological yearbooks which were sent to WMO by a number of countries, intensified direct contacts to hydrological services and requests for data exchange with other national and research-oriented hydrological databanks in the world.
6. The GRDC maintains a report series. Three reports have been issued in 1993 (see last page: Reference of GRDC Reports). Besides the yearly Status Report, the GRDC will regularly publish reports on current issues.

Organizational activities

1. Nominations have been made to establish a GRDC Steering Committee to advise the GRDC on necessary activities and assist the GRDC in data acquisition and dissemination as well as in the development of user-oriented data products from the GRDC database. The first meeting of the Steering Committee is planned for June 1994.
2. The collaboration between the GRDC and GEMS/Water has been strengthened with regard to the regular exchange of data. To facilitate communication between the GRDC and the GEMS/Water global databank for surface and groundwater quality, the software package RAISON - developed by Environment Canada in the GEMS/Water program - is used at the GRDC to compile regional reports of streamflow.
3. A closer linkage between the GRDC and the OHP of WMO has been established through active participation in meetings of the Regional Working Groups Hydrology and linkage with OHP activities, namely the planned World Hydrological Cycle Observing System - Africa (WHYCOS-Africa) project.
4. The establishment of close bilateral contacts to national hydrological services and research institutions is especially important for the GRDC to maintain and improve the level of acceptance of the Centre.

In 1993, the GRDC participated on a meeting of the Working Group Hydrology of the WMO Regional Association I (Africa) in November 1993 in Abidjan, Ivory Coast. The GRDC was also presented during Symposia and Workshops in Wallingford, England; Yokohama, Japan; Montevideo, Uruguay; Geneva, Switzerland; Kathmandu, Nepal; and New Delhi, India.

4. A call for data for the inclusion into the GRDC has been issued to 73 countries so far. The list of addresses of countries to which letters were sent by February 1994 is attached to the report as annex 2.

Main GRDC activities planned in 1994

Technical activities

1. Transposition of the databank to an Open Desktop under UNIX using INFORMIX 4GL.
2. Improvement of databank tools for the display of databank information and production of data products.
3. Generation of an updated GRDC catalogue of available and missing data series; the first updated catalogue is available since February 1994.
4. With regard to quality control, the GRDC has yet to build up facilities for tests of data plausibility and homogeneity. Information about data consistency are usually not provided by data suppliers. While the principal responsibility of data quality lies with the national services supplying hydrological data to the GRDC, the practice has shown that an additional quality control is necessary to advise users on possible errors or anomalies in data sets delivered to them and to give a feed back to data suppliers if errors have been detected.

This is an activity which will not be finalized in 1994 due to budgetary constraints to develop the necessary tools in the databank and the enormous task to perform quality control for all river basins. Quality control will be performed first on a set of selected rivers.

5. Compilation of information about stations and river basin characteristics. This is an on-going activity and depends largely upon incoming information from WMO member countries and other sources of information, such as from UNEP-GRID. So far, the incoming information from members is not sufficient to build up a GIS-based support system for the GRDC.
6. Establishment of a GRDC library for printed and electronic information. This activity is in its infancy state. Yearbooks, studies, maps etc. are archived in a library system. A quantitative input is expected in future from incoming results from research projects which were conducted on the basis of GRDC data.
7. In accordance to a recommendation of the Scientific Steering Group of GEWEX (January 1994), the GRDC aims at the production of a report with the collective data of all river stations which are close to the mouth of rivers to oceans. These data can then be used to determine continental fresh water fluxes into oceans for the validation of General Circulation Models (GCM's).

8. With regard to WCP-Water project A.8 (see below) the GRDC will produce a report about the discharge of the 15 largest rivers of the world, together with the discharge data for these rivers displayed and also available on diskette.

Organizational activities

1. The first meeting of the GRDC Steering Committee planned for June 1994 will certainly be a major impuls for the work of the GRDC especially with regard to the definition of the nature and extent of GRDC services and the linkage to other UN bodies and non-governmental institutions.
2. Data acquisition for hydrological and related data from selected countries will be continued as outlined above.
3. Participation in GRDC related activities to improve flow of up-to-date data to the GRDC. The means to achieve this is mainly the participation in meetings of WMO Working Groups Hydrology, workshops, symposia and activities related to WCP and World Climate Research Programmes (WCRP) as well as the planned WHYCOS-Africa - project to ask for data.
4. Participation in WMO, UNESCO, GEMS/Water and activities of the Global Precipitation Climatology Centre (GPCC) activities with regard to the definition of working programs and data exchange.
5. Improvement of information policy about GRDC's role and data contents. An important task in this respect will be the improvement of feed-back information to data suppliers about database contents and use of the data. As an incentive to national hydrological services supplying data to the GRDC, some advisory services are offered with regard to network planning, instrumentation, hydrological methods for discharge and sediment measurements, water quality assessment and data processing. The Federal Institute of Hydrology has the know how to assist in this task.

Medium-term planned activities

Besides the on-going activities in 1994, the GRDC keeps abreast to improve its services. Further activities are planned in medium term (say, 2 years) to be incorporated into the routine GRDC activities:

- Improved quality control and statistical analyses of data sets.
- Compilation of information about stations and river basin characteristics and the generation of a Geographical Information System (GIS).
- Map of long-term annual and monthly means of measured and gridded runoff for the documentation of the hydrological situation. This activity depends on the results of grid-oriented estimation techniques.
- Further cooperation with the Global Precipitation Climatology Centre (GPCC) and other relevant global data centres (e.g. UNEP GEMS/Water and the Global Resource Information Database of UNEP (GRID-UNEP)).

Principal linkages of the GRDC with WCP-Water Projects

Currently, the GRDC is linked with a number of WCP-projects:

Project A.2

Analyzing long time series of hydrological data and indices with respect to climate variability and change.

Project A.5

"Collection of Global Runoff Data" is equivalent to the operation of the GRDC.

Project A.8

Detecting global and regional runoff trends by monitoring discharge of selected rivers.

Project A.9

Monitoring changes in the characteristics of extreme hydrological events (floods and droughts).

Project B.3

Development of grid-related estimates of hydrological variables.

Project B.7

Comparison study of time series of areal mean monthly precipitation and streamflow of selected catchment areas.

Current and planned research at the GRDC

While the GRDC is at present not engaged in research itself, the GRDC collaborates actively with a number of research projects including regional and global trends in time series, calculation of water balance components in different scales, transfer of runoff to grid area values for validation of GCM's (WCP-Water project B.3) including maps of means for measured and gridded runoff, and a comparison of gridded mean monthly precipitation and streamflow for the Niger river (WCP-Water project B.7).

Preparations are made to participate actively in the planned ICSU/WMO Arctic Climate System Study (ACSYS). A nationally funded project "Analysis and parameterization of runoff formation on a regional and global scale" is under preparation. The Niger river basin has been selected for this study.

In the context of the WMO WCP-Water Project B.3 (Development of grid-related estimates of hydrological variables), since October 1992 a nationally funded research project is undertaken at the Federal Institute of Hydrology. It is foreseen that the GRDC will make use of the methodologies developed in the project to produce maps of gridded runoff data for selected basins. The project is briefly outlined below:

Monthly runoff values for the period 1971 to 1980 are computed for a grid net covering the Weser catchment in Germany as a pilot catchment. The methods used are in line with the agreement reached on the Second Planning Meeting on Grid Estimation of Runoff Data in Warsaw, in April 1992. In accordance to user requirements, the grid size can be customized for projects in climatology and hydrology on regional and global scales. A GIS is being used as a tool for the computation of these data. Data input to the GIS consist of image processed data sets (soils, landuse, etc.) from international institutions as well as from a Digital Elevation Map of the Weser catchment. The results of this project can be used for the validation of climatological as well as for meso- and macrocale hydrological models. The gridded runoff data and ancillary information will be offered to the World Climate Centers of the WMO and to UNEP/GRID in Geneva for further distribution.

Requests for data from the GRDC in 1993

The table below lists the major data requests from GRDC in 1993. Only those names are listed where actual data has been transferred. The GRDC sent the catalogue of the database to about 20 data users who wanted to obtain information about the GRDC holdings before requesting actual data at a later stage.

The few cases, where requests could not be positively answered, are not listed.

Data suppliers are invited to contact the GRDC in case a direct communication with the data users is desired. The GRDC would then transmit the complete address of the data user. In this context it is necessary to note, that all data users are requested to supply information about the results of their research to GRDC for reference. As all requests were made for new research projects, results are at the moment not available.

REQUEST MADE BY (NAME, COUNTRY)	COUNTRY OR RIVER, FOR WHICH DATA ARE REQUESTED	PURPOSE OF DATA USE
Bishop, J.M., Institute for Scientific Research, Kuwait	Iran, Kuwait	Design for prawn industries
Buren, T., International Institute for Applied Systems Analysis, Austria	Altogether 114 river basins in all regions	Climate change impact on regional water resources
Drange, H., Nansen Environmental and Remote Sensing Centre, Norway	Report 100 MPI/GRDC	Discharge from 50 selected rivers of the world for GCM validation
Cunnane, C., University College, Dept. Hydrology, Ireland	GRDC catalogue	Selection of rivers for trend analysis of discharge
Ebel, Ch., State Environment Agency, Germany	Argentina	Environmental protection in the Rio Colorado basin
Freon, P., ORSTOM, France	Italy	EC-program in Marine research
Friederich, State Agency for Agriculture and Water Resources, Germany	Rivers flowing in the Baltic Sea	Pollution fluxes in the Baltic Sea
Hastenrath, S., Univ. of Wisconsin, Dept. Atmospheric and Oceanic Sciences, U.S.A.	Zaire	Research on mechanisms of tropical climate anomalies
Zhou, J., Institute of Atmospheric Physics, China	Report 100 MPI/GRDC	Discharge from 50 selected rivers of the world for GCM validation.

Kisiel, K., Univ. Arizona, Dept. Hydrology, U.S.A.	12 large river basins globally	Development of GIS-system
Lee, T., UN Economic Commission, Chile	GRDC catalogue	Latin-American integrated water resources planning and management
Lal, M., Indian Institute of Technology, India	India	Validation of GCM's
Lean, J., U.K. Met. Office, U.K.	Report 100 MPI/GRDC	Discharge from 50 selected rivers of the world for GCM validation.
Mahfouf, J., Meteo-France, France	Report 100 MPI/GRDC	Discharge from 50 selected rivers of the world for GCM validation.
Mamayev, V., Central Research Centre, Oceanographic Institute, U.S.A.	Selected rivers in Eastern Europe	Sea level rise in the Black Sea
Manley, R., Cambridge Univ., U.K.	Euphrat, Tigris	Marshes at the southern end of Euphrat and Tigris for World Conservation Union
Hua-Lu, P., NOAA, U.S.A.	Report 100 MPI/GRDC	Discharge from 50 selected rivers of the world for GCM validation.
Tonderski, A., Linköping Univ., Sweden	West European and East European rivers	Hydrological data for research in water quality changes
Tateishi, R., Chiba Univ., Japan	Selected rivers over the world	Global water resources and water use
Braithwaite, D., EOS Project, Univ. of Arizona, U.S.A.	Selected rivers over the world	Preparation of selected global data sets for GCM modellers
Kwadijk, J., Univ. Utrecht, Netherlands	Ganges, Brahmaputra	Adaption and test of water balance model
Winnegge, Th., Fed. Inst. Hydrology, Germany	Niger river	Comparative studies with precipitation data held in the GPCC
Yamagata, T., University of Tokyo	Report 100 MPI/GRDC	Discharge from 50 selected rivers of the world for GCM validation.
Roth, R., Int. Meteorology & Climatology, Univ. Hannover	Report 100 MPI/GRDC	Discharge from 50 selected rivers of the world for GCM validation.

TOTAL NUMBER OF STATIONS IN THE GRDC - DATABASE

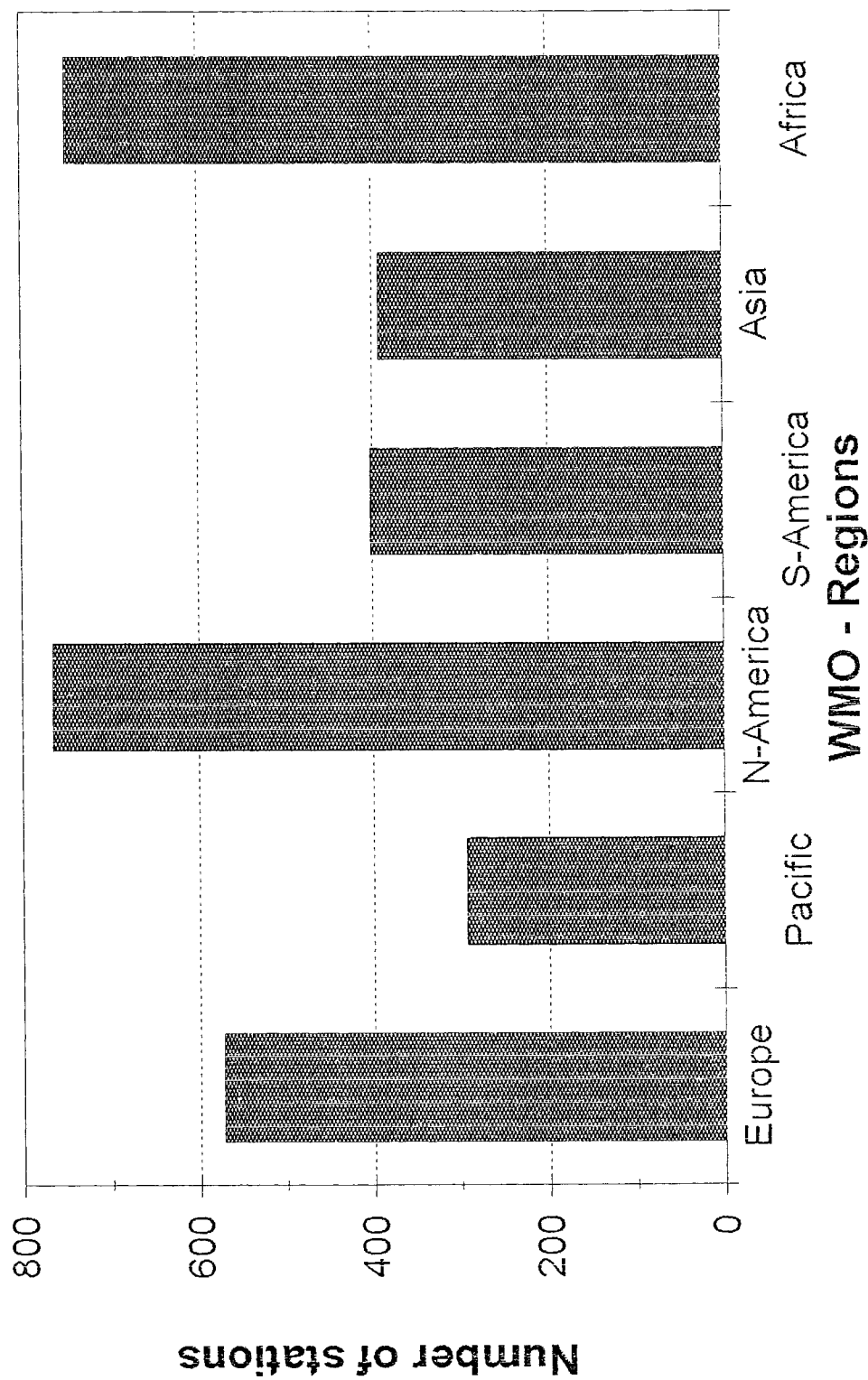


Figure 1: Total number of stations in the GRDC - Database

STATIONS SPLITTED INTO CLASSES

WMO - Region: AFRICA

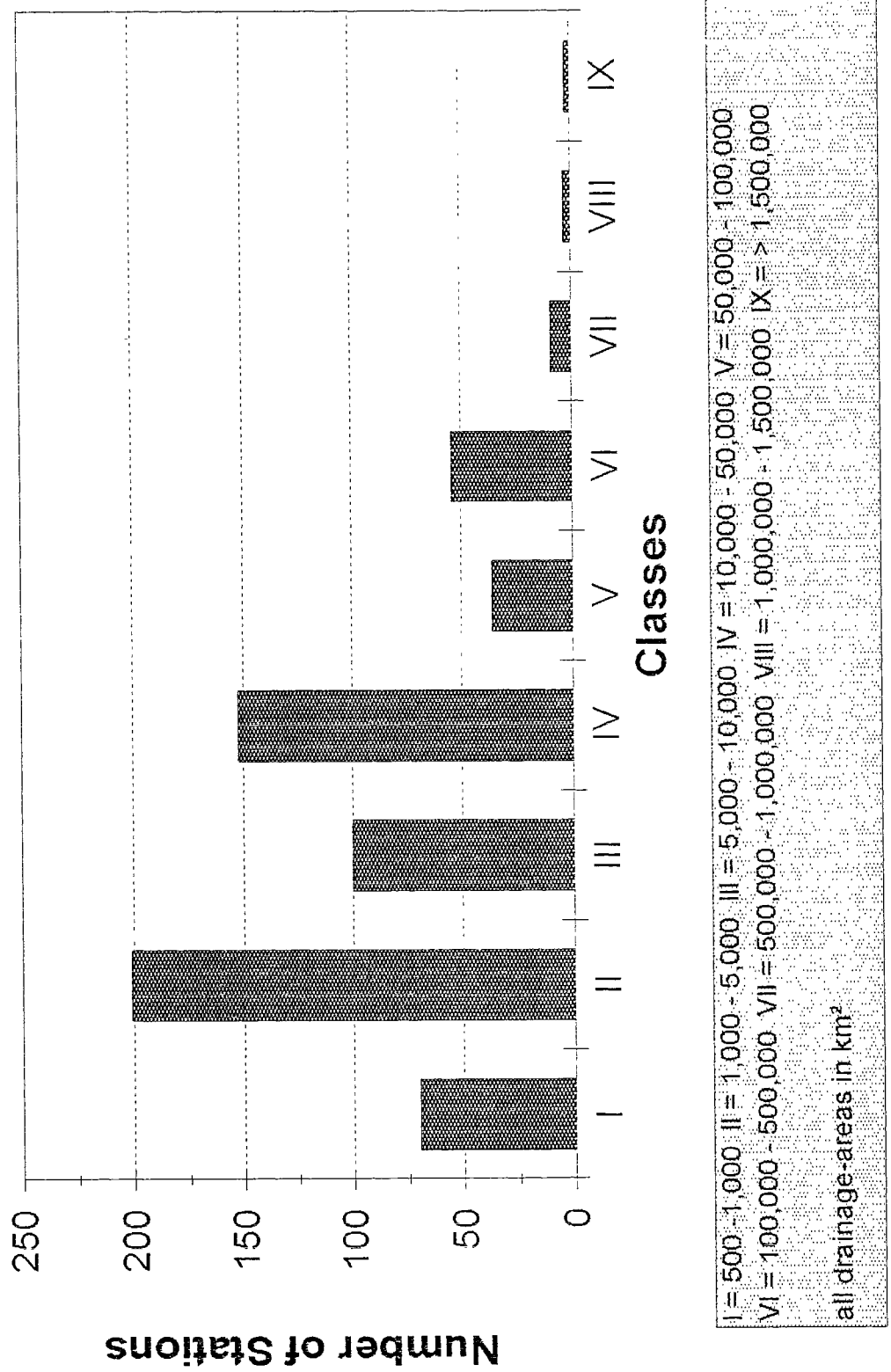


Figure 2: Size classes of GRDC-basins in Africa

STATIONS SPLITTED INTO CLASSES

WMO - Region: ASIA

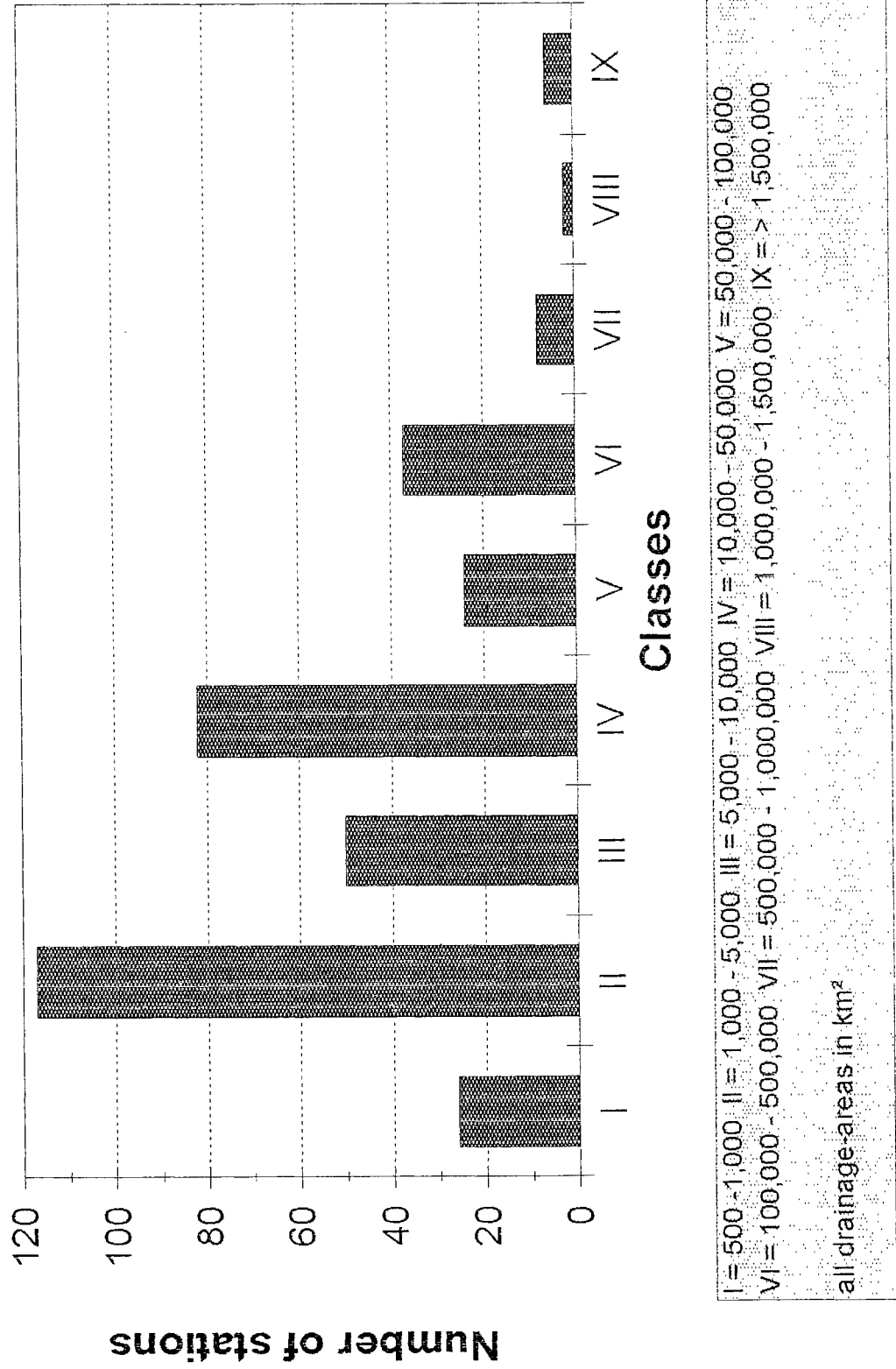


Figure 3: Size classes of GRDC-basins in Asia

STATIONS SPLITTED INTO CLASSES

WMO - Region: EUROPE

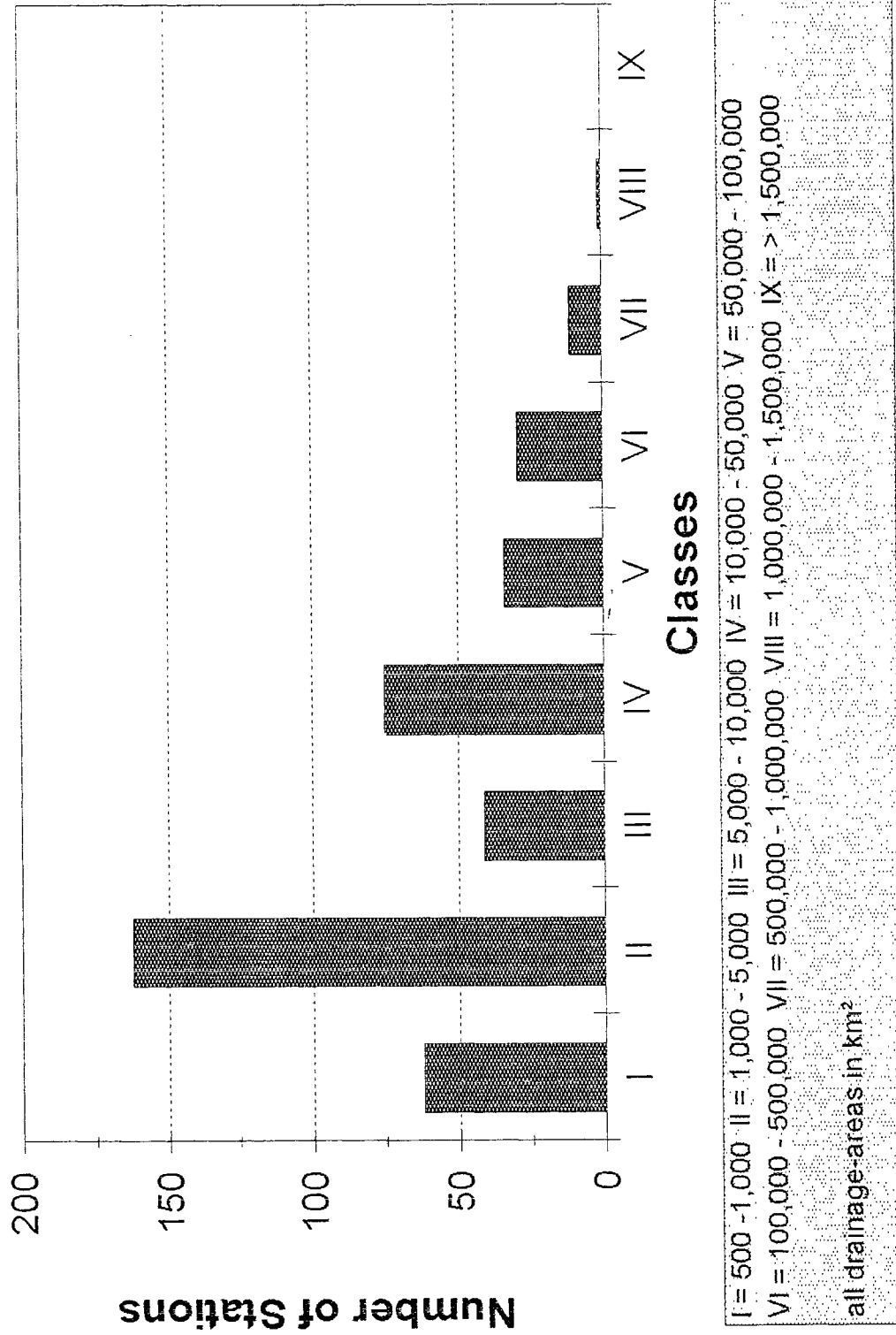
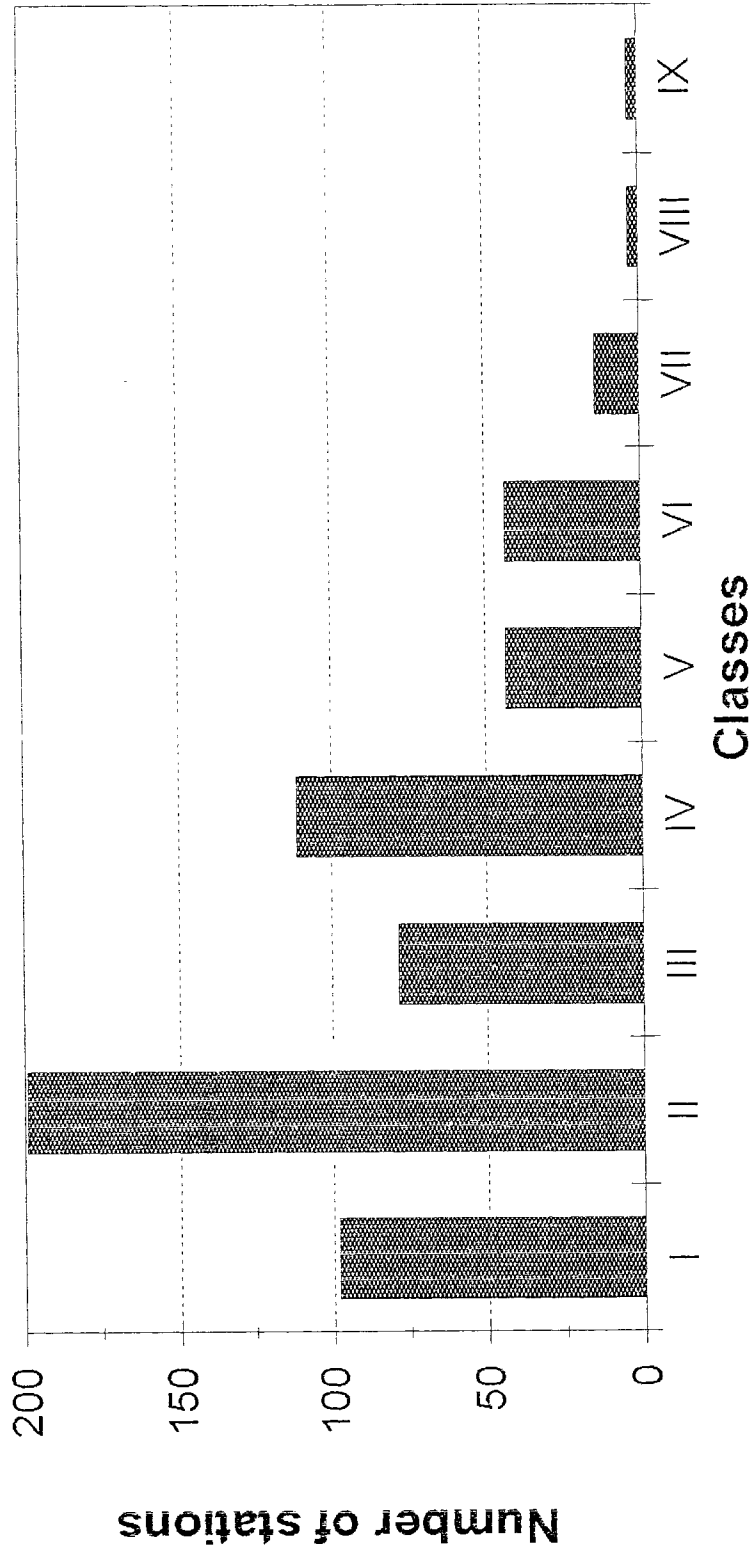


Figure 4: Size classes of GRDC-basins in Europe

STATIONS SPLITTED INTO CLASSES

WMO - REGION: NORTH AMERICA



I = 500 - 1,000 II = 1,000 - 5,000 III = 5,000 - 10,000 IV = 10,000 - 50,000 V = 50,000 - 100,000
 VI = 100,000 - 500,000 VII = 500,000 - 1,000,000 VIII = 1,000,000 - 1,500,000 IX = > 1,500,000
 all drainage-areas in km²

Figure 5: Size classes of GRDC-basins in North America

STATIONS SPLITTED INTO CLASSES

WMO - Region: SOUTH AMERICA

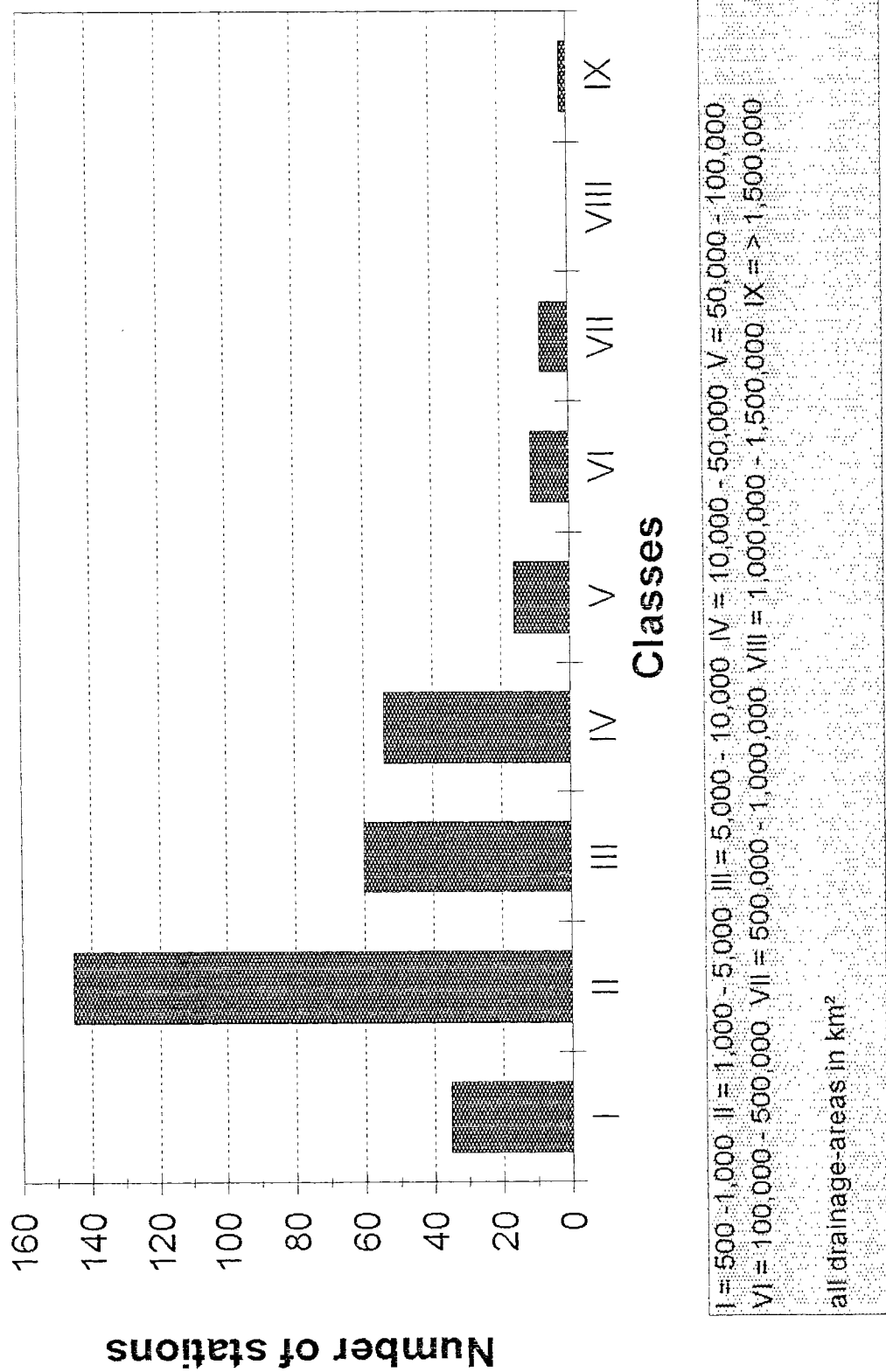
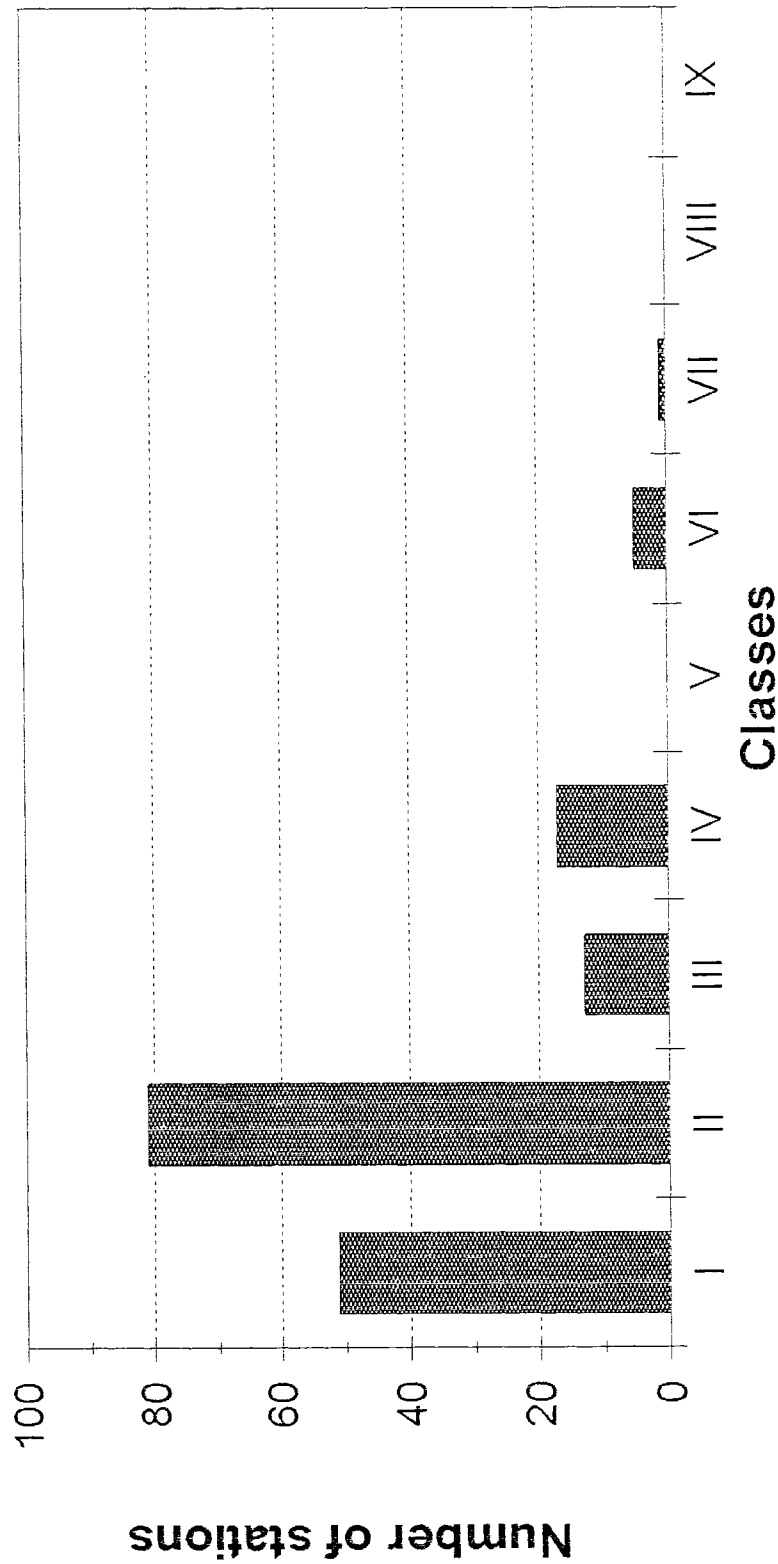


Figure 6: Size classes of GRDC-basins in South America

STATIONS SPLITTED INTO CLASSES

WMO - Region: PACIFIC



I = 500 - 1,000 II = 1,000 - 5,000 III = 5,000 - 10,000 IV = 10,000 - 50,000 V = 50,000 - 100,000
 VI = 100,000 - 500,000 VII = 500,000 - 1,000,000 VIII = 1,000,000 - 1,500,000 IX = > 1,500,000
 all drainage areas in km²

Figure 7: Size classes of GRDC-basins in the Pacific region

Annex 1

Tables of updated and new stations in the GRDC

GRDC - IMPORT

21.02.94

BENIN

Date	GRDC-Nr	River	Station	Landcode	Data		Monthly/ Daily data	Updater/ New
					from	to		
29.12.93	1733100	Queme	Pont de Beterou	BJ	04.1992	10.1992	D	U
29.12.93	1733300	Queme	Pont de Save	BJ	04.1992	10.1992	D	U
29.12.93	1713600	Queme	Bonou	BJ	04.1992	10.1992	D	U
29.12.93	1733320	Okpara	Kaboua	BJ	04.1992	10.1992	D	U
29.12.93	1733400	Zou	Dome	BJ	04.1992	10.1992	D	U
29.12.93	1733200	Zou	Atcherigbe	BJ	04.1992	10.1992	D	U

GRDC - IMPORT

DANUBE

Date	GRDC-Nr	River	Station	Landcode	Data		Monthly/ Daily data	Update/ New
					from	to		
20.01.94	6342500	Danube	Ingolstadt	DL	1931	1970	M	N
20.01.94	6342600	Danube	Regensburg	DL	1931	1970	M	N
20.01.94	6342900	Danube	Achleiten	DL	1931	1970	M	N
20.01.94	6343900	Inn	Passau-Ingling	DL	1931	1970	M	N
20.01.94	6242400	Danube	Stein-Krems	OS	1931	1970	M	N
20.01.94	6242500	Danube	Wien-Nußdorf	OS	1931	1970	M	N
20.01.94	6242100	Danube	Linz	OS	1931	1970	M	N
20.01.94	6242250	Enns	Steyr	OS	1951	1970	M	N
20.01.94	6246500	Drava	Neubrucke	OS	1951	1970	M	N
20.01.94	6246600	Mur	Landscha	OS	1951	1970	M	N
20.01.94	6542500	Danube	Pancevo	YG	1931	1970	M	N
20.01.94	6542600	Danube	Veliko Gradiste	YG	1931	1970	M	N
20.01.94	6142620	Vah	Sala	CZ	1931	1970	M	N
20.01.94	6142660	Hron	Brehy	CZ	1931	1970	M	N
20.01.94	6842200	Danube	Novo Selo	BU	1937	1970	M	N
20.01.94	6842400	Danube	Lom	BU	1941	1970	M	N
20.01.94	6842700	Danube	Svistov	BU	1931	1970	M	N
20.01.94	6842800	Danube	Ruse	BU	1931	1970	M	N
20.01.94	6842900	Danube	Silistra	BU	1941	1970	M	N
20.01.94	6842550	Iskar	Orahovica	BU	1936	1970	M	N
20.01.94	6742500	Danube	Zimnicea	RO	1931	1970	M	N
20.01.94	6742800	Danube	Vadu-Oii-Hirsova	RO	1931	1970	M	N
20.01.94	6742450	Olt	Stoenesti	RO	1950	1970	M	N
20.01.94	6742700	Siret	Lungoci	RO	1950	1970	M	N
20.01.94	6942200	Siret	Storozince	UR	1953	1970	M	N
20.01.94	6944250	Tisza	Vilok	UR	1954	1970	M	N

GRDC - IMPORT

22.02.94

DANUBE

Date	GRDC-Nr	River	Station	Landcode	Data		Monthly/ Daily data	Update/ New
					from	to		
20.01.94	6544100	Tisa	Senta	YG	1931	1970	M	U
20.01.94	6444600	Szamos	Csenger	HU	1931	1970	M	U
20.01.94	6444110	Maros	Mako	HU	1931	1970	M	U
20.01.94	6547500	Velika Morava	Lubicevsky Most	YG	1931	1970	M	U
20.01.94	6942100	Pрут	Chernovttsy	UR	1931	1970	M	U
20.01.94	6942450	Danube	Dunaalmas	HU	1948	1970	M	U
20.01.94	6942600	Danube	Mohacs	HU	1931	1970	M	U
20.01.94	6542100	Danube	Bezdan	YG	1931	1949	M	U
20.01.94	6542200	Danube	Bogojevo	YG	1931	1970	M	U
20.01.94	6142150	Morava	Moravski Jan	CZ	1931	1970	M	U
20.01.94	6142600	Ipel	Ipelsky-Solonek	CZ	1931	1970	M	U
20.01.94	6444090	Tisza	Tiszabecs	HU	1938	1958	M	U

GRDC - IMPORT

DENMARK

Date	GRDC-Nr	River	Station	Landcode	Data		Monthly/ Daily data	Update/ New
					from	to		
04.01.94	6934100	Skjern	Alegard	DN	1924	1970	M	U
04.01.94	6934500	Tryggevaelde	Lille Linde	DN	1917	1970	M	U
17.01.94	6934300	Uggerby	Asted Bro	DN	1917	1970	M	N
17.01.94	6934310	Lindholm	Elkaer Bro	DN	1918	1970	M	N
17.01.94	6934050	Arup	Arup	DN	1935	1970	M	N
17.01.94	6934150	Skive	Hagebro	DN	1965	1970	M	N
17.01.94	6934250	Gudena	Tvilumbro	DN	1917	1970	M	N
17.01.94	6934400	Arhus	Skiby	DN	1919	1970	M	N
17.01.94	6934450	Giber	Fulden	DN	1960	1970	M	N
17.01.94	6934350	Ribe	Staugager	DN	1933	1970	M	N
17.01.94	6934800	Brede	Bredebro	DN	1921	1970	M	N
17.01.94	6934850	Grona	Vindvedkanalen	DN	1959	1970	M	N
17.01.94	6934700	Odense	Ejby Molle	DN	1931	1970	M	N
17.01.94	6934530	Amose	Bromolle	DN	1920	1970	M	N
17.01.94	6934570	Ringsted	Lille Svenstrup	DN	1949	1970	M	N
17.01.94	6934571	Susa	Holluse Molle	DN	1934	1970	M	N

GRDC - IMPORT

FRANCE (CEMAGREF)

Date	GRDC-Nr	River	Station	Landcode	Data		Monthly/ Daily data	Updater/ New
					from	to		
34330	6139230	Le Jabron	Souspierre	FR	1967	1991	D	N
34330	6139240	La Glueyre	Tisonèche	FR	1960	1991	D	N
34330	6139340	La Galaure	St Uze	FR	1980	1992	D	N
34330	6139360	L'Azergues	Chatillon	FR	1970	1991	D	N
34330	6139370	La Mare	Verrines	FR	1972	1992	D	N
34330	6139380	La Coise	Nezelle	FR	1970	1992	D	N
34330	6139430	L'Ardières	Beaujeu	FR	1969	1992	D	N
34330	6139440	La Guisane	Casset	FR	1978	1992	D	N
34330	6139450	Le Guiers Mort	St Laurent du Pont	FR	1974	1990	D	N
34330	6139470	L'Albarine	St Rambert	FR	1970	1992	D	N
34330	6139640	La Reyssouze	Montagnat	FR	1967	1992	D	N
34330	6139680	L'Ognon	Fourguenons	FR	1968	1991	D	N
34330	6139700	L'Ainan	Vétraz - Monthoux	FR	1972	1988	D	N
34330	6139710	Le Rahin	Plancher Bas	FR	1968	1991	D	N
34330	6139720	La Rosemontoise	Chaux	FR	1974	1991	D	N
34330	6139800	L'Ill	Altkirch	FR	1963	1991	D	N
34330	6139810	La Thur	Viller	FR	1960	1991	D	N
34330	6139820	La Brucher	Wisches	FR	1961	1991	D	N

FRANCE (CEMAGREF)

Date	GRDC-Nr	River	Station	Landcode	Data		Monthly/ Daily data	Update/ New
					from	to		
27.12.93	6119100	Le Louet	Sombrun	FR	1968	1991	D	N
27.12.93	6122350	L'Orgeval	Theil	FR	1962	1991	D	N
27.12.93	6122400	Le Fossé Rognon	Mélarchez	FR	1974	1990	D	N
27.12.93	6123150	L'Ognon	Villeneuve les Sorinière	FR	1964	1990	D	N
27.12.93	6123550	Le Tholon	Champvaillon	FR	1968	1992	D	N
27.12.93	6123560	L'Ouanne	Toucy	FR	1969	1992	D	N
27.12.93	6123700	La Dragne	Vandenesse	FR	1968	1990	D	N
27.12.93	6125080	La Tourmente	St Denis-Prés-Martel	FR	1971	1991	D	N
27.12.93	6125150	Le Chadoulin	Allos	FR	1977	1990	D	N
27.12.93	6125160	L'Aussonelle	Seilh	FR	1968	1992	D	N
27.12.93	6125300	Le Chapouroux	Hermet	FR	1971	1992	D	N
27.12.93	6125350	La Mimente	Florac	FR	1976	1991	D	N
27.12.93	6125400	Le Gardon de St Jean	Corbes Roc Courbe	FR	1967	1991	D	N
27.12.93	6125440	Le Volp	Ste Croix Volvestre	FR	1968	1991	D	N
27.12.93	6125540	Le Dadou	St Jean de Jeanne	FR	1968	1991	D	N
27.12.93	6128050	Le Fresquet	Villepinte	FR	1971	1991	D	N
27.12.93	6128150	Le Real Collobrier	Valescure	FR	1967	1991	D	N
27.12.93	6139050	La Brillanne	Lauzon	FR	1965	1992	D	N
27.12.93	6139200	Le Verdon	Foux d'Allos	FR	1980	1991	D	N
27.12.93	6139220	Le Roubion	Soyans	FR	1965	1991	D	N

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LUXEMBOURG

Date	GRDC-Nr	River	Station	Landcode	Data		Monthly/ Daily data	Update/ New
					from	to		
30.12.93	6836100	Alzette	Ettelbruck	LX	1983	1987	D	U
17.01.94	6836190	Alzette	Esch (frontiere)	LX	1983	1987	D	N

MADAGASKAR

Date	GRDC-Nr	River	Station	Landcode	Data		Monthly/ Daily data	Update/ New
					from	to		
17 01 94	1389720	Vohitra	Rogez	MG	05.1952	12.1979	M	N
17 01 94	1389710	Ramena	Ambodimanga	MG	10.1953	11.1976	M	N
17 01 94	1389320	Menarandria	Ttanoroa	MG	11.1951	10.1983	M	N

MEKONG

Date	GRDC-Nr	River	Station	Landcode	Data		Monthly/ Daily data	Update/ New
					from	to		
11.01.94	2969078	Huai Mong	Ban Kruat	TH	04.1985	03.1986	D	U
11.01.94	2969080	Lam Choen	Ban Tha Dua	TH	01.1990	12.1990	D	U
11.01.94	2969081	Huai Rai	Ban Non Kiang	TH	01.1990	12.1990	D	U
11.01.94	2969082	Nam Chi	Ban Chot	TH	01.1990	12.1990	D	U
11.01.94	2969083	Nam Chi	Ban Kok	TH	01.1988	12.1988	D	U
11.01.94	2969087	Nam Mun	Satuk	TH	01.1985	03.1987	D	U
11.01.94	2969090	Mekong	Nong Khai	TH	01.1988	12.1990	D	U
11.01.94	2969095	Mekong	Nakhon Phanom	TH	01.1990	12.1990	D	U
11.01.94	2969096	Nam Kam	Na Kae	TH	01.1988	12.1990	D	U
11.01.94	2969100	Mekong	Mukdahan	TH	06.1987	12.1990	D	U
11.01.94	2969115	Nam Yang	Ban Na Thom	TH	01.1981	12.1990	D	U
11.01.94	2969116	Huai Khayung	Ban Huai Khayung	TH	01.1990	12.1990	D	U
11.01.94	2969123	Huai Thap Than	Ban Hauai Thap Than	TH	04.1985	12.1987	D	U
11.01.94	2969124	Nam Mun	Rasi Salai	TH	01.1990	12.1990	D	U
11.01.94	2969150	Nam Chi	Yasothon	TH	04.1987	12.1990	D	U
11.01.94	2969200	Nam Mun	Ubon	TH	06.1987	12.1990	D	U
11.01.94	2969210	Lam Dom Yai	Ban Fang Phe	TH	01.1990	12.1990	D	U
11.01.94	2969220	Nam Mun	Kaeng Sapu Tai	TH	01.1990	12.1990	D	U

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MEKONG

Date	GRDC-Nr	River	Station	Landcode	Data		Monthly/ Daily data	Update/ New
					from	to		
11.01.94	2369800	Dak Bla	Kontum	VS	01.1990	12.1990	D	U
11.01.94	2369900	Ea Krong	Cau-14	VS	01.1990	12.1990	D	U
11.01.94	2469049	Nam Khan	Ban Mixai	LA	01.1988	12.1989	D	U
11.01.94	2469050	Mekong	Luang Prabang	LA	01.1988	12.1990	D	U
11.01.94	2469055	Nam Lik	Ban Hin Heup	LA	01.1988	12.1990	D	U
11.01.94	2469058	Nam Gnum	Ban Pak Kanhoung	LA	01.1990	12.1990	D	U
11.01.94	2469060	Nam Ou	Muong Ngoy	LA	01.1988	12.1990	D	U
11.01.94	2469072	Mekong	Vientianne	LA	01.1988	12.1990	D	U
11.01.94	2469092	Se Bang Fai	Mahaxai	LA	01.1990	12.1990	D	U
11.01.94	2469098	Se Bang Fai	Se Bang Fai	LA	04.1985	08.1985	D	U
11.01.94	2469110	Se Champhone	Kengkok	LA	01.1990	12.1990	D	U
11.01.94	2469111	Nam Theun	Ban Signo	LA	01.1990	12.1990	D	U
11.01.94	2469120	Se Ban Hieng	Ban Keng Done	LA	06.1990	12.1990	D	U
11.01.94	2469260	Mekong	Pakse	LA	01.1990	12.1990	D	U
11.01.94	2469265	Se Done	Souvanna Khili	LA	01.1990	12.1990	D	U
11.01.94	2469300	Se Kong	Attopeu	LA	01.1990	12.1990	D	U
11.01.94	2969009	Nam Mae Fang	Ban Tha Mai Liam	TH	01.1988	12.1989	D	U
11.01.94	2969010	Mekong	Chiang Saen	TH	05.1987	12.1990	D	U
11.01.94	2969011	Nam Mae Kok	Ban Tha Ton	TH	01.1988	12.1990	D	U
11.01.94	2969028	Nam Mae Pum	Bna Mae Chai	TH	01.1980	03.1982	D	U
11.01.94	2969029	Nam Mae Lao	Ban Tha Sai	TH	01.1989	12.1990	D	U
11.01.94	2969030	Nam Mae Ing	Thoeng	TH	01.1989	12.1990	D	U
11.01.94	2969069	Nam Heung	Ban Pak Huai	TH	01.1988	12.1990	D	U
11.01.94	2969076	Nam Pong	Si Chomphu	TH	01.1990	12.1990	D	U
11.01.94	2969077	Huai Luang	Ban Tha Tum	TH	01.1985	03.1987	D	U

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NEPAL

Date	GRDC-Nr	River	Station	Landcode	Data		Monthly/ Daily data	Updater/ New
					from	to		
04.01.94	2549230	Chepe Khola	Garam Besi	NE	1987	1992	D	U
04.01.94	2549240	Andhi Khola	Dumrichaur Andhimuhan	NE	1989	1989	D	U
04.01.94	2550120	Balephi Khola	Jalbire	NE	1989	1990	D	U
04.01.94	2549210	Rapti River	Rajaiya	NE	1989	1990	D	U
20.01.94	2549250	Marsyangdi	Bimal Nagbar	NE	1989	1990	D	N
20.01.94	2548400	Karnali	Chaspapani	NE	1989	1990	D	N

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NIGER

Date	GRDC-Nr	River	Station	Landcode	Data		Monthly/ Daily data	Update/ New
					from	to		
04.01.94	1234090	Niger	Kandaji	NR	1985	1988	D	U
04.01.94	1234700	Goulbi de Maradi	Nielloua	NR	1985	1988	D	U
04.01.94	1234100	Dargol	Tera	NR	1985	1988	D	U
04.01.94	1234500	Maggia	Tsernaouga	NR	1985	1988	D	U
04.01.94	1234200	Tapoa	Campement Du Double Ve	NR	1985	1988	D	U
04.01.94	1234050	Garouol	Dolbel	NR	1985	1988	D	U
04.01.94	1234180	Goroubi	Diongore	NR	1985	1988	D	U
04.01.94	1234550	Kori Badeguicheri	Badeguicheri	NR	1985	1988	D	U
04.01.94	1234080	Goroul	Alcongou	NR	1985	1988	D	U
04.01.94	1234130	Sirba	Garbe Kourou	NR	1985	1988	D	U
04.01.94	1234650	Goulbi De Maradai	Guidam Roundji	NR	1985	1988	D	U
04.01.94	1234120	Dargol	Kakassi	NR	1985	1988	D	U

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RUSSIAN FEDERATION

Date	GRDC-Nr	River	Station	Landcode	Data		Monthly/ Daily data	Update/ New
					from	to		
18.11.93	6975140	Oka	Kaluga	RS	1881	1985	M	U
18.11.93	6976450	Belaya	Ufa	RS	1878	1985	M	U
18.11.93	6979600	Desna	Chemigov	RS	1884	1985	M	U

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SENEGAL

Date	GRDC-Nr	River	Station	Landcode	Data		Monthly/ Daily data	Update/ New
					from	to		
30.12.93	1812500	Senegal	Bakel	SG	1988	1989	D	U
30.12.93	1812600	Faleme	Kidara	SG	1988	1989	D	U
30.12.93	1813780	Gambie	Kedougou	SG	1988	1989	D	U
30.12.93	1813700	Gambie	Mako	SG	1988	1989	D	U
30.12.93	1813500	Gambie	Simenti	SG	1988	1989	D	U
30.12.93	1813460	Gambie	Wassadou Amont	SG	1988	1989	D	U
30.12.93	1813450	Gambie	Wassadou Aval	SG	1988	1989	D	U
30.12.93	1813200	Gambie	Gouloumbou	SG	1988	1989	D	U
30.12.93	1813800	Diaguéri	Pont Routier	SG	1988	1989	D	U
30.12.93	1813350	Sadouyou	Sinthiou Maleme	SG	1988	1989	D	U
30.12.93	1813750	Sili	Pont Routier	SG	1988	1989	D	U
30.12.93	1813650	Thiokoye	Pont Routier	SG	1988	1989	D	U

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UNGARN

Date	GRDC-Nr	River	Station	Landcode	Data		Monthly/ Daily data	Update/ New
					from	to		
07.01.94	6444380	Sajo	Felseozolca	HU	1931	1990	D	U
07.01.94	6442500	Danube (Duna)	Nagymaros	HU	1931	1990	D	U
07.01.94	6444100	Tisza	Szeged	HU	1931	1990	D	U
07.01.94	6442050	Raba	Szentgotthard	HU	1988	1989	D	U
07.01.94	6442200	Marcal	Rabaszentmiklos	HU	1988	1989	D	U
07.01.94	6442300	Kapos	Kurd	HU	1988	1989	D	U
07.01.94	6444310	Tisza	Tiszapalkonya	HU	1988	1989	D	U
07.01.94	6444200	Tisza	Szolnok	HU	1988	1989	D	U
07.01.94	6444500	Kraszna	Agerdomajor	HU	1988	1989	D	U
07.01.94	6444350	Bodva	Szendro	HU	1988	1989	D	U
07.01.94	6444250	Zagyva	Jasztelek	HU	1988	1989	D	U
07.01.94	6444400	Fehér-Körös	Gyula	HU	1988	1989	D	U
20.01.94	6444600	Szamos	Csenger	HU	1931	1990	D	N
20.01.94	6442450	Duna	Dunaalmas	HU	1948	1990	D	N
20.01.94	6444110	Maros	Mako	HU	1931	1990	D	N
20.01.94	6442600	Duna	Mohacs	HU	1931	1990	D	N
20.01.94	6444090	Tisza	Tiszabecs	HU	1938	1958	D	N

UNITED KINGDOM

Date	GRDC-Nr	River	Station	Landcode	Data		Monthly/ Daily data	Update/ New
					from	to		
30.12.93	6604610	Tay	Ballathie	UK	01.1991	12.1991	D	U
30.12.93	6604800	Dee	Woodend	UK	01.1991	12.1991	D	U
30.12.93	6604650	Spey	Boat O Brig	UK	01.1991	12.1991	D	U
30.12.93	6605550	Wharfe	Flint Mill Weir	UK	01.1991	12.1991	D	U
30.12.93	6605600	Trent	Colwick	UK	01.1991	12.1991	D	U
30.12.93	6606300	Ise Brook	Harrowden Old Mill	UK	01.1991	12.1991	D	U
30.12.93	6606400	Bedford Ouse	Bedford	UK	01.1991	12.1991	D	U
30.12.93	6606900	Waveney	Needham Mill	UK	01.1991	12.1991	D	U
30.12.93	6606850	Stour	Langham	UK	01.1991	12.1991	D	U
30.12.93	6607200	Exe	Thorverton	UK	01.1991	12.1991	D	U
30.12.93	6607150	Taw	Umberleigh	UK	01.1991	12.1991	D	U
30.12.94	6603500	Lagan	Newforge	UK	01.1991	12.1991	M	U
30.12.93	6609500	Severn	Bewdley	UK	01.1991	12.1991	D	U
30.12.93	6608500	Wye	Ddoi Farm	UK	01.1991	12.1991	D	U
03.01.94	6605540	Wharfe	Addingham	UK	01.1991	12.1991	M	U
03.01.94	6607500	Stour	Throop Mill	UK	01.1991	12.1991	M	U
03.01.94	6604500	Annan	Brydekirk	UK	01.1991	12.1991	M	U
03.01.94	6604100	Ewe	Poolwee	UK	01.1991	01.1991	M	U

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URUGUAY

Date	GRDC-Nr	River	Station	Landcode	Data		Monthly/ Daily data	Updater/ New
					from	to		
29.12.93		Rio Uruguay	Salto	UY	01.1991	12.1991	D	U

Annex 2

Country requests for data supply to the GRDC

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Egypt

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Direction Nationale de l'Hydraulique
et de l'Energie (DNHE)
B.P. 66
Bamako
Mali

Mr. S. N. SOK APPADU
Mauritius Meteorological Service
Vacoas

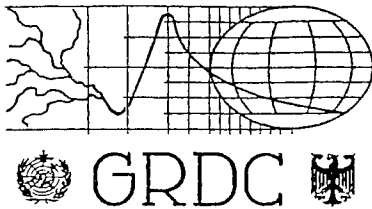
Iles Maurice

Mr. A. BENCHERQI
Administration de l'Hydraulique
Direction de la Recherche et de la
Planification de l'eau
Rue Hassan Ben Chekroun
Agdal-Rabat

Maroc

Annex 3

Extraction of GRDC catalogue



Global Runoff Data Centre
 Bundesanstalt für Gewässerkunde
 Kaiserin-Augusta-Anlagen 15-17
 56068 Koblenz
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Tel. National (0261)1306-0
 International +49 261 1306-0
 Telex 8-62499
 Telefax +49 261 1306280

GRDC operates with the support of the Federal Republic of Germany under the auspices of WMO

GLOBAL RUNOFF DATA CENTRE (GRDC)

I. Africa

01 Medjerda											
1201100	Medjerda	Ghardimaou	TS	3627N	843E	1480	1	1976	12	1979	M 1
1201150	Mellegue	K13	TS	3612N	850E	9000	1	1976	12	1979	M 1
1201500	Medjerda	Sloughia	TS	3658N	952E	20895	1	1976	12	1979	M 1
02 Chott Melhir, Chott Rharsa											
03 Chott Djerid											
04 Mediterranean Sea Coast (Western Part)											
1104150	Cheliff	Sidi Belatar	AL	3602N	027E	43750	1	1976	8	1978	M 1
1104200	Mina	Oued El-Abtal	AL	3550N	068E	6635	1	1976	8	1978	M 1
1104300	Rhiou	Ammi Moussa	AL	3587N	112E	2398	1	1976	12	1979	M 1
1104450	Mazafran	Fer a Cheval	AL	3667N	282E	1912	1	1976	8	1979	M 1
1104480	Boudouaou	Keddara	AL	3665N	342E	829	1	1976	8	1979	M 1
1104500	Isser	Lakhdaria	AL	3662N	358E	4149	1	1976	8	1979	M 1
1104530	Sebaou	Baghlia	AL	3680N	387E	2501	1	1976	12	1979	M 1
1104600	Bouselam	Sidi Yahia	AL	3642N	460E	4309	1	1976	8	1978	M 1
1104700	Rhumel	Oued Athmania	AL	3623N	630E	1220	1	1976	8	1978	M 1
1104800	Melah	Bouchevouf	AL	3645N	772E	552	1	1976	8	1978	M 1
1204900	Joumine	Djebel Antra	TS	3695N	947E	235	1	1976	12	1979	M 1
1304100	Emsa	Emsa	MC	3552N	530W	110	4	1971	2	1988	D 1
1304800	Kert	Dar Driouch	MC	3490N	329W	1353	6	1969	9	1987	D 1

A B C D E F G H I J K

COMMENT:

- A = GRDC-Code
- B = Name of river
- C = Name of station
- D = Code of country
- E = Latitude
- F = Longitude
- G = Catchment area in km²
- H = first available record in database
- I = last available record in database
- J = Daily/Monthly data
- K = Code of measurement (1 = runoff in m³/s)

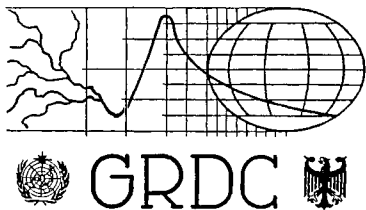
GRDC-Code (for example 1304800):

- 1 = WMO-Region (1 = Africa)
- 3 = GRDC-Country code (3 = Morocco)
- 04 = GRDC-Subregion; main river basin (04 = Mediterranean Sea Coast)
- 800 = GRDC-Station code

Annex 3: Extraction of Global Runoff Data Centre-Catalogue.

Annex 4

Example of mean daily flow data



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A	B	C DE
CHINDWIN	HKAMTI	
334.00324.00320.00305.00296.00292.00288.00276.00268.00264.00		1 11978
264.00256.00252.00248.00248.00244.00244.00240.00236.00236.00		2 11978
240.00240.00240.00232.00224.00216.00212.00208.00204.00200.00196.00		3 11978
196.00196.00192.00192.00192.00188.00184.00184.00184.00184.00		1 21978
180.00180.00176.00176.00168.00168.00164.00164.00160.00164.00		2 21978
168.00172.00168.00164.00164.00164.00160.00160.00		3 21978
152.00148.00144.00140.00136.00140.00140.00136.00148.00148.00		1 31978
156.00148.00140.00136.00124.00124.00120.00120.00112.00112.00		2 31978
108.00108.00104.00104.00099.00099.00097.00097.00096.00096.00097.000		3 31978

COMMENT:

- A = Name of river
- B = Name of station
- C = Number of row (there are always 3 rows per month)
- D = Month
- E = Year

Data rows:

Each data row has a length of 80 characters, where the year, month and number of row are right-bound. There are always three rows per month. The first 2 rows contain 10 flow-values; the third will differ from 8 to 11 values, depending on the count of days per month. Each value consists of 6 characters. Missing values will be marked with "9999."

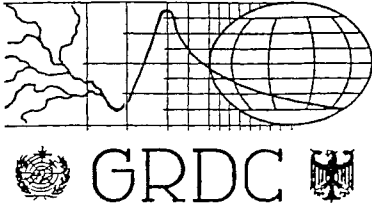
Example:

February 23rd, 1978 = 164.00

Annex 4: Example of mean daily flow data

Annex 5

Example of mean monthly flow data



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A
 AMAZONAS
 C D

B
 OBIDOS

192811100013800018100020600021700021400019800016900011700085300.85500.90200.
 192910400012800014200018200020900021500019900017200013700090900.80100.93900.
 193011400014400017100019400020400020100019200017400013800010100089800.93500.
 193111000013300016300019000020100019400017400014000097600.81500.86400.94000.
 193211900016200018800020500021100020800019600017000013100093500.85800.93000.
 193311100014000016600018900020800020700020000016800010700076900.80500.91400.
 1934110000146000182000202000220000216000210000183000149000119000118000129000.
 193514300016000018000020300022100021600019700016700012900091200.75700.79800.
 193610500014200016200017600019300018100016200013500091900.87100.81900.82300.

COMMENT:

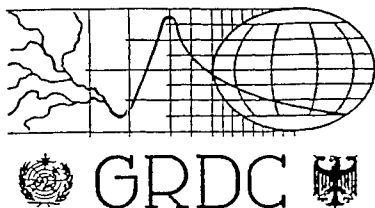
- A = Name of river (= 40 characters)
- B = Name of station (= 30 characters)
- C = Year
- D = data (January - December)

Each value = 6 characters
 The values are in m³/s.
 Missing values = 9999.

Annex 5: Example of mean monthly flow data.

Annex 6

List of country codes



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AB	Albania	HU	Hungary	PF	French Polynesia
AD	Azerbeidzhan	HV	Burkina Faso	PH	Philippines
AG	Argentina	IE	Ireland	PK	Pakistan
AH	Afghanistan	IL	Iceland	PL	Poland
AL	Algeria	IN	India	PM	Panama
AU	Australia	IQ	Iraq	PO	Portugal
AX	Armenia	IR	Iran	PR	Peru
BJ	Benin	IS	Israel	PU	Puerto Rico
BM	Myanmar	IV	Cote d'Ivoire	PY	Paraguay
BO	Bolivia	IY	Italy	RE	France (Reunion)
BU	Bulgaria	JD	Jordan	RO	Romania
BW	Bangladesh	JM	Jamaica	RS	Russian Federation
BX	Belgium	JP	Japan	RW	Rwanda
BY	Byelorussia	KA	Micronesia	SB	Sri Lanka
BZ	Brazil	KG	Kirghistan	SG	Senegal
CD	Chad	KN	Kenya	SH	American Samoa
CE	Central African Rep.	KO	Rep. Korea	SI	Somalia
CG	Congo	KR	Dem. Peopl. Rep. Korea	SL	Sierra Leone
CH	Chile	KZ	Kazakhstan	SM	Suriname
CI	China	LA	Laos	SN	Sweden
CM	Cameroon	LI	Liberia	SP	Spain
CN	Canada	LS	Lesotho	SR	Singapore
CO	Columbia	LT	Lithuania	SU	Sudan
CS	Costa Rica	LV	Latvia	SV	Swaziland
CU	Cuba	LX	Luxembourg	SW	Switzerland
CY	Cyprus	LY	Libya	SY	Syria
CZ	Czech Republic	MA	Mauritius	TA	Tadzhikistan
DJ	Djibouti	MC	Morocco	TG	Togo
DL	Germany	MF	France (Guadeloupe)	TH	Thailand
DN	Denmark	MG	Madagascar	TN	Tanzania
DR	Dominican Republik	MI	Mali	TR	Turkmenistan
EG	Egypt	MK	Moldavia	TS	Tunesia
EO	Estonia	MO	Mongolia	TU	Turkey
EQ	Ecuador	MR	France (Martinique)	TW	Taiwan
ES	El Salvador	MS	Malaysia	UG	Uganda
ET	Ethiopia	MT	Mauretania	UK	United Kingdom
FG	French Guiana	MW	Malawi	UR	Ukraine
FI	Finland	MX	Mexico	US	U. S. A.
FJ	Fiji	MZ	Mozambique	UY	Uruguay
FR	France	NC	New Caledonia	UZ	Uzbekistan
GG	Georgia	NG	Papua New Guinea	VN	Venezuela
GH	Ghana	NI	Nigeria	VS	Vietnam
GM	Guam	NK	Nicaragua	YG	Yugoslavia
GN	Guinea	NL	Netherlands	ZA	South Africa
GO	Gabon	NO	Norway	ZB	Zambia
GR	Greece	NP	Nepal	ZR	Zaire
GU	Guatemala	NR	Niger	ZW	Zimbabwe
GY	Guyana	NZ	New Zealand		
HK	Hongkong	OS	Austria		
HO	Honduras	PB	Palau		

Annex 6: List of Country Codes

Reference of GRDC-Reports

- Report No. 1** Second Workshop on the Global Runoff Data Centre, Koblenz,
May 1993 Germany, 15 - 17 June, 1992.
- Report No. 2** Dokumentation bestehender Algorithmen zur Übertragung von
May 1993 von Abflußwerten auf Gitternetze.(Incl.abstract in English by
GRDC: Documentation of existing algorithms for
transformation of runoff data to grid cells).
G.C. Wollenweber
- Report No. 3** GRDC - Status Report 1992.
June 1993
- Report No. 4** GRDC -Status Report 1993
June 1994