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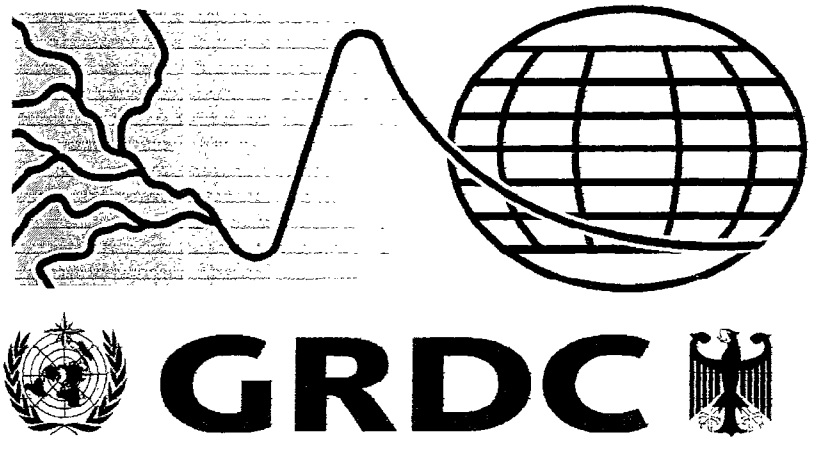
Bundesanstalt für Gewässerkunde
Koblenz, Deutschland

Global Runoff Data Centre
Federal Institute of Hydrology
Koblenz, Germany

Report No. 12

Second Interim Report on the Arctic River Database for the Arctic Climate System Study (ACSYS)



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CONTENTS

Figures, Tables and Maps of the Report

1. Introduction

1.1 This report is the Second Interim Report on the Arctic River Database (ARDB) for the Arctic Climate System Study (ACSYS). The report reflects the status of available data in the Global Runoff Data Centre (GRDC). With the submission of the Second Interim Report, the GRDC continues its contribution to ACSYS.

1.2 The call of the GRDC for the contribution of data for the ARDB had a satisfying response and the contribution of the data is documented at the end of the report. The priority task is now to produce complete time series for selected stations. This is necessary to obtain a homogenous set of time series for comparative flux calculations. The figures with the overlapping time-series of ACSYS stations amply demonstrate this necessity.

1.3 Once this homogenous time-series data set has been assembled, the task of the build up of the initial ARDB has been accomplished. It is envisaged, that the basic ARDB can be finalized within the next 12 months. The continuation of update services of ACSYS participants will then be instrumental for the long-term monitoring of freshwater fluxes into the Arctic ocean.

1.4 The compilation of data for this report allows the calculation of river freshwater fluxes into the Arctic Ocean. The results are satisfying in that the bandwidth for estimation errors for freshwater fluxes into the Arctic ocean is now considerably lower and the flux computations seem to be realistic on the basis of available data. As is shown in the report, a limited number of river gauging stations close to the mouth of these rivers into the Arctic Ocean seems to be sufficient to obtain reliable flux calculations.

2. Proposed Extension of the Rational for the Establishment of the ARDB

2.1 In accordance with the Initial Implementation Plan for ACSYS (WCRP, 1994), the specific objectives of the ACSYS hydrological programme have been stated in the First Interim Report (GRDC, 1995). From the viewpoint of the GRDC, the potential monitoring capability of the ACSYS station network should be strengthend both, conceptually and technically.

2.2 Appropriate links could be established with the Continental Scale Experiments (CSE`s) of GEWEX, GCOS and GTOS and on an operational, near real-time basis with the World Hydrological Cycle Observing System (WHYCOS) which is being implemented in several regions in a collaborative effort of WMO, the World Bank and national hydrological services.

2.3 Paraphrasing the objectives of the ACSYS ARDB, the envisaged monitoring capacity sustains the provision of observational data for the assessment of possible long-term trends of the components of the fresh water balance in the Arctic region under changing climate conditions. It also supports near real-time modeling of the hydrological cycle under specific Arctic climate conditions, using refined macro-scale hydrological models adapted to the specific environmental conditions of the Arctic.

3. Implementation of the ARDB

3.1 No substantial changes have been made in the implementation format and data compilation routine as compared to the First Interim Report. An addition to the previous catalog format is the inclusion of the percentage of missing data in the time-series for each station.

3.2 The development of the database increased from 15 stations as stated in the ACSYS-Science Plan (WCRP, 1992) and 182 stations included in the First Interim Report to currently 235 stations including the hinterland stations. Out of the previous 182 stations, 17 stations have been updated while 53 stations (29%) are new in the database. 35 stations close to the mouth of the rivers have been used for the calculation of freshwater flux into the Arctic Ocean. The inclusion of the Mackenzie river with its Arctic Red River station is of special value.

3.3 The exchange of freshwater between the Arctic Ocean and the Pacific and the Atlantic Ocean couples the atmospheric and oceanic branches of the global hydrological cycle (Tsing-Chan Chen et al.; 1996). The Yukon river is the single most important freshwater provider to the Bering Strait waters in addition to the Kobuk and Noatak rivers. Therefore, the Yukon river has now been included into the ARDB although it does not discharge into the Arctic Ocean in a strict sense. The Kobuk river is not yet included into the ARDB while the Noatak river is included but reports for a short time series of 6 years 46% of missing daily data.

4. Data quality

4.1 No changes have been made in data quality checks. All data are published in national hydrological yearbooks and their quality is assessed as good - satisfactory. Considering the quality of hydrological measurements by the hydrological services of the countries contributing to the ACSYS project it is assumed that the time-series of the data from different sources are of comparable accuracy.

4.2 The concept of "error bars" is difficult to apply for hydrological records when the complete station history including rating curves are not available. A general assessment has been made in the First Interim Report about the possible scale of errors (15% for hinterland stations and up to 30 % for coastal stations). These figures can at present not be substantiated and in chapter 7 below, a suggestion to remedy this situation is made. The determination of the variability of discharges from selected stations has a much higher practical value to calculate the seasonal and interannual variability of freshwater flux into the Arctic Ocean.

4.3 The data plausibility tool which is now available at the GRDC will be used to check the data of selected gauging stations near the mouth of rivers into the Arctic Ocean. Some of the newly obtained data are from small rivers and some time-series like that for important rivers such as the Noatak river and a station (Stolb) closest to the mouth of the Lena river have time series of insufficient length (e.g. 6 years only for the Noatak and 9 years for the Lena at Stolb). In the case of the Lena river, the station further inland (Kusur) with 55 years of record has been maintained for flux calculations. Rivers with very small drainage basins such as the Trail Valley Creek near Inuvit (68km^2) have not been considered in the flux calculations.

5. Calculation of Freshwater Fluxes into the Arctic Ocean

5.1 The database is now comprehensive enough to allow the calculation of the freshwater flux from rivers into the Arctic Ocean. A final calculation will be done after the complete compilation of the ARDB. The following table shows the comparison of flux calculations from stations close to mouth of rivers from the First Interim Report and this report.

Variables	First Interim Report (20 stations)	Second Interim Report (35 stations)	12 largest rivers by area of the region
GRDC-basin area (km^2)	11.212.741	12.867.876	12.298.388
Runoff (mm/year)	195	202	189
Volume (km^3/year)	110	74	194
Volume-Sum (km^3/year)	2.191	2.600	2323

Table 1 Calculation of freshwater fluxes into the Arctic Ocean

5.2 It can be seen that the total drainage basin area has increased by 13%. The runoff has increased 7 mm/year. Most notable is the sharp decrease in mean annual volume of discharge into the Arctic Ocean. The newly added rivers and stations contribute a relatively small amount of freshwater and hence the average volume of discharge is getting less. For the actual computation of freshwater fluxes, the mean flux per year as average from all stations has only a limited significance.

5.3 In line with expectation, the Volume-Sum of discharge - which sums up the mean annual discharge volume from a discrete number of stations for their entire available time-series - rises from 2.191 km^3/year for 20 stations to 2.600 km^3/year for 35 stations.

5.4 For comparison, the numbers are also given for the 12 largest rivers (by area) draining into the Arctic Ocean: It is apparent that the Volume-Sum for the 35 largest rivers is 16% higher than for the Volume-Sum number given in Interim Report No. 1 mainly due to updated time-series and therefore longer records.

5.5 In Figure 1, the rivers have been ranked according to the size of their drainage basins (with reference to the location of the gauging stations) and the cumulated Volume-Sum discharge is plotted for all 35 stations near the mouth of the rivers into the Arctic Ocean.

In comparison with the volume of discharge reported by Aagaard and Carmack (1989) the Volume-Sum of discharge from GRDC-data corresponds well. For comparison, the cumulated runoff has also been plotted in the graph.

5.6 It is apparent that for practical reasons the number of stations required to assess and monitor the riverine freshwater flux into the Arctic Ocean can be limited: The curves show for both, cumulated runoff and Volume-Sum of discharge, that the increasing number of stations does not increase the information yield for flux calculations into the Arctic Ocean. For practical purposes, 24 gauging stations of the 24 largest rivers (ranked by area) would suffice to obtain reliable freshwater flux estimates. The total catchment then amounts to 12.671.131 km^2 which is only 1.5 % less than the catchment for the 35 rivers for which the flux has been calculated. The stations after rank 24 have basin sizes of less than 7.000km^2. In Table 5 these stations have been identified.

5.7 It is proposed that the ACSYS Steering Committee decides to adopt these stations as principal observing stations to monitor river freshwater fluxes into the Arctic Ocean. The "owners" of these stations should be requested to supply detailed station information and - wherever feasible - near real-time discharge data to the GRDC for the inclusion in the ARDB. Where the technical and/or institutional capacity is not sufficient, the deficiencies should be documented in a detailed report and actions deliberated to remedy the situation.

6. Data Products for ACSYS

6.1 GRDC expects that ACSYS defines standard data products as input for further data analysis and hydrological modelling by ACSYS participants. Specific data products such as graphs and data files of the flow variability of selected rivers can be created on request. Recently, the GRDC has been able to offer two more standard products, namely flow duration curves and box-plots.

6.2 Examples for both graphical products are displayed in Figures 2 and 3 for the Lena river at Kusur. The flow duration curve shows the number of days of subceedance of a given discharge for mean, maximum and minimum discharge conditions. The box-plots indicate the maximum, median and minimum discharges and the 90th, 75th, 25th and 10th percentiles of the time series as average for every month of the available time-series (see Figure 4). These

products demonstrate the magnitude of variation of discharges.

6.3 However, the GRDC wishes to define statistical indicators of annual and inter-seasonal variability. External support both - in terms of expertise and manpower - is sought to accomplish this task. Major issues in this respect are the lag-times of water in river basins due to lakes, groundwater storage and frost action in winter seasons and the possible periodicity of flow events in addition to its variability.

7. Presentation of the ARDB Update

7.1 The rational for including hinterland stations and the problems associated with stations close to the mouth in the Arctic region have been discussed in the First Interim Report. This issue has been recognized by the GEWEX Scientific Steering Committee, 1996 and the formulation of a discharge measuring programme for coastal stations with a view to obtain an idea of the error bandwidth of observations has been proposed in close collaboration between the ACSYS-SSG and the GRDC.

7.2 The following Table 2 of overlapping time-series of GRDC-ACSYS stations demonstrate that for Asia fairly homogenous time series for most rivers exist between about 1976-78 and 1984-87. However, very few stations reported data up to 1990-91. For North America, the situation is different with hardly a homogenous block of stations except rivers in the second half of part two of North American overlapping stations.

7.3 However, many stations report data up to 1990. Europe shows a solid block of homogenous time-series for a larger number of rivers from about 1978 to 1988. In comparison with the First Interim Report, the situation of stations with overlapping time-series has improved but is still not satisfying especially with regard to the short duration of overlapping time-periods of only about 10 years.

7.4 The catalog tables (Table 4) show that most time series are complete with few or no missing values. Though especially for North America many stations with daily discharge data have been reported it is still thought that an archive of mainly mean daily discharge data cannot be built up for the purposes of ACSYS.

8. Access to the ARDB

8.1 The database, tables and graphics documented in this report are in principal ready for distribution through GRDC on diskettes. There is a demand for these data from a number of researchers in climate and Arctic Ocean studies. In the past, the GRDC has been keen to link individual researchers with the ACSYS project management to use synergistic effects of researchers working in the same field and region.

8.2 As the ARDB is nearing completion the ACSYS Science Steering Group should define user rights for the access to the *entire* ARDB in accordance with GRDC's data dissemination policy endorsed by the Steering Committee of the GRDC on its 2nd session in Koblenz, June 1995. This Policy Guideline is attached to this report as annex 1.

9. Outlook

9.1 ACSYS can play an important role in GEWEX because its subject matters overlap significantly. According to Curry (1996), the Arctic Ocean is a global heat sink which moderates the planetary albedo (this is part of the Energy content of GEWEX) and it influences the thermohaline circulation through the export of fresh water (this is the Water issue of GEWEX). To utilize the synergy effects between the different programmes, ACSYS should consider a closer cooperation with GEWEX and in particular the Mackenzie (MAGS) and BALTEX projects within GEWEX.

9.2 The seasonal and interannual variability of freshwater flux into the Arctic Ocean is of particular interest to quantify the flux of cold, low-saline arctic water into the Pacific. Therefore, more rivers which drain into the Bering Strait like the Noatak and Kobuk rivers should be added to the ARDB.

9.3 Considering the difficulties to obtain data from the territory of the former Soviet Union for years subsequent to 1990, the compilation of a data set with a reference period 1970 - 1990 should be attempted. For several large rivers with long-term data series however, it is possible to perform comparative statistical analysis to obtain a clue as to the variability of the hydrological behaviour and changes in the water balance of selected rivers draining into the Arctic Ocean.

However, a statistical indicator to quantify flux variability and anomalies has not yet agreed upon. The ACSYS SSG is therefore asked to provide guidance in this matter.

9.4 In view of the identified representative stations above, the proposal is made to recognize this station network for the monitoring of freshwater fluxes into the Arctic Ocean.

9.5 To quantify discharges and obtain an idea of measurement errors, a discharge measuring programme at the mouth of large rivers draining into the Arctic Ocean should be discussed.

10. References

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GLOBAL RUNOFF DATA CENTRE (GRDC)

Cumulated discharge and runoff of 35 Stations from GRDC in comparison with volumesum of 9 stations from Aagaard and Carmack

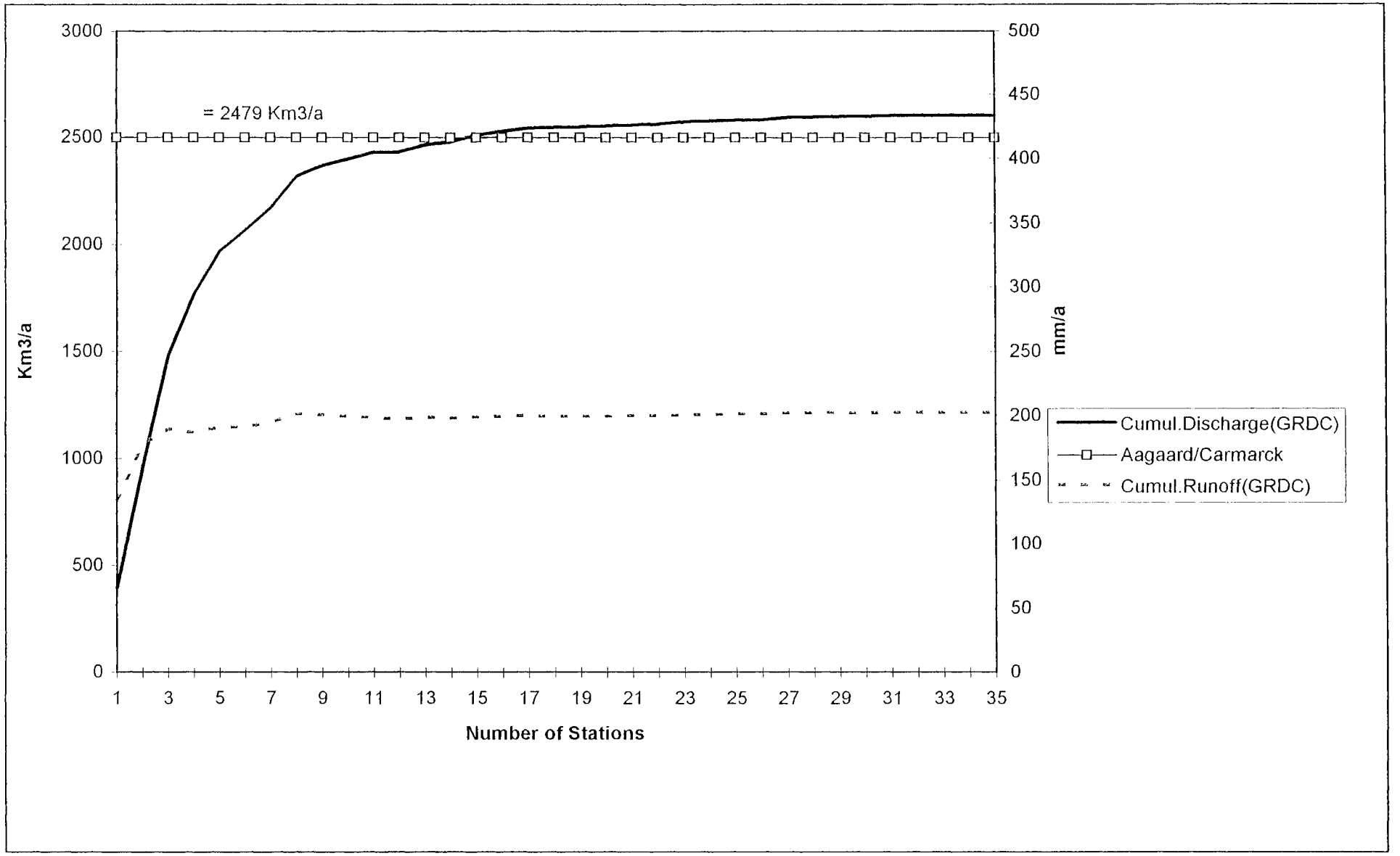


Figure :1

GLOBAL RUNOFF DATA CENTRE (GRDC)

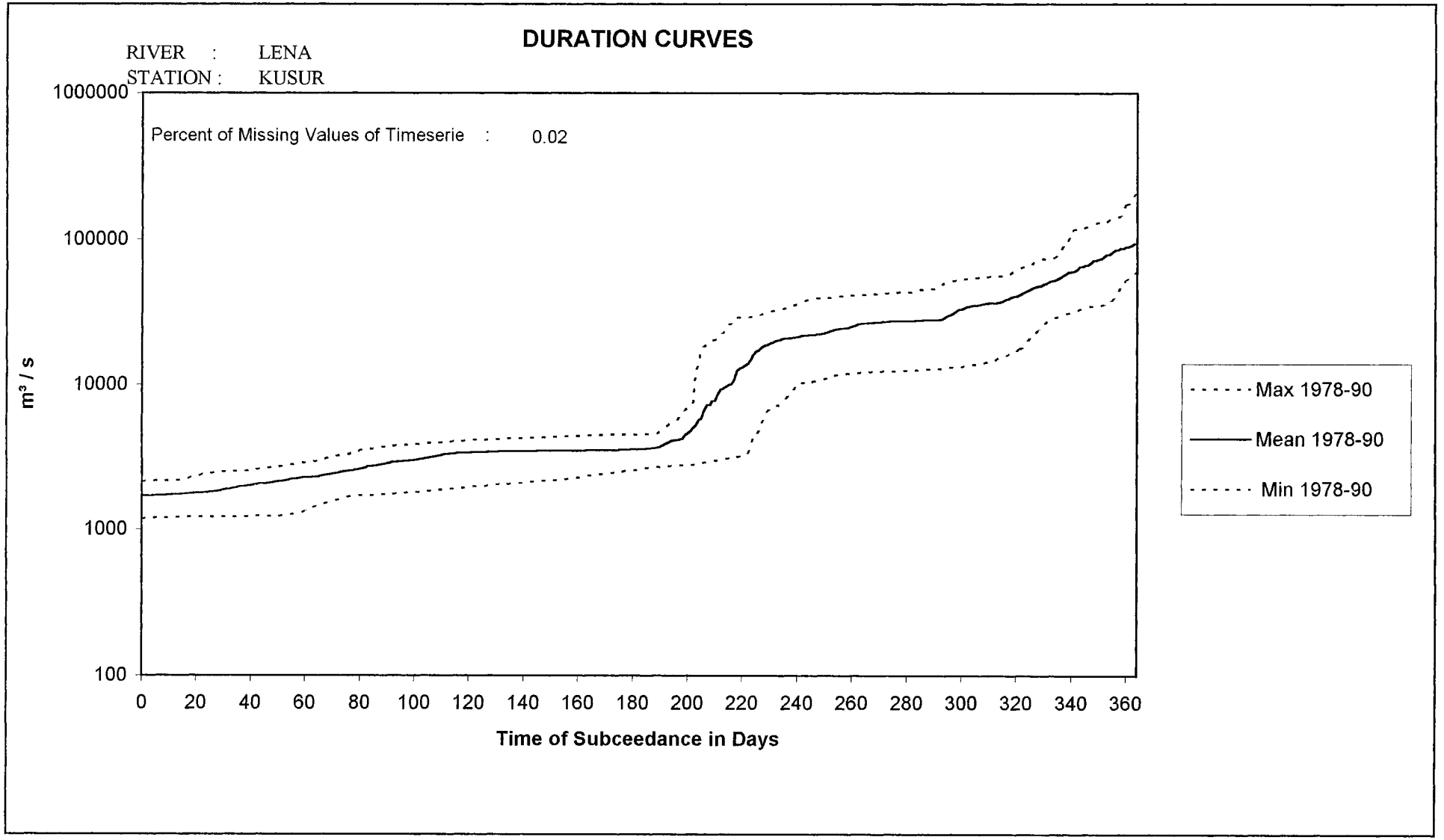


Figure : 2

GLOBAL RUNOFF DATA CENTRE (GRDC)

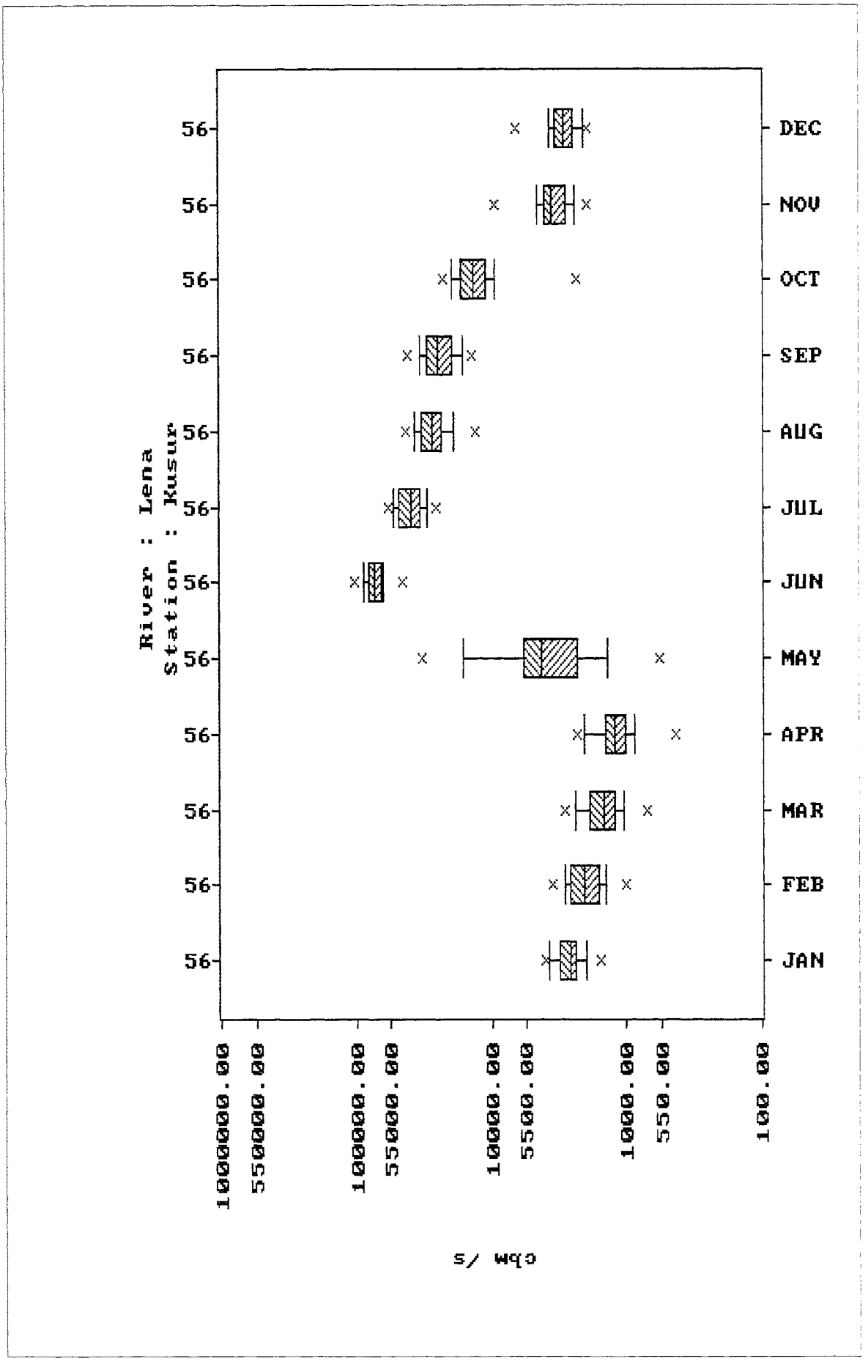


Figure : 3

GLOBAL RUNOFF DATA CENTRE (GRDC)

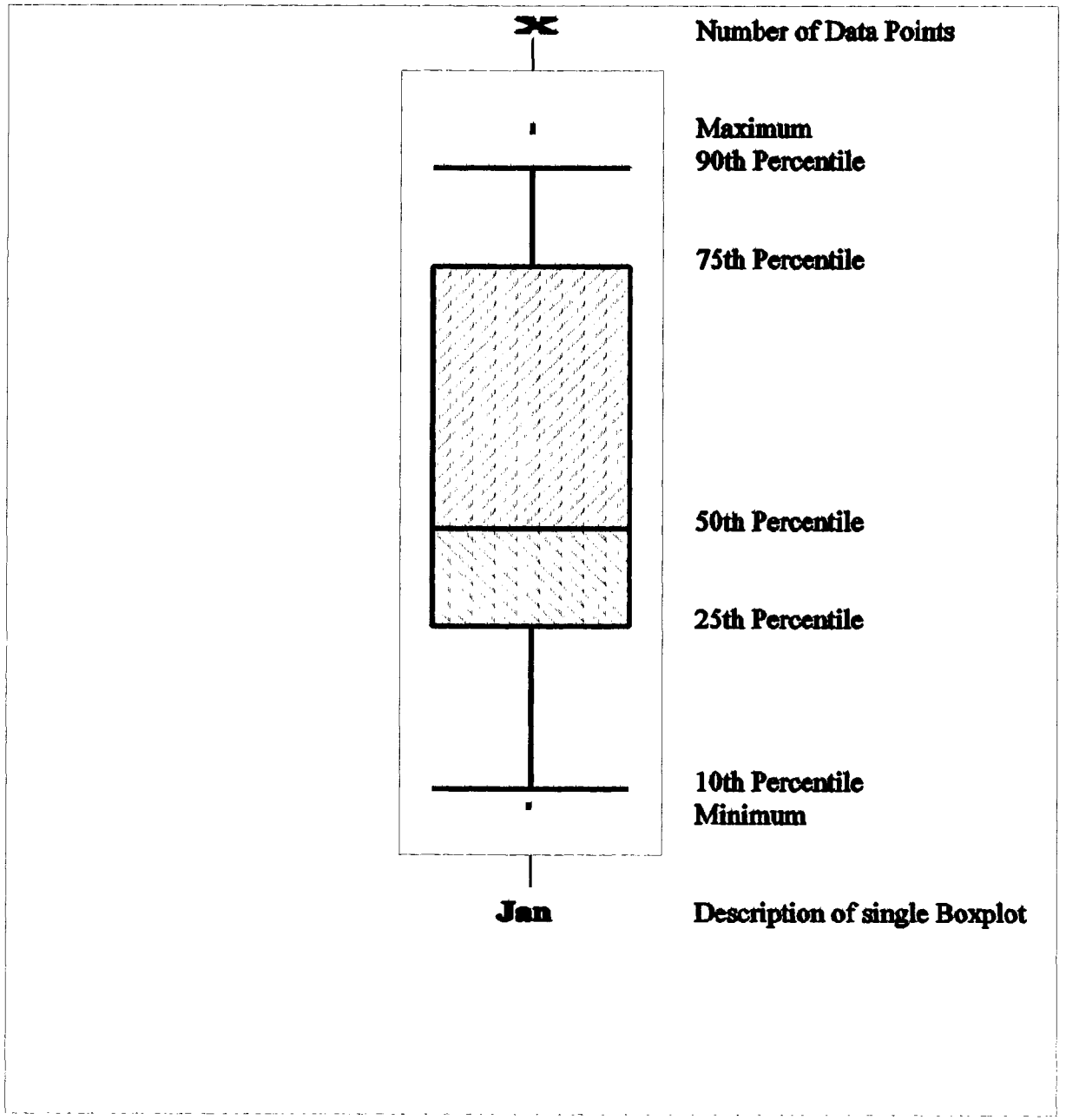


Figure 4

GLOBAL RUNOFF DATA CENTRE (GRDC)

ASIA Part 1

Overview of overlapping timeseries in GRDC-ACSYS Database

River	Station	time series		1895	1900	1905	1910	1915	1920	1925	1930	1935	1940	1945	1950	1955	1960	1965	1970	1975	1980	1985	1990
Vitim	Bodaibo	1965	1984																				
Maya	Chabda	1965	1984																				
Zhuya	Svetly	1978	1987																				
Anabar	Saskylakh	1966	1987																				
Kempendai	Kempendai	1978	1987																				
Kirenga	Shorokhovo	1965	1984																				
Timpton	Nagorny	1978	1987																				
Iya	Tulun	1965	1984																				
Lena	Kusur	1935	1990																				
Lena	Stolb	1978	1987																				
Ebitiem	Ebetem	1980	1987																				
Kenkeme	Vtoroy Stanok	1978	1987																				
Tuba	Bugurtak	1965	1984																				
Chaptakhai	mouth	1978	1987																				
Radio-Uruyete	near The mouth	1978	1987																				
Podgornyi	near The mouth	1978	1987																				
Buor-Iuryakh	Kujdusun	1978	1987																				
Malaya Cherepanikha	Tiube	1978	1987																				
Shestakovka	Kamyrdagystakh	1978	1987																				
Ider	Tosontsengel	1978	1982																				
Delgermuren	Muren	1976	1984																				
Khoit Tamir	Ikh Tamir	1978	1982																				
Selenga	Chutic	1976	1984																				
Orkhon	Orkhon	1976	1984																				
Kharaa	Barun Kharaa	1978	1982																				
Tola	Ulan-Bator	1976	1984																				
Terelj	Terelj	1978	1982																				
Khara-Murin	Murino	1978	1987																				
Bolshaya Rechka	Possolskaya	1978	1987																				
Selenga	Mostovoy	1980	1991																				
Uda	Alygdzher	1979	1979																				
Khilok	Maleta	1965	1984																				
Olkha	Olkha	1978	1987																				
Gravlyka	Igarka	1978	1987																				
Yenisei	Igarka	1936	1990																				
Us	Ust-Zolotaya	1978	1987																				
Markha	Malykai	1965	1984																				
Syda	Otrok	1978	1987																				
Sizim	Sizim	1978	1987																				
Podkamennaya Tunguska	Kuzmovka	1965	1984																				
Nizhnaya Tunguska	Podvoloshino	1978	1987																				
Dzhida	Dzhida	1980	1991																				
Chernaya	Chernoye Ii	1978	1987																				
Mikhanskij	Velmo 2	1978	1987																				

Table 2: Tables of Overlapping Time-Series for ACSYS-Stations

ASIA Part 2

Overview of overlapping timeseries in GRDC-ACSYS Database

River	Station	time series		1895	1900	1905	1910	1915	1920	1925	1930	1935	1940	1945	1950	1955	1960	1965	1970	1975	1980	1985	1990
Bolshoi Yugan	Ugut	1965	1984																				
Tym	Napas	1965	1984																				
Tom	Tomsk	1965	1990																				
Peschanaya	Tochilnoe	1978	1987																				
Mayma	Mayma	1978	1987																				
Biya	Biysk	1895	1985																				
Akkem	Akkem	1978	1987																				
Tom	Novokuznetsk	1894	1985																				
Usa	Mezhdourechensk	1978	1987																				
Irtish	Omsk	1980	1990																				
Ishim	Petropavlovsk	1965	1984																				
Ishim	Tselinograd	1978	1987																				
Ulba	Ulba Perevalochnaya	1965	1987																				
Levaya Berezovka	Sredigorne	1978	1987																				
Bergamak	Pjazany	1978	1987																				
Aremzyanka	Chukmanka	1978	1987																				
Uy	Stepnoe	1978	1987																				
Tura	Tiumen	1896	1985																				
Lobva	Lobva	1969	1987																				
Northern Sosva	Sosva	1965	1984																				
Ob	Salekhard	1930	1990																				
Reshetka	Novoalekseevskoe	1978	1987																				
Yalynka	Kaltiukova	1978	1987																				
Yana	Dzanghky	1938	1984																				
Yana	Ubileynaya	1978	1988																				
Omoloy	Namu	1979	1987																				
Sugoy	3 2km Downstream of Omchikchan	1965	1984																				
Indigirka	Vorontsovo	1937	1988																				
Alazeja	Andrushkino	1978	1988																				
Kolyma	Sredne-Kolymsk	1927	1988																				
Kolyma	Emtegei	1980	1990																				
Kolyma	Kolymskaya	1978	1988																				
Nera	Ala-Chubuk	1965	1984																				
Paljavaam	Paljavaam	1978	1988																				
Khatanga	Khatanga	1982	1988																				
Amguema	mouth of Shoumny Brook	1944	1984																				
Nadym	Nadym	1978	1987																				
Taz	Sidorovsk	1978	1988																				
Amga	Buyaga	1965	1984																				
Pur	Samburg	1965	1988																				
Olenek	8km Upstream of mouth Of Pur River	1952	1963																				
Olenek	7 5km Downstream of mouth Of River Pur	1965	1984																				
Olenek	Sukhana	1978	1988																				

Table 2: Tables of Overlapping Time-Series for ACSYS-Stations

GLOBAL RUNOFF DATA CENTRE (GRDC)

NORTH AMERICA

Part 1

Overview of overlapping timeseries in GRDC-ACSYS Database

River	Station	time series		1910	1915	1920	1925	1930	1935	1940	1945	1950	1955	1960	1965	1970	1975	1980	1985	1990
Colville	Nuiqsut	1977	1977																	
Noatak	Noatak	1965	1971																	
Yukon	Pilot Station	1975	1993																	
Yukon	Kaltag, Alas.	1956	1966																	
Yukon	Ruby, Alas.	1956	1984																	
Koyukuk	Hughes, Alas.	1960	1982																	
Yukon River	Rampart	1954	1967																	
Yukon River	near Stevens Village	1976	1993																	
Tanana	Nenana, Alas.	1962	1993																	
Tanana	Big Delta	1948	1957																	
Chena River	Fairbanks, Alas.	1978	1989																	
Salcha River	near Salchaket, Alas.	1978	1989																	
Porcupine River	Fort Yukon, Alas.	1964	1979																	
Porcupine River	near International Boundary	1987	1993																	
Tanana	Tanacross, Alas.	1965	1984																	
Yukon River	Eagle	1950	1993																	
Porcupine River	Old Crow	1961	1990																	
Stewart River	Mayo	1949	1964																	
Stewart River	above Fraser Falls	1980	1986																	
Yukon River	Dawson	1945	1980																	
Klondike River	above Bonanza Creek	1965	1990																	
Yukon River	above White River	1956	1986																	
White River	km 1881.6 Alaska Highway	1974	1990																	
Big Creek	near The mouth	1974	1990																	
Yukon River	Carmacks	1951	1990																	
Pelly River	Pelly Crossing	1951	1990																	
M'clintock River	near Whitehorse	1955	1990																	
Wheaton River	near Carcross	1955	1990																	
Teslin River	near Whitehorse	1955	1973																	
Teslin River	near Teslin	1944	1990																	
Fantail River	Outlet of Fantail Lake	1978	1989																	
Atlin	near Atlin	1951	1988																	
Yukon River	above Frank Creek	1953	1986																	
Mackenzie River	Inuvik (East Channel)	1973	1992																	
Mackenzie River	Arctic Red River	1972	1992																	
Rengleng River	below Highway No. 8	1973	1990																	
Snake River	near The mouth	1975	1990																	
Weldon Creek	near The mouth	1978	1990																	
Carcajou River	below Imperial River	1976	1990																	
Mackenzie River	Norman Wells	1943	1990																	
Mackenzie River	Norman Wells	1966	1984																	
Hyland River	km 108.5 Nahanni Range Road	1976	1990																	
Root River	near The mouth	1974	1990																	
Indin River	above Chalco Lake	1977	1990																	

Table 2: Tables of Overlapping Time-Series for ACSYS-Stations

GLOBAL RUNOFF DATA CENTRE (GRDC)

NORTH AMERICA

Part 2

Overview of overlapping timeseries in GRDC-ACSYS Database

River	Station	time series		1910	1915	1920	1925	1930	1935	1940	1945	1950	1955	1960	1965	1970	1975	1980	1985	1990
South Nahanni River	above Clausen Creek	1966	1990																	
Birch River	Highway No 7	1974	1990																	
Hyland River	near Lower Post	1978	1989																	
Dease River	Outlet of Dease Lake	1978	1984																	
Kechlka	mouth	1962	1984																	
Coal River	At The mouth	1978	1989																	
Liard River	Lower Crossing	1944	1990																	
Liard River	Fort Liard	1942	1990																	
Mackenzie River	near Fort Providence	1958	1978																	
Snowdrift River	Outlet of Siltaza Lake	1976	1990																	
Marten River	above Thoa River	1977	1990																	
Muskwa	near Fort Nelson	1944	1984																	
Fort Nelson	above Muskwa River	1978	1984																	
Salt River	below Peace Point Highway	1973	1980																	
Slave River	Fitzgerald	1921	1990																	
Peace River	Peace Point	1959	1990																	
Ingenika River	above Swannell River	1978	1989																	
Peace River	Hudson Hope	1949	1984																	
Halfway	near Farrell Creek (Lower Station	1962	1983																	
Pine	East Pine	1961	1984																	
Parsnip River	above Misinchinka River	1978	1989																	
Whitemud River	near Dixonville	1971	1990																	
Peace River	Peace River	1915	1990																	
Smoky River	Watino	1915	1990																	
Heart River	near Nampa	1963	1990																	
Hartley Creek	near Fort Mackay	1975	1990																	
Steepbank River	near Fort Mcmurray	1972	1990																	
Athabasca River	below Mcmurray	1957	1990																	
Hangingstone River	Fort Mcmurray	1965	1990																	
West Prairie River	near High Prairie	1921	1990																	
Waskahigan River	near The mouth	1968	1990																	
Athabasca River	Athabasca	1913	1990																	
Snake Indian River	near The mouth	1971	1990																	
Athabasca River	near Jasper	1913	1990																	
Mcleod River	above Embarras River	1954	1990																	
Wolf Creek	Highway No 16a	1954	1990																	
Lobstick River	near Styal	1954	1986																	
Pembina River	near Entwistle	1914	1990																	
Firth River	near The mouth	1972	1990																	
Babbage River	below Caribou Creek	1976	1992																	
Trail Valley Creek	near Inuvik	1977	1992																	
Coppermine River	Point Lake Outlet	1965	1992																	
Big River	above Egg River	1975	1988																	
Tree River	near The mouth	1968	1992																	
Burnside River	near The mouth	1976	1992																	
Gordon River	near The mouth	1977	1992																	
Ellice River	near The mouth	1971	1992																	
Freshwater Creek	near Cambridge Bay	1970	1992																	
Back	below Deep Rose Lake	1966	1984																	
Back	above Hermann River	1965	1992																	

Table 2: Tables of Overlapping Time-Series for ACSYS-Stations

EUROPE Part 1

Overview of overlapping timeseries inGRDC- ACSYS Database

River	Station	time series		1880	1885	1890	1895	1900	1905	1910	1915	1920	1925	1930	1935	1940	1945	1950	1955	1960	1965	1970	1975	1980	1985	1990
Hvita I Borgarfirdi	Kljafoss	1951	1993																							
Oelfusa	Selfoss	1950	1992																							
Bruara	Efstadalsbru	1961	1991																							
Thjorsa	Urridafoss	1947	1993																							
Joekulsa I Fljotsdal	Holl	1962	1991																							
Joekulsa Vestari	Goddalabru	1971	1991																							
Djupa	Bru	1968	1992																							
Svarta	Ullarfoss	1932	1992																							
Joekulsa a Fjollum	Dettifoss	1939	1984																							
Lagarfljot	Lagarfoss	1949	1993																							
Tana	Polmak	1912	1987																							
Paatsjoki	Lake Inari Outlet	1949	1992																							
Etneelv	Stordalsvatn	1913	1988																							
Oselv	Roeykenes	1978	1983																							
Vossa	Bulken	1892	1988																							
Lygna	Tingvatn	1978	1983																							
Tovdalselv	Austena	1925	1987																							
Dramselv	Etna	1920	1988																							
Mosseelv	Hoegfoss	1978	1983																							
Gloma	Langnes	1901	1984																							
Gaula	Haga Bru	1978	1983																							
Gloma	Knappom	1917	1988																							
Argardselv	Oeyungen	1978	1983																							
Vefsna	Unkervatn	1978	1983																							
Kjerringa	Vassvatn	1917	1988																							
Saltelv	Junkerdalselv	1938	1988																							
Lakselv	Mevatn	1978	1983																							
Altaelv	Masi	1978	1983																							
Onega	Porog	1965	1988																							
Vonguda	Vonguda	1981	1988																							
Solza	Soukhie Porogui	1978	1987																							
Northern Dvina(Severnaya Dvina)	Ust-Pinega	1881	1990																							
Vaga	Filaievskaya	1965	1984																							
Mud'yuga	Patrakeyevskaya	1978	1987																							
Pinega	Kulogory	1978	1987																							
Mezen	Malonisogorskaya	1965	1990																							
Kuloy	Kuloy	1978	1988																							
Peza	Igumnovo	1978	1988																							
Pizhma	Borovaya	1978	1987																							
Pesha	Volokovaya	1978	1988																							
Pechora	Ust-Tsilma	1932	1990																							
Vytchegda	Malaya Kushba	1965	1984																							
Pechora	Yaksha	1978	1987																							

Table 2: Tables of Overlapping Time-Series for ACSYS-Stations

EUROPE Part 2

Overview of overlapping timeseries inGRDC- ACSYS Database

River	Station	time series		1880	1885	1890	1895	1900	1905	1910	1915	1920	1925	1930	1935	1940	1945	1950	1955	1960	1965	1970	1975	1980	1985	1990
Pechora	Oksino	1980	1988																							
Usa	Adzva	1965	1984																							
Iyema	Izvail	1978	1979																							
Egul	Chukhlom	1978	1987																							
Ema	Novoe	1978	1987																							
Jena	Jena	1979	1987																							
Ura	Ura-Guba	1979	1988																							
Kola	Oktjabrsky Railway,km 1429	1965	1988																							
Umba	Paialka	1979	1988																							
Pechenga	Pechenga	1979	1988																							
Nama-Joki	Luostari	1980	1988																							
Titovka	km 15.5	1979	1988																							
Rosta	near The mouth	1979	1987																							
Sosnovka	Sosnovka	1979	1988																							
Chapoma	Chapoma	1979	1988																							
Chavanga	Chavanga	1979	1988																							
Varzuga	Varzuga	1979	1988																							
Kuzreka	Kuzreka	1979	1988																							
Olenica	Olenica	1979	1988																							
Kolviza	Kolvza	1979	1988																							
Nenoksa	Nenoksa	1980	1988																							
Nuhcha	Nuhcha	1978	1988																							
Maloshuika	Maloshuika	1978	1988																							
Suma	Sumskiy Posad	1978	1988																							
Kem	Putkinskaya Ges	1978	1988																							
Pueta	Kem	1978	1988																							
Shuya	Shueretskaya	1978	1988																							
Pongoma	Pongoma	1978	1988																							

Table 2: Tables of Overlapping Time-Series for ACSYS-Stations

THE 24 LARGEST RIVER BASINS

Overview of overlapping timeseries inGRDC- ACSYS Database

River	Station	time series		1880	1885	1890	1895	1900	1905	1910	1915	1920	1925	1930	1935	1940	1945	1950	1955	1960	1965	1970	1975	1980	1985	1990
Ob	Salekhard	1930	1990																							
Yenisei	Igarka	1936	1990																							
Lena	Kusur	1935	1990																							
Mackenzie River	Arctic Red River	1972	1992																							
Yukon	Pilot Station	1975	1993																							
Kolyma	Kolymskaya	1978	1988																							
Northern Dvina(Severnaya Dvina)	Ust-Pinega	1881	1990																							
Pechora	Oksino	1980	1988																							
Indigirka	Vorontsovo	1937	1988																							
Yana	Ubileynaya	1978	1988																							
Olenek	7 5km Downstream of mouth	1965	1984																							
Omoloy	Namu	1979	1987																							
Taz	Sidorovsk	1978	1988																							
Back	below Deep Rose Lake	1966	1984																							
Pur	Samburg	1965	1988																							
Mezen	Malonisogorskaya	1965	1990																							
Onega	Porog	1965	1988																							
Coppermine River	Point Lake Outlet	1965	1992																							
Ellice River	near The mouth	1971	1992																							
Burnside River	near The mouth	1976	1992																							
Tana	Polmak	1912	1987																							
Varzuga	Varzuga	1979	1988																							
Thjorsa	Urridafoss	1947	1993																							
Joekulsa a Fjollum	Dettifoss	1939	1984																							

Table 2: Tables of Overlapping Time-Series for ACSYS-Stations

GLOBAL RUNOFF DATA CENTRE (GRDC)

ASIA

No	River	Station	Country	Basin Area
1	Vitim	Bodaibo	RS	186000
2	Maya	Chabda	RS	165000
3	Anabar	Saskylakh	RS	78800
4	Kirenga	Shorokhovo	RS	46500
5	Iya	Tulun	RS	14500
6	Lena	Kusur	RS	2430000
7	Lena	Stolb	RS	2460000
8	Tuba	Bugurtak	RS	31800
9	Delgermuren	Muren	MO	16300
10	Selenga	Chutic	MO	92300
11	Orkhon	Orkhon	MO	23600
12	Khilok	Maleta	RS	25700
13	Yenisei	Igarka	RS	2440000
14	Markha	Malykai	RS	89600
15	Podkamennaya Tunguska	Kuzmovka	RS	218000
16	Bolshoi Yugan	Ugut	RS	22100
17	Tym	Napas	RS	24500
18	Tom	Tomsk	RS	57000
19	Biya	Biysk	RS	36900
20	Tom	Novokuznetsk	RS	29800
21	Ishim	Petropavlovsk	KZ	118000
22	Tura	Tiumen	RS	58500
23	Northern Sosva	Sosva	RS	65200
24	Ob	Salekhard	RS	2949998
25	Yana	Dzanghky	RS	216000
26	Yana	Ubilenaya	RS	224000
27	Omoloy	Namu	RS	108000
28	Indigirka	Vorontsovo	RS	305000
29	Alazeja	Andrushkino	RS	29000
30	Kolyma	Sredne-Kolymsk	RS	361000
31	Kolyma	Kolmskaya	RS	526000
32	Nera	Ala-Chubuk	RS	22300
33	Khatanga	Khatanga	RS	275000
34	Nadym	Nadym	RS	48000
35	Taz	Sidorovsk	RS	100000
36	Amga	Buyaga	RS	23900
37	Pur	Samburg	RS	95100
38	Olenek	8km Upstr.of Pur River	RS	181000
39	Olenek	7.5km Downstr.Of River Pur	RS	198000
40	Olenek	Sukhana	RS	127000

Table : 3

GLOBAL RUNOFF DATA CENTRE (GRDC)

NORTH AMERICA

No	River	Station	Country	Basin Area
1	Colville	Nuiqsut	US	53535
2	Noatak	Noatak	US	31080
3	Yukon	Pilot Station	US	831390
4	Yukon	Kaltag, Alas.	US	767000
5	Yukon	Ruby, Alas.	US	670810
6	Koyukuk	Hughes, Alas.	US	48433
7	Yukon River	Rampart	US	516446
8	Yukon River	near Stevens Village	US	508417
9	Tanana	Nenana, Alas.	US	66304
10	Tanana	Big Delta	US	34965
11	Porcupine River	Fort Yukon, Alas.	US	76405
12	Porcupine River	near International Boundary	US	59829
13	Tanana	Tanacross, Alas.	US	22144
14	Yukon River	Eagle	US	293965
15	Porcupine River	Old Crow	CN	55400
16	Stewart River	Mayo	CN	31598
17	Stewart River	above Fraser Falls	CN	30588
18	Yukon River	Dawson	CN	264000
19	Yukon River	above White River	CN	149961
20	Yukon River	Carmacks	CN	818000
21	Pelly River	Pelly Crossing	CN	49000
22	Teslin River	near Whitehorse	CN	36519
23	Teslin River	near Teslin	CN	30300
24	Yukon River	above Frank Creek	CN	30821
25	Mackenzie River	Arctic Red River	CN	1660000
26	Mackenzie River	Norman Wells	CN	1570000
27	South Nahanni River	above Clausen Creek	CN	33400
28	Kechika	mouth	CN	22700
29	Liard River	Lower Crossing	CN	104000
30	Liard River	Fort Liard	CN	222000
31	Mackenzie River	near Fort Providence	CN	970000
32	Muskwa	near Fort Nelson	CN	20300
33	Fort Nelson	above Muskwa River	CN	22800
34	Slave River	Fitzgerald	CN	606000
35	Peace River	Peace Point	CN	293000
36	Peace River	Hudson Hope	CN	70200
37	Pine	East Pine	CN	12100
38	Peace River	Peace River	CN	186000
39	Smoky River	Watino	CN	50300
40	Athabasca River	below Mcmurray	CN	133000
41	Athabasca River	Athabasca	CN	74600
42	Coppermine River	Point Lake Outlet	CN	19300
43	Burnside River	near The mouth	CN	16800
44	Ellice River	near The mouth	CN	16900
45	Back	below Deep Rose Lake	CN	98200
46	Back	above Hermann River	CN	93900

Table : 3

GLOBAL RUNOFF DATA CENTRE (GRDC)

EUROPE

No	River	Station	Country	Basin Area
1	Tana	Polmak	NO	14005
2	Gloma	Langnes	NO	40221
3	Altaelv	Masi	NO	5693
4	Onega	Porog	RS	55770
5	Northern Dvina(Severnaya Dvina)	Ust-Pinega	RS	348000
6	Vaga	Filaievskaya	RS	13200
7	Pinega	Kulogory	RS	36700
8	Mezen	Malonisogorskaya	RS	56400
9	Peza	Igumnovo	RS	12000
10	Pechora	Ust-Tsilma	RS	248000
11	Vytchegda	Malaya Kushba	RS	26500
12	Pechora	Yaksha	RS	9620
13	Pechora	Oksino	RS	312000
14	Usa	Adzva	RS	54700
15	Umba	Paialka	RS	6250
16	Varzuga	Varzuga	RS	7940
17	Kem	Putkinskaya Ges	RS	27700

Table : 3

GLOBAL RUNOFF DATA CENTRE (GRDC)
ACSYS STATIONS

ASIA **Subregion 03: Lena**

GRDC-No.	River	Station	Longitude	Latitude	Area (km²)	first rec.	last rec.	Day/Month	Miss. Val. (%)
2903050	Vitim	Bodaibo	57.9 N	114.25 E	186000	1.1965	12.1984	M	0
2903080	Maya	Chabda	59.75 N	134.75 E	165000	1.1965	12.1984	M	0
2903100	Zhuya	Svetly	58.44 N	116.14 E	4790	1.1978	12.1987	D	0
2903150	Anabar	Saskylakh	71.98 N	113.95 E	78800	1.1978	12.1987	D	11
2903150	Anabar	Saskylakh	71.98 N	113.95 E	78800	1.1966	12.1984	M	9
2903200	Kempendai	Kempendai	61.91 N	118.68 E	1290	1.1978	12.1987	D	10
2903300	Kirenga	Shorokhovo	57.67 N	108.07 E	46500	1.1965	12.1984	M	0
2903400	Timpton	Nagorny	55.98 N	124.75 E	613	1.1978	12.1987	D	0
2903410	Iya	Tulun	54.77 N	100.65 E	14500	1.1965	12.1984	M	0
2903420	Lena	Kusur	70.7 N	127.65 E	2430000	1.1978	12.1990	D	0
2903420	Lena	Kusur	70.7 N	127.65 E	2430000	1.1935	12.1984	M	0
2903430	Lena	Stolb	72.37 N	126.8 E	2460000	1.1978	12.1987	D	0
2903450	Ebitiem	Ebetem	70.36 N	127.95 E	1000	1.1980	12.1987	D	<1
2903500	Kenkeme	Vtoroy Stanok	62.06 N	129.03 E	3550	1.1978	12.1987	D	1
2903700	Tuba	Bugurtak	53.77 N	92.77 E	31800	1.1965	12.1984	M	2
2903910	Chaptakhai	mouth			28.4	1.1978	12.1987	D	0
2903920	Radio-Uruyete	near The mouth			22.8	1.1978	12.1987	D	<1
2903930	Podgornyi	near The mouth			20.3	1.1978	12.1987	D	13
2903940	Buor-Iuryakh	Kujdusun			743	1.1978	12.1987	D	0
2903950	Malaya Cherepanikha	Tiube			469	1.1978	12.1987	D	<1
2903960	Shestakovka	Kamyrdagystakh			170	1.1978	12.1987	D	<1

Table 4: Catalog of ACSYS-Stations including Updates and New Stations

GLOBAL RUNOFF DATA CENTRE (GRDC)
ACSYS STATIONS

ASIA **Subregions 07, 08, 09: Yenisei**

GRDC-No.	River	Station	Longitude	Latitude	Area (km²)	first rec.	last rec.	Day/Month	Miss. Val. (%)
2909100	Graviyka	Igarka	67.51 N	86.55 E	323	1.1978	12.1987	D	8
2909150	Yenisei	Igarka	67.48 N	86.5 E	2440000	5.1978	12.1990	D	5
2909150	Yenisei	Igarka	67.48 N	86.5 E	2440000	1.1936	12.1984	M	0
2909250	Us	Ust-Zolotaya	52.03 N	92.66 E	6110	1.1978	12.1987	D	0
2909280	Markha	Malykai	63.43 N	117.05 E	89600	1.1965	12.1984	M	3
2909300	Syda	Otrok	54.33 N	92.5 E	1480	1.1978	12.1987	D	0
2909350	Sizim	Sizim	51.36 N	95.96 E	867	1.1978	12.1987	D	0
2909400	Podkamennaya Tunguska	Kuzmovka	62.22 N	92.02 E	218000	1.1965	12.1984	M	0
2909700	Nizhnaya Tunguska	Podvoloshino	58.28 N	108.41 E	8270	1.1978	12.1987	D	0
2909750	Dzhida	Dzhida	60.33 N	103.83 E		1.1980	12.1991	D	0
2909900	Chernaya	Chernoye Ii			301	1.1978	12.1987	D	0
2909950	Mikhanskij	Velmo 2			32.3	1.1978	12.1987	D	0
2707050	Ider	Tosontsengel	48.73 N	98.28 E	8012	4.1978	11.1982	D	32
2707100	Delgermuren	Muren	49.58 N	100.13 E	16300	1.1976	12.1984	M	0
2707200	Khoit Tamir	Ikh Tamir	47.5 N	101.25 E	2993	1.1978	12.1982	D	2
2707500	Selenga	Chutic	49.37 N	102.83 E	92300	1.1976	12.1984	M	0
2707600	Orkhon	Orkhon	48.65 N	103.57 E	23600	1.1976	12.1984	M	0
2707700	Kharaa	Barun Kharaa	48.92 N	106.07 E	9580	1.1978	12.1982	D	0
2707800	Tola	Ulan-Bator	47.9 N	106.92 E	6300	1.1976	12.1984	M	0
2707900	Terelj	Terelj	48.05 N	107.42 E	1232	5.1978	12.1982	D	11
2907100	Khara-Murin	Murino	51.36 N	104.31 E	1130	1.1978	12.1987	D	0
2907200	Bolshaya Rechka	Possolskaya	51.76 N	106.44 E	565	1.1978	12.1987	D	0
2907400	Selenga	Mostovoy	52 N	107.33 E	440200	1.1980	12.1991	D	0
2908300	Uda	Alygdzher	53.53 N	98.21 E	4980	1.1979	12.1979	D	0
2908400	Khilok	Maleta	50.77 N	108.25 E	25700	1.1965	12.1984	M	0
2908500	Olkha	Olkha	52.1 N	104.03 E	590	1.1978	12.1987	D	0

Table 4: Catalog of ACSYS-Stations including Updates and New Stations

GLOBAL RUNOFF DATA CENTRE (GRDC)
ACSYS STATIONS

ASIA **Subregions 10, 11, 12: Ob**

GRDC-No.	River	Station	Longitude	Latitude	Area (km²)	first rec.	last rec.	Day/Month	Miss. Val. (%)
2912200	Uy	Stepnoe	54.13 N	60.48 E	3600	1.1978	12.1987	D	10
2912400	Tura	Tiumen	57.15 N	65.53 E	58500	1.1896	12.1985	M	0
2912500	Lobva	Lobva	59.05 N	60.26 E	2940	1.1978	12.1987	D	0
2912500	Lobva	Lobva	59.05 N	60.26 E	2940	1.1969	12.1984	M	0
2912550	Northern Sosva	Sosva	63.67 N	61.88 E	65200	1.1965	12.1984	M	5
2912600	Ob	Salekhard	66.57 N	66.53 E	2949998	1.1978	12.1990	D	0
2912600	Ob	Salekhard	66.57 N	66.53 E	2949998	1.1930	12.1984	M	0
2912900	Reshetka	Novoalekseevskoe			32	1.1978	12.1987	D	0
2912950	Yalynka	Kaltiukova			62.6	1.1978	12.1987	D	0
2910100	Bolshoi Yugan	Ugut	60.32 N	74.12 E	22100	1.1965	12.1984	M	0
2910200	Tym	Napas	59.9 N	81.92 E	24500	1.1965	12.1984	M	0
2910300	Tom	Tomsk	56.58 N	84.87 E	57000	1.1980	12.1990	D	0
2910300	Tom	Tomsk	56.58 N	84.87 E	57000	1.1965	12.1984	M	0
2910450	Peschanaya	Tochilnoe	52.18 N	85.18 E	4720	1.1978	12.1987	D	0
2910460	Mayma	Mayma	52 N	85.85 E	780	1.1978	12.1987	D	0
2910470	Biya	Biysk	52.52 N	85.27 E	36900	1.1895	12.1985	M	0
2910480	Akkem	Akkem	50.33 N	86.91 E	78.9	1.1978	12.1987	D	66
2910490	Tom	Novokuznetsk	53.75 N	87.1 E	29800	1.1894	12.1985	M	0
2910500	Usa	Mezhdourechensk	53.64 N	88.1 E	3320	1.1978	12.1987	D	0
2911100	Irtish	Omsk	55.2 N	73.21 E	321000	1.1980	12.1990	D	1
2911200	Ishim	Petropavlovsk	54.97 N	69.12 E	118000	1.1965	10.1984	M	7
2911300	Ishim	Tselinograd	51.11 N	71.46 E	7400	1.1978	12.1987	D	7
2911800	Ulba	Ulba Perevalochnaya	49.93 N	82.83 E	4900	1.1978	12.1987	D	0
2911800	Ulba	Ulba Perevalochnaya	49.93 N	82.83 E	4900	1.1965	12.1984	M	0
2911900	Levaya Berezovka	Sredigorne			251	1.1978	12.1987	D	0
2911920	Bergamak	Pjazany			371	1.1978	12.1987	D	0
2911940	Aremzyanka	Chukmanka			478	1.1978	10.1987	D	1

Table 4: Catalog of ACSYS-Stations including Updates and New Stations

GLOBAL RUNOFF DATA CENTRE (GRDC)
ACSYS STATIONS

ASIA — **Subregion 98: Jana, Indigirka, Kolyma**

GRDC-No.	River	Station	Longitude	Latitude	Area (km²)	first rec.	last rec.	Day/Month	Miss. Val. (%)
2998100	Yana	Dzanghky	69.67 N	135.33 E	216000	1.1938	12.1984	M	1
2998110	Yana	Ubileynaya	70.75 N	136.08 E	224000	1.1978	12.1988	D	<1
2998150	Omoloy	Namu	69.38 N	134.62 E	108000	1.1979	12.1987	D	2
2998200	Sugoy	3.2km Downstream of Omchikchan	62.6 N	156 E	5880	1.1965	12.1984	M	0
2998400	Indigirka	Vorontsovo	69.58 N	147.35 E	305000	1.1978	12.1988	D	<1
2998400	Indigirka	Vorontsovo	69.58 N	147.35 E	305000	1.1937	12.1984	M	0
2998450	Alazeja	Andrushkino	69.17 N	154.5 E	29000	1.1978	12.1988	D	<1
2998500	Kolyma	Sredne-Kolymsk	67.37 N	153.67 E	361000	1.1978	12.1988	D	5
2998500	Kolyma	Sredne-Kolymsk	67.37 N	153.67 E	361000	1.1927	12.1984	M	13
2998501	Kolyma	Emtegei	62.83 N	146.5 E	9560	1.1980	12.1990	D	<1
2998510	Kolyma	Kolymskaya	68.73 N	158.72 E	526000	1.1978	12.1988	D	0
2998600	Nera	Ala-Chubuk	64.68 N	144.07 E	22300	1.1965	12.1984	M	8
2998800	Paljavaam	Paljavaam	68.53 N	174.15 E	6810	1.1978	12.1988	D	0
2998850	Khatanga	Khatanga	71.98 N	102.45 E	275000	6.1982	9.1988	D	64
2998900	Amguema	mouth of Shoumny Brook	67.67 N	181.1 E	26700	1.1944	12.1984	M	25

ASIA — **Subregion 99: Nadym, Pur, Taz, Ananbar, Chatanga, Olenek**

GRDC-No.	River	Station	Longitude	Latitude	Area (km²)	first rec.	last rec.	Day/Month	Miss. Val. (%)
2999200	Nadym	Nadym	65.62 N	72.67 E	48000	1.1978	12.1987	D	0
2999250	Taz	Sidorovsk	66.6 N	82.28 E	100000	1.1978	12.1988	D	28
2999800	Amga	Buyaga	59.55 N	126.95 E	23900	1.1965	12.1984	M	0
2999500	Pur	Samburg	67.08 N	78.15 E	95100	1.1978	12.1988	D	31
2999500	Pur	Samburg	67.08 N	78.15 E	95100	1.1965	5.1984	M	17
2999900	Olenek	8km Upstream of mouth Of Pur River	71.67 N	123.98 E	181000	1.1952	12.1963	M	2
2999910	Olenek	7.5km Downstream of mouth Of River	72.12 N	123.22 E	198000	1.1965	12.1984	M	0
2999920	Olenek	Sukhana	68.62 N	118.33 E	127000	1.1978	12.1988	D	0

Table 4: Catalog of ACSYS-Stations including Updates and New Stations

GLOBAL RUNOFF DATA CENTRE (GRDC)
ACSYS STATIONS

NORTH AMERICA **Subregion 01: Alaska (Arctic Ocean)**

GRDC-No.	River	Station	Longitude	Latitude	Area (km²)	first rec.	last rec.	Day/Month	Miss. Val. (%)
4101500	Colville	Nuiqsut	70.16 N	150.92 W	53535	6.1977	9.1977	D	7
4101800	Noatak	Noatak	67.57 N	162.94 W	31080	8.1965	9.1971	D	46

NORTH AMERICA **Subregion 09: Canada (Arctic Ocean)**

GRDC-No.	River	Station	Longitude	Latitude	Area (km²)	first rec.	last rec.	Day/Month	Miss. Val. (%)
4209010	Firth River	near The mouth	69.32 N	139.57 W	5710	5.1972	12.1990	D	4
4209050	Babbage River	below Caribou Creek	68.82 N	138.67 W	1510	8.1976	12.1992	D	9
4209100	Trail Valley Creek	near Inuvik	68.74 N	133.44 W	68	5.1977	12.1992	D	14
4209400	Coppermine River	Point Lake Outlet	65.41 N	114 W	19300	7.1965	12.1992	D	2
4209450	Big River	above Egg River	72.48 N	123.4 W	3640	7.1975	12.1988	D	15
4209500	Tree River	near The mouth	67.63 N	111.88 W	5960	12.1968	12.1992	D	3
4209550	Burnside River	near The mouth	66.74 N	108.82 W	16800	9.1976	12.1992	D	4
4209580	Gordon River	near The mouth	66.81 N	107.1 W	1530	8.1977	12.1992	D	13
4209600	Ellice River	near The mouth	67.71 N	104.14 W		1.1971	12.1992	D	0
4209650	Freshwater Creek	near Cambridge Bay	69.13 N	104.99 W	1490	7.1970	12.1992	D	20
4209800	Back	below Deep Rose Lake	66.08 N	96.5 W	98200	1.1966	12.1984	M	12
4209805	Back	above Hermann River	66.09 N	96.5 W	93900	1.1965	12.1992	D	0

Table 4: Catalog of ACSYS-Stations including Updates and New Stations

GLOBAL RUNOFF DATA CENTRE (GRDC)
ACSYS STATIONS

NORTH AMERICA **Subregion 03: Yukon**

GRDC-No.	River	Station	Longitude	Latitude	Area (km²)	first rec.	last rec.	Day/Month	Miss. Val. (%)
4103200	Yukon	Pilot Station	61.93 N	162.88 W	831390	10.1975	9.1993	D	0
4103300	Yukon	Kaltag, Alas.	64.33 N	158.72 W	767000	10.1956	9.1966	D	0
4103300	Yukon	Kaltag, Alas.	64.33 N	158.72 W	767000	10.1956	12.1964	M	8
4103450	Yukon	Ruby, Alas.	64.73 N	155.48 W	670810	10.1956	9.1978	D	0
4103450	Yukon	Ruby, Alas.	64.73 N	155.48 W	670810	1.1965	12.1984	M	6
4103500	Koyukuk	Hughes, Alas.	66.05 N	154.27 W	48433	1.1960	9.1982	D	2
4103500	Koyukuk	Hughes, Alas.	66.05 N	154.27 W	48433	1.1965	9.1982	M	1
4103520	Yukon River	Rampart	65.51 N	150.17 W	516446	10.1954	9.1967	D	5
4103550	Yukon River	near Stevens Village	65.87 N	149.72 W	508417	10.1976	9.1993	D	0
4103600	Tanana	Nenana, Alas.	64.57 N	149.1 W	66304	5.1962	9.1993	D	0
4103600	Tanana	Nenana, Alas.	64.57 N	149.1 W	66304	1.1965	12.1984	M	5
4103610	Tanana	Big Delta	64.15 N	145.85 W	34965	9.1948	9.1957	D	11
4103630	Chena River	Fairbanks, Alas.	64.85 N	147.7 W	5130	1.1978	9.1989	D	0
4103650	Salcha River	near Salchaket, Alas.	64.47 N	146.92 W	5620	1.1978	9.1989	D	0
4103700	Porcupine River	Fort Yukon, Alas.	66.98 N	143.13 W	76405	8.1964	9.1979	D	1
4103700	Porcupine River	Fort Yukon, Alas.	66.98 N	143.13 W	76405	1.1965	9.1979	M	<1
4103710	Porcupine River	near International Boundary	67.42 N	140.89 W	59829	10.1987	9.1993	D	0
4103750	Tanana	Tanacross, Alas.	63.38 N	143.75 W	22144	1.1965	12.1984	M	0
4103800	Yukon River	Eagle	64.79 N	141.2 W	293965	6.1950	9.1993	D	2
4203050	Porcupine River	Old Crow	67.57 N	139.83 W	55400	6.1961	12.1990	D	11
4203050	Porcupine River	Old Crow	67.57 N	139.83 W	55400	6.1966	12.1984	M	14
4203150	Stewart River	Mayo	63.59 N	135.89 W	31598	1.1949	9.1964	D	8
4203160	Stewart River	above Fraser Falls	63.49 N	135.13 W	30588	1.1980	12.1986	D	0
4203200	Yukon River	Dawson	64.07 N	139.43 W	264000	3.1945	12.1980	D	10
4203200	Yukon River	Dawson	64.07 N	139.43 W	264000	1.1966	12.1980	M	0
4203210	Klondike River	above Bonanza Creek	64.03 N	139.4 W	7800	6.1965	12.1990	D	1
4203250	Yukon River	above White River	63.08 N	139.49 W	149961	9.1956	12.1986	D	7
4203300	White River	km 1881.6 Alaska Highway	61.97 N	140.55 W	6240	8.1974	12.1990	D	3
4203340	Big Creek	near The mouth	62.57 N	137 W	1730	6.1974	12.1990	D	1
4203400	Yukon River	Carmacks	62.1 N	136.27 W	81800	7.1951	12.1990	D	1
4203400	Yukon River	Carmacks	62.1 N	136.27 W	81800	1.1966	12.1984	M	0
4203500	Pelly River	Pelly Crossing	62.83 N	136.58 W	49000	10.1951	12.1990	D	4
4203500	Pelly River	Pelly Crossing	62.83 N	136.58 W	49000	1.1966	12.1984	M	0
4203700	M'clintock River	near Whitehorse	60.6 N	134.45 W	1700	10.1955	12.1990	D	8
4203750	Wheaton River	near Carcross	60.13 N	134.88 W	875	10.1955	12.1990	D	16
4203760	Teslin River	near Whitehorse	61.49 N	134.78 W	36519	10.1955	12.1973	D	8
4203770	Teslin River	near Teslin	60.48 N	133.3 W	30300	4.1944	12.1990	D	7
4203770	Teslin River	near Teslin	60.48 N	133.3 W	30300	1.1956	12.1988	M	0
4203800	Fantail River	Outlet of Fantail Lake	59.58 N	134.38 W	717	1.1978	12.1989	D	1
4203850	Atlin	near Atlin	59.6 N	133.81 W	6810	1.1951	12.1988	M	0
4203900	Yukon River	above Frank Creek	41.43 N	135.19 W	30821	6.1953	12.1986	D	3

Table 4: Catalog of ACSYS-Stations including Updates and New Stations

GLOBAL RUNOFF DATA CENTRE (GRDC)
ACSYS STATIONS

NORTH AMERICA **Subregion 08: Mackenzie** Part 1

GRDC-No.	River	Station	Longitude	Latitude	Area (km²)	first rec.	last rec.	Day/Month	Miss. Val. (%)
4208020	Mackenzie River	Inuvik (East Channel)	68.38 N	133.76 W		1.1973	12.1992	D	1
4208025	Mackenzie River	Arctic Red River	67.46 N	133.74 W	1660000	8.1972	12.1992	D	<1
4208030	Rengleng River	below Highway No. 8	67.75 N	133.85 W	1310	2.1973	12.1990	D	5
4208050	Snake River	near The mouth	65.97 N	134.02 W	8910	8.1975	12.1990	D	12
4208060	Weldon Creek	near The mouth	66.38 N	132.65 W	847	1.1978	12.1990	D	0
4208110	Carcajou River	below Imperial River	65.28 N	127.68 W	6860	7.1976	12.1990	D	4
4208150	Mackenzie River	Norman Wells	65.28 N	126.85 W	1570000	5.1943	12.1990	D	35
4208150	Mackenzie River	Norman Wells	65.28 N	126.85 W	1570000	1.1966	12.1984	M	9
4208190	Hyland River	km 108.5 Nahanni Range Road	61.48 N	128.23 W	2150	9.1976	12.1990	D	7
4208200	Root River	near The mouth	62.47 N	123.42 W	9840	9.1974	12.1990	D	<1
4208210	Indin River	above Chalco Lake	64.4 N	115.03 W	1790	8.1977	12.1990	D	<1
4208220	South Nahanni River	above Clausen Creek	61.25 N	124.03 W	33400	5.1969	12.1990	D	9
4208220	South Nahanni River	above Clausen Creek	61.25 N	124.03 W	33400	6.1966	12.1984	M	12
4208230	Birch River	Highway No. 7	61.33 N	122.08 W	542	10.1974	12.1990	D	<1
4208240	Hyland River	near Lower Post	59.95 N	128.15 W	9450	1.1978	12.1989	D	8
4208250	Dease River	Outlet of Dease Lake	58.8 N	130.08 W	1520	1.1978	12.1984	D	0
4208255	Kechika	mouth	59.62 N	127.31 W	22700	10.1962	12.1984	M	5
4208260	Coal River	At The mouth	59.68 N	136.95 W	9190	1.1978	12.1989	D	0
4208270	Liard River	Lower Crossing	59.42 N	126.1 W	104000	7.1944	12.1990	D	9
4208270	Liard River	Lower Crossing	59.42 N	126.1 W	104000	1.1960	12.1984	M	2
4208280	Liard River	Fort Liard	60.25 N	123.48 W	222000	10.1942	12.1990	D	26
4208280	Liard River	Fort Liard	60.25 N	123.48 W	222000	1.1966	12.1984	M	3
4208300	Mackenzie River	near Fort Providence	61.27 N	117.53 W	970000	3.1958	11.1978	D	35
4208300	Mackenzie River	near Fort Providence	61.27 N	117.53 W	970000	1.1966	10.1975	M	16
4208320	Snowdrift River	Outlet of Siltaza Lake	62.17 N	109.85 W	6030	3.1976	12.1990	D	3
4208340	Marten River	above Thoa River	60.6 N	108.97 W	736	4.1977	12.1990	D	4
4208360	Muskwa	near Fort Nelson	58.79 N	122.66 W	20300	9.1944	12.1984	M	14
4208365	Fort Nelson	above Muskwa River	58.67 N	122.64 W	22800	10.1978	12.1984	M	10
4208380	Salt River	below Peace Point Highway	59.83 N	111.97 W	821	1.1973	12.1980	D	0
4208400	Slave River	Fitzgerald	59.87 N	111.58 W	606000	5.1921	12.1990	D	47
4208400	Slave River	Fitzgerald	59.87 N	111.58 W	606000	6.1921	12.1984	M	
4208450	Peace River	Peace Point	59.12 N	112.43 W	293000	2.1959	12.1990	D	1
4208450	Peace River	Peace Point	59.12 N	112.43 W	293000	1.1966	12.1984	M	0
4208510	Ingenika River	above Swannell River	56.72 N	125.1 W	4200	1.1978	12.1989	D	0

Table 4: Catalog of ACSYS-Stations including Updates and New Stations

GLOBAL RUNOFF DATA CENTRE (GRDC)
ACSYS STATIONS

NORTH AMERICA **Subregion 08: Mackenzie** Part 2

GRDC-No.	River	Station	Longitude	Latitude	Area (km²)	first rec.	last rec.	Day/Month	Miss. Val. (%)
4208550	Peace River	Hudson Hope	56.03 N	121.9 W	70200	10.1949	12.1984	M	5
4208560	Halfway	near Farrell Creek (Lower Statio	56.23 N	121.48 W	9400	6.1962	12.1983	M	4
4208570	Pine	East Pine	55.72 N	121.21 W	12100	1.1961	12.1984	M	5
4208590	Parsnip River	above Misinchinka River	55.07 N	122.93 W	4900	1.1978	12.1989	D	0
4208610	Whitemud River	near Dixonville	56.5 N	117.65 W	2010	7.1971	10.1990	D	5
4208630	Peace River	Peace River	56.25 N	117.32 W	186000	5.1915	12.1990	D	34
4208630	Peace River	Peace River	56.25 N	117.32 W	186000	6.1915	12.1984	M	37
4208640	Smoky River	Watino	55.72 N	117.62 W	50300	6.1915	12.1990	D	44
4208640	Smoky River	Watino	55.72 N	117.62 W	50300	1.1956	12.1988	M	0
4208650	Heart River	near Nampa	56.05 N	117.12 W	1960	3.1963	12.1990	D	8
4208710	Hartley Creek	near Fort Mackay	57.25 N	111.45 W	357	6.1975	10.1990	D	7
4208720	Steepbank River	near Fort Mcmurray	57 N	111.4 W	1370	9.1972	10.1990	D	10
4208730	Athabasca River	below Mcmurray	56.78 N	111.4 W	133000	10.1957	12.1990	D	1
4208730	Athabasca River	below Mcmurray	56.78 N	111.4 W	133000	1.1966	12.1984	M	1
4208740	Hangingstone River	Fort Mcmurray	56.7 N	111.35 W	914	3.1965	10.1990	D	12
4208780	West Prairie River	near High Prairie	55.43 N	116.48 W	1163	4.1921	12.1990	D	51
4208810	Waskahigan River	near The mouth	54.75 N	117.2 W	1040	2.1968	12.1990	D	3
4208870	Athabasca River	Athabasca	54.72 N	113.29 W	74600	5.1913	12.1990	D	18
4208870	Athabasca River	Athabasca	54.72 N	113.29 W	74600	1.1952	12.1988	M	0
4208910	Snake Indian River	near The mouth	53.15 N	118.02 W	1580	5.1971	11.1990	D	50
4208920	Athabasca River	near Jasper	52.9 N	118.05 W	3900	7.1913	12.1990	D	51
4208940	Mcleod River	above Embarras River	53.47 N	116.62 W	2560	11.1954	12.1990	D	0
4208940	Mcleod River	above Embarras River	53.47 N	116.62 W	2560	1.1955	12.1988	M	0
4208950	Wolf Creek	Highway No. 16a	53.6 N	116.27 W	829	11.1954	12.1990	D	0
4208950	Wolf Creek	Highway No. 16a	53.6 N	116.27 W	829	1.1955	12.1988	M	0
4208955	Lobstick River	near Styal	53.61 N	115.11 W	1570	11.1954	12.1986	D	<1
4208955	Lobstick River	near Styal	53.61 N	115.11 W	1570	1.1956	12.1986	M	0
4208960	Pembina River	near Entwistle	53.6 N	115 W	4430	5.1914	12.1990	D	41
4208960	Pembina River	near Entwistle	53.6 N	115 W	4430	1.1955	12.1988	M	0

Table 4: Catalog of ACSYS-Stations including Updates and New Stations

GLOBAL RUNOFF DATA CENTRE (GRDC)
ACSYS STATIONS

EUROPE	Subregion 01: Iceland								
GRDC-No.	River	Station	Longitude	Latitude	Area (km²)	first rec.	last rec.	Day/Month	Miss. Val. (%)
6401080	Hvita I Borgarfirdi	Kljafoss	64.69 N	21.42 W	1685	1.1951	12.1993	D	1
6401080	Hvita I Borgarfirdi	Kljafoss	64.69 N	21.42 W	1685	7.1951	12.1993	M	1
6401090	Oelfusa	Selfoss	63.94 N	21.01 W	5760	1.1950	12.1992	D	2
6401090	Oelfusa	Selfoss	63.94 N	21.01 W	5760	9.1950	12.1992	M	1
6401110	Bruara	Efstadalsbru	64.26 N	20.52 W	225	1.1961	12.1991	D	2
6401110	Bruara	Efstadalsbru	64.26 N	20.52 W	225	9.1961	12.1991	M	2
6401120	Thjorsa	Urridafoss	63.93 N	20.6 W	7200	1.1947	12.1993	D	<1
6401120	Thjorsa	Urridafoss	63.93 N	20.6 W	7200	4.1947	12.1993	M	0
6401130	Joekulsa I Fljotsdal	Holl	64.98 N	15.09 W	575	1.1962	12.1991	D	2
6401130	Joekulsa I Fljotsdal	Holl	64.98 N	15.09 W	575	9.1962	12.1991	M	2
6401200	Joekulsa Vestari	Goddalabru	65.33 N	19.09 W	799	1.1971	12.1991	D	2
6401200	Joekulsa Vestari	Goddalabru	65.33 N	19.09 W	799	6.1971	12.1991	M	2
6401500	Djupa	Bru	63.95 N	17.65 W	260	1.1968	12.1992	D	2
6401500	Djupa	Bru	63.95 N	17.65 W	260	7.1968	12.1992	M	2
6401600	Svarta	Ullarfoss	65.49 N	19.39 W	390	1.1932	12.1992	D	1
6401600	Svarta	Ullarfoss	65.49 N	19.39 W	390	9.1932	12.1992	M	1
6401700	Joekulsa a Fjollum	Dettifoss	66.03 N	16.45 W	7000	1.1939	12.1984	D	1
6401700	Joekulsa a Fjollum	Dettifoss	66.03 N	16.45 W	7000	9.1939	12.1984	M	1
6401800	Lagarfljot	Lagarfoss	65.5 N	14.37 W	2800	1.1949	12.1993	D	2
6401800	Lagarfljot	Lagarfoss	65.5 N	14.37 W	2800	9.1949	9.1993	M	10

EUROPE	Subregion 30: Common to Norway-Finland-Russia								
GRDC-No.	River	Station	Longitude	Latitude	Area (km²)	first rec.	last rec.	Day/Month	Miss. Val. (%)
6730500	Tana	Polmak	70.07 N	28.05 E	14005	1.1912	12.1987	M	1
6830100	Paatsjoki	Lake Inari Outlet	68.9 N	27.15 E	14575	1.1949	12.1992	D	1

Table 4: *Catalog of* ACSYS-Stations including Updates and New Stations

GLOBAL RUNOFF DATA CENTRE (GRDC)
ACSYS STATIONS

EUROPE **Subregion 31: Norway**

GRDC-No.	River	Station	Longitude	Latitude	Area (km²)	first rec.	last rec.	Day/Month	Miss. Val. (%)
6731130	Etneelv	Stordalsvatn	59.68 N	6.02 E	134	1.1913	12.1988	M	0
6731150	Oselv	Roeykenes	60.25 N	5.43 E	49	1.1978	12.1983	D	97
6731200	Vossa	Bulken	60.63 N	6.28 E	1071	1.1892	12.1988	M	0
6731250	Lygna	Tingvatn	58.4 N	7.23 E	266	1.1978	12.1983	D	97
6731280	Tovdalselv	Austena	58.85 N	8.1 E	290	1.1925	12.1987	M	0
6731300	Dramselv	Etna	60.93 N	9.43 E	565	1.1920	12.1988	M	0
6731350	Mosseelv	Hoegfoss	59.55 N	10.77 E	302	1.1978	12.1983	D	97
6731400	Gloma	Langnes	59.6 N	11.12 E	40221	9.1901	12.1984	M	0
6731500	Gaula	Haga Bru	63.07 N	10.28 E	3080	1.1978	12.1983	D	97
6731530	Gloma	Knappom	60.63 N	12.03 E	1625	1.1917	12.1988	M	0
6731550	Argardselv	Oeyungen	64.25 N	11.08 E	235	1.1978	12.1983	D	97
6731600	Vefsna	Unkervatn	65.5 N	14.22 E	756	1.1978	12.1983	D	0
6731650	Kjerringa	Vassvatn	66.4 N	13.18 E	18.5	1.1917	12.1988	M	0
6731680	Saltelv	Junkerdalselv	66.82 N	15.43 E	426	1.1938	12.1988	M	0
6731900	Lakselv	Mevatn	69.23 N	17.78 E	178	1.1978	12.1983	D	0
6731900	Lakselv	Mevatn	69.23 N	17.78 E	178	1.1978	1.1978	M	84
6731950	Altaelv	Masi	69.42 N	23.63 E	5693	1.1978	12.1983	D	0

Table 4: Catalog of ACSYS-Stations including Updates and New Stations

GLOBAL RUNOFF DATA CENTRE (GRDC)
ACSYS STATIONS

EUROPE **Subregion 70: Russia (Northern District)**

GRDC-No.	River	Station	Longitude	Latitude	Area (km²)	first rec.	last rec.	Day/Month	Miss. Val. (%)
6970100	Onega	Porog	63.8 N	38.27 E	55770	1.1978	12.1988	D	5
6970100	Onega	Porog	63.8 N	38.27 E	55770	1.1965	12.1984	M	0
6970150	Vonguda	Vonguda	63.8 N	38.5 E	374	5.1981	12.1988	D	<1
6970200	Solza	Soukhie Porogui	64.31 N	39.48 E	1190	1.1978	12.1987	D	9
6970250	Northern Dvina(Severnaya Dvina	Ust-Pinega	64.1 N	42.17 E	348000	1.1883	12.1990	D	
6970250	Northern Dvina(Severnaya Dvina	Ust-Pinega	64.1 N	42.17 E	348000	6.1881	12.1985	M	0
6970270	Vaga	Filaievskaya	61.23 N	42.25 E	13200	1.1965	12.1984	M	0
6970300	Mud'yuga	Patrakeyevskaya	64.96 N	40.5 E	305	1.1978	12.1987	D	0
6970400	Pinega	Kulogory	64.71 N	43.66 E	36700	1.1978	12.1987	D	0
6970500	Mezen	Malonisogorskaya	64.95 N	45.67 E	56400	1.1978	12.1990	D	<1
6970500	Mezen	Malonisogorskaya	64.95 N	45.67 E	56400	1.1965	12.1984	M	0
6970550	Kuloy	Kuloy	64.97 N	43.52 E	3040	1.1978	12.1988	D	7
6970560	Peza	Igumnovo	65.82 N	45.1 E	12000	1.1978	12.1988	D	0
6970600	Pizhma	Borovaya	65.33 N	51.81 E	4890	1.1978	12.1987	D	0
6970630	Pesha	Volokovaya	66.5 N	48.25 E	2780	1.1978	12.1988	D	<1
6970650	Pechora	Ust-Tsilma	65.47 N	52.25 E	248000	5.1980	12.1990	D	4
6970650	Pechora	Ust-Tsilma	65.47 N	52.25 E	248000	1.1932	12.1984	M	0
6970680	Vytchegda	Malaya Kushba	61.67 N	53.73 E	26500	1.1965	12.1984	M	0
6970700	Pechora	Yaksha	61.86 N	56.66 E	9620	1.1978	12.1987	D	0
6970710	Pechora	Oksino	67.63 N	52.18 E	312000	5.1980	12.1988	D	<1
6970850	Usa	Adzva	66.65 N	59.1 E	54700	1.1965	12.1984	M	0
6970900	Iyema	Izvail			1150	1.1978	12.1979	D	0
6970910	Egul	Chukhlom			123	1.1978	12.1987	D	0
6970920	Ema	Novoe			179	1.1978	12.1987	D	0

Table 4: Catalog of ACSYS-Stations including Updates and New Stations

GLOBAL RUNOFF DATA CENTRE (GRDC)
ACSYS STATIONS

EUROPE — Subregion 71: Kola Peninsula

GRDC-No.	River	Station	Longitude	Latitude	Area (km²)	first rec.	last rec.	Day/Month	Miss. Val. (%)
6971050	Jena	Jena	67.58 N	30.84 E	1600	1.1979	12.1987	D	0
6971080	Ura	Ura-Guba	69.41 N	32.78 E	1020	1.1979	12.1988	D	<1
6971100	Kola	Oktiabrsky Railway,km 1429	68.88 N	33.05 E	3780	1.1979	12.1988	D	<1
6971100	Kola	Oktiabrsky Railway,km 1429	68.88 N	33.05 E	3780	1.1965	12.1984	M	0
6971150	Umba	Paialka	66.64 N	34.08 E	6250	1.1979	12.1988	D	0
6971200	Pechenga	Pechenga	69.53 N	31.17 E	1680	1.1979	12.1988	D	4
6971250	Nama-Joki	Luostari	69.58 N	31.7 E	142	10.1980	12.1988	D	4
6971300	Titovka	km 15.5	69.55 N	31.65 E	942	1.1979	12.1988	D	2
6971350	Rosta	near The mouth	69.02 N	33.08 E	51.7	1.1979	12.1987	D	4
6971400	Sosnovka	Sosnovka	66.48 N	40.55 E	584	1.1979	12.1988	D	<1
6971500	Chapoma	Chapoma	66.08 N	38.83 E	1090	1.1979	12.1988	D	0
6971550	Chavanga	Chavanga	66.12 N	37.78 E	1180	1.1979	12.1988	D	4
6971600	Varzuga	Varzuga	66.4 N	36.63 E	7940	1.1979	12.1988	D	0
6971650	Kuzreka	Kuzreka	66.62 N	34.8 E	250	1.1979	12.1988	D	2
6971700	Olenica	Olenica	66.48 N	35.36 E	374	1.1979	12.1988	D	2
6971710	Kolviza	Kolviza	67.08 N	33.07 E	1260	1.1979	12.1988	D	2
6971750	Nenoksa	Nenoksa	64.6 N	39.17 E	374	2.1980	12.1988	D	<1

EUROPE — Subregion 72: Karelia, North-West Russia

GRDC-No.	River	Station	Longitude	Latitude	Area (km²)	first rec.	last rec.	Day/Month	Miss. Val. (%)
6972100	Nuhcha	Nuhcha	63.92 N	36.22 E	1350	1.1978	12.1988	D	0
6972150	Maloshuika	Maloshuika	63.75 N	37.4 E	481	1.1978	12.1988	D	0
6972750	Suma	Sumskiy Posad	64.15 N	35.43 E	1990	1.1978	12.1988	D	0
6972810	Kem	Putkinskaya Ges	64.95 N	34.62 E	27700	1.1978	12.1988	D	0
6972815	Pueta	Kem	64.95 N	34.62 E	48	1.1978	12.1988	D	0
6972820	Shuya	Shueretskaya	64.75 N	34.7 E	934	1.1978	12.1988	D	0
6972900	Pongoma	Pongoma	65.33 N	34.38 E	1220	1.1978	12.1988	D	0

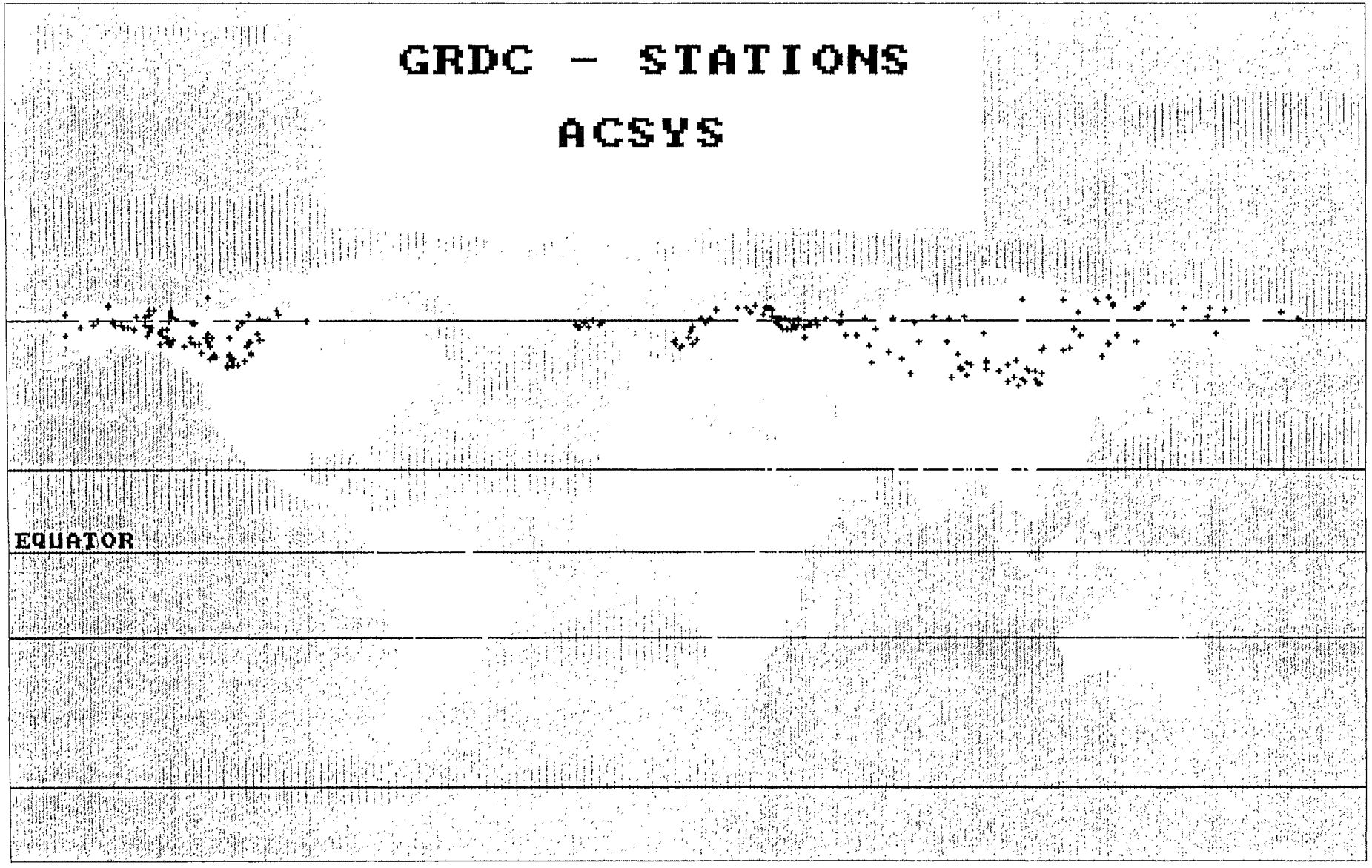
Table 4: Catalog of ACSYS-Stations including Updates and New Stations

GLOBAL RUNOFF DATA CENTRE (GRDC)

35 GRDC STATIONS FOR COMPUTING FRESHWATERFLUXES INTO THE ARCTIC OCEAN

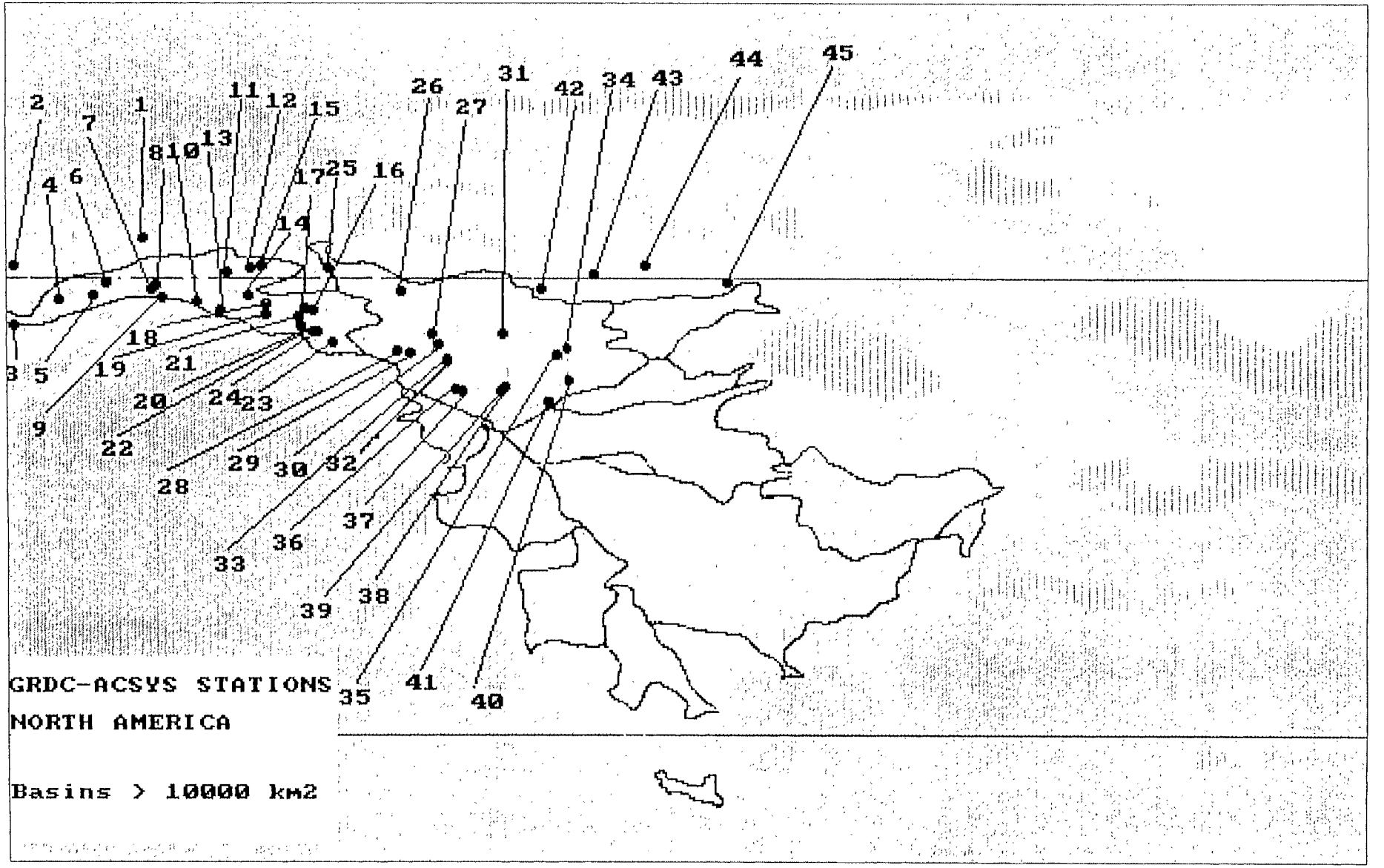
2912600	Ob	Salekhard	RS	6657N	6653E	2949998	1	1930	12	1984
2909150	Yenisei	Igarka	RS	6748N	8650E	2440000	1	1936	12	1984
2903430	Lena	Kusur	RS	70.7N	127.65E	2430000	1	1935	12	1984
4208025	Mackenzie River	Arctic Red River	CN	6746N	13374W	1660000	8	1972	12	1992
4103200	Yukon	Pilot Station	US	6193N	16288W	831390	10	1975	9	1993
2998510	Kolyma	Kolmskaya	RS	6873N	15872E	526000	1	1978	12	1988
6970250	Northern Dvina(Severnaya Dvina)	Ust-Pinega	RS	6410N	4217E	348000	6	1881	12	1985
6970710	Pechora	Oksino	RS	6763N	5218E	312000	5	1980	12	1988
2998400	Indigirka	Vorontsovo	RS	6958N	14735E	305000	1	1978	12	1988
2998110	Yana	Ubilenaya	RS	7075N	13608E	224000	1	1978	12	1988
2999910	Olenek	7.5km Downstream of mouth Of River Pur	RS	7212N	12322E	198000	1	1965	12	1984
2998150	Omoloy	Namu	RS	6938N	13462E	108000	1	1979	12	1987
2999250	Taz	Sidorovsk	RS	6660N	8228E	100000	1	1978	12	1988
4209800	Back	below Deep Rose Lake	CN	6608N	9650W	98200	1	1966	12	1984
2999500	Pur	Samburg	RS	6708N	7815E	95100	1	1978	12	1988
6970500	Mezen	Malonisogorskaya	RS	6495N	4567E	56400	1	1965	12	1990
6970100	Onega	Porog	RS	6380N	3827E	55770	1	1965	12	1988
4209400	Coppermine River	Point Lake Outlet	CN	6541N	11400W	19300	7	1965	12	1992
4209600	Ellice River	near The mouth	CN	6771N	10414W	16900	1	1971	12	1992
4209550	Burnside River	near The mouth	CN	6674N	10882W	16800	9	1976	12	1992
6730500	Tana	Polmak	NO	7007N	2805E	14005	1	1912	12	1987
6971600	Varzuga	Varzuga	RS	6640N	3663E	7940	1	1979	12	1988
6401120	Thjorsa	Urridafoss	IL	6393N	2060W	7200	4	1947	12	1993
6401700	Joekulsa a Fjollum	Dettifoss	IL	6603N	1645W	7000	9	1939	12	1984
6971150	Umba	Paialka	RS	6664N	3408E	6250	1	1979	12	1988
4209500	Tree River	near The mouth	CN	6763N	11188W	5960	12	1968	12	1992
6401090	Oelfusa	Selfoss	IL	6394N	2101W	5760	9	1950	12	1992
6731950	Altaelv	Masi	NO	6942N	2363E	5693	1	1978	12	1983
6971100	Kola	Oktiabrsky Railway,km 1429	RS	6888N	3305E	3780	1	1965	12	1988
4209450	Big River	above Egg River	CN	7248N	12340W	3640	7	1975	12	1988
6401800	Lagarfljot	Lagarfoss	IL	6550N	1437W	2800	9	1949	9	1993
6970630	Pesha	Volokovaya	RS	6650N	4825E	2780	1	1978	12	1988
4209580	Gordon River	near The mouth	CN	6681N	10710W	1530	8	1977	12	1992
4209650	Freshwater Creek	near Cambridge Bay	CN	6913N	10499W	1490	7	1970	12	1992
6970200	Solza	Soukhie Porogui	RS	6431N	3948E	1190	1	1978	12	1987

Table : 5

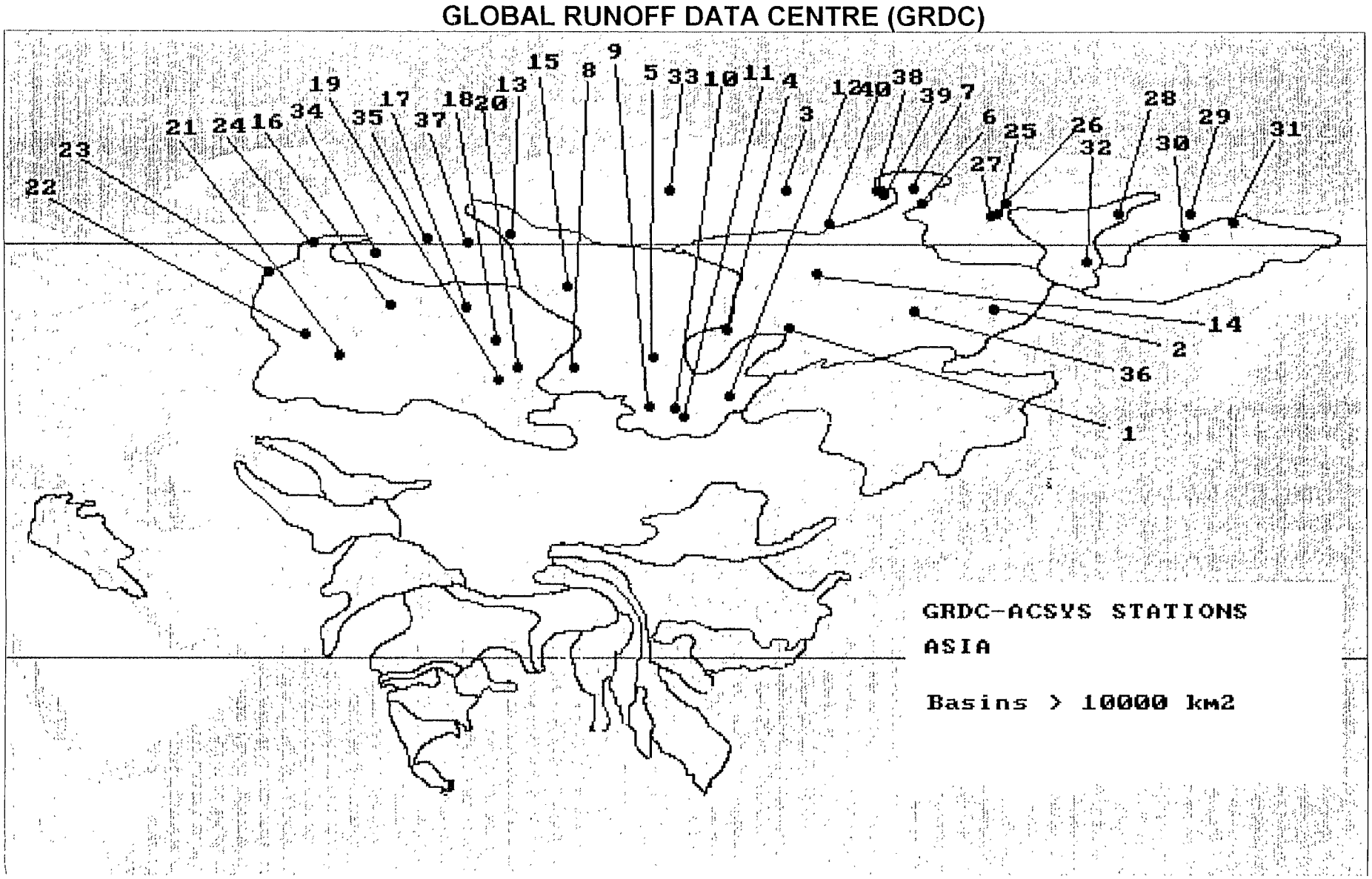


Map 1:

GLOBAL RUNOFF DATA CENTRE (GRDC)

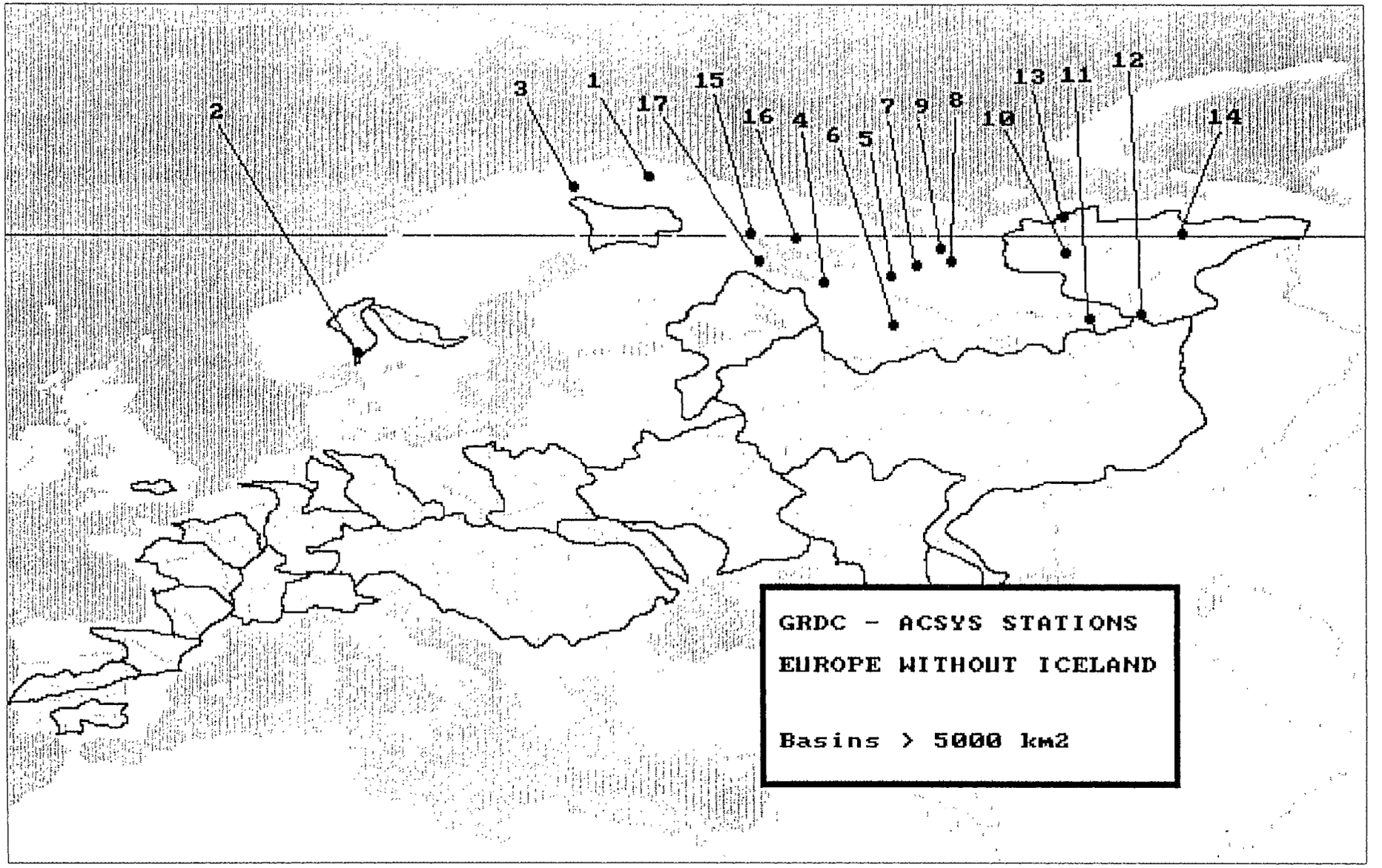


Map 2:


GLOBAL RUNOFF DATA CENTRE (GRDC)
GRDC-ACSYS STATIONS
ASIA
Basins > 10000 km2

Map 3:

GLOBAL RUNOFF DATA CENTRE (GRDC)



Map 4:

ANNEX 1

Global Runoff Data Centre
Federal Institute of Hydrology
Bundesanstalt für Gewässerkunde
Kaiserin-Augusta-Anlagen 15-17
56068 Koblenz
Federal Republic of Germany

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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

POLICY GUIDELINES FOR THE DISSEMINATION OF DATA AND COSTING OF SERVICES

Preamble

The Global Runoff Data Centre (GRDC) operates under the auspices of the World Meteorological Organization (WMO) on the advice of its international Steering Committee and in cooperation with organizations such as UNESCO, UNEP, WHO and ICSU. This Guideline regulates the acquisition and dissemination of hydrological data and costing of services in the Global Runoff Data Centre under the Terms of Reference stipulated during the First Session of the Steering Committee of the GRDC and the committments of WMO at its Twelfth Congress in 1995.

The Guideline does not infringe on the ownership rights on the data transmitted to the GRDC by data providers. In particular, the GRDC does not usually provide value-added and costed services to data users which fall in the domain of national hydrological services.

At its Twelfth Congress in 1995, the World Meteorological Organisation (WMO) adopted Resolution 40 (Cg-XII) and thus committed itself, as a fundamental principal, "to broadening and enhancing the free and unrestricted international exchange of meteorological and related data and products." In this context, "free and unrestricted" means non-discriminatory and without charge, the latter with the meaning "at no more than the cost of reproduction and delivery, without charge for the data and products themselves." With regard to the Global Runoff Data Centre, Congress also adopted Resolution 21 (Cg-XII) which encourages Members "to support the GRDC through the provision of the hydrological data and related information that it needs".

WMO Congress also adopted the practice that countries "should provide to the research and education communities, for their non-commercial activities, free and unrestricted access to all data and products exchanged under the auspices of WMO "with the understanding that the commercial use of these data may be subject to conditions."

1. Principles of data acquisition and access

1.1 The GRDC operates on the WMO principal mentioned above with the aim of encouraging the widespread use of the data for national, regional and global studies.

1.2 Contributing countries are encouraged to transfer unrestricted, quality controlled, selected hydrological data together with station history information to the GRDC. The transfer of daily discharge data is preferred.

1.3 When requested by a contributing agency, the GRDC also accepts and stores restricted data. In such cases, the agency concerned specifies the relevant restrictions and the GRDC flags the restricted data and uses them under the conditions specified by the contributing agency.

2. Dissemination of GRDC-Data

2.1 GRDC data are available to users under the conditions specified in 2.2. to 2.6 below.

2.2 Requests for data must reach the GRDC in written form: letter, facsimile, telex or email. A proforma is attached for use in this respect (annex 1).

2.3 The data user agrees in writing that the data received are not transferred to third parties without the written consent of the GRDC (proforma in annex 2).

2.4 GRDC data shall not be used for commercial purposes without the prior consent of the national hydrological service(s) and/or other contributors of the data to the GRDC. The GRDC will request such consent on behalf of a potential user.

2.5 The data user agrees that the GRDC may inform the national hydrological service(s) supplying the data about the use to which their data have been put and will transfer the name and address of the data user to the hydrological service(s) concerned.

2.6 The GRDC makes available subsets of the GRDC database on request, as stated above. Requests for the entire database or substantial parts of it cannot be entertained.

3. Cost of services

3.1 Information about the GRDC, including the yearly status reports and the database contents (catalogue), are provided free of charge upon request.

3.2 To enhance the services of the GRDC, the GRDC charges data users on a non-profit base for the time used for carrying out services and for costs of material, handling and mailing.

3.3 Standard GRDC services (annex 3) are free for agencies and institutions which contribute data to the GRDC, as well as for the Secretariats of international organizations which are the principal clients of the GRDC, such as WMO, UNESCO, UNEP and WHO.

3.4 For all other users, the cost for databank queries, diskettes, mail and all other overheads is based on the current price for services charged by the Federal Institute of Hydrology, Koblenz staff time being based on a per hour rate which in June 1995 was set at DM 75,--.

3.5 Services for projects which require extensive work at the GRDC or the establishment of an own database are agreed upon in a Memorandum of Unterstanding (MoU) between the project partners. In these cases, the financial contribution for the services of the GRDC are costed and incorporated in the MoU.

3.6 To give an indication of the approximate costs of databank services, the following can serve as a guide:

a) Simple queries, such as a search for all stations of three major rivers and the extraction of mean daily discharge data:

Estimated time for completion:	1.5 hours
Approximate cost (June 1995) :	DM 112,50

b) Complex queries, such as the selection of daily discharge time series of at least 20 years for 20 stations from three major rivers, with maximum overlap of time series:

Estimated time for completion:	5 hours
Approximate cost (June 1995) :	DM 375,--

For complex tasks where data products (statistical evaluations, graphics etc.) are also requested, a cost estimate is made and agreed upon in advance.

3.7 Payment for services is by bank transfer to the credit of the GRDC:

BUNDESKASSE KOBLENZ, LANDESZENTRALBANK KOBLENZ
BLZ: 570 000 00, ACCOUNT: 570 010 01, credit: 1207/11902 GRDC

Cheques sent by registered mail are also acceptable.

4. Disclaimer

4.1 While the GRDC makes every effort to eliminate errors from the data base, there may be errors in the data unknown to the GRDC. Neither the GRDC nor its sponsors can be held responsible for the consequences of the use of GRDC data, error free or otherwise.

Annex 1

Format for Data Request from GRDC

Any request for data should provide the following information:

a) Origin of the request including name, postal, e-mail address, phone and fax number of the individual person or institute making the request; where an institute, the name and the position of the responsible officer should also be provided.

b) Specification of request (e.g. which rivers, stations or regions, monthly or mean daily data, time series).

c) Rational for the data request.

d) Detailed description of the use to be made of the data. A summary of the research or study project should be added to the request.

e) Signature of the person or responsible officer referred to in a) above.

Declaration of the Data User

The undersigned declares that he/she is responsible for the use of the data provided by the GRDC and agrees to use the data under the following conditions:

1. The GRDC data are not transferred either in part or total to third parties or to the general public (e.g. by electronic media), without the written consent of the GRDC.

2. The data will not be used for commercial purposes without the written consent of the GRDC. The GRDC itself will obtain clearance from the respective national hydrological service(s) and/or other data contributors.

3. The dataset will be not accessible to unauthorized persons and after completion of the specified studies, the dataset will be kept seperate from the general data processing facilities on diskette, tape or CD.

4. After completion of the studies and parts thereof, two copies of the results will be made available for the GRDC, as well as publications arising from the use of the data set or parts thereof.

5. In all publications, the source of the data will be fully cited as: "The Global Runoff Data Centre, D - 56068 Koblenz, Germany".

6. The GRDC operates on a non-profit basis. In certain cases, however, the GRDC may charge the data user a nominal amount for data queries and handling or an amount which has been agreed upon between the requesting agency and the GRDC prior to data delivery. The undersigned confirms his/her capacity to pay bills presented by the GRDC for services.

7. Disclaimer

While the GRDC makes every effort to eliminate errors from the data base, there may be errors in the data unknown to the GRDC. Neither the GRDC nor its sponsors can be held responsible for the consequences of the use of GRDC data, error free or otherwise.

I, as principal researcher/representative of the requesting organization agree to the conditions stated above.

Place and date :_____

Signature :_____

Standard Services of GRDC

The following standard services are rendered on a routine basis and are distinguished from specialized services to data users:

- Production and dissemination of catalogs and yearly status reports
- Database queries and response to data requests
- Compilation of project/programme related sub - databases
- Production of tables and graphs to illustrate and enhance the understanding of the content of the database
- Monitoring of global/regional runoff on a comparative basis
- Production of reports in the GRDC - Report series on global/regional hydrological issues on demand from projects/programmes of, inter alia, WMO, UNEP and UNESCO

The GRDC holds the right to change the extend and scope of standard services without notice.

An example for specialized services would be the detailed statistical analysis of regional time-series for specific studies.

Report No. 1 (May 1993)	Second Workshop on the Global Runoff Data Centre, Koblenz, Germany, 15 - 17 June, 1992.
Report No. 2 (May 1993)	Dokumentation bestehender Algorithmen zur Übertragung von Abflußwerten auf Gitternetze. (Incl. abtract in English by the GRDC: Documentation of existing algorithms for transformation of runoff data to grid cells) by G.C. Wollenweber.
Report No. 3 (June 1993)	GRDC - Status Report 1992.
Report No. 4 (June 1994)	GRDC - Status Report 1993.
Report No. 5 (November 1994)	Hydrological Regimes of the Largest Rivers in the World - A Compilation of the GRDC Database.
Report No. 6 (December 1994)	Report of the First Meeting of the GRDC Steering Committee, Koblenz, Germany, June 20 - 21, 1994.
Report No. 7 (June 1995)	GRDC - Status Report 1994.
Report No. 8 (July 1995)	First Interim Report on the Arctic River Database for the Arctic Climate System Study (ACSYS).
Report No. 9 (August 1995)	Report of the Second Meeting of the GRDC Steering Committee, Koblenz, Germany, June 27 - 28.
Report No. 10 (March 1996)	Freshwater Fluxes from Continents into the World Oceans based on Data of the Global Runoff Data Base.
Report No. 11 (April 1996)	GRDC - Status Report 1995.