

Weltdatenzentrum Abfluß
Bundesanstalt für Gewässerkunde
Koblenz, Deutschland

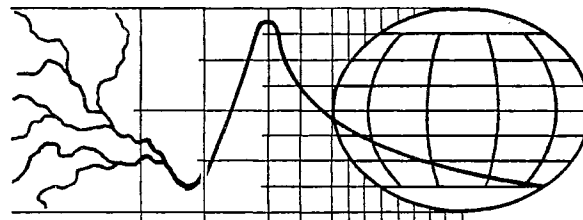
Global Runoff Data Centre
Federal Institute of Hydrology
Koblenz, Germany

Report No.1

**Second Workshop on the
GLOBAL RUNOFF DATA CENTRE**

Koblenz, Germany, 15 - 17 June, 1992

Organized by
Hydrology and Water Resources Department;
World Meteorological Organization, Geneva
and
Federal Institute of Hydrology, Koblenz



GRDC



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CONTENTS		Page
PREFACE		1
1	OPENING OF THE WORKSHOP	2
	1.1 Introductory Remarks	2
2	THE GLOBAL RUNOFF DATA CENTRE (GRDC)	6
	2.1 General	6
	2.2 Status of the GRDC	7
	2.3 Structure and administrative arrangements	8
3	DATA	9
	3.1 Coverage	10
	3.2 Procedures	11
	3.3 Types of Data	11
4	OTHER INFORMATION	13
5	CO-OPERATION	14
6	TRANSFORMATION OF FLOW DATA TO GRID POINTS	14
7	ACTION PLAN	17
8	CLOSURE	17
APPENDIX		
A	LIST OF PARTICIPANTS	
B	AGENDA	
C	HISTORICAL DEVELOPMENT OF THE GRDC	
D	WCP-PROJECTS AND OTHER INTERNATIONAL PROJECTS AND PROGRAMMES	
E	ACTION PLAN	
F	LIST OF ABBREVIATIONS	
G	FIGURES	
H	REPORTS BY THE WORKSHOP PARTICIPANTS	

levels rating curves, catchment boundaries, elevation, land uses, soil types, etc.

The GRDC should concentrate on possessing a good areal coverage by obtaining data from baseline stations, trend stations, and global flux stations and/or stations near the oceans (GEMS, WHO, WMO, UNESCO).

It was also suggested that data should be collected for:

- all large rivers with mean annual discharge greater than $100 \text{ m}^3/\text{s}$ including major tributaries;
- basins with catchment areas greater than $1,000,000 \text{ km}^2$;
- basins with more than 1,000,000 inhabitants;
- stations characterizing flow into the oceans (GEMS, WCP-Water Project A.8, GCOS, i.e. collecting monthly discharge data for major rivers and making estimates of monthly continental discharge from the collected data and estimates of discharge from the ungauged areas of the continents for the period from 1950 to present);
- undisturbed areas ($\sim 5,000 \text{ km}^2$ and/or $1,000 \text{ km}^2 - 10,000 \text{ km}^2$);
- selected catchments with natural flow.

- Regular reports of the GRDC within WMO Bulletins.
- Annually Status Reports of the GRDC to WMO.

5 CO-OPERATION

Co-operation with other data centres should help to enlarge the GRDC database. On the one hand those data already being collected can be made available to users, on the other hand the distribution of these data can play an important role in the assistance of collecting new data. It also seems possible to apply to other Centre's systems for the management and application of data. The co-ordination is necessary in selecting other stations which monitor discharge, water quality and precipitation in the same area of interest.

6 TRANSFORMATION OF FLOW DATA TO GRID POINTS

A pilot project was proposed for the purpose of constructing data sets over certain dense river flow networks, which could be used in currently available techniques for estimating runoff over grid-cells. The areas should be fairly homogenous from both climatic and hydrologic viewpoints. Daily river flow measurements for each catchment and for the years 1978 to 1990 should be obtained. Where this is not possible, monthly values should be taken instead.

The pilot area covers the basins of the rivers Rhine, Weser, Elbe, Oder and Weichsel within Germany, Czechoslovakia and Poland. The core area is:

48° - 55° N latitude, 7° - 15° E longitude - for the whole pilot area: 45° - 55° N latitude, 5° - 25° E longitude.

This activity is to be undertaken by the GRDC in co-operation with the Department M2 of the Federal Institute of Hydrology (BfG) and with the WMO, IIASA and other appropriate National Institutions.

Water resource impacts of climate variability and change occur at much shorter time scales than within one month (e.g. high and low flows). Therefore, a number of additional specific locations are needed and a close co-operation between GRDC and GPCC should be assured.

On the ability of atmospheric models representing the surface water budget Dr. Schaake commented that this is depending on both local and large scale processes. To understand how to improve limitations indicated in model validations at specific stream gauges additional information on a larger spatial scale is fundamental. In particular, gridded fields of monthly runoff are needed. Ideally, these grid cells should cover all of the continents, but it is even more important for these estimates being well established at single locations rather than on an overall distribution. Furthermore, the comparison of runoff derived by atmospheric models and grid point runoff does not imply sufficient verification of the atmospheric model, because this requires runoff from discharge data being estimated at individual grid points.

Dr. Schaake made the following suggestions to develop diagnostic information for atmospheric modelers:

- To continue to identify specific regions where runoff grids will be produced and to set up a schedule to produce these data over the next few years.
- To collect daily and monthly discharge data for specific gauges for the period 1950 to the present in support of the gridding project.
- To produce monthly gridded fields (on a 30 minute grid) and to update them annually. Finally they should be combined with climatological programmes.
- To produce a data product together with the GPCC containing these grids, the stream gauge data, and related precipitation information.

Hydrologic modelers tend to focus their activities on data that are available within in their own countries. However, the needs of global hydrologic modeling require data from many countries.

The general state of the art in hydrologic modeling would advance substantially if quantity data are available for a wider range of climates. It would then be possible to acquire streamflow data of specific locations for limited periods as well other data required for hydrologic modeling which are needed for producing digital data products (e.g. basin boundaries).

7 ACTION PLAN

Future activities of the GRDC will be to complete together with the Secretariat of WMO existing data sets within the needed time steps and spacial resolutions. In order to motivate WMO Member States to provide additional data to the GRDC, WMO Members are being informed about the present status of the GRDC by a leaflet which is regularly updated. In CHy sessions of working groups and expert meetings of WMO, new ideas and as a result additional requests for data will probably arise. Then the GRDC will play a major role within the international exchange of data. Therefore, the Centre should strenghten its activities in the collection of data and all countries are asked to support the GRDC providing them with their runoff data sets.

An action plan was developed to continue the work which had already been accomplished and it can be seen from Appendix E.

8 CLOSURE

The workshop was closed at 13.00 p.m., June 17, 1992.

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A project to calculate grid-related estimates of runoff over Central Europe is to be undertaken in three phases. In Phase I, each participating institution applied the methodology to data from their own country and prepared a technical which included:

- the experiences in applying the methodology;
- comments on the methodology; and
- proposals for improvements or for alternative methodologies.

In order to discuss the results, a meeting was held in April 1992. In this meeting it was proposed to use an approach with three stages in Phase II:

- (i) use of only observed runoff data;
- (ii) use of empirical-statistical relationships between physiographic characteristics (such as elevation) and runoff;
- (iii) use of (ii) and hydrometeorological characteristics.

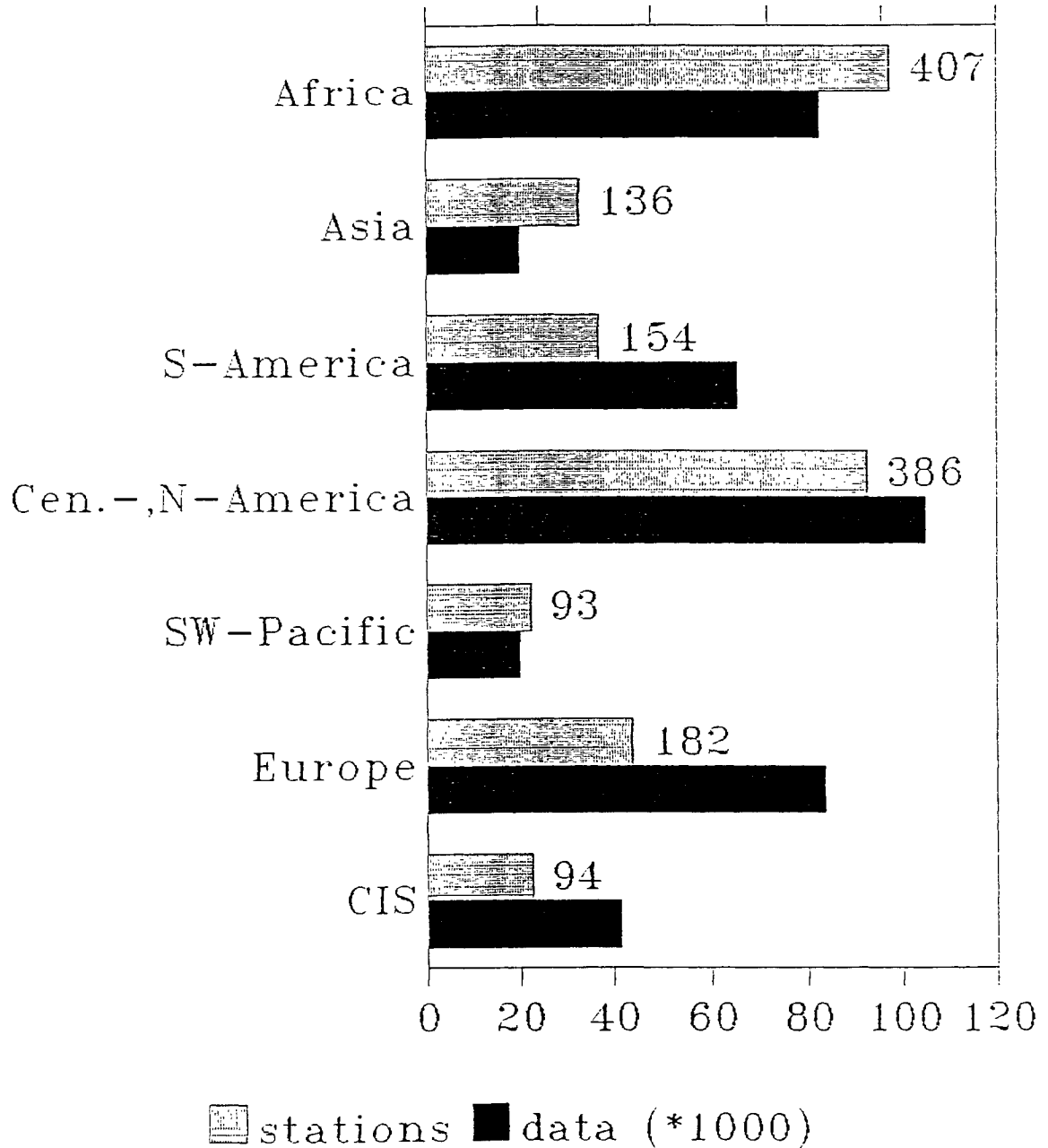
This approach should be applied for initial basins selected by each participating institution. Phase III will be the application of the finally agreed methodology throughout the whole project region.

GEMS/WATER

GRDC has agreed to participate in GEMS/WATER by providing selected flow data from its data base to the GEMS/WATER global data bank held at the WHO Collaborating Centre for Surface and Ground Water Quality in Canada.

The collaboration process calls for GRDC to provide GEMS/WATER with a synopsis of data records for use during the current GEMS/WATER country missions (1991-92). These missions are being organized by WHO with the aim of introducing Phase Two of the programme to participating countries and to discuss the planning and implementation of the expanded GEMS/WATER monitoring network. The countries were to be requested to make available their water quality data to the GEMS/WATER data base and water quantity data to GRDC.

WMO-Regions



Total : 418,000 data (1452 stations)

Figure 2: Data by WMO - Regions (monthly)

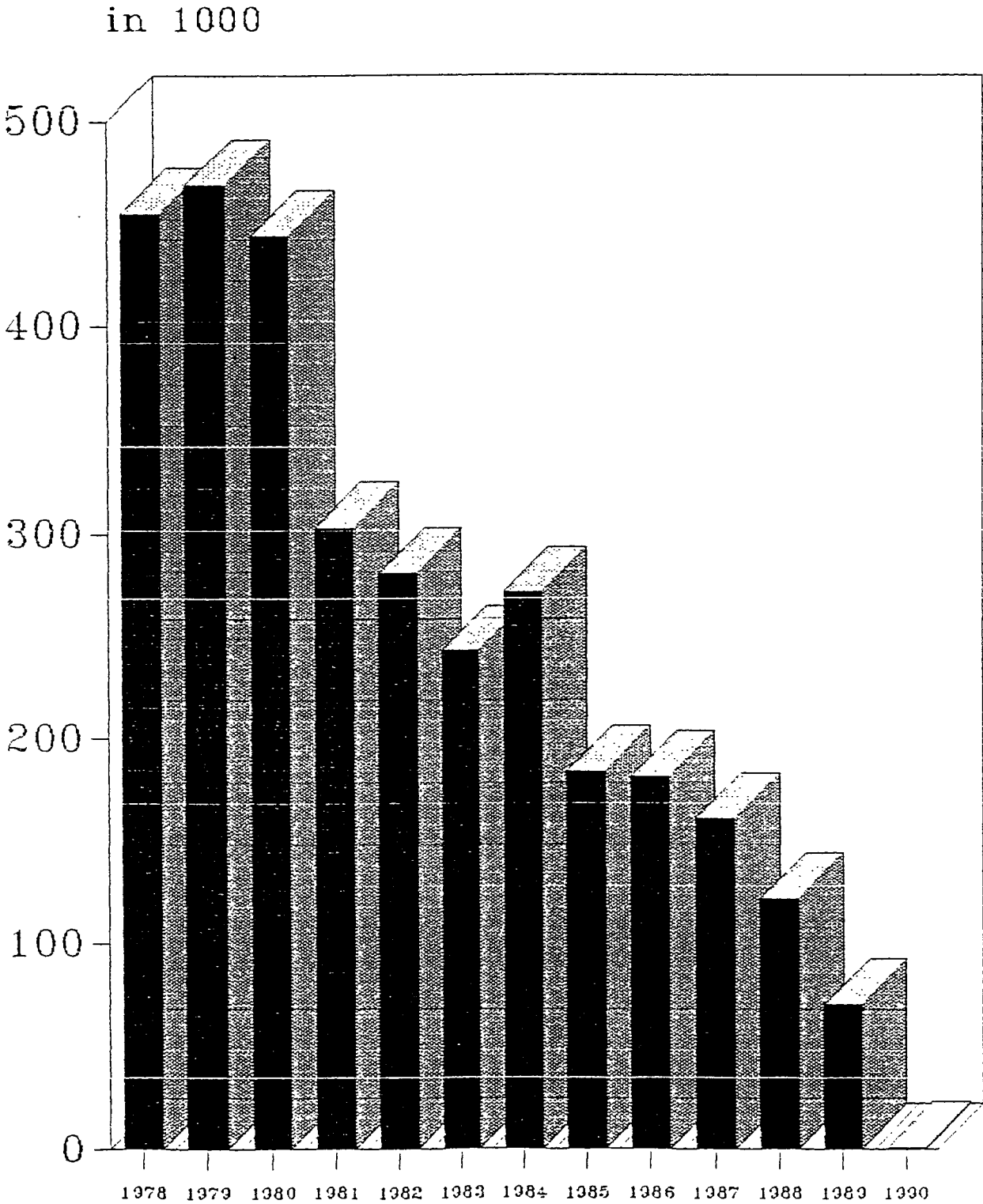


Figure 4: Data for Period 1978 - 1990 (daily)

in 1000

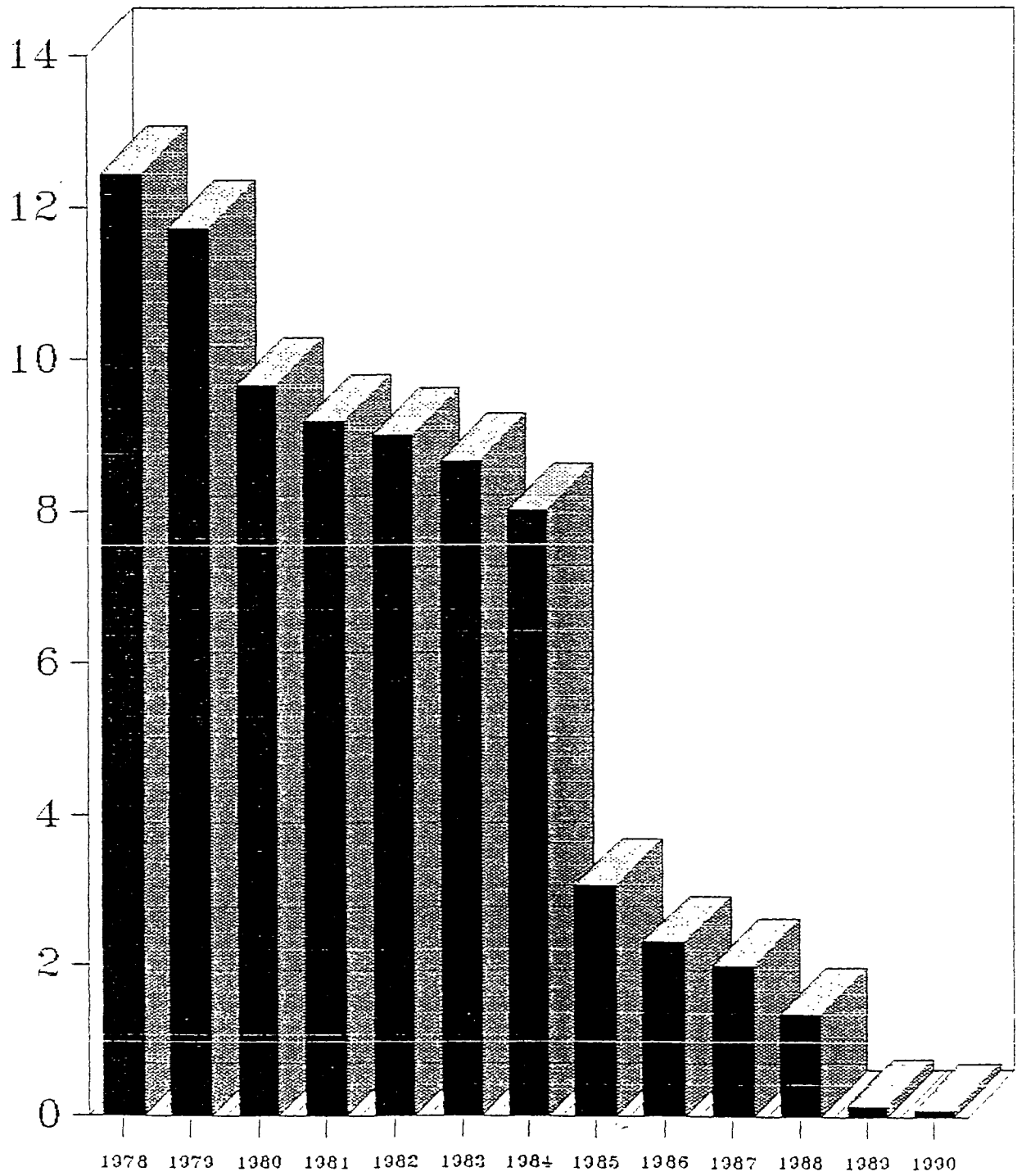


Figure 5: Data for Period 1978 - 1990 (monthly)

GLOBAL RUNOFF DATA CENTRE (GRDC) - CATALOGUE

1. Africa (Region)		01 Medjerda (Subregion)		02 Chott Melhli, Chott Rharsa		03 Chott Djerid		04 Mediterranean Sea Coast. (Western Part)	
A	B	C	D	E	F	G	H	I	K
1201100	Medjerda	Gha'dimaou	TS 3627N	027E	43750	1	1976	12	1979 M J
1201150	Mellegue	KJS	TS 3612N	068E	6635	1	1976	12	1979 M J
1201500	Medjerda	Souqhia	TS 3658N	952E	20895	1	1976	12	1979 M J
1104150	Chejiff	Sidi Bejatar	AL 3602N	027E	43750	1	1976	12	1979 M J
1104200	Mina	Oued El-Ablal	AL 3550N	068E	6635	1	1976	12	1979 M J
1104300	Rhieu	Amni Moussa	AL 3587N	112E	2398	1	1976	12	1979 M J
1104450	Mazafran	Fer a Cheval	AL 3667N	282E	1912	1	1976	12	1979 M J
1104480	Boudouaou	Keddara	AL 3665N	342E	829	1	1976	12	1979 M J
1104500	Isser	Lakhdaria	AL 3662N	358E	4149	1	1976	12	1979 M J
1104530	Sebaou	Raghia	AL 3680N	387E	2501	1	1976	12	1979 M J
1104600	Bousselam	Sidj Yahia	AL 3642N	460E	4309	1	1976	12	1979 M J
1104700	Rhumej	Oued Alhmanja	AL 3623N	630E	1220	1	1976	12	1979 M J
1104800	Mejah	Bouchegouf	AL 3645N	772E	552	1	1976	12	1979 M J
1204900	Joumine	Djebel Antra	TS 3695N	947E	235	1	1976	12	1979 M J
1304100	Emsa	Emsa	MC 3552N	530W	110	4	1971	?	1988 O J
1304800	Kert	Dar Driouch	MC 3490N	329W	1353	6	1969	9	1987 O J

COMMENT

 A = GRDC-Code
 B = Rivar
 C = Station
 D = Code of country
 E = Latitude
 F = Longitude
 G = Catchment area (km²)
 H = Begin of observation data
 I = End of observation data
 J = Kind of data (M = Monthly data, D = Daily data)
 K = Code of measurement

Figure 8

Example

Figure 3 shows the general way how to work with RAISON/GEMS

Data Retrieval within a Polygon

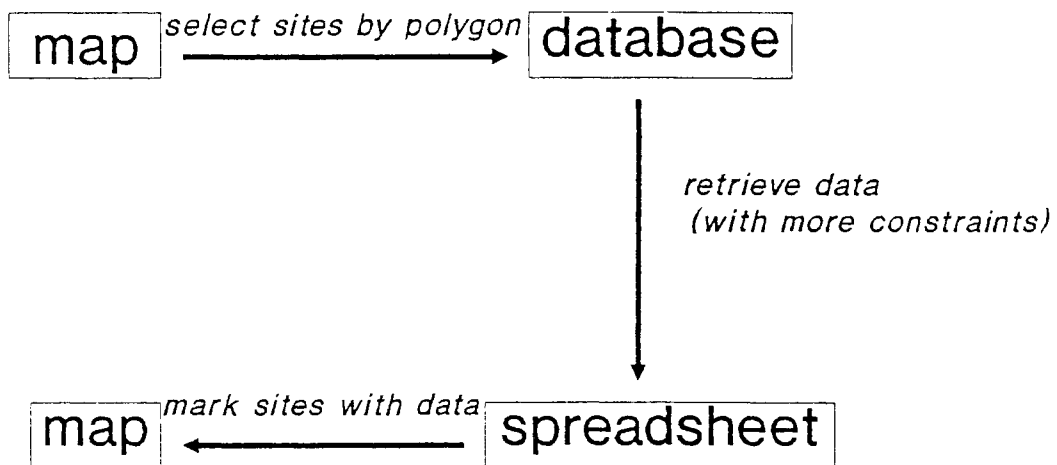


Figure 3

Particular problems result from the large GCM-grid mesh size (500 km); fine-scale effects caused by local topography and other land surface features, are neglected. It is therefore not surprising that GCMs representations of contemporary patterns of rainfall and river runoff do not adequately match observations at the regional level. This seriously limits their predictive use with different climate or land-use scenarios.

Assessments of changes in land surface properties

To improve the realism of GCMs by a better simulation of land-air water exchange and an ameliorate understanding of near-ground dynamics of the water cycle, and its links to energy transfer - as affected by the composition and distribution of vegetation, land relief, soils, and other landscape features is need.

The BAHC project addresses these issues, through experimental studies, modelling and remote sensing. The emphasis is on biologically-mediated effects, with a structured progression from intensive studies of key processes at the patch scale to those layer scales (regional, continental and global).

Why plants matter

Vegetation affects water and energy exchanges in many ways.

Leaves and needles decrease wind strength, alter the absorption of solar radiation, and increase the surface area for evaporation. More importantly, higher plants carry moisture from different soil horizons to the atmosphere, by a complex and dynamic root system, water - conducting "tubes" and leaf and needle stomata. In addition, root dynamic and the decomposition of dead plant organic matter (e.g. roots, leaves etc.) by soil organisms modify soil texture and structure considerably, affecting water infiltration, seepage penetration and drainage.

From tropics to tundra

One region of particular concern is the Amazon Basin, supporting around 30 % of the Earth's remaining tropical forests. What would be the hydrological consequences of their complete removal, and replacement by shrub and grassland? Such a scenario

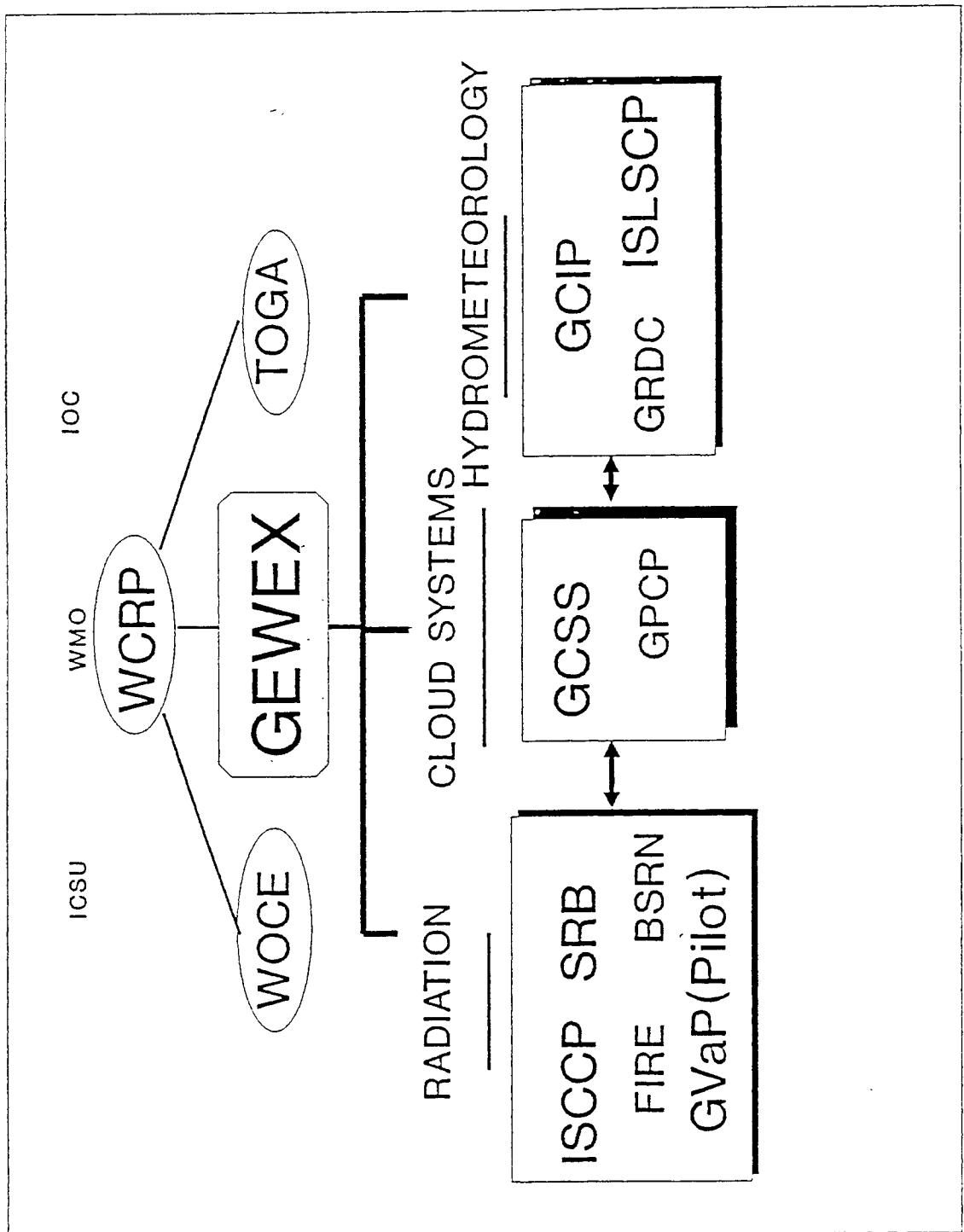


Figure 1

