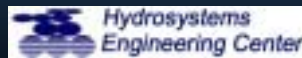


Rainfall Runoff Forecasting System (RRFS)



16 November 2005

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Contents

- ◎ Definition and functions of RRFS
- ◎ Structure of RRFS
- ◎ Running and Operation of RRFS

Rainfall-Runoff Relationship



- ⊙ Purpose of RRFS development
 - ⊙ Forecasting of water demand and supply in real-time or for a short-term period (within 10days)
 - ⊙ Real-time water balance technology for optimizing water distribution and supply

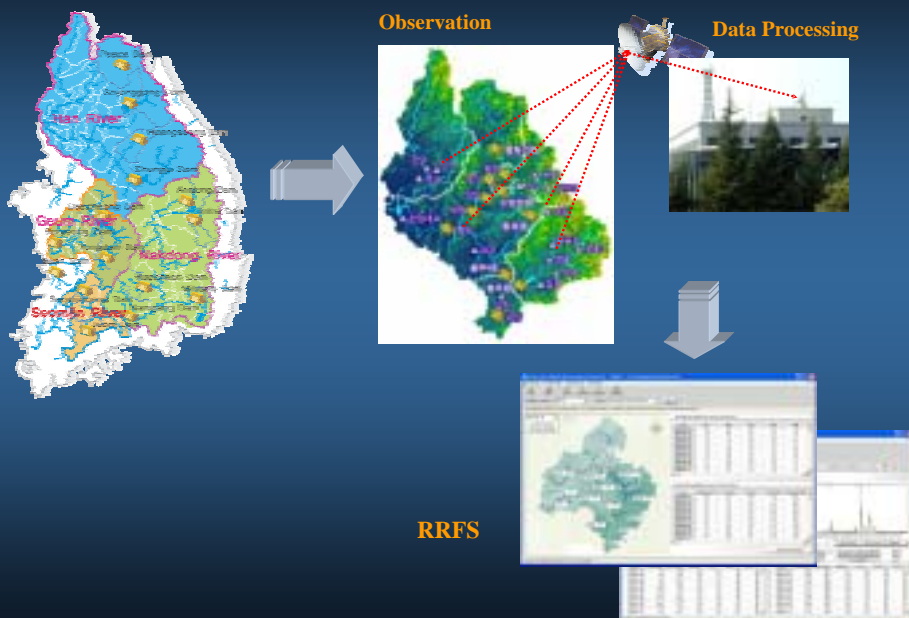
What is RRFS?

- ⊙ Rainfall Runoff Forecasting System (RRFS) is developed to analyze the streamflow states of the major control points at upstream and downstream of the dam in order to simulate the low flow on which the management of dry season is based.
- ⊙ Sharing the information and providing the user's convenience will be achieved by developing the web-based interface technology.

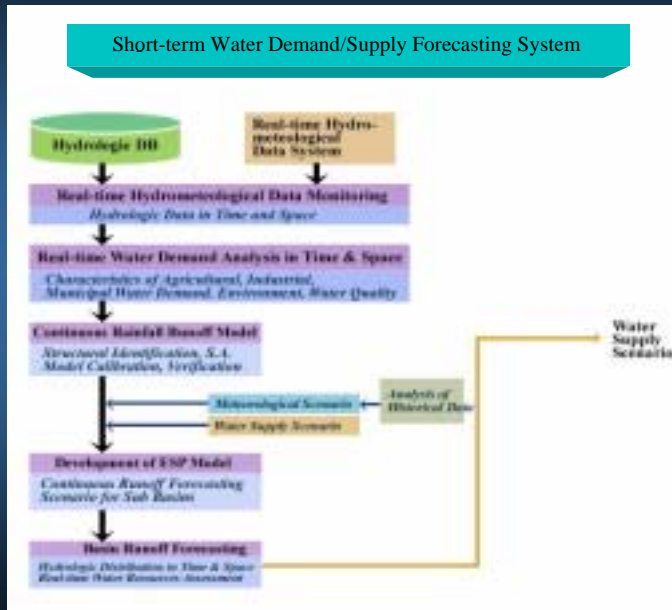
Major functions of RRFS

- ⊙ Integrated management of water quantity and quality
- ⊙ Identifying characteristics of water use for municipal, industrial and agricultural purposes
- ⊙ Deriving hydrologic rainfall-runoff relationship
- ⊙ Estimating streamflow by sub-basins and major control point

Procedure of Runoff Simulation



Structure of RRFS

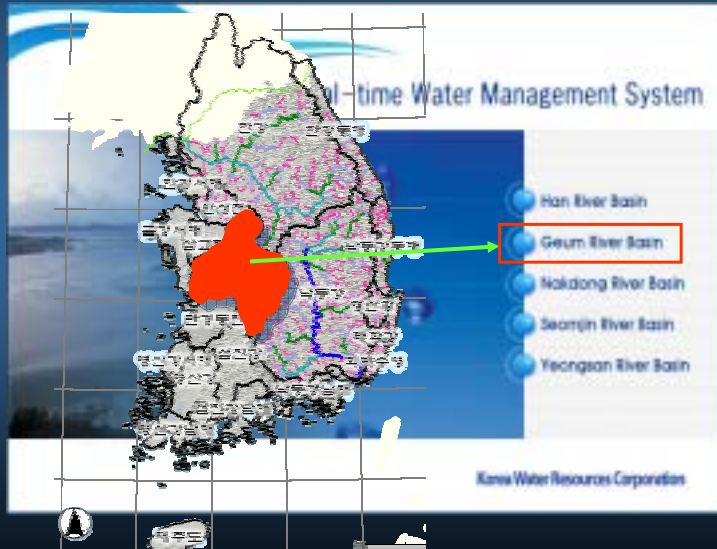


Menu Structure of RRFS

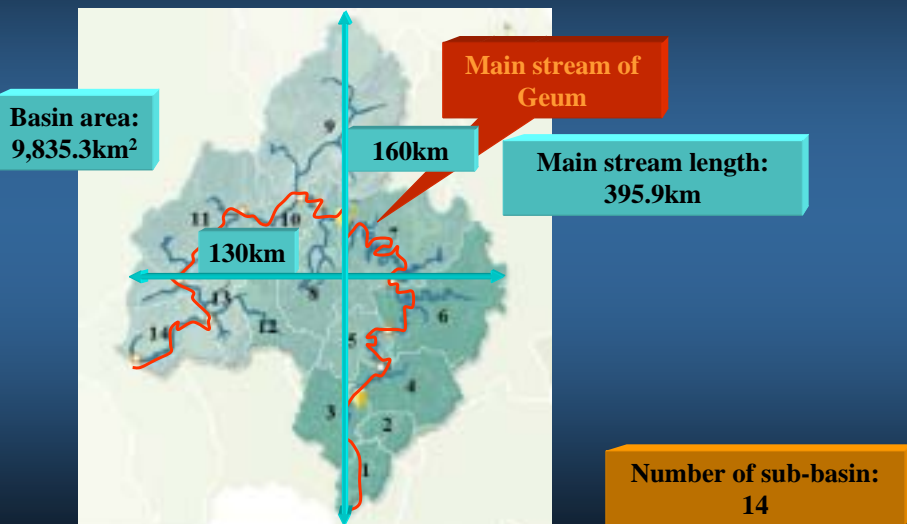


Running of RRFS

◎ Initial window



Geum River Basin



Model Verification (1)

Quick Parameter Calibration

Basic parameters

Water use

Additional parameters

Data Setup for Runoff Forecasting

ESP Option

Period Setup

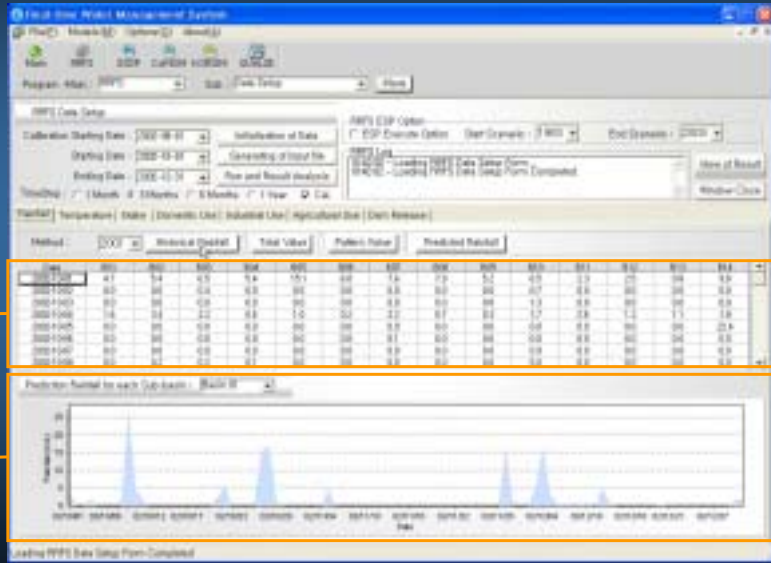
Data Type

Table

Graph

Rainfall Type (1)

Historical Rainfall

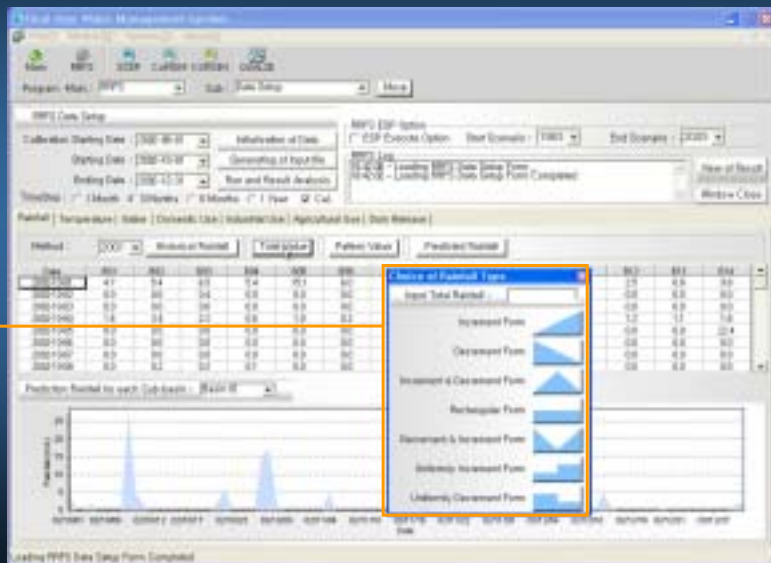


Table

Graph

Rainfall Type (2)

Total Value

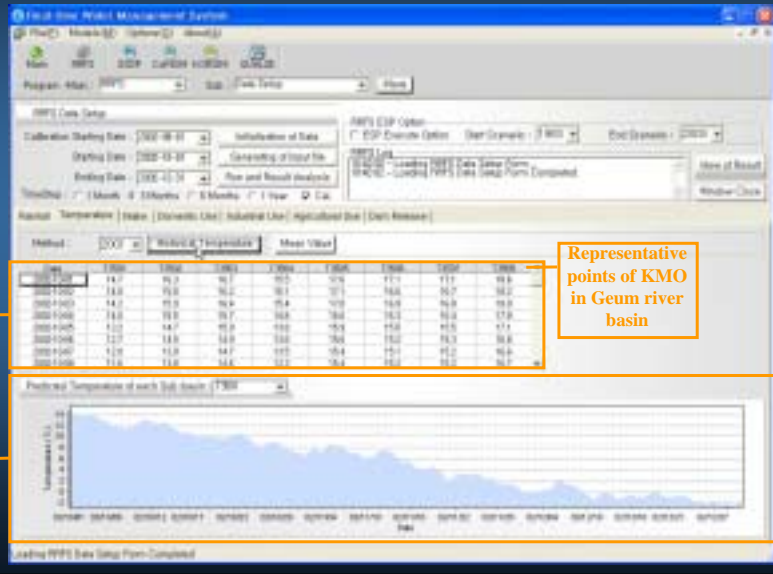


Choice of Type of Rainfall Distribution

- Input Total Rainfall
- Incremental Form
- Decremental Form
- Increment & Decremental Form
- Non-linear Form
- Decremental & Incremental Form
- Uniformly Incremental Form
- Uniformly Decremental Form

Temperature Type (1)

Historical Temperature



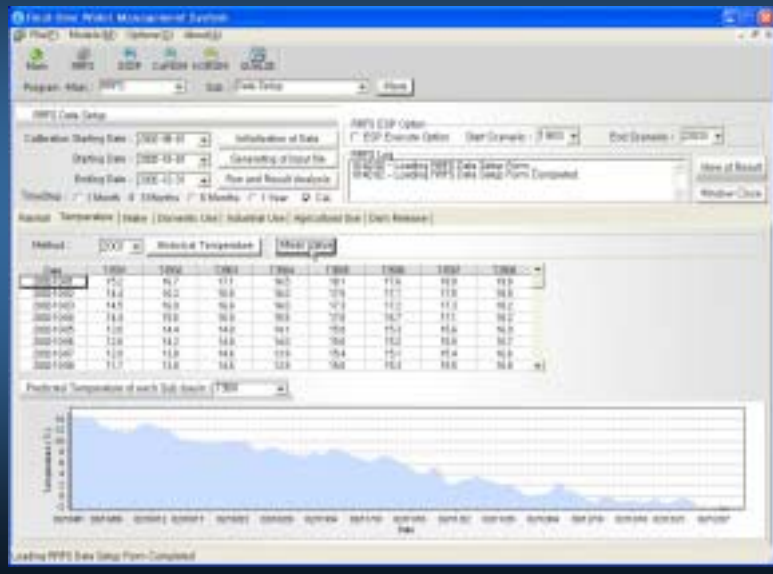
Table

Representative points of KMO in Geum river basin

Graph

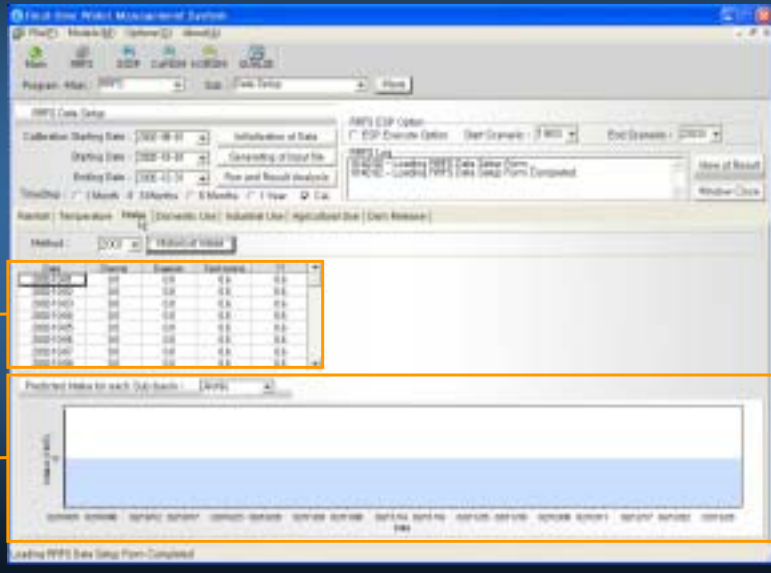
Temperature Type (2)

Mean Temperature



Intake

⦿ Historical Intake

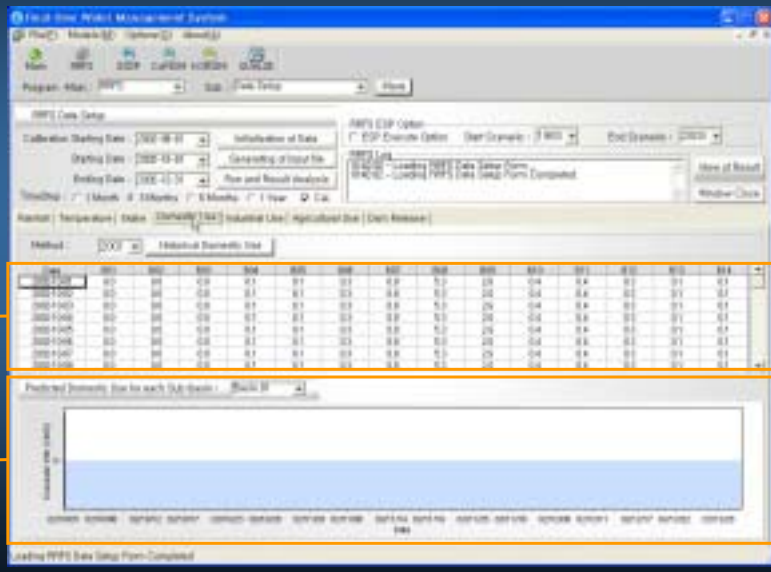


Table

Graph

Water Use Type (1)

⦿ Domestic Use – Historical data

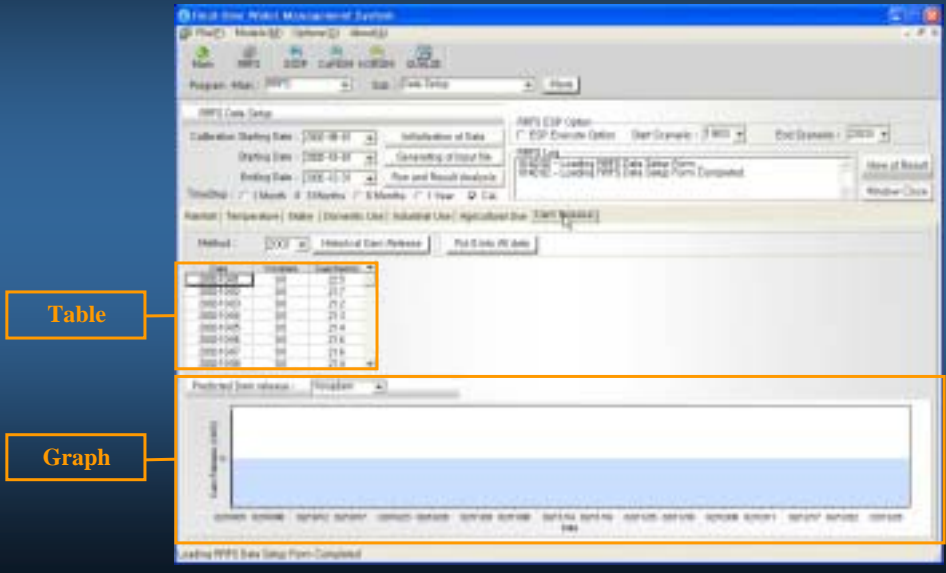


Table

Graph

Dam Release Type (1)

⦿ Historical Dam release

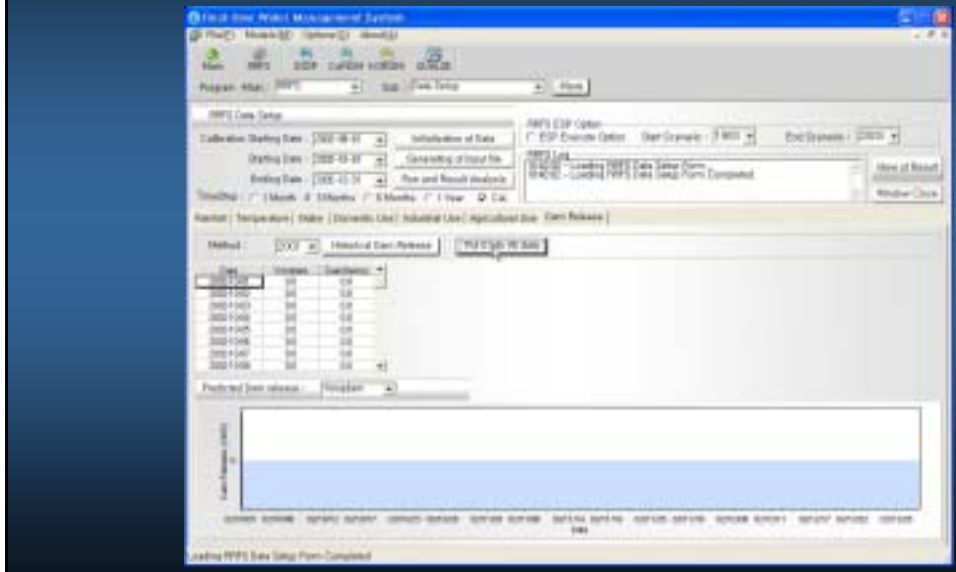


Table

Graph

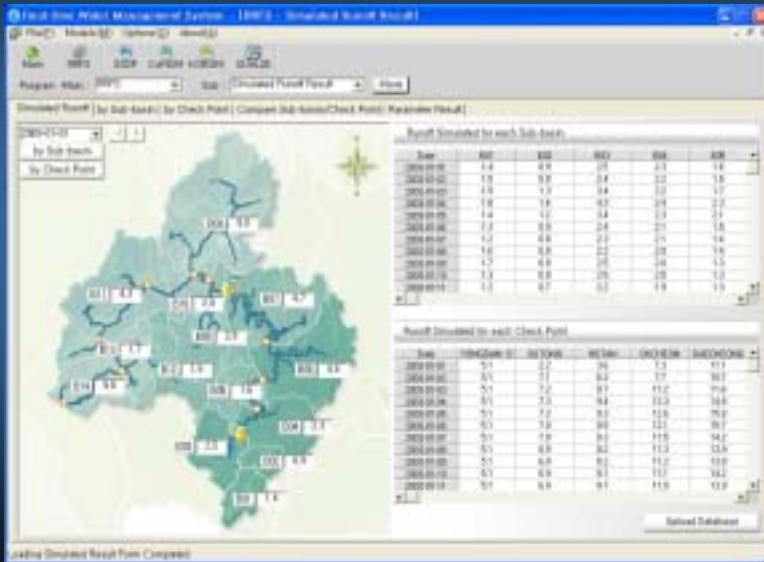
Dam Release Type (2)

⦿ Zero Value



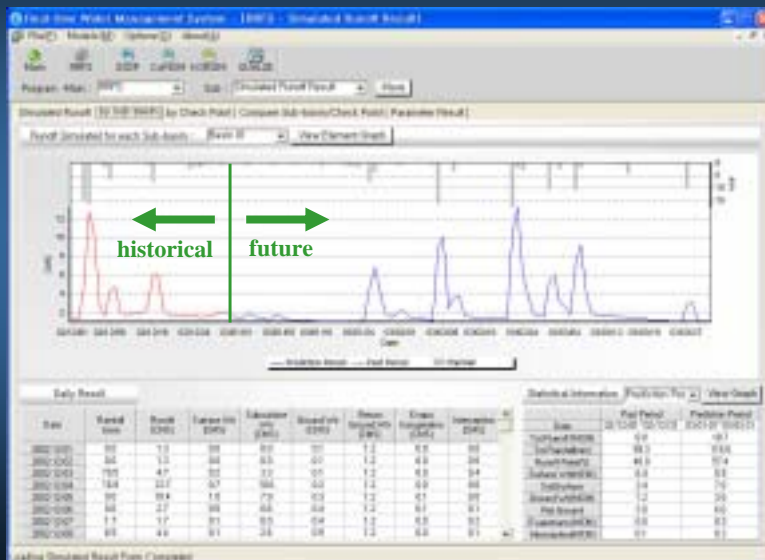
Outputs (1)

⊙ Simulated runoff



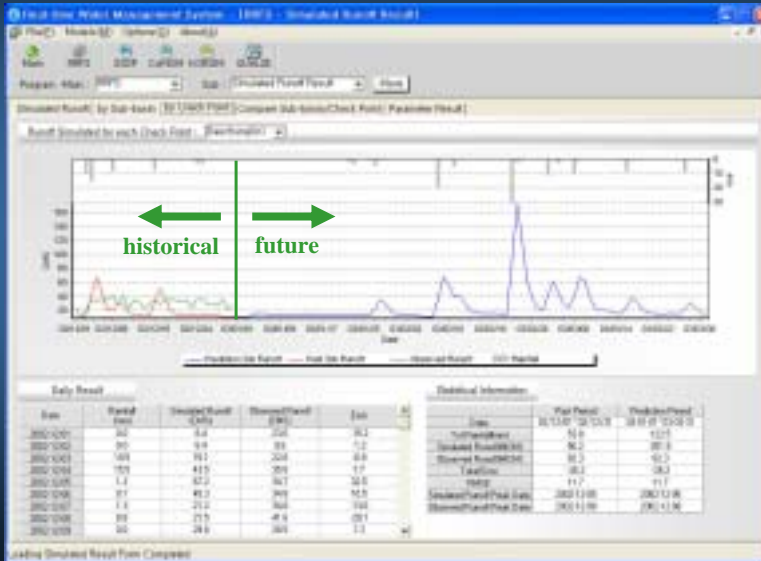
Output (2)

⊙ Simulated runoff for each sub-basin



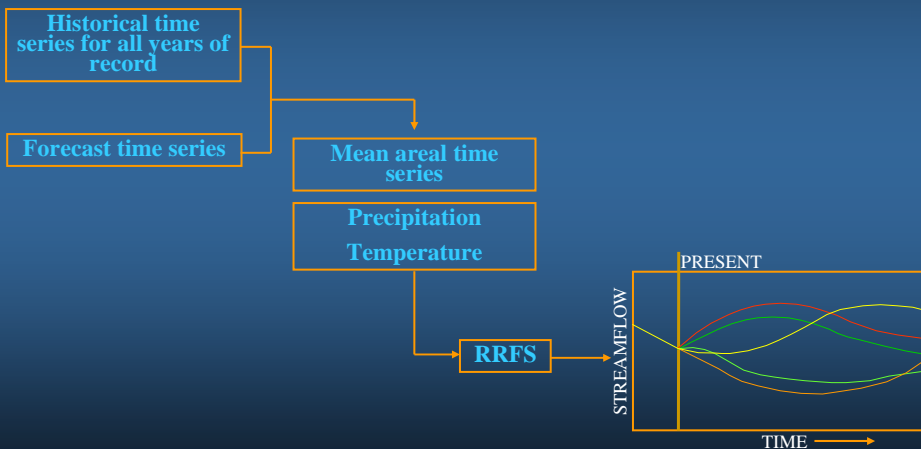
Output (3)

⊙ Simulated runoff for each control point



ESP Procedure (1)

⊙ Ensemble Streamflow Prediction



ESP Procedure (2)

ESP Option & Running

Choice of scenario

ESP Status

ESP end

ESP Procedure (3)

ESP Graph

Basin Choice

historical forecasting

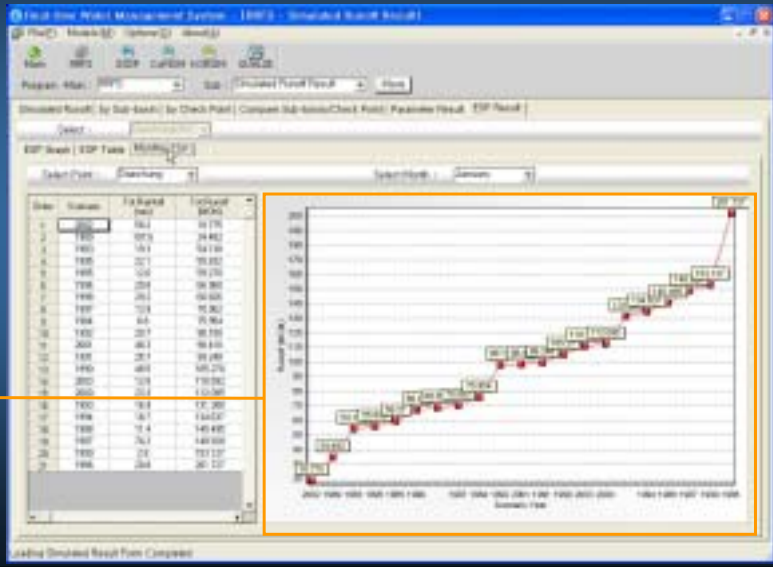
ESP Procedure (4)

ESP Result Table by Each Subbasin

Subbasin	Population	Total Runoff	Urban's Runoff	Commercial's Runoff	Industrial's Runoff	Residential's Runoff	Greenland's Runoff	Other's Runoff
1	104	10.0	0.0	0.0	0.0	0.0	0.0	0.0
2	200	20.0	0.0	0.0	0.0	0.0	0.0	0.0
3	300	30.0	0.0	0.0	0.0	0.0	0.0	0.0
4	400	40.0	0.0	0.0	0.0	0.0	0.0	0.0
5	500	50.0	0.0	0.0	0.0	0.0	0.0	0.0
6	600	60.0	0.0	0.0	0.0	0.0	0.0	0.0
7	700	70.0	0.0	0.0	0.0	0.0	0.0	0.0
8	800	80.0	0.0	0.0	0.0	0.0	0.0	0.0
9	900	90.0	0.0	0.0	0.0	0.0	0.0	0.0
10	1000	100.0	0.0	0.0	0.0	0.0	0.0	0.0
11	1100	110.0	0.0	0.0	0.0	0.0	0.0	0.0
12	1200	120.0	0.0	0.0	0.0	0.0	0.0	0.0
13	1300	130.0	0.0	0.0	0.0	0.0	0.0	0.0
14	1400	140.0	0.0	0.0	0.0	0.0	0.0	0.0
15	1500	150.0	0.0	0.0	0.0	0.0	0.0	0.0
16	1600	160.0	0.0	0.0	0.0	0.0	0.0	0.0
17	1700	170.0	0.0	0.0	0.0	0.0	0.0	0.0
18	1800	180.0	0.0	0.0	0.0	0.0	0.0	0.0
19	1900	190.0	0.0	0.0	0.0	0.0	0.0	0.0
20	2000	200.0	0.0	0.0	0.0	0.0	0.0	0.0
21	2100	210.0	0.0	0.0	0.0	0.0	0.0	0.0
22	2200	220.0	0.0	0.0	0.0	0.0	0.0	0.0
23	2300	230.0	0.0	0.0	0.0	0.0	0.0	0.0
24	2400	240.0	0.0	0.0	0.0	0.0	0.0	0.0
25	2500	250.0	0.0	0.0	0.0	0.0	0.0	0.0
26	2600	260.0	0.0	0.0	0.0	0.0	0.0	0.0
27	2700	270.0	0.0	0.0	0.0	0.0	0.0	0.0

ESP Procedure (5)

Monthly ESP Results by Each Point



Characteristics of RRFS

- ⊙ DB solution for RRFS
- ⊙ User-friendly operating system
- ⊙ Diversity and flexibility of input data
- ⊙ Running and modification according to various scenarios
- ⊙ Estimation of real-time runoff
- ⊙ Conjunctive use with other models such as SSDP, COMOM etc.
- ⊙ Change with other engines for runoff simulation
- ⊙ Runoff forecasting with ESP scheme

Present Status of RRFS

- ⊙ In KOWACO, RRFS will be served as a useful tool for real-time rainfall-runoff analyses in efficient basin water resources management including rivers and reservoirs.
- ⊙ RRFS is currently tested and verified at Water Resources Operation Center (WROC) to manage water resources of Geum river basin.

Future Works

- ◎ RRFS is extending to apply to other river basins, such as Nakdong river basin, etc.
- ◎ GUI system of RRFS is upgrading continuously to operate more conveniently by users

Thank you!

