Program of the AWCI training course for the Climate Change Assessment and Adaptation Study

3. Case Study : SURR Model

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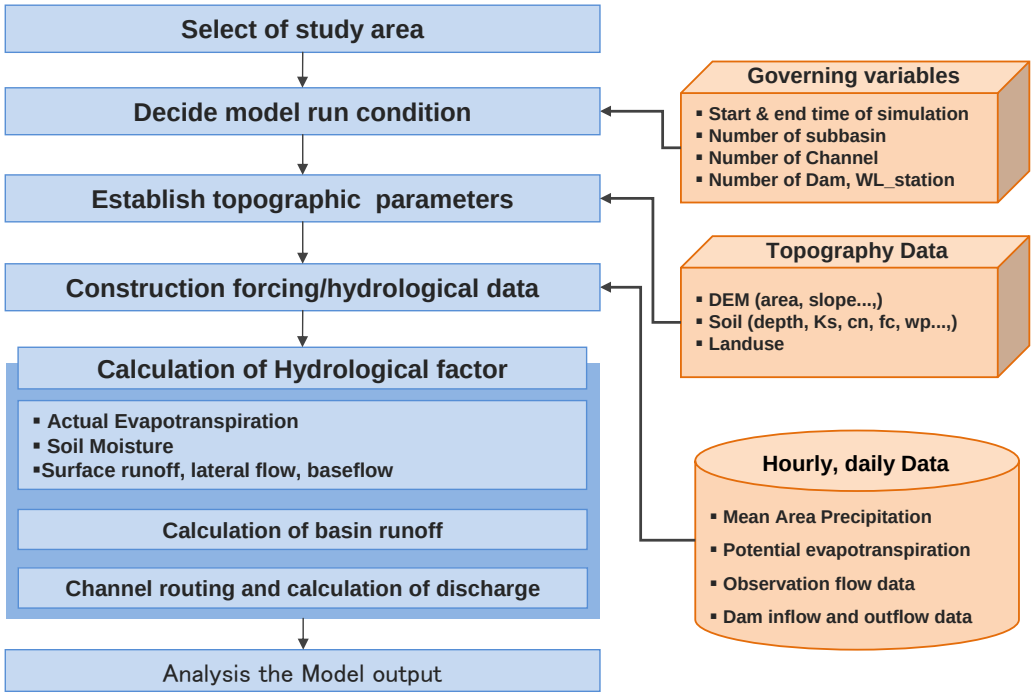
Outline of model Case Study

Model simulation process



Description of Input/Output Files

Input

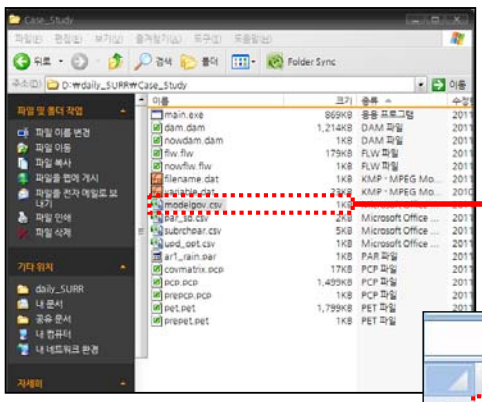
File name	Information
modelgov.csv	Model govern factor file
subchpar.csv	Soil Parameter file each sub basin
pcp.pcp	Mean area precipitation file each sub basin
pet.pet	Potential evapotranspiration file each sub basin
dam.dam	Observation dam inflow and outflow file
flw.flw	Observation flow file each water level station

Output

File name	Information
cn.sub	CN Value record file each subbasin
scn.sub	Variable storage parameter values
hydrocomn.sub	Hydrology elements file each subbasin (AET, soil water, surface runoff, lateral flow, groundwater flow)
stormn.sub	Storage value each subbasin
dischmn.dat	Discharge value from channel routing

Model run condition setup

➢ Case1 : Hourly Simulation



Folder :SURR_model / code_h

Filename : modelgov.csv

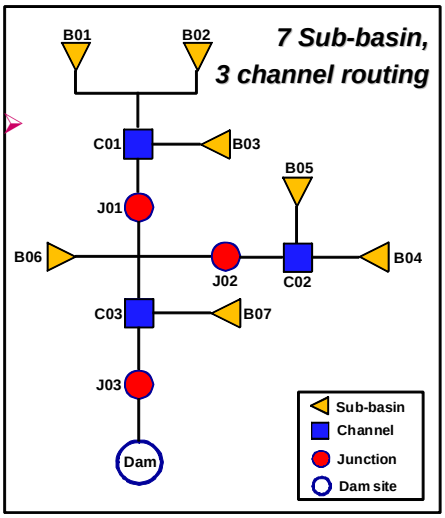
N3

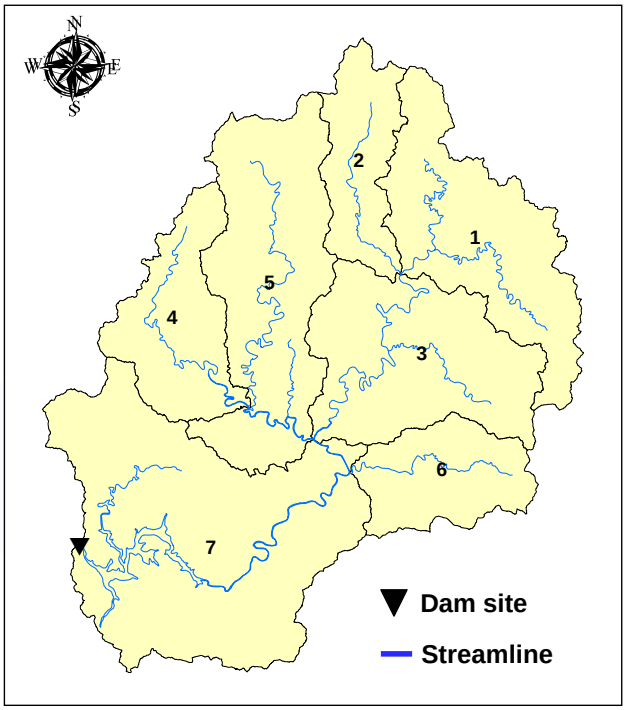
	A	B	C	D	E
1	2009060101	Start time of Simulation (yyyymmddhh)			
2	2003073124	End time of Simulation (yyyymmddhh)			
3	7	Number of Basin			
4	3	Number of Channel			
5	1	Number of Dam site			
6	0	Number of Water level station			
7	1	1: Hourly simulation | 2: Daily simulation			
8					

Sample Application of SURR Model

Study area(Chungju Dam) – AWCI Demonstration Basin

- Area : 6662 km²
- Basin Slope : 0.3185
- Stream network

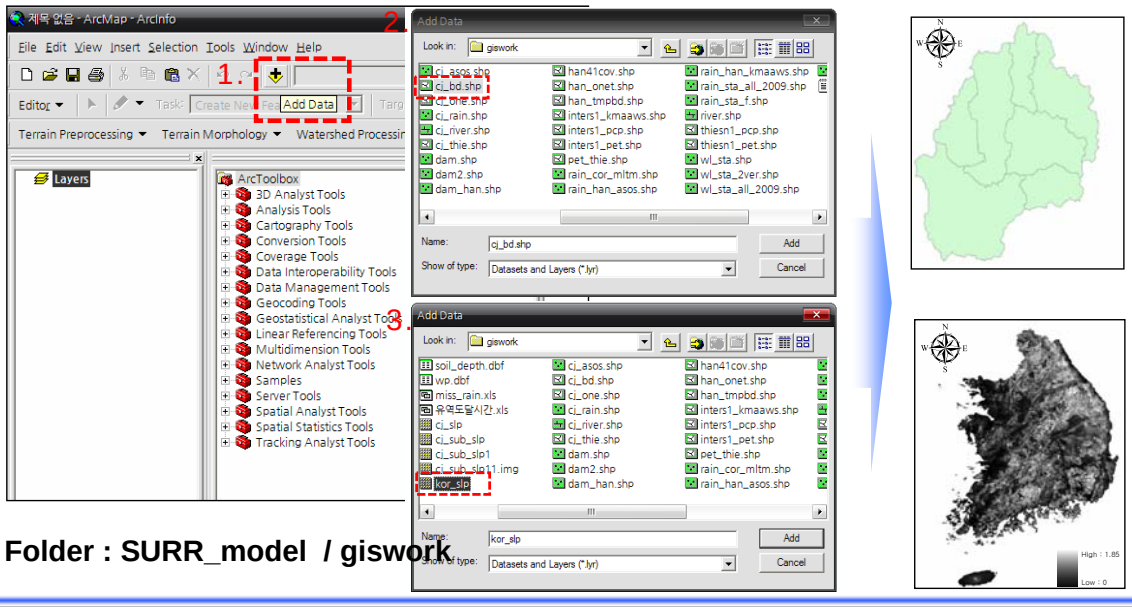




Construction of input file

- Subchpar.csv : Topographic Data Setup (examples : Slope, CN)
- Calculation of sub basin slope

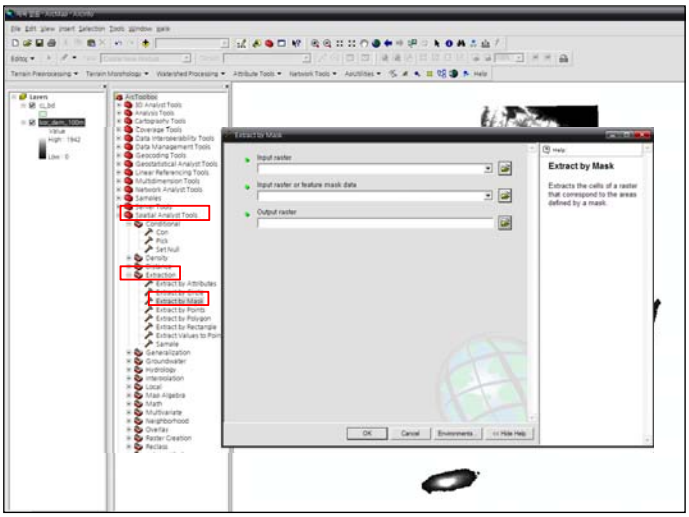
- Start Arc Map → Add Data → Open file <cj_bd.shp>, <kor_slp >

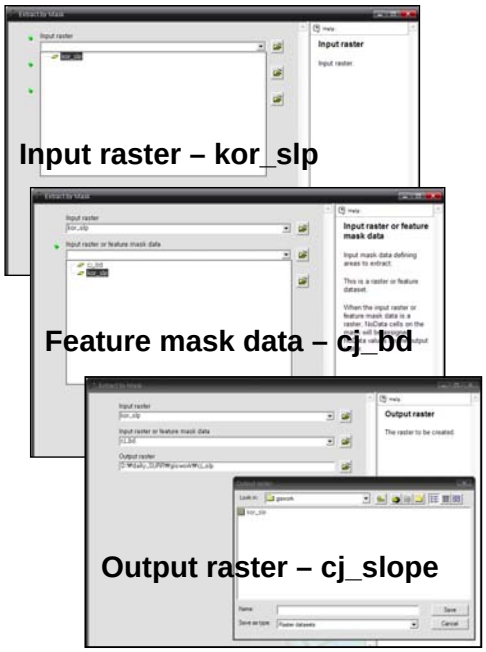


Folder : SURR_model / giswork

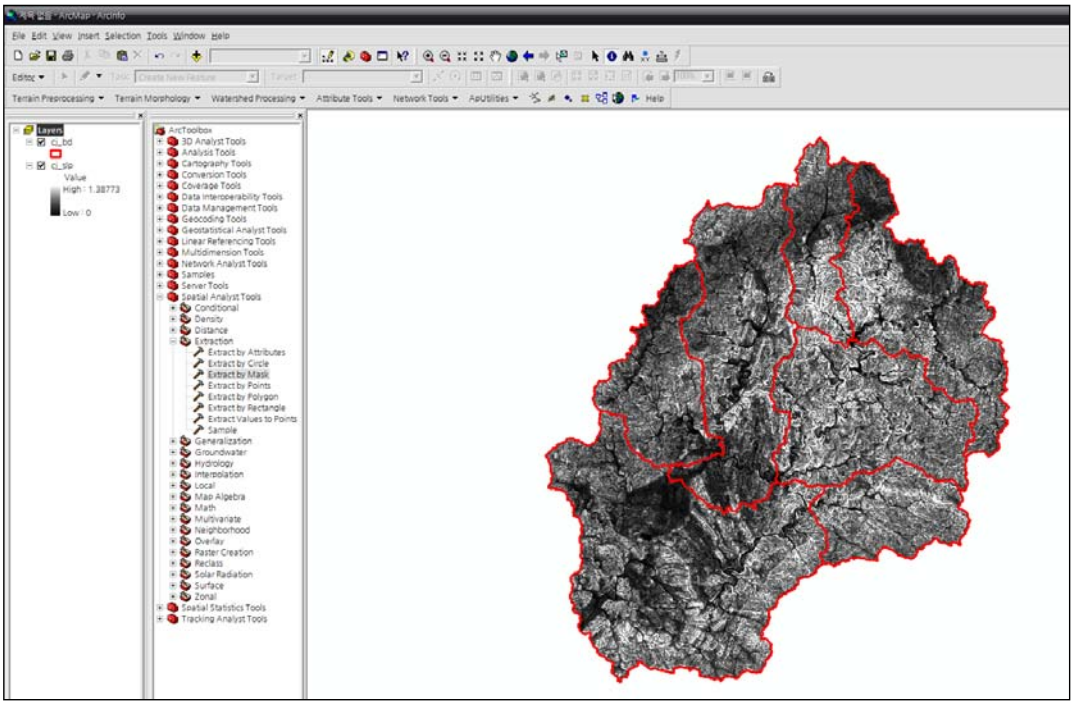
Clip slope file

- ArcToolbox → Spatial Analyst Tool → Extraction → Extraction by Mask



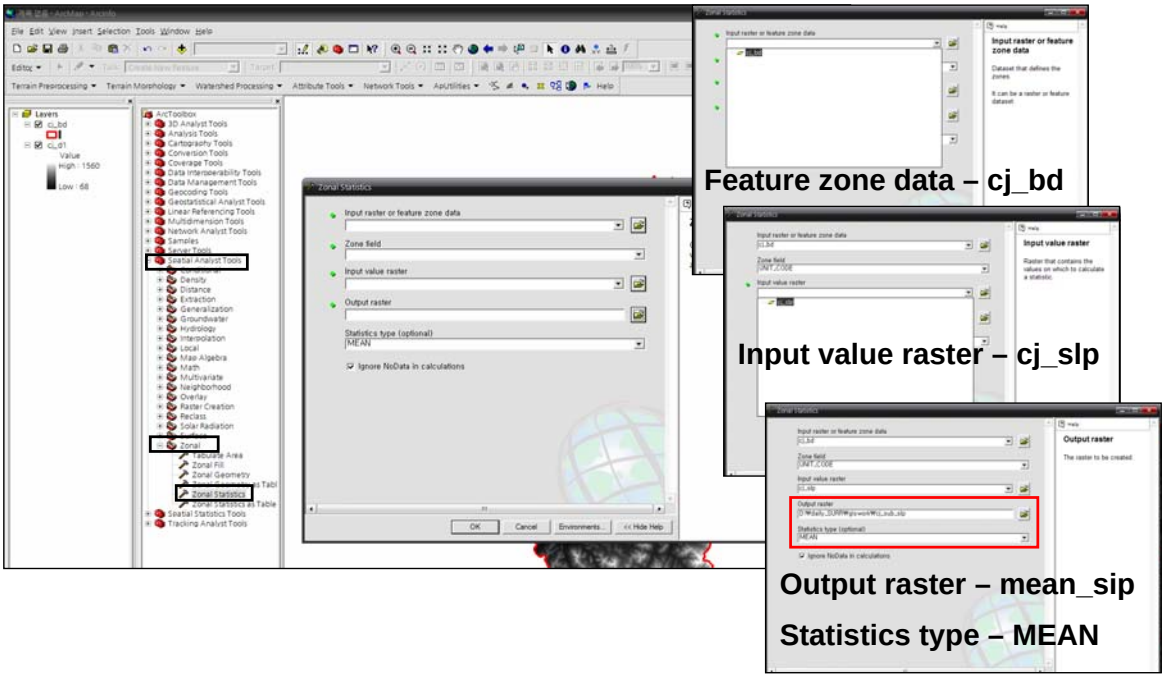


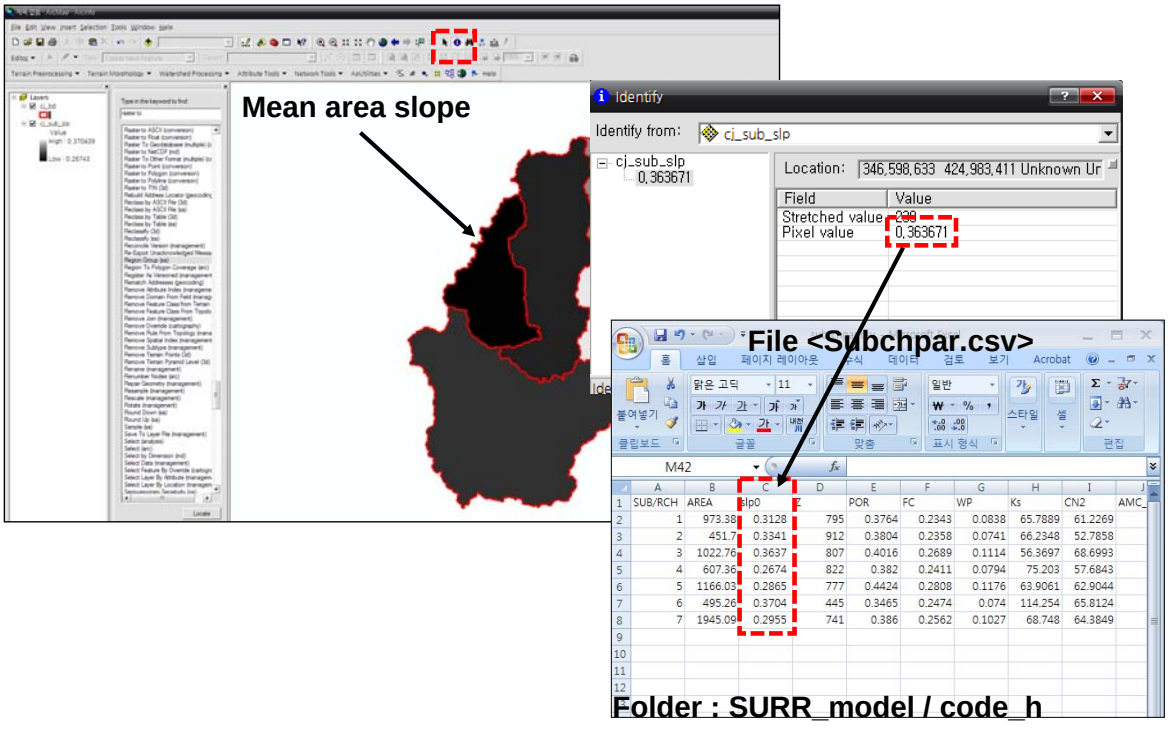
Cliped slope file



Calculation of mean area slope

- ArcToolbox →Spatial Analyst Tool → Zonal → Zonal Statistics



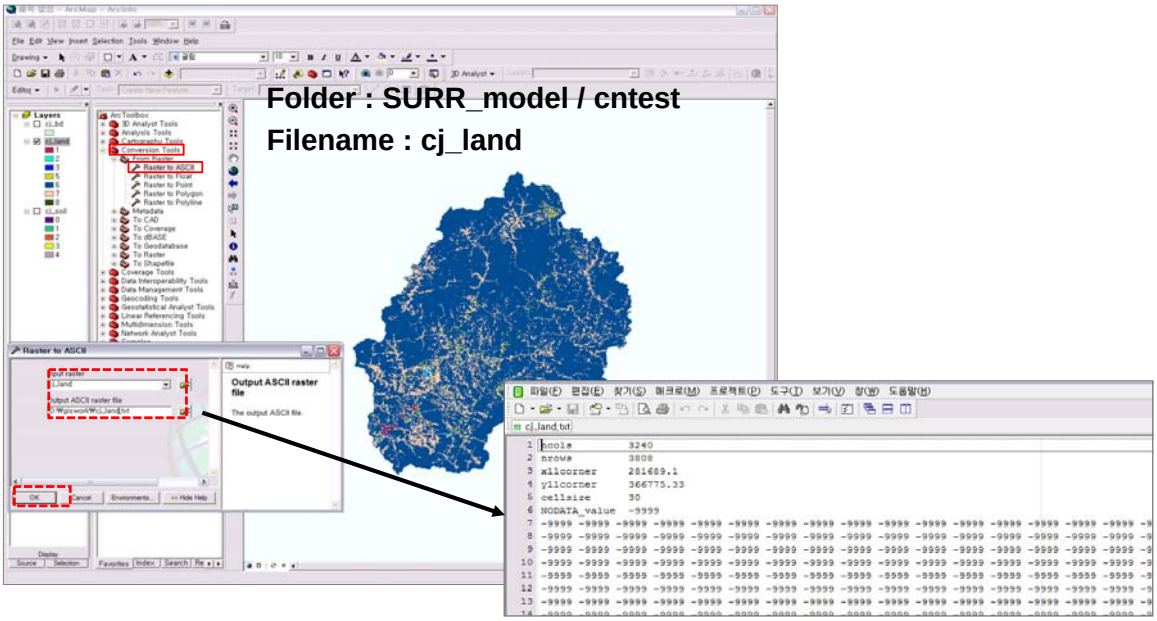


	A	B	C	D	E	F	G	H	I	J
1	SUB/RCH	AREA	Slp0	Z	POR	FC	WP	Ks	CN2	AMC_
2	1	973.38	0.3128	795	0.3764	0.2343	0.0838	65.7889	61.2269	
3	2	451.7	0.3341	912	0.3804	0.2358	0.0741	66.2348	52.7858	
4	3	1022.76	0.3637	807	0.4016	0.2689	0.1114	56.3697	68.6993	
5	4	607.36	0.2674	822	0.382	0.2411	0.0794	75.203	57.6843	
6	5	1166.03	0.2865	777	0.4424	0.2808	0.1176	63.9061	62.9044	
7	6	495.26	0.3704	445	0.3465	0.2474	0.074	114.254	65.8124	
8	7	1945.09	0.2955	741	0.386	0.2562	0.1027	68.748	64.3849	
9										
10										
11										
12										

➢ Calculation of mean areal CN

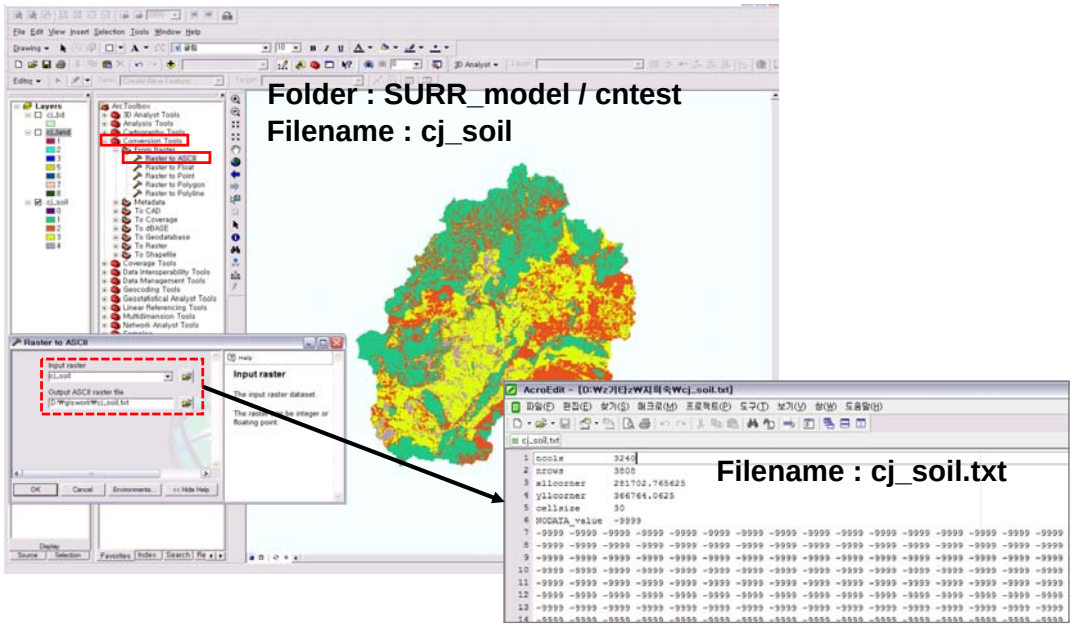
Conversion of landuse raster file into ascii file

- Arc tool box → Conversion Tools → Raster to ASCII

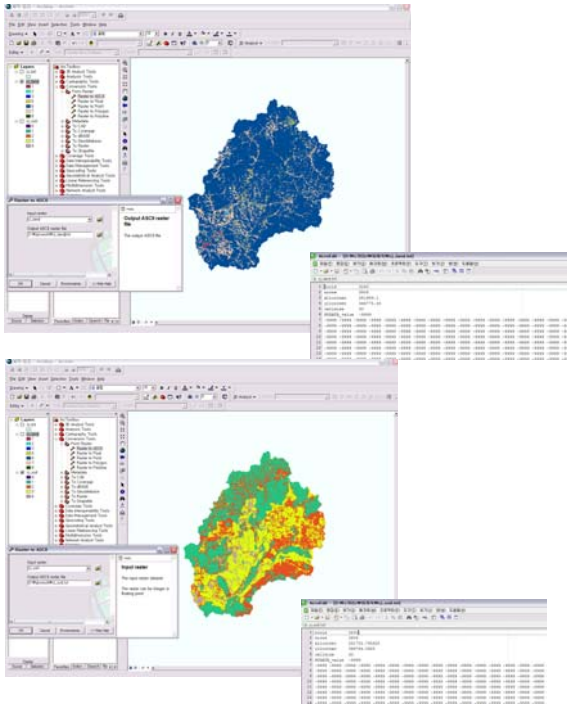


Conversion of soil raster file into ascii file

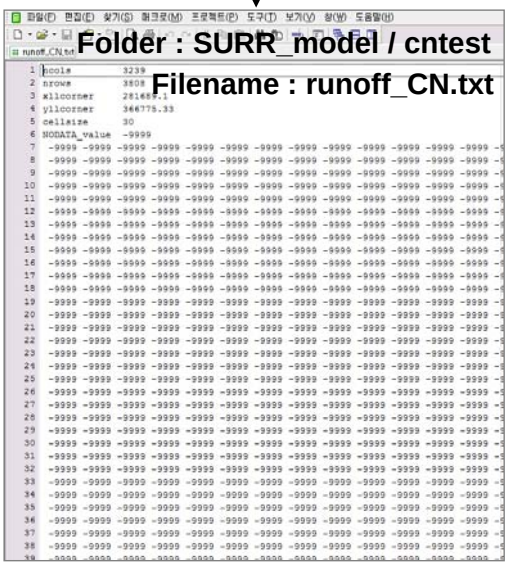
- Arc tool box → Conversion Tools → Raster to ASCII



Calculation of CN at each grid



Program Run : CN_calbration.exe

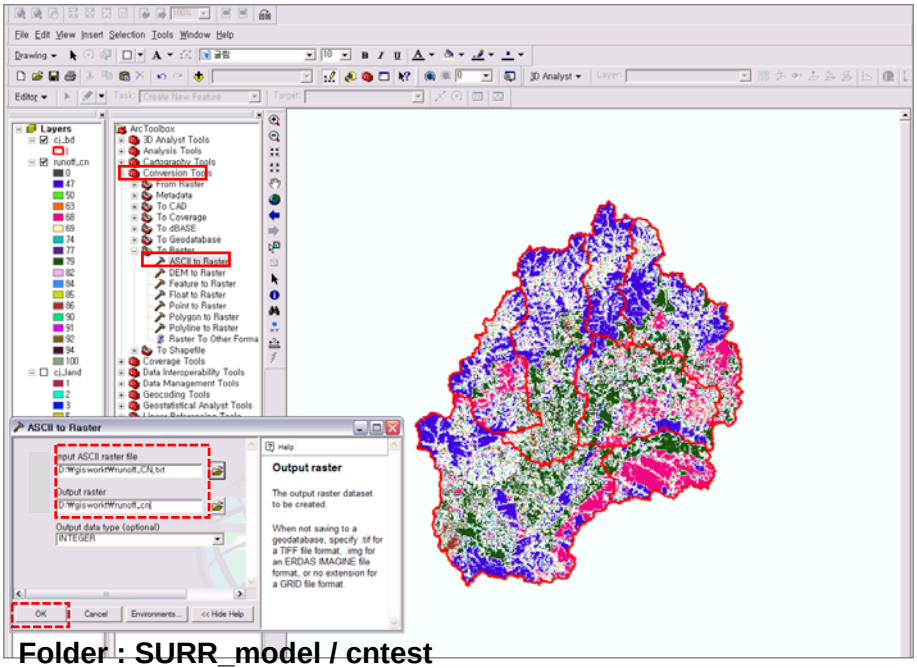


Folder : SURR_model / cntest

Filename : runoff_CN.txt

Conversion of CN_ascii file into CN_raster file

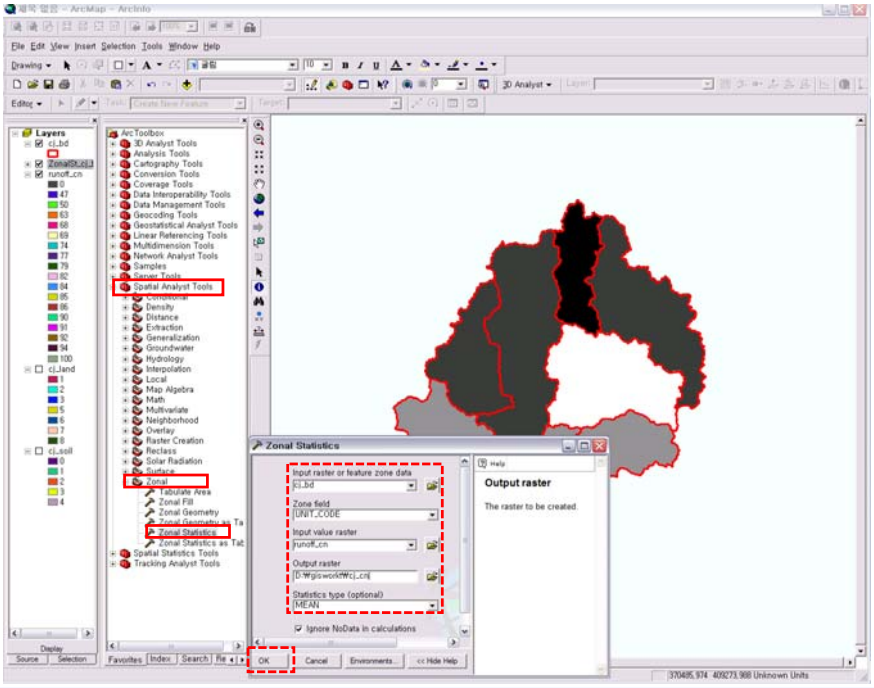
- Arc tool box → Conversion Tools → ASCII to Raster

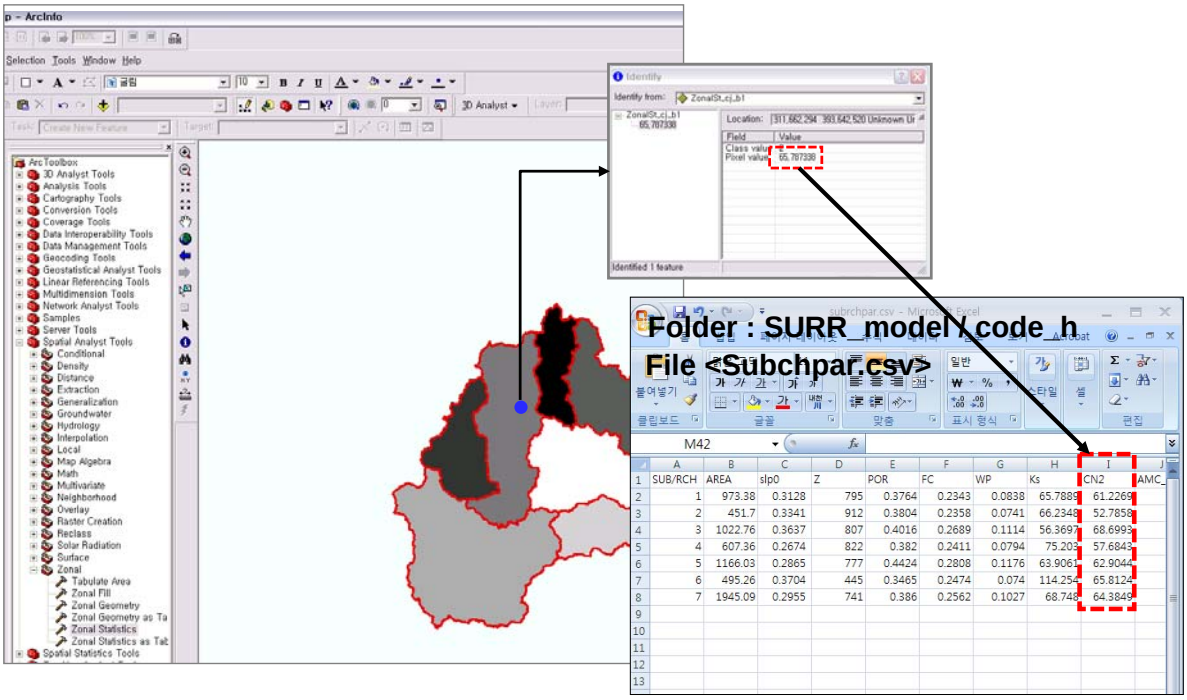


Folder : SURR_model / cntest

Calculation of mean areal CN each subbasin

- Arc tool box → Spatial Analyst Tools – Zonal – Zonal Statistics

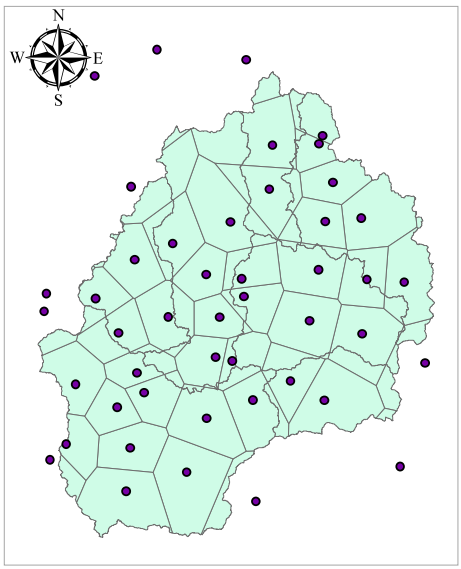




Forcing data setup

SURR_model / code_h

- Precipitation thiessen polygons using ArcMap



- File <pcp.pcp>

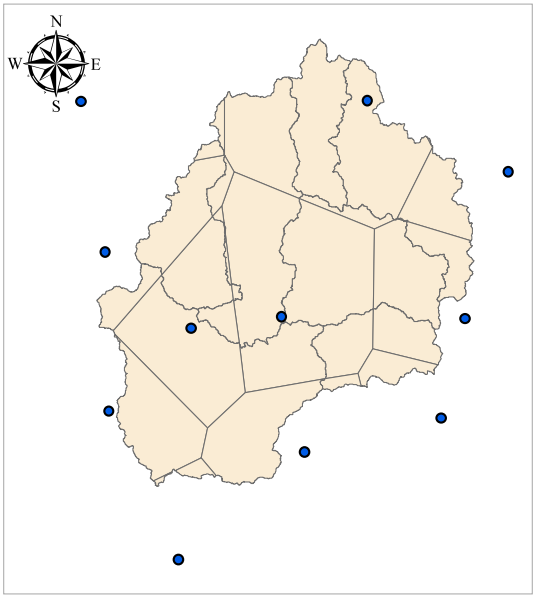
time	01s	02s	03s	04s	05s	06s
2002010101	1.10	1.30	1.70	3.40	2.40	2.50
2002010102	.60	.10	.40	.10	.40	.30
2002010103	.00	.00	.00	.00	.00	.00
2002010104	.00	.10	.30	.10	.40	.10
2002010105	1.20	1.20	2.00	.30	.90	1.50
2002010106	.80	.70	1.80	.20	.70	.80
2002010107	1.90	1.20	2.60	3.50	2.80	3.00
2002010108	.40	.00	.00	.00	.00	.00
2002010109	.00	.00	.20	.00	.20	.00
2002010110	.00	.80	.40	.30	.20	.00
2002010111	.00	.00	1.60	.00	.20	.00
2002010112	.80	.30	1.40	.00	.00	.40
2002010113	.40	.10	.20	.00	.10	.20
2002010114	1.40	1.80	1.30	.90	1.30	.00
2002010115	6.80	11.20	8.70	8.70	12.20	10.00
2002010116	11.70	11.80	13.70	11.00	11.10	9.90
2002010117	5.10	3.60	3.30	2.30	2.20	3.50
2002010118	.00	1.20	1.30	.00	.30	.30
2002010119	.10	.00	1.20	.00	.20	.10
2002010120	.30	1.00	.70	1.40	1.20	.90
2002010121	.00	.50	.70	.50	.20	.10
2002010122	.20	.00	.50	.00	.00	.40
2002010123	.20	.00	.20	.00	.00	.00
2002010124	.00	.00	.20	.00	.00	.00
2002010201	1.20	.40	.20	.00	.00	.10
2002010202	3.10	.50	2.40	.60	.10	2.50
2002010203	2.40	.90	1.50	.60	.70	1.20
2002010204	.00	.00	.00	.00	.00	.00
2002010205	.00	.00	.40	.00	.00	.00
2002010206	.20	.00	.80	.00	.10	.00
2002010207	.00	.00	.20	.00	.00	.00
2002010208	.00	.00	.20	.00	.00	.00
2002010209	.00	.40	.00	.00	.10	.00
2002010210	.00	.00	.00	.00	.00	.00
2002010211	.00	.00	.00	.00	.00	.00
2002010212	.00	.00	.00	.00	.00	.00

YYYYMMDDHH (hourly)

Mean Area Precipitation (MAP)

- Weather data thiessen polygons using ArcMap
- Calculation of potential evapotranspiration

SURR_model / code_h



File name : <pet.pet>

time	01s	02s	03s	04s	05s	06s
2002010101	.00	.00	.00	.00	.00	.00
2002010102	.00	.00	.00	.00	.00	.00
2002010103	.00	.00	.00	.00	.00	.00
2002010104	.00	.00	.00	.00	.00	.00
2002010105	.01	.00	.00	.00	.00	.00
2002010106	.01	.00	.00	.02	.00	.00
2002010107	.02	.01	.02	.02	.02	.01
2002010108	.03	.02	.03	.03	.03	.03
2002010109	.06	.05	.05	.05	.05	.05
2002010110	.10	.06	.10	.10	.09	.11
2002010111	.11	.08	.12	.12	.10	.12
2002010112	.13	.10	.12	.12	.12	.13
2002010113	.12	.09	.12	.11	.11	.12
2002010114	.10	.07	.10	.10	.09	.10
2002010115	.08	.06	.07	.07	.07	.07
2002010116	.05	.04	.04	.03	.04	.04
2002010117	.02	.02	.00	.01	.01	.01
2002010118	.02	.02	.01	.00	.01	.01
2002010119	.03	.01	.00	.00	.01	.00
2002010120	.02	.01	.00	.00	.00	.00
2002010121	.02	.01	.00	.00	.00	.00
2002010122	.01	.01	.00	.01	.01	.00
2002010123	.02	.01	.00	.01	.01	.00
2002010124	.01	.01	.00	.00	.01	.00
2002010201	.02	.01	.00	.00	.01	.00
2002010202	.02	.01	.01	.00	.00	.01
2002010203	.01	.01	.00	.00	.00	.01
2002010204	.02	.01	.00	.01	.00	.01
2002010205	.02	.01	.01	.01	.01	.01
2002010206	.03	.01	.01	.01	.01	.01
2002010207	.03	.02	.02	.02	.02	.02
2002010208	.03	.02	.03	.03	.02	.03
2002010209	.05	.03	.05	.05	.05	.05
2002010210	.06	.05	.07	.08	.07	.08

YYYYMMDDHH (hourly)

Mean Area PET

➢ Initial parameter setup

Parameter	description	Value
K	Storage Function constant of the subbasin	70
P	Storage Function constant of the subbasin	0.3
KK	Storage Function constant of the channel	5200

Folder : SURR_model / code_h

File <Subchpar.csv>

subrchpar.csv - Microsoft Excel

V29

	J	K	L	M	N	O	P	Q	R	S	T	U	V	W
1	AMC_D	SURLAG	LHIL	SEPLAG	LATLAG	GW_LAG	ALPHA_BF	AQMIN	ADJET	K	p	tao	KK	pp
2	24	4	0.5	1	0.1	100	1	2		1			5	1
3	24	4	0.5	1	0.1	100	1	2		1			8	1
4	24	4	0.5	1	0.1	100	1	2		1			5	1
5	24	4	0.5	1	0.1	100	1	2		1			5	1
6	24	4	0.5	1	0.1	100	1	2		1			8	1
7	24	4	0.5	1	0.1	100	1	2		1			8	1
8	24	4	0.5	1	0.1	100	1	2		1			5	1
9														

❑ Initial model run

➢Filename : Main.exe

```
D:₩01_연구₩02_SURF₩han_river₩code₩main.exe
********** MODEL OPTIONS **********
STARTING TIME : 2002050101(YYYYMMDDHH)
ENDING TIME   : 2002083124(YYYYMMDDHH)
TOTAL NUMBER OF SUBBASIN    :   41
TOTAL NUMBER OF CHANNEL     :   28
TOTAL NUMBER OF DAM         :   11
TOTAL NUMBER OF WL STATION  :    4
LEAD TIME TO FORECAST       :    1HR

PRECIPITATION TYPE          :    1
(OPT : 1: AWS | 2: STATISTIC MODEL | 3: RADAR | 4: RDAPS)
SIMULATION METHOD           :    1
(OPT : 1: deterministic process | 2: stochastic process)
NUMBER OF ENSEMBLE TRACE    :   40
**********************************************************
COPYRIGHT : WATER RESOURCE LAB. IN SEJONG UNIVERSITY
DEVELOPER : LEE, B.J. (VERSION 01: 2010.4)
**********************************************************
READING MODEL PARAMETERS.....

READING FORCING DATA.....

SIMULATING RUNOFF MODEL.....
```

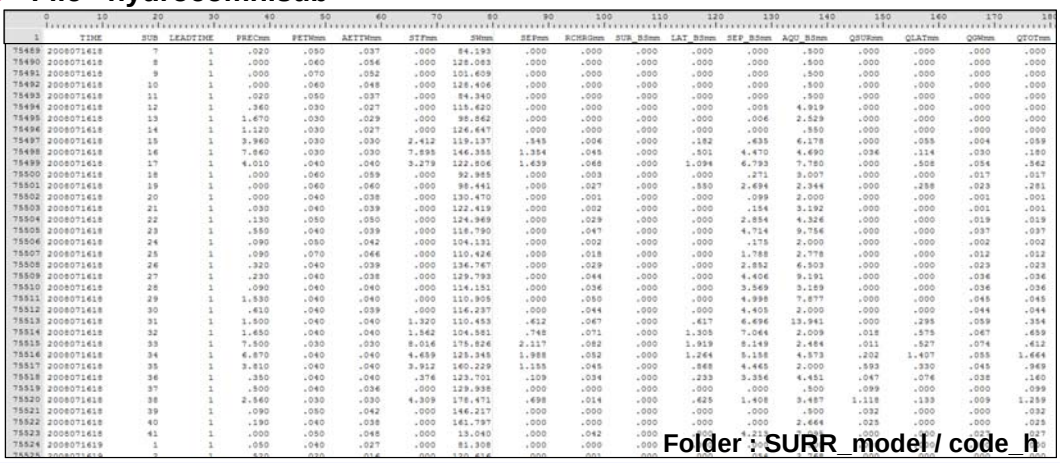
Folder : SURR_model / code_h

Initial model outputs

- **File name : cn.sub, scn.sub, hydrocomn.sub , dischmn.dat**

File name	Information	File name	Information
cn.sub	Hourly CN value at subbasin	hydrocomn. sub	Hourly hydro components value at subbasin (AET, soil water, surface runoff, lateral flow, groundwater flow)
scn.sub	Hourly variable retention parameter value at subbasin	dischmn.dat	Hourly Discharge value at chnnel

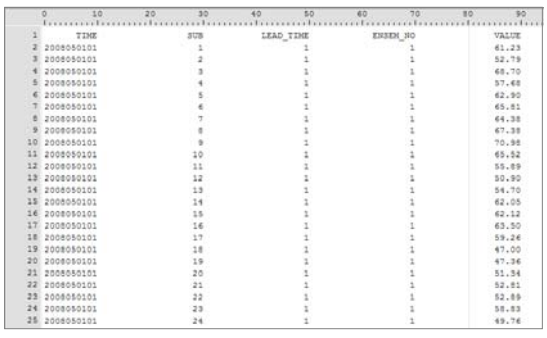
- **File <hydrocomn.sub>**



	TIME	SUB	LEADTIME	PRECmm	PETMM	AETTMm	STFmm	SWmm	SEPmm	RCHRGmm	SUR_BSmm	LAT_BSmm	SEP_BSmm	AQU_BSmm	QSUBmm	QLATmm	QGWmm	QTOTmm
75489	2008071618	7	1	.020	.050	.037	.000	84.193	.000	.000	.000	.000	.000	.500	.000	.000	.000	.000
75490	2008071618	8	1	.000	.060	.056	.000	128.083	.000	.000	.000	.000	.000	.500	.000	.000	.000	.000
75491	2008071618	9	1	.000	.070	.052	.000	101.609	.000	.000	.000	.000	.000	.500	.000	.000	.000	.000
75492	2008071618	10	1	.000	.060	.048	.000	128.406	.000	.000	.000	.000	.000	.500	.000	.000	.000	.000
75493	2008071618	11	1	.020	.050	.037	.000	84.340	.000	.000	.000	.000	.000	.500	.000	.000	.000	.000
75494	2008071618	12	1	.360	.030	.027	.000	115.620	.000	.000	.000	.000	.005	4.919	.000	.000	.000	.000
75495	2008071618	13	1	1.670	.030	.029	.000	98.862	.000	.000	.000	.000	.006	2.529	.000	.000	.000	.000
75496	2008071618	14	1	1.120	.030	.027	.000	126.647	.000	.000	.000	.000	.000	.850	.000	.000	.000	.000
75497	2008071618	15	1	3.960	.030	.030	2.412	119.137	.545	.004	.000	.182	.635	6.178	.000	.055	.004	.059
75498	2008071618	16	1	7.860	.030	.030	7.595	146.355	1.354	.045	.000	.501	4.470	4.690	.036	.114	.030	.180
75499	2008071618	17	1	4.010	.040	.040	3.279	122.806	1.439	.068	.000	1.094	6.793	7.780	.000	.508	.054	.562
75500	2008071618	18	1	.000	.060	.059	.000	92.985	.000	.003	.000	.000	.271	3.007	.000	.000	.017	.017
75501	2008071618	19	1	.000	.060	.060	.000	98.441	.000	.027	.000	.550	2.694	2.344	.000	.258	.023	.281
75502	2008071618	20	1	.000	.040	.038	.000	130.470	.000	.001	.000	.000	.099	2.000	.000	.000	.001	.001
75503	2008071618	21	1	.030	.040	.039	.000	122.419	.000	.002	.000	.000	.154	3.192	.000	.000	.001	.001
75504	2008071618	22	1	.130	.050	.050	.000	124.969	.000	.029	.000	.000	2.854	4.326	.000	.000	.019	.019
75505	2008071618	23	1	.550	.040	.039	.000	116.790	.000	.047	.000	.000	4.714	9.756	.000	.000	.037	.037
75506	2008071618	24	1	.090	.050	.042	.000	104.131	.000	.002	.000	.000	.175	2.000	.000	.000	.002	.002
75507	2008071618	25	1	.090	.070	.064	.000	110.426	.000	.018	.000	.000	1.788	2.778	.000	.000	.012	.012
75508	2008071618	26	1	.320	.040	.039	.000	136.767	.000	.029	.000	.000	2.852	6.503	.000	.000	.023	.023
75509	2008071618	27	1	.230	.040	.038	.000	129.793	.000	.044	.000	.000	4.406	9.191	.000	.000	.036	.036
75510	2008071618	28	1	.090	.060	.060	.000	114.151	.000	.036	.000	.000	3.569	3.169	.000	.000	.036	.036
75511	2008071618	29	1	1.530	.040	.040	.000	110.905	.000	.050	.000	.000	4.998	7.877	.000	.000	.045	.045
75512	2008071618	30	1	.610	.040	.039	.000	116.237	.000	.044	.000	.000	4.405	2.000	.000	.000	.044	.044
75513	2008071618	31	1	1.500	.040	.040	1.320	110.453	.612	.067	.000	.617	6.696	13.941	.000	.295	.059	.354
75514	2008071618	32	1	1.650	.040	.040	1.562	104.581	.748	.071	.000	1.305	7.066	2.009	.018	.575	.067	.659
75515	2008071618	33	1	7.500	.030	.030	8.016	175.826	2.117	.082	.000	1.919	8.149	2.486	.011	.527	.074	.612
75516	2008071618	34	1	6.870	.040	.040	4.659	125.345	1.988	.052	.000	1.264	5.158	4.573	.202	1.407	.055	1.666
75517	2008071618	35	1	3.810	.040	.040	3.912	160.229	1.155	.045	.000	.868	4.445	2.000	.593	.330	.045	.969
75518	2008071618	36	1	.350	.040	.040	.376	123.701	.109	.034	.000	.233	3.356	4.451	.047	.076	.038	.160
75519	2008071618	37	1	.500	.040	.036	.000	129.938	.000	.000	.000	.000	.000	.500	.099	.000	.000	.099
75520	2008071618	38	1	2.560	.030	.030	4.309	178.471	.698	.014	.000	.625	1.408	3.487	1.118	.133	.009	1.259
75521	2008071618	39	1	.090	.050	.042	.000	146.217	.000	.000	.000	.000	.000	.900	.032	.000	.000	.032
75522	2008071618	40	1	.190	.040	.038	.000	161.797	.000	.000	.000	.000	.000	2.664	.023	.000	.000	.023
75523	2008071618	41	1	.000	.050	.048	.000	13.040	.000	.042	.000	.000	4.211	[illegible]	.000	[illegible]	.027	.027
75524	2008071619	1	1	.050	.040	.027	.000	81.308	.000	.000	.000	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

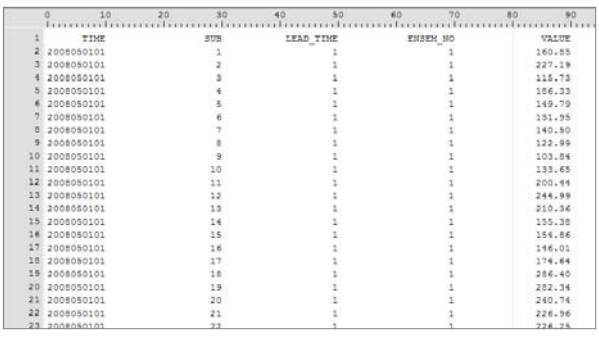
Folder : SURR_model / code_h

- **File <cn.sub>**



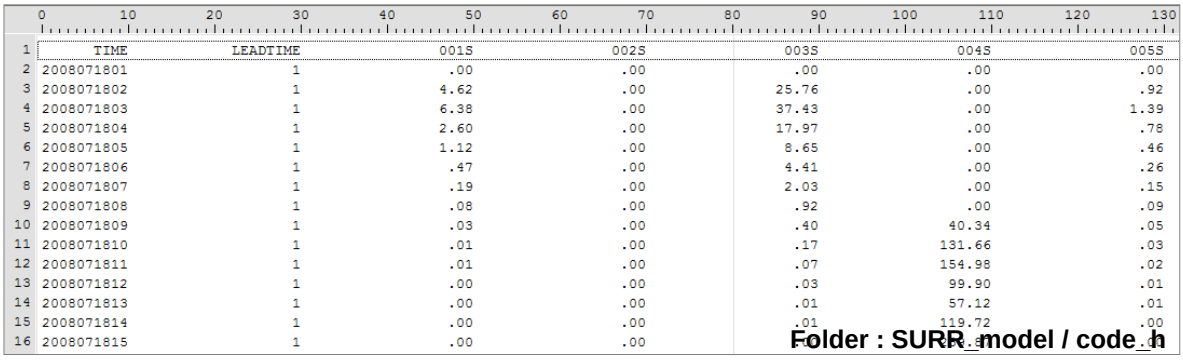
	TIME	SUB	LEAD_TIME	ENSEM_NO	VALUE
2	2008050101	1	1	1	61.23
3	2008050101	2	1	1	52.79
4	2008050101	3	1	1	68.70
5	2008050101	4	1	1	57.68
6	2008050101	5	1	1	62.90
7	2008050101	6	1	1	65.81
8	2008050101	7	1	1	64.38
9	2008050101	8	1	1	67.38
10	2008050101	9	1	1	70.98
11	2008050101	10	1	1	65.52
12	2008050101	11	1	1	55.89
13	2008050101	12	1	1	50.90
14	2008050101	13	1	1	54.70
15	2008050101	14	1	1	62.05
16	2008050101	15	1	1	62.12
17	2008050101	16	1	1	63.50
18	2008050101	17	1	1	59.26
19	2008050101	18	1	1	47.00
20	2008050101	19	1	1	47.36
21	2008050101	20	1	1	51.34
22	2008050101	21	1	1	52.81
23	2008050101	22	1	1	52.89
24	2008050101	23	1	1	58.83
25	2008050101	24	1	1	49.76

- **File <scn.sub>**



	TIME	SUB	LEAD_TIME	ENSEM_NO	VALUE
2	2008050101	1	1	1	160.85
3	2008050101	2	1	1	227.19
4	2008050101	3	1	1	115.73
5	2008050101	4	1	1	156.33
6	2008050101	5	1	1	149.79
7	2008050101	6	1	1	131.95
8	2008050101	7	1	1	140.50
9	2008050101	8	1	1	122.99
10	2008050101	9	1	1	103.84
11	2008050101	10	1	1	133.65
12	2008050101	11	1	1	200.44
13	2008050101	12	1	1	244.99
14	2008050101	13	1	1	210.36
15	2008050101	14	1	1	155.38
16	2008050101	15	1	1	154.86
17	2008050101	16	1	1	146.01
18	2008050101	17	1	1	174.64
19	2008050101	18	1	1	286.40
20	2008050101	19	1	1	282.34
21	2008050101	20	1	1	240.74
22	2008050101	21	1	1	226.96
23	2008050101	22	1	1	224.25

- **File <dischmn.dat>**



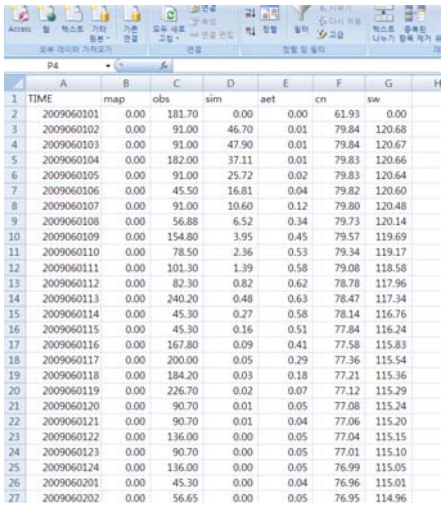
	TIME	LEADTIME	001S	002S	003S	004S	005S
2	2008071801	1	.00	.00	.00	.00	.00
3	2008071802	1	4.62	.00	25.76	.00	.92
4	2008071803	1	6.38	.00	37.43	.00	1.39
5	2008071804	1	2.60	.00	17.97	.00	.78
6	2008071805	1	1.12	.00	8.65	.00	.46
7	2008071806	1	.47	.00	4.41	.00	.26
8	2008071807	1	.19	.00	2.03	.00	.15
9	2008071808	1	.08	.00	.92	.00	.09
10	2008071809	1	.03	.00	.40	40.34	.05
11	2008071810	1	.01	.00	.17	131.66	.03
12	2008071811	1	.01	.00	.07	154.98	.02
13	2008071812	1	.00	.00	.03	99.90	.01
14	2008071813	1	.00	.00	.01	57.12	.01
15	2008071814	1	.00	.00	.01	119.72	.00
16	2008071815	1	.00	.00	.00	[illegible]	.00

Folder : SURR_model / code_h

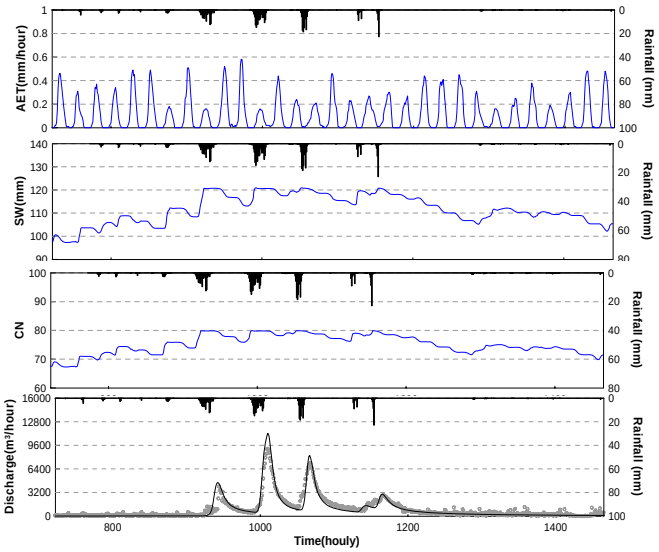
Graphics of selected output

- Filenmae : h_simul.xlsx

- File <dischmn.dat> - Column '03S'
- File <hydrocomn.sub> - Column 'AET','SW'
- File <cn.sub> - Column 'CN'



	A	B	C	D	E	F	G
1	TIME	map	obs	sim	aet	cn	sw
2	2009060101	0.00	181.70	0.00	0.00	61.93	0.00
3	2009060102	0.00	91.00	46.70	0.01	79.84	120.68
4	2009060103	0.00	91.00	47.90	0.01	79.84	120.67
5	2009060104	0.00	182.00	37.11	0.01	79.83	120.66
6	2009060105	0.00	91.00	25.72	0.02	79.83	120.64
7	2009060106	0.00	45.50	16.81	0.04	79.82	120.60
8	2009060107	0.00	91.00	10.60	0.12	79.80	120.48
9	2009060108	0.00	56.88	6.52	0.34	79.73	120.14
10	2009060109	0.00	154.80	3.95	0.45	79.57	119.69
11	2009060110	0.00	78.50	2.36	0.53	79.34	119.17
12	2009060111	0.00	101.30	1.39	0.58	79.08	118.58
13	2009060112	0.00	82.30	0.82	0.62	78.78	117.96
14	2009060113	0.00	240.20	0.48	0.63	78.47	117.34
15	2009060114	0.00	45.30	0.27	0.58	78.14	116.76
16	2009060115	0.00	45.30	0.16	0.51	77.84	116.24
17	2009060116	0.00	167.80	0.09	0.41	77.58	115.83
18	2009060117	0.00	200.00	0.05	0.29	77.36	115.54
19	2009060118	0.00	184.20	0.03	0.18	77.21	115.36
20	2009060119	0.00	226.70	0.02	0.07	77.12	115.29
21	2009060120	0.00	90.70	0.01	0.05	77.08	115.24
22	2009060121	0.00	90.70	0.01	0.04	77.06	115.20
23	2009060122	0.00	136.00	0.00	0.05	77.04	115.15
24	2009060123	0.00	90.70	0.00	0.05	77.01	115.10
25	2009060124	0.00	136.00	0.00	0.05	76.99	115.05
26	2009060201	0.00	45.30	0.00	0.04	76.96	115.01
27	2009060202	0.00	56.65	0.00	0.05	76.95	114.96



Model parameter estimation

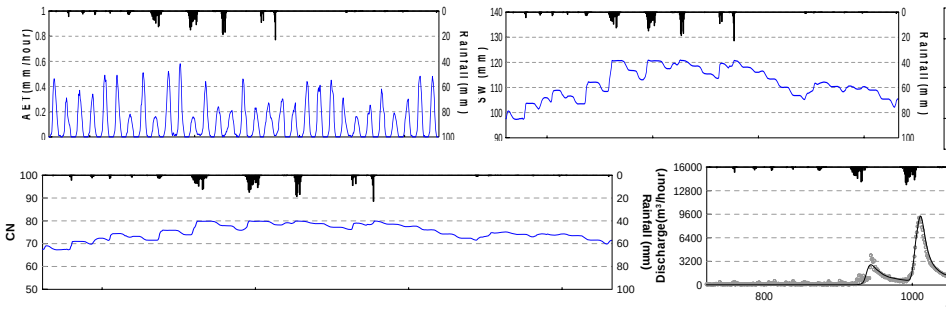
- Parameter estimation methods

- Manual estimation
- Automate estimation

- Manual eatimation of model parameters

Parameter	description	Range
K	Storage Function constant of the subbasin	10 – 70
P	Storage Function constant of the subbasin	0.2 – 0.4
KK	Storage Function constant of the channel	2500- 6500

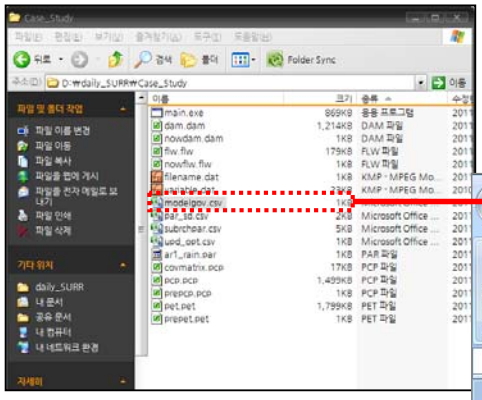
Parameter	Value
K	60
P	0.3
KK	3900, 6500



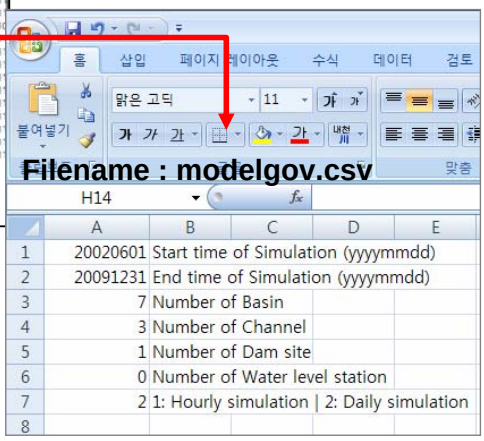
VE	-13.13
RMSE (m3/s)	392.44
CC	0.96
ME	0.88

Model run condition setup

➢ Case2 : Daily simulation



Folder : SURR_model / code_d

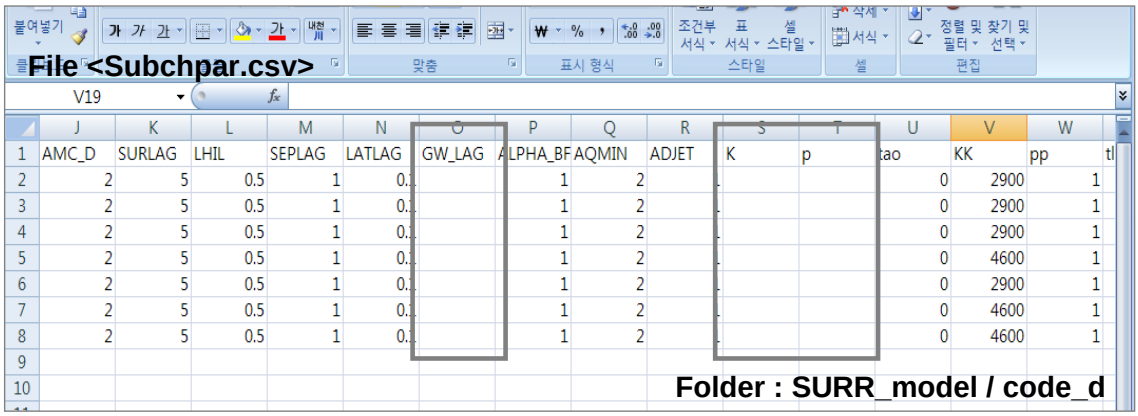


Filename : modelgov.csv

	A	B
1	20020601	Start time of Simulation (yyyymmdd)
2	20091231	End time of Simulation (yyyymmdd)
3	7	Number of Basin
4	3	Number of Channel
5	1	Number of Dam site
6	0	Number of Water level station
7	2	1: Hourly simulation | 2: Daily simulation
8		

Initial parameter setup

Parameter	description	value
K	Storage Function constant of the subbasin	40
P	Storage Function constant of the subbasin	0.3
GW_LAG	Delay time for aquifer recharge	100



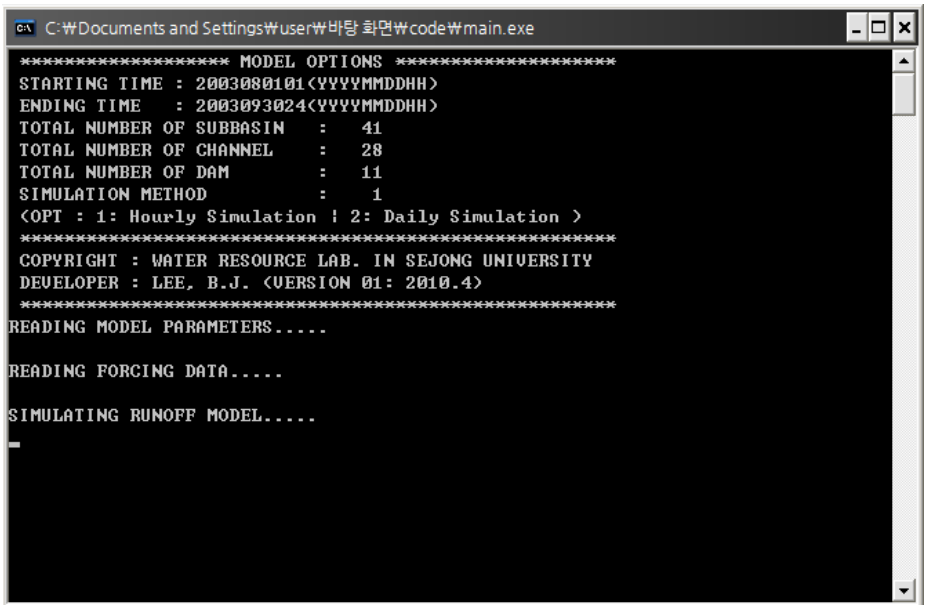
File <Subchpar.csv>

	J	K	L	M	N	O	P	Q	R	S	T	U	V	W
1	AMC_D	SURLAG	LHIL	SEPLAG	LATLAG	GW_LAG	ALPHA_BF	AQMIN	ADJET	K	p	tao	KK	pp
2	2	5	0.5	1	0.1		1	2				0	2900	1
3	2	5	0.5	1	0.1		1	2				0	2900	1
4	2	5	0.5	1	0.1		1	2				0	2900	1
5	2	5	0.5	1	0.1		1	2				0	4600	1
6	2	5	0.5	1	0.1		1	2				0	2900	1
7	2	5	0.5	1	0.1		1	2				0	4600	1
8	2	5	0.5	1	0.1		1	2				0	4600	1
9														
10														

Folder : SURR_model / code_d

Initial model run

➢ **Filename : Main.exe**



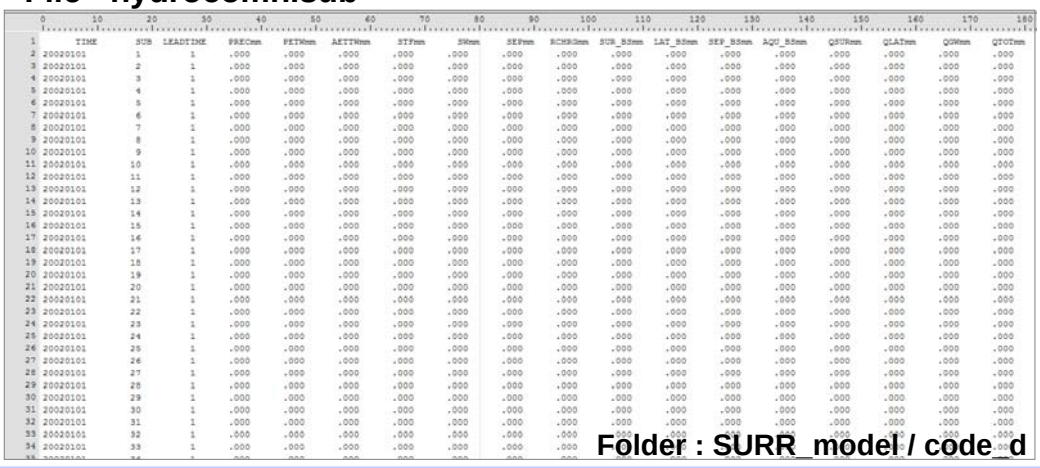
Folder : SURR_model / code_d

Initial model outputs

➢ **File name : cn.sub, scn.sub, hydrocomn.sub , dischmn.dat**

File name	Information	File name	Information
cn.sub	Daily CN Value at subbasin	hydrocomn. sub	Daily hydro components value at subbasin (AET, soil water, surface runoff, lateral flow, groundwater flow)
scn.sub	Daily variable retention parameter value at subbasin	dischmn.dat	Daily Discharge value at chnnel

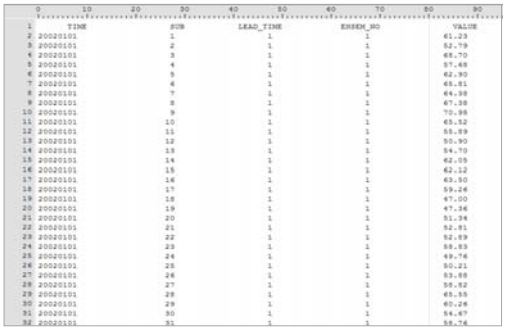
➢ **File <hydrocomn.sub>**



	TIME	SUB	LEADTIME	PRECmm	PETmm	AETTmm	STFmm	SWmm	SEPmm	RCHRGmm	SUB_BSmm	LAT_BSmm	SEP_BSmm	AQU_BSmm	QSURmm	QLATmm	QGWmm	QTOTmm
2	20020101	1	1	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
3	20020101	2	1	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
4	20020101	3	1	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
5	20020101	4	1	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
6	20020101	5	1	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
7	20020101	6	1	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
8	20020101	7	1	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
9	20020101	8	1	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
10	20020101	9	1	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
11	20020101	10	1	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
12	20020101	11	1	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
13	20020101	12	1	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
14	20020101	13	1	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
15	20020101	14	1	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
16	20020101	15	1	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
17	20020101	16	1	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
18	20020101	17	1	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
19	20020101	18	1	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
20	20020101	19	1	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
21	20020101	20	1	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
22	20020101	21	1	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
23	20020101	22	1	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
24	20020101	23	1	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
25	20020101	24	1	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
26	20020101	25	1	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
27	20020101	26	1	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
28	20020101	27	1	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
29	20020101	28	1	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
30	20020101	29	1	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
31	20020101	30	1	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
32	20020101	31	1	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
33	20020101	32	1	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
34	20020101	33	1	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000

Folder : SURR_model / code_d

File <cn.sub>



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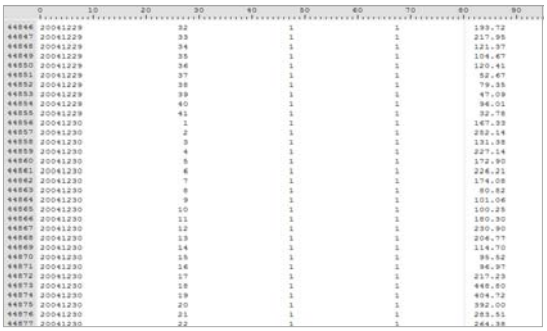


File <dischmn.dat>

	TIME	LEADTIME	0015	0025	0035	0045	0055	0065	0075
2	20020101	1	.00	.00	.00	.00	.00	.00	.00
3	20020102	1	.08	.00	29.23	9.31	.00	.42	9.60
4	20020103	1	.07	.00	23.68	14.90	.00	.40	13.34
5	20020104	1	.04	.00	14.66	32.08	.00	.29	19.35
6	20020105	1	.02	.00	8.21	44.99	.00	.19	27.71
7	20020106	1	.02	.00	4.39	40.27	.00	.11	33.05
8	20020107	1	.03	.00	2.33	40.65	.00	.06	36.35
9	20020108	1	.05	.01	1.27	55.50	.00	.04	42.30
10	20020109	1	.06	.01	.73	43.91	.00	.02	44.10
11	20020110	1	.06	.01	.46	31.37	.00	.01	41.08
12	20020111	1	.06	.01	.33	28.83	.00	.01	37.08
13	20020112	1	.07	.01	.26	28.77	.00	.00	33.91
14	20020113	1	.08	.01	.23	59.77	.00	.00	40.17
15	20020114	1	.08	.01	.22	50.73	.00	.00	44.47
16	20020115	1	.70	.46	1.39	40.96	.00	.01	44.51
17	20020116	1	5.54	3.64	10.84	42.66	.00	.02	44.02
18	20020117	1	10.75	6.44	22.58	49.26	.00	.05	45.34
19	20020118	1	13.68	7.76	30.84	37.46	.00	.07	43.83
20	20020119	1	14.48	8.03	35.11	35.04	.00	.08	40.84
21	20020120	1	14.07	7.74	36.46	33.71	.00	.09	38.32
22	20020121	1	13.17	7.23	35.91	33.00	.00	.09	36.33
23	20020122	1	12.18	6.70	34.33	31.[illegible]	.00	.08	34.[illegible]

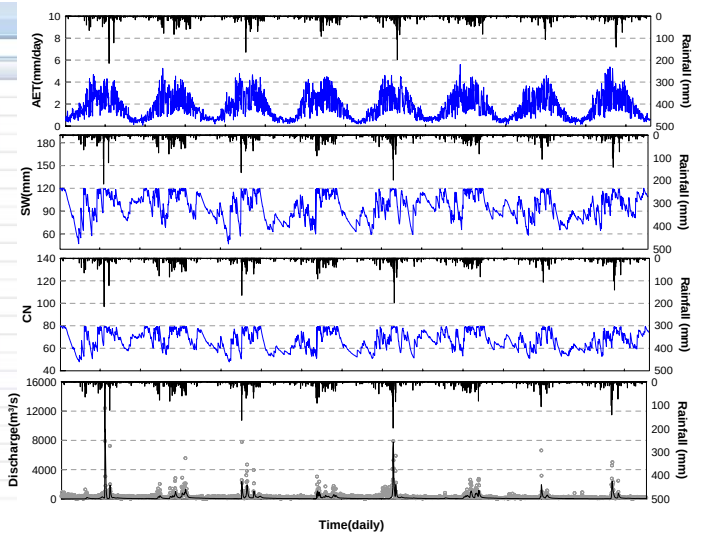
Folder : SURR_model / code_d

Graphics of selected output

Filenmae : d_simul.xlsx

- File <dischmn.dat> - Column '03S'
- File <hydrocomn.sub> - Column 'AET','SW'
- File <cn.sub> - Column 'CN'

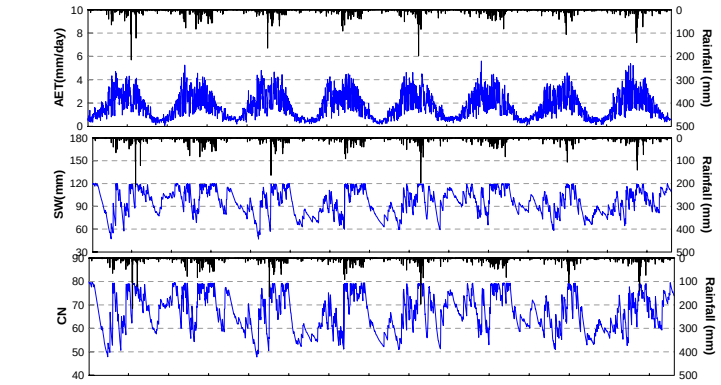
	A	B	C	D	E	F	G
1	time	map	obs	sim	aet	c n	sw
2	20020101	0	188.87	0	0	61.93	0
3	20020102	0.4	341.27	29.23	0.61	79.84	120.08
4	20020103	0	463.96	23.68	0.67	79.54	119.41
5	20020104	0.17	890.54	14.66	0.47	79.21	119.12
6	20020105	1.21	400.15	8.21	0.9	79.04	119.35
7	20020106	0.87	281.5	4.38	0.83	79.18	119.25
8	20020107	2.64	283.96	2.28	0.6	79.14	120.09
9	20020108	0.06	615.52	1.17	0.53	79.55	119.62
10	20020109	0.09	402.29	0.59	0.72	79.31	118.99
11	20020110	0.24	657.92	0.3	0.4	78.98	118.84
12	20020111	0.27	538.79	0.15	1.2	78.88	117.91
13	20020112	0.41	750.75	0.08	1.37	78.36	116.9
14	20020113	0.19	525.83	0.04	0.58	77.83	116.5
15	20020114	0.97	480.25	0.02	0.46	77.63	117.01
16	20020115	10.13	874.71	0.03	0.56	77.82	120.14
17	20020116	12.03	696.92	0.29	0.47	79.56	120.22
18	20020117	3.46	273.83	0.68	0.36	79.61	120.34
19	20020118	0.44	309.5	1.02	0.61	79.66	119.87
20	20020119	0.27	387	1.27	0.81	79.42	119.25
21	20020120	0.89	209.6	1.44	0.48	79.1	119.66
22	20020121	0.34	388.42	1.55	0.77	79.3	119.21
23	20020122	0.2	244.58	1.61	0.58	79.04	118.83
24	20020123	0.09	207.06	1.65	0.68	78.85	118.24



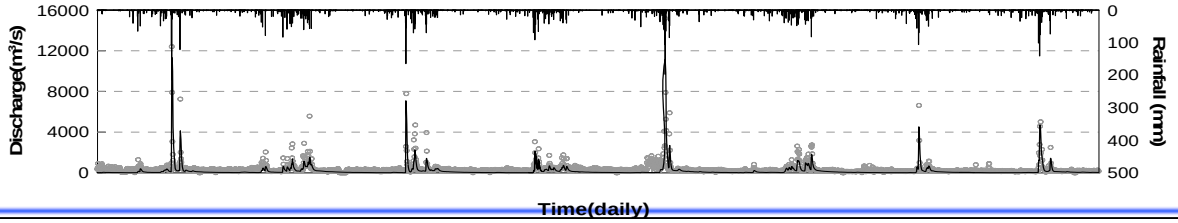
Manual – of model parameters

Parameter	description	Range
K	Storage Function constant of the subbasin	10 – 70
P	Storage Function constant of the subbasin	0.2 – 0.4
GW_LAG	Storage Function constant of the channel	0 - 500

Parameter	Value
K	10.15
P	0.3
GW_LAG	50



VE	−2.13
RMSE (mm/day)	4.68
CC	0.85
ME	0.68



Thank you