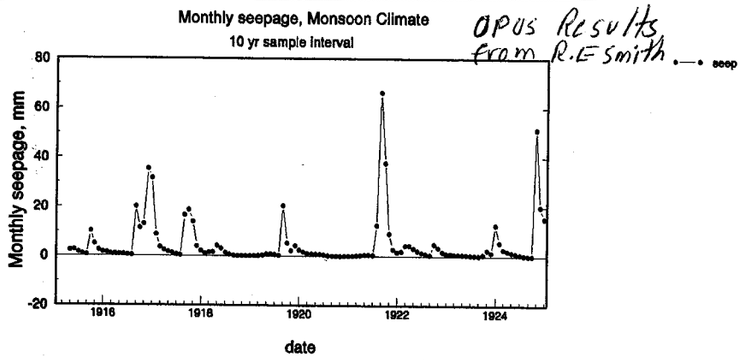
DAW 7/15/04 Comparison Between Opus and KINEROS2 results for single plane element No. 23.

A plot of monthly seepage as estimated by the OPUS model is shown below



OPUS Results from R.E Smith ..... seep

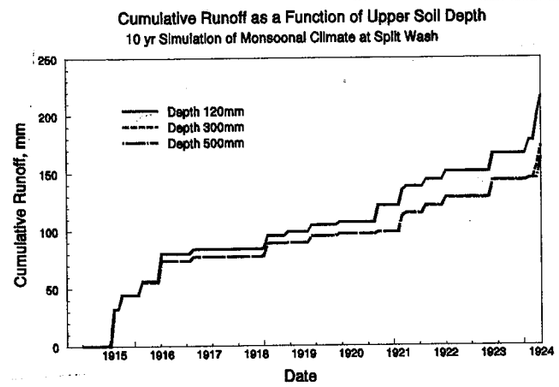
Smith file is: C:\USW_04\OPUS_KINEROS\spw10mon.gpw (Corel draw)

It would be useful to compare cumulative runoff and seepage. Tel. con with R.E. Smith — he will send ASCI file with the above monthly values.

8/13/04 Smith sent a file (figure) showing accumulated (monthly) runoff for the 10-yr monsoon climate, element # 23 but with depths of soil 120, 300 and 500 mm
File: C:\USW_04\OPUS_KINEROS\Splw10yROMon.
Corel presentations
He also sent 6 ASCI files with formats as shown
The files are monthly precip, runoff etc for 3 soil depths with 2 values of K_s.

0001A

"date"	"Precip"	"Runoff"	"Tot.ET"	"Seepage"	"Soil W"
04/30/1915	0.00	0.00	12.32	2.55	171.41
05/30/1915	0.00	0.00	34.54	3.03	133.83
06/30/1915	48.96	0.13	43.18	1.20	138.27
07/30/1915	57.51	0.00	51.44	0.49	144.21
08/30/1915	47.92	0.00	40.42	0.23	151.47
09/30/1915	47.99	0.00	13.65	3.93	182.01
10/30/1915	10.22	0.00	9.50	4.96	177.77
11/30/1915	3.59	0.00	14.04	2.40	164.93



← Splw 10y ROMon.

DAW 8-14-04
To make Smith's OPUS output files equivalent to the KINEROS2 output, they must be combined by editing so that for the period Dec – June, K_s = 22.25 mm/h and for July – Nov. K_s = 11.25 mm/h

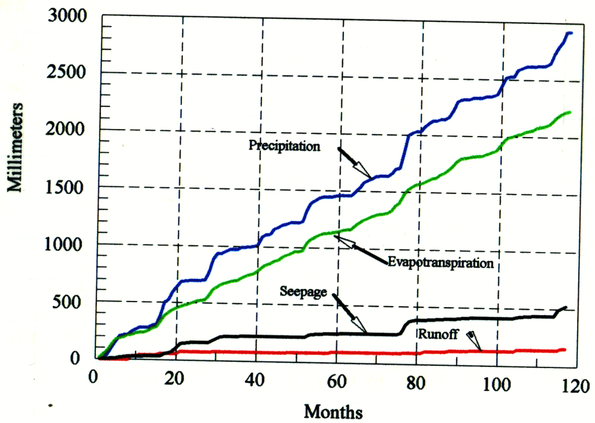
For the 300 mm soil depth, ASCI files are: Spl30d10yLmon.txt for K_s = 11.25 mm/h and Spl30d10yHmon.txt for K_s = 22.25 mm/h
Edit with PSIPLOT
Create file C:\USW_04\OPUS_KINEROS\SmithOPUS\OPUSMon300.POW

DAW 8-16-04
Create columns of accumulated monthly precipitation, evapotranspiration, seepage and runoff for OPUS results, 10 yr Monsoon climate, 300 mm soil depth.
Plot OPUS precipitation, Evapotranspiration (ET), runoff and seepage vs months. File is C:\USW-04\OPUS_KINEROS\SMITHOPUS\Accum_300.PGW

See figure on p 196.
Most of the precipitation is utilized in transpiration and evaporation but seepage into bedrock is approximately 53 mm/yr and surface runoff is 15.5 mm/yr.

Daw 8/18/04 KINEROS_OPUS Comparison (cont)

Plot OPUS and KINEROS2 on same sheet
OPUS – Seepage and runoff
KINEROS2 – Potential bedrock infiltration and runoff
File: C\USW_04\OPUS_KINEROS\SMITHOPUS\~~KIN_OPUS300.PGW~~ Daw 8/18/04
\SEEPVSPOTBR.PGW



File: C | USW_04 | OPUS_KINEROS | SmithOPUS | Accum_300.PGW
daw 8-16-04

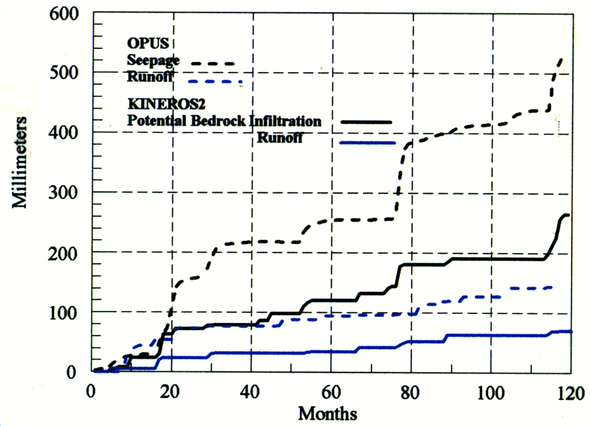
OPUS Water Balance Calculations for Upper Split Wash
Element 23 with Soil Depth = 300 mm. Monsoon Climate

Daw 8/19/04

If we examine the figure on p 189 for the 50-yr monsoon precipitation, we see that the OPUS result for one plane element (ridge) of seepage = 53 mm corresponds to a CDF of about 0.35 for KINEROS2 potential bedrock infiltration (i.e. about 65% of ridge element areas would have greater average potential bedrock infiltration.

If we examine the figure on p 196, however, we see that for element 23 (Thick = 300 mm), potential bedrock infiltration is less than seepage estimates of OPUS (See fig top of p 197). This suggests that by selecting only potential runoff-producing events for KINEROS2 evaluations, we omit other events that may cause bedrock infiltration.

Daw 8/19/04 KINEROS-OPUS Comparisons



Runoff and Seepage Estimates - OPUS and KINEROS2
Element 23, Soil Depth = 300 mm; Monsoon Climate

File: C : |USW_04 | OPUS_KINEROS | SMITHOPUS | SEEPVSPOTBR.PGW
daw 8-18-04

The omission of small precipitation events and failure to account for continuous daily soil water content results in less runoff and less potential seepage in KINEROS2 simulations

To get more insight into the interaction between soil depth and water balance, examine

OPUS results for THICK = 120 mm and 500 mm.

For the 120 mm soil depth, ASCI files are Sp112d10yLmon.TXT and Sp112d10yHmon.TXT. Import into PSIplot and create a new file: C:\USW_04\OPUS_KINEROS\SmithOPUS\OPUSMON120.PGW with seasonal K_s variations. ✓

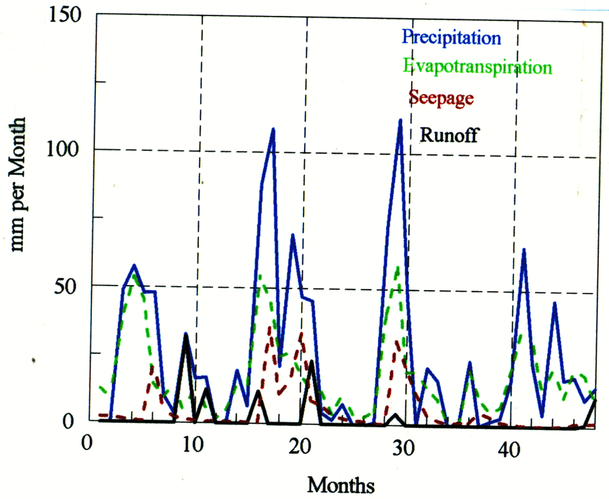
For the 500 mm soil depth, ASCI files are Sp150d10yLmon.TXT and Sp150d10yHmon.TXT. Import into PSIplot and create a new file: C:\USW_04\OPUS_KINEROS\SmithOPUS\OPUSMON500.PGW ✓

Prepare a Figure of accumulated seepage as a function of time with soil depth as a parameter
File Name: C:\USW_04\OPUS_KINEROS\SmithOPUS\OPUS_SEEPMON.PGW

Daw 8-20-04

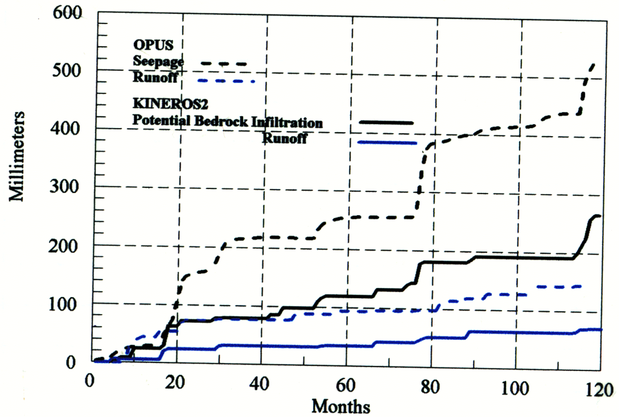
Prepare the following figures:
Accumulated runoff vs time ✓
" ET " " ✓
Soil water content vs time ✓
Precip, runoff and seepage for 120 mm depth

daw 8/20/04



Monthly Precipitation, Runoff and Seepage
Element 23, 120 mm, OPUS Monsoon Climate

File C : | USW_04 | OPUS_KINEROS | Smith OPUS | OPUS_PVS120.PGW
daw 8 - 20 - 04

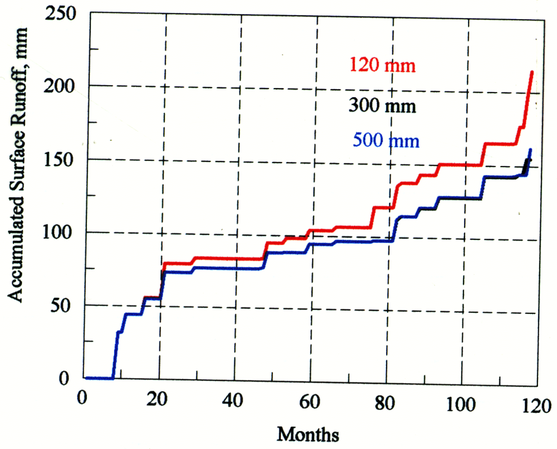


Runoff and Seepage Estimates - OPUS and KINEROS2
Element 23, Soil Depth = 300 mm; Monsoon Climate

File: C : [USW_04 | OPUS_KINEROS | SMITHOPUS | SEEPVSPOTBR.PGW
daw 8-18-04

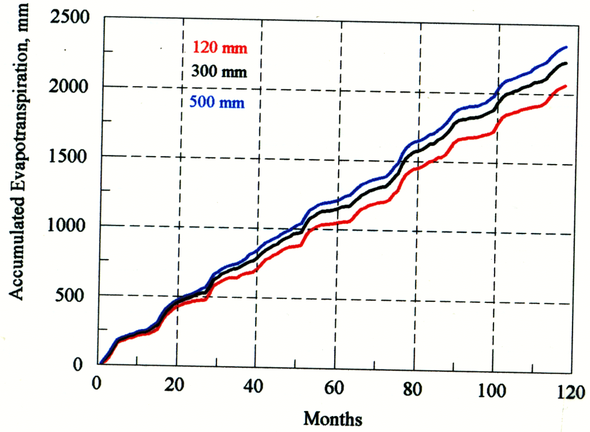
This Figure shows that the storm selection process used with KINEROS2 leads to smaller amounts of potential bedrock infiltration than seepage estimates from OPUS model

daw 8/20/04



Soil Depth Effects on Surface Runoff
Element 23; OPUS results, Monsoon Climate

File: C | USW_04 | OPUS_KINEROS | SmithOPUS | OPUS_ROMon.pgw
daw 8 - 20 - 04

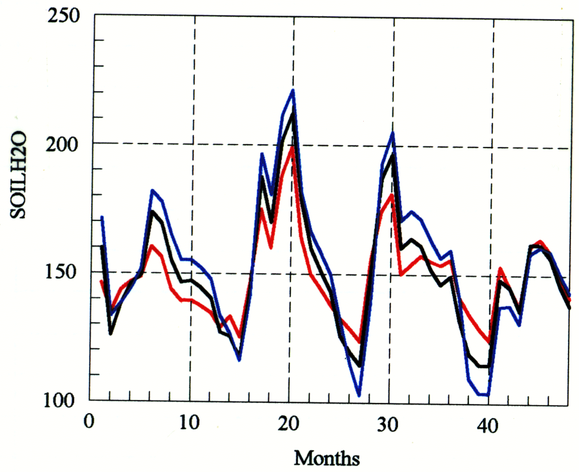


Effect of Soil Depth on Evapotranspiration
Element 23, OPUS, Monsoon Climate

File: C: USW_04 | OPUS_KINEROS | SmithOPUS | OPUS_ETMon.pgw
daw 8 - 20 - 04

The shallower soils exhibit less ET, which is to be expected

Daw 8/20/04



Effect of Soil Depth on Soil Water Content
Element 23, OPUS, Monsoon Climate

File: C: | USW_04 | OPUS_KINEROS | Smith OPUS | OPUS_SOILH20Mon.pgw
daw 8 - 20 - 04

Effect of Soil Depth on Accumulated Seepage - Element 23
OPUS, Monsoon Climate

File: C: | USW_04 | OPUS_KINEROS | SmithOPUS | OPUS_SeepMon.pgw
daw 8 - 19 - 04

Seepage increases as soil depth decreases. Consistent with KINEROS2 results

Conclusion: Examine the OPUS model structure and results in more detail.

Daw 9-10-04
Downloaded files from R.E. Smith, Exploratory analysis of data

Daw 2-7-05 OPUS-KINEROS Comparison

Added information on runoff, bedrock infiltration and potential bedrock infiltration for the 9-yr. record to Quattro Pro file: C:\USW_03\OUTREAL\REALTABLE5.qpw Data were from plane element 23 and were obtained from the *.OUT and *.SUM files in the same directory. Sent the file as an e-mail attachment to R.E. Smith. He will compare results with OPUS results.

TL 4/14/2008

Daw 5-6-05 Examination of Differences Between Two Versions of KINEROS for Validation Purposes

The Upper Split Wash Computer Runs documented on p173 were from the program KIN203_2w, with version 1.12ws shown on output files, dated Sept. 18, 2003. Some minor changes have been made since then, resulting in program KIN2WS, version 1.13ws dated May 5, 2005.

Objective: To repeat runs APISW_12, APISW_15 and APISW_17 with version 1.13ws and to compare the results with those documented on p173, to see if there are significant differences.

Procedure:

1) Control files used for runs for version 1.12ws were copied to C:\VALIDATION_SWRI\VALIDATION_05, renamed and the names of output files were changed

Control files are:
APISW_12C.FIL
APISW_15C.FIL
APISW_17C.FIL
} in above directory

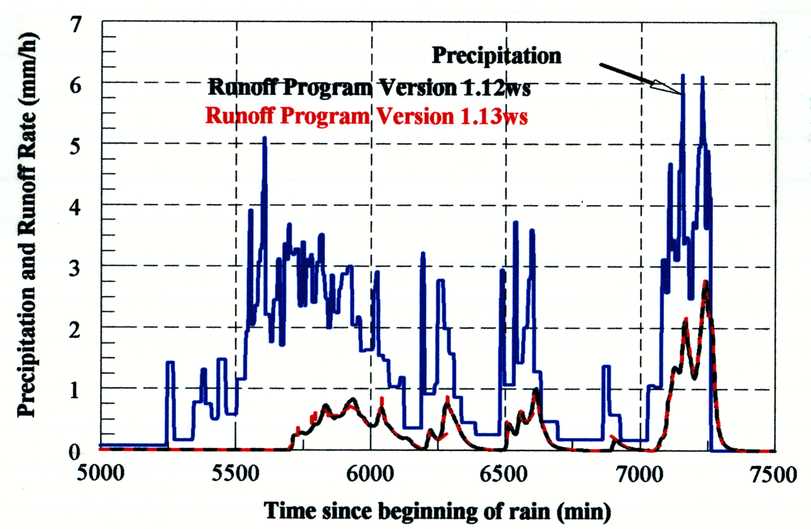
Output files are the same with extension .OUT and are in C:\USW_03\OUTREAL3

Daw 5-9-05 Program Comparisons (Con't)

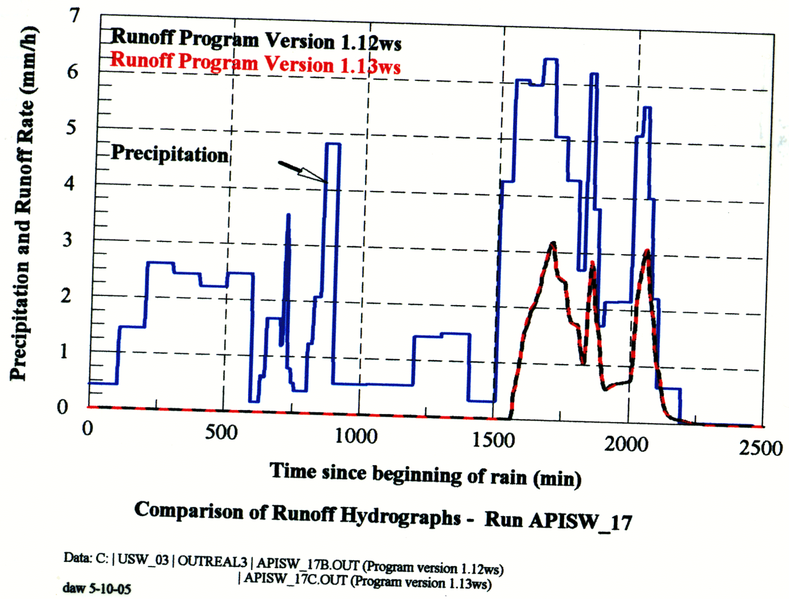
Program Version	Runoff Volumes (mm)/channel Infiltration(mm) APISW_12	APISW_15	APISW_17
1.12ws	11.35/0.63	4.87/0.57	16.05/0.55
1.13ws	11.43/0.63	4.92/0.57	16.15/0.55

For APISW_15 the difference is 1% for the other two it is less than 1%. Given the parameter uncertainty and the sensitivity this is insignificant. A review of the output files showed that the greatest differences for individual plane elements were for the elements disturbed by roads. These elements had some Hortonian runoff and the program changes ~~were~~ Daw 5-9-05 corrected the wetted area of the rills for uppermost planes, which is consistent.

There were no differences in channel infiltration. Runoff hydrographs for APISW_12 and APISW_17 are shown in the following two Figures.



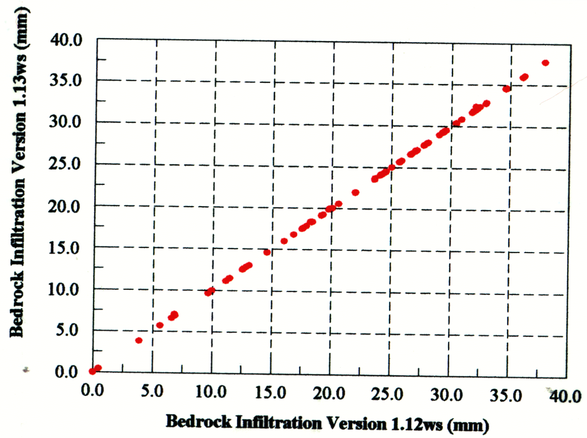
daw 5-10-05 Runoff Comparisons (Con't)



Comparison of Runoff Hydrographs - Run APISW_17

Data: C: | USW_03 | OUTREAL3 | APISW_17B.OUT (Program version 1.12ws)
| APISW_17C.OUT (Program version 1.13ws)
daw 5-10-05

These differences are clearly insignificant. The bedrock infiltration for each plane and channel element for version 1.13ws is plotted versus that for 1.12ws This shows a 1:1 relationship.

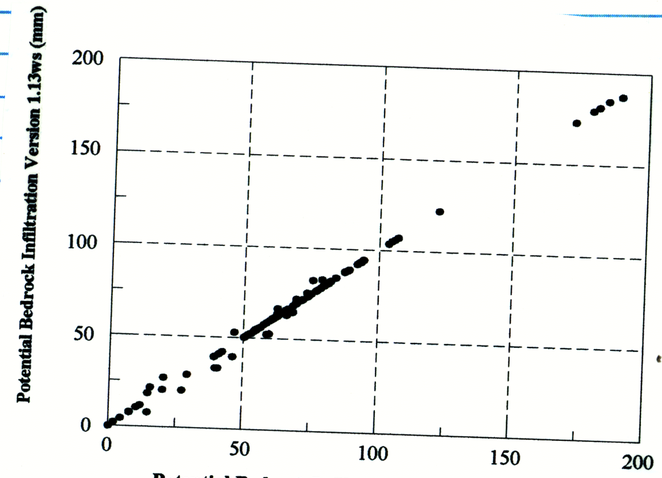


Bedrock Infiltration for Each Element - APISW_12
Different KINEROS2 Versions

Data: C: | USW_03 | OUTREAL3 | APISW_12B.OUT (Program version 1.12ws)
| APISW_12C.OUT (Program version 1.13ws)
Fig: C: | VALIDATION_SWRI | VALIDATION_05 | Bedrock_Compare_12.pgw
daw 5-10-05

daw 5-10-05 Runoff Comparisons (Con't)

When potential bedrock infiltration is plotted in the same manner there is some scatter about the 1:1 line in the 10-50 mm range. This reflects increased runoff and decreased infiltration for the disturbed elements for version 1.13ws with corresponding increased runon and infiltration for immediately downslope elements. There is no indication of bias.



Potential Bedrock Infiltration for Each Element - APISW_12
Different KINEROS2 Versions

Data: C: | USW_03 | OUTREAL3 | APISW_12B.OUT (Program version 1.12ws)
| APISW_12C.OUT (Program version 1.13ws)
Fig. : C: | VALIDATION_SWRI | VALIDATION_05 | Pot_Bed_Compare_12.pgw
daw 5-10-05

The following figures show the CDFs of infiltration excess, bedrock infiltration and potential bedrock infiltration