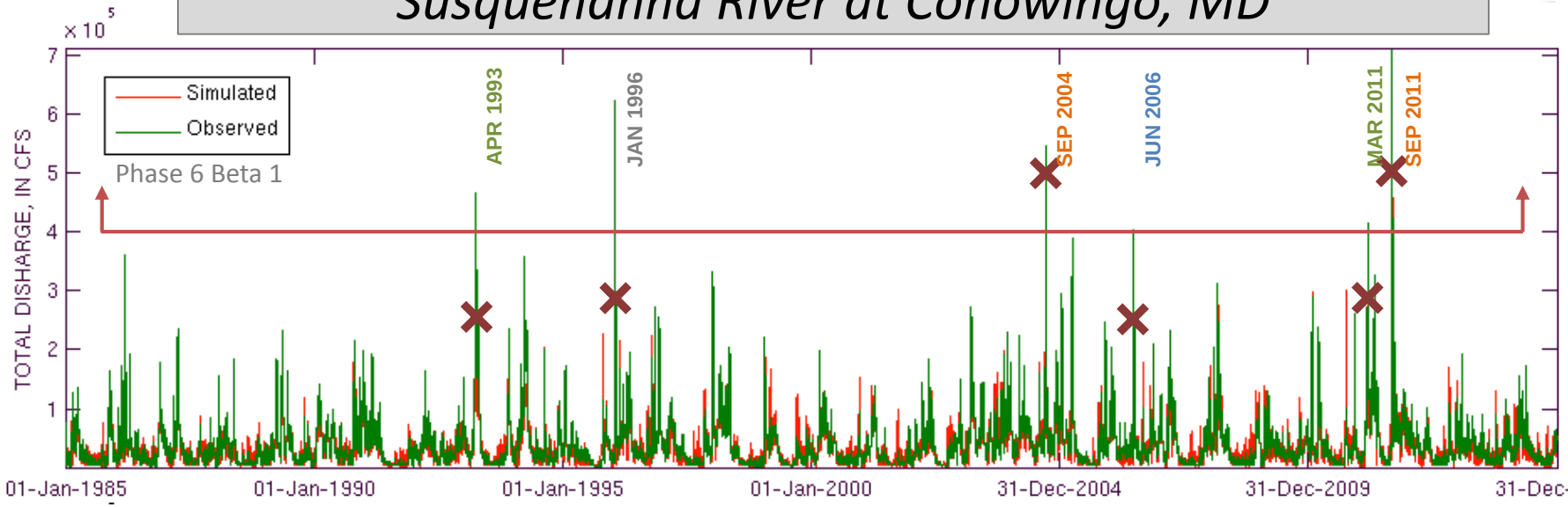
03/10/2016

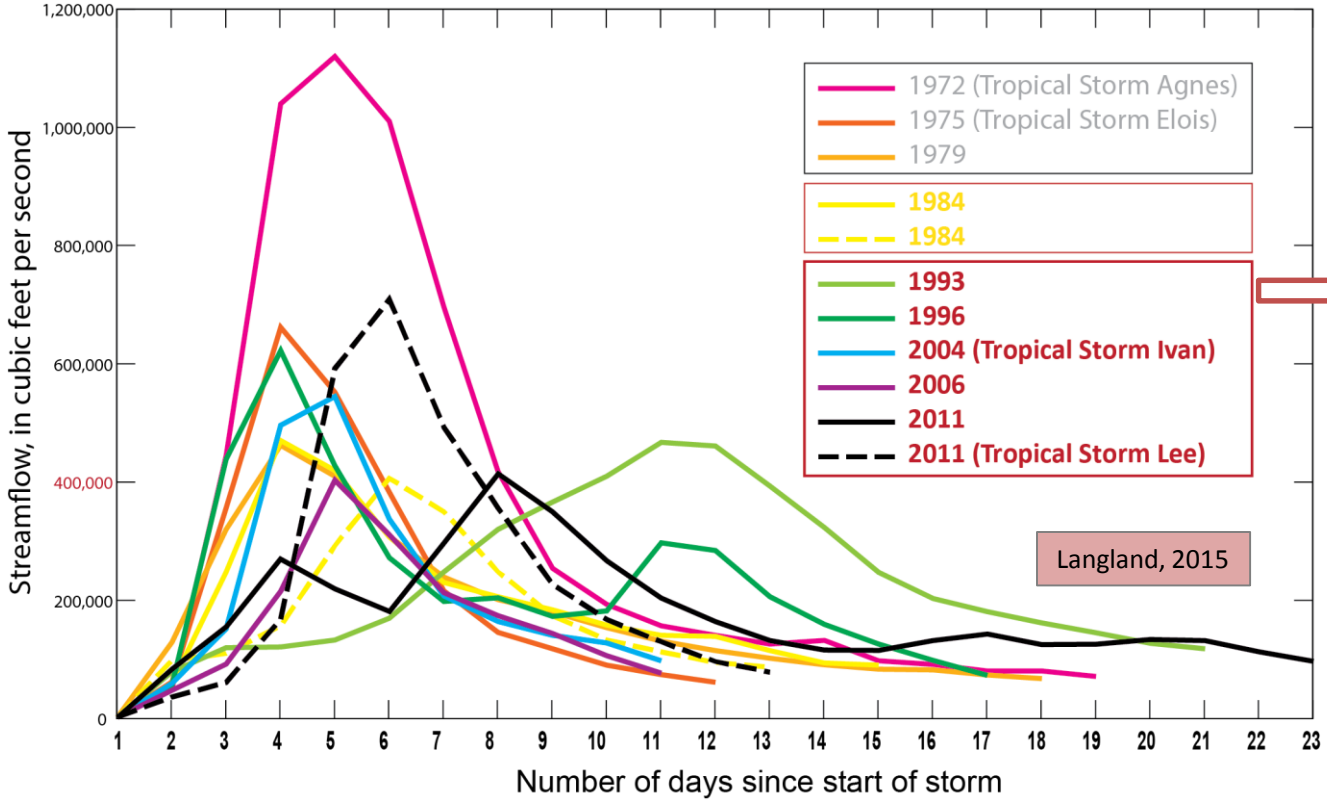
Hydrology Calibration and Extreme Flow Events in Phase 6 Watershed Model (beta)

Modeling Workgroup Conference Call

Gopal Bhatt
Penn State University

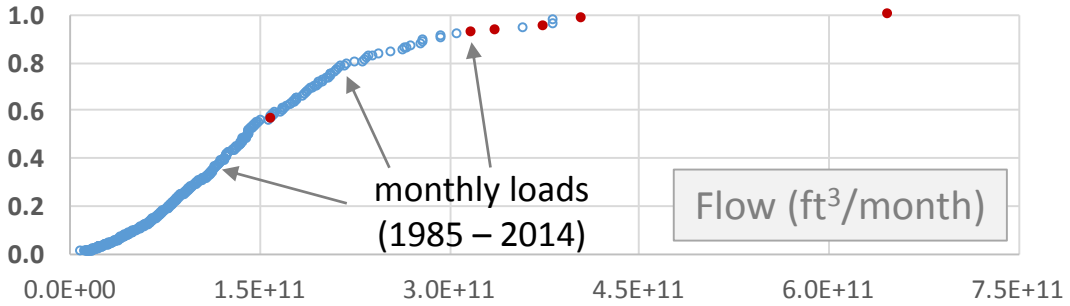
Susquehanna River at Conowingo, MD

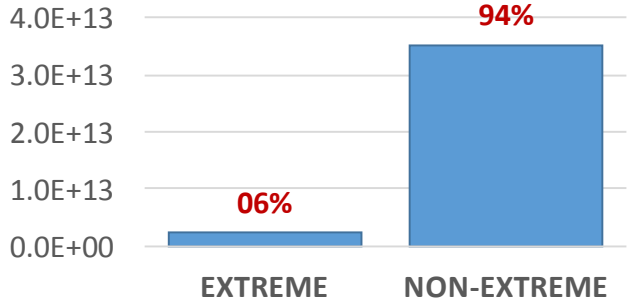


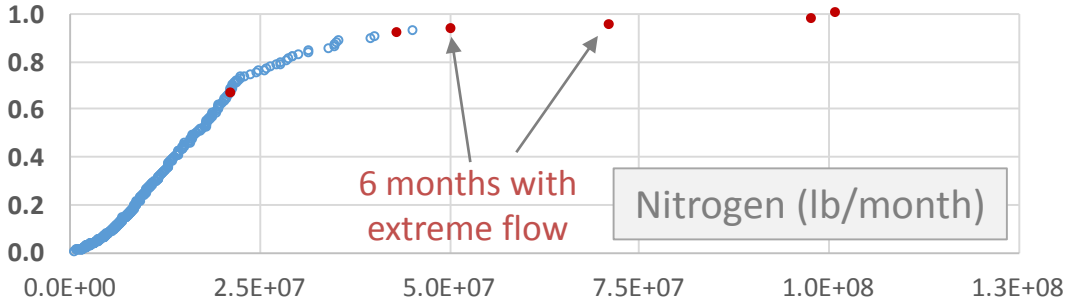


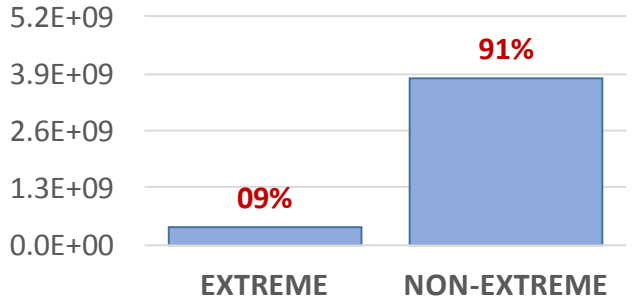
6 Extreme Events

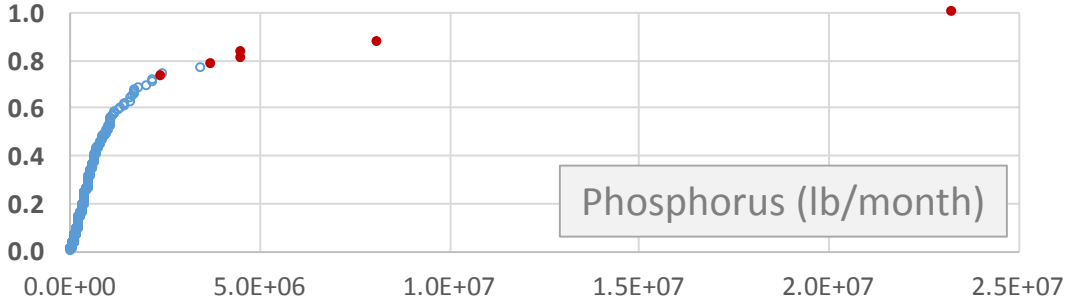
Monthly loads from Susquehanna River Basin

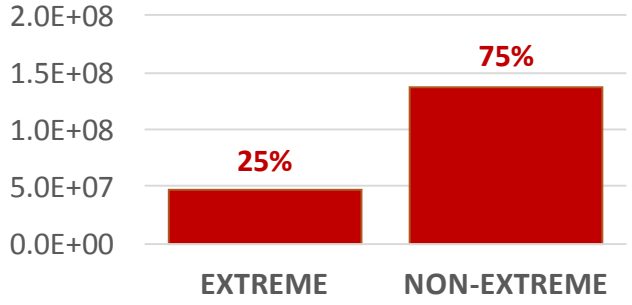


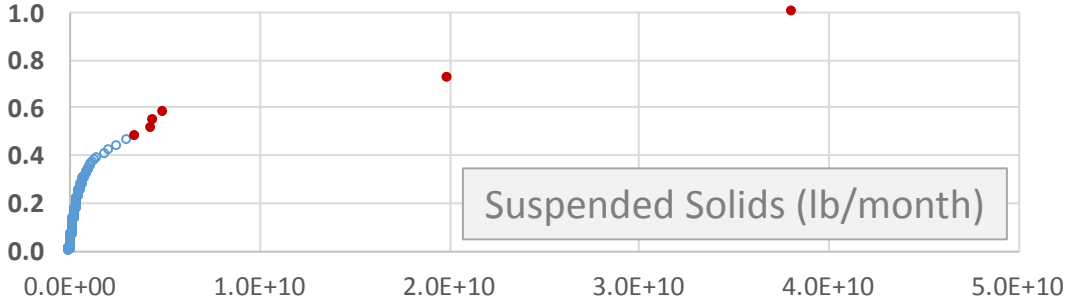


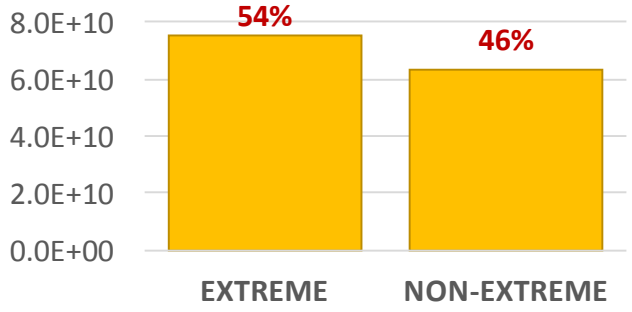






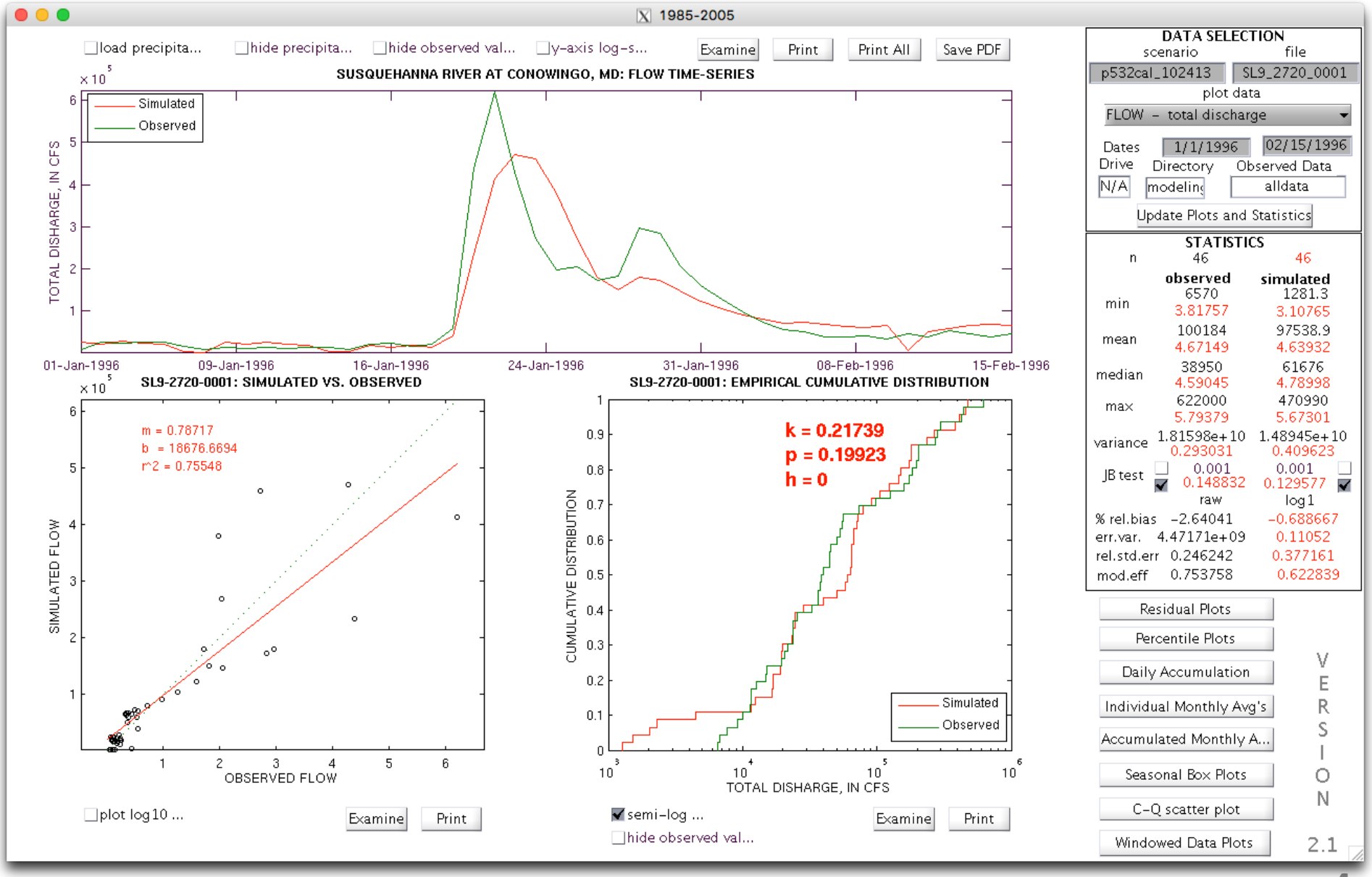




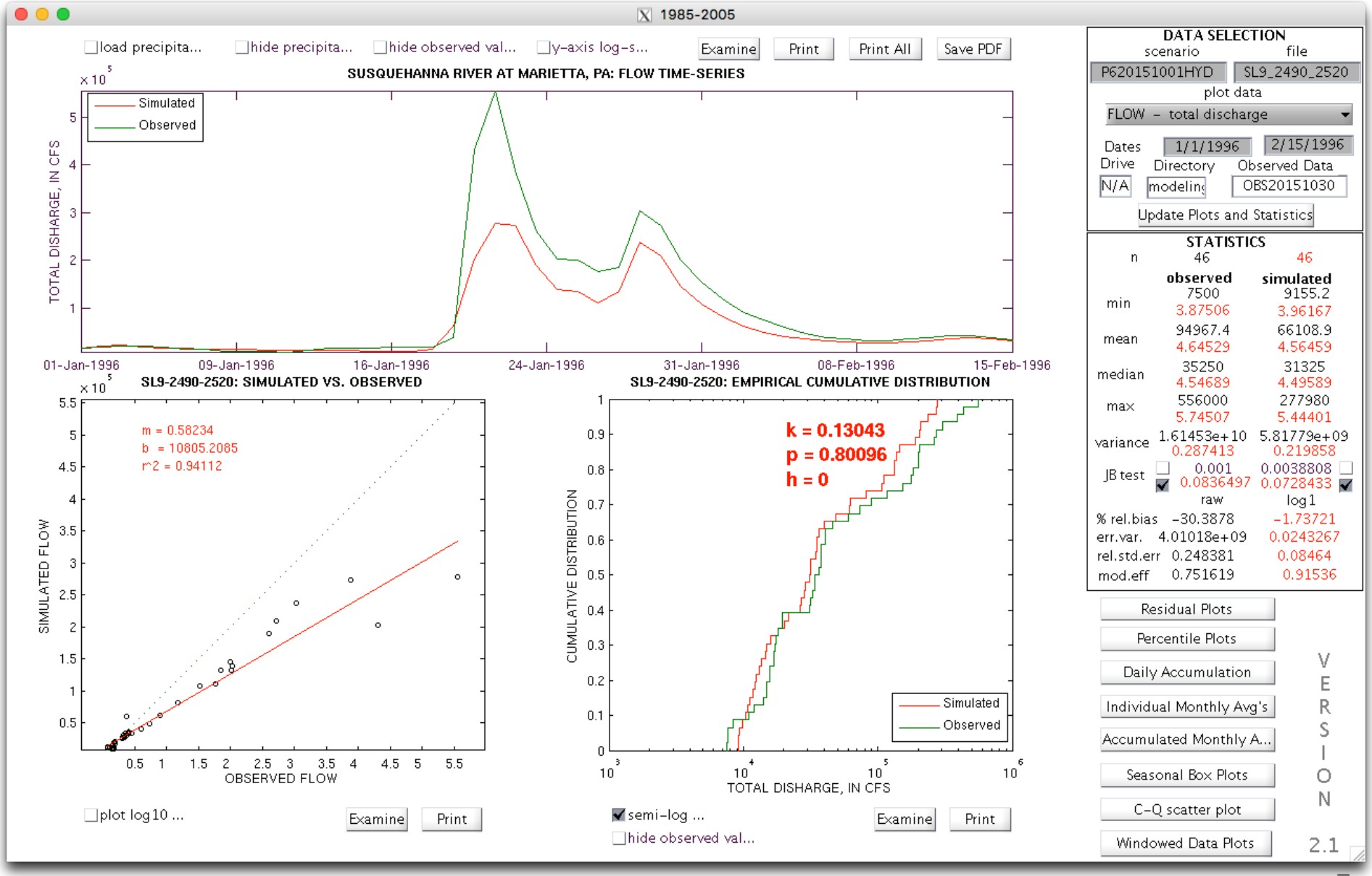


Phase 5.3.2 *(with +10F from Jan 17 – 19)*

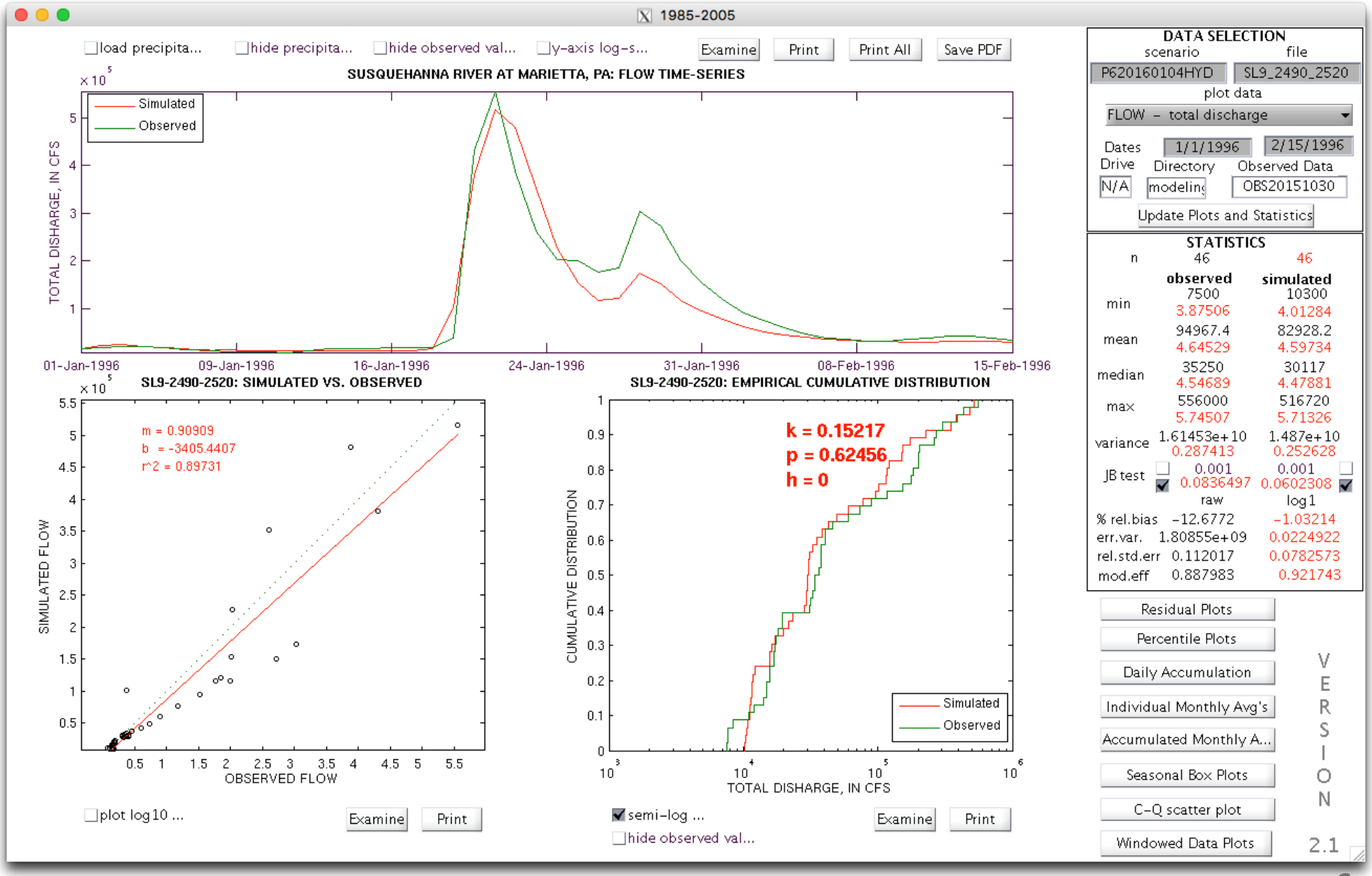
1996 Big Melt



Phase 6 – Beta 1



Phase 6 – Beta 2 preview *(+10F from Jan 18 – 21 & Ice Jams)*

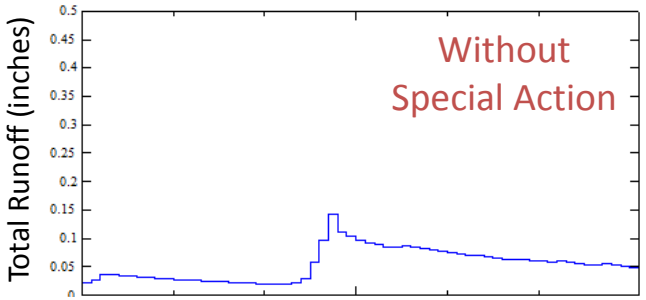


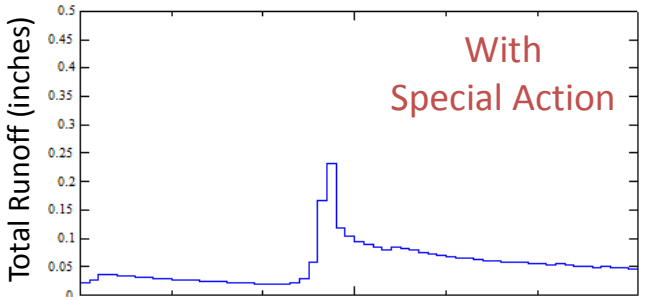
IBAR = mean infiltration capacity over the land segment (in/interval)

```
IBAR = (INFILT/(LZS/LZSN)**INFEXP)*INFFAC
```

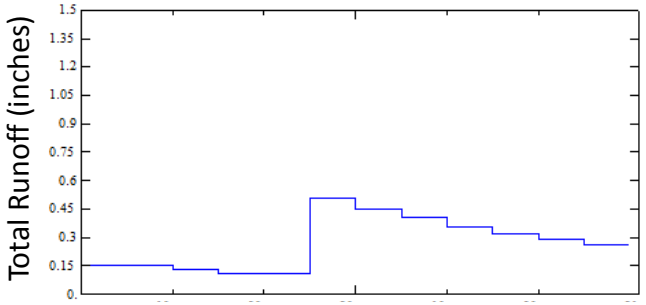
Special Action: if it has rained more than 6 inches in last 14 days.

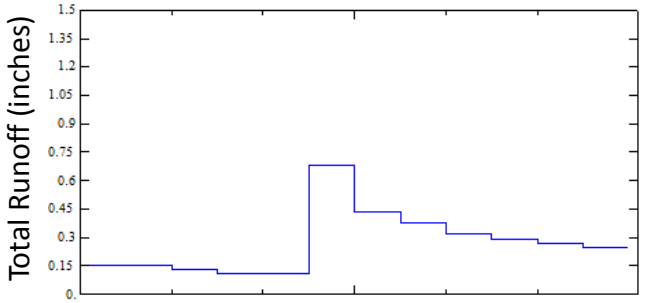
1 day



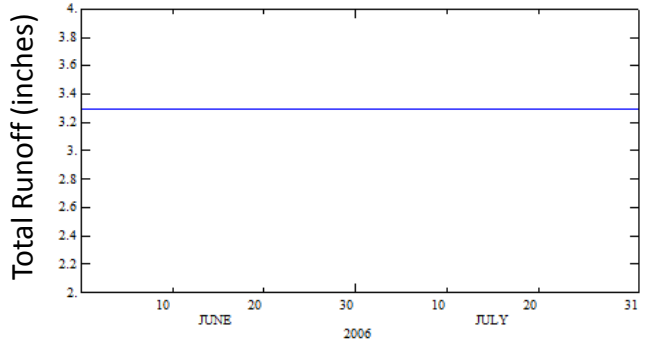


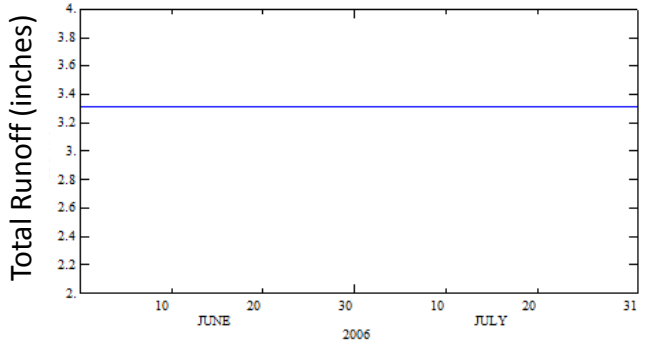
5 day



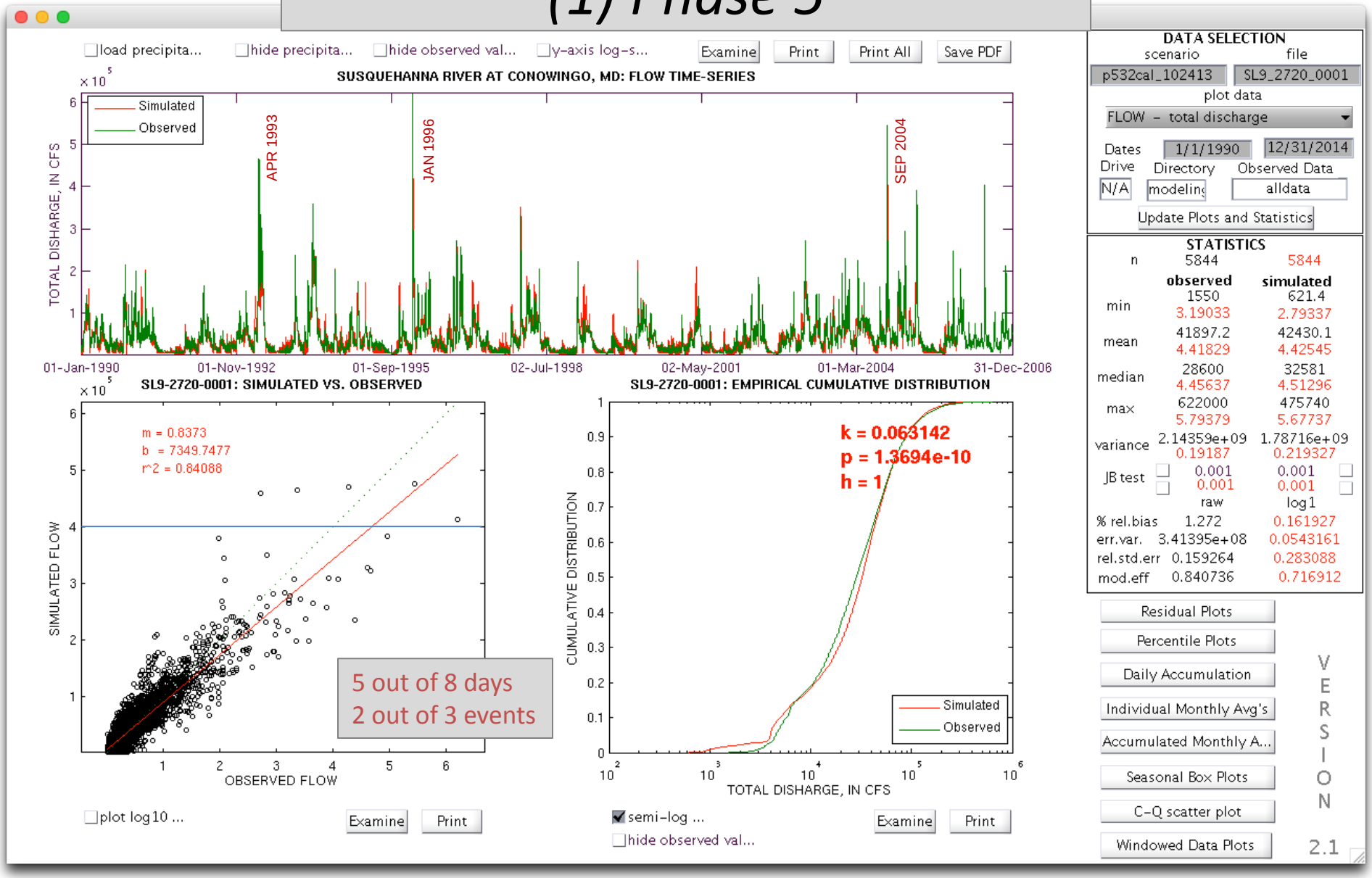


2 month

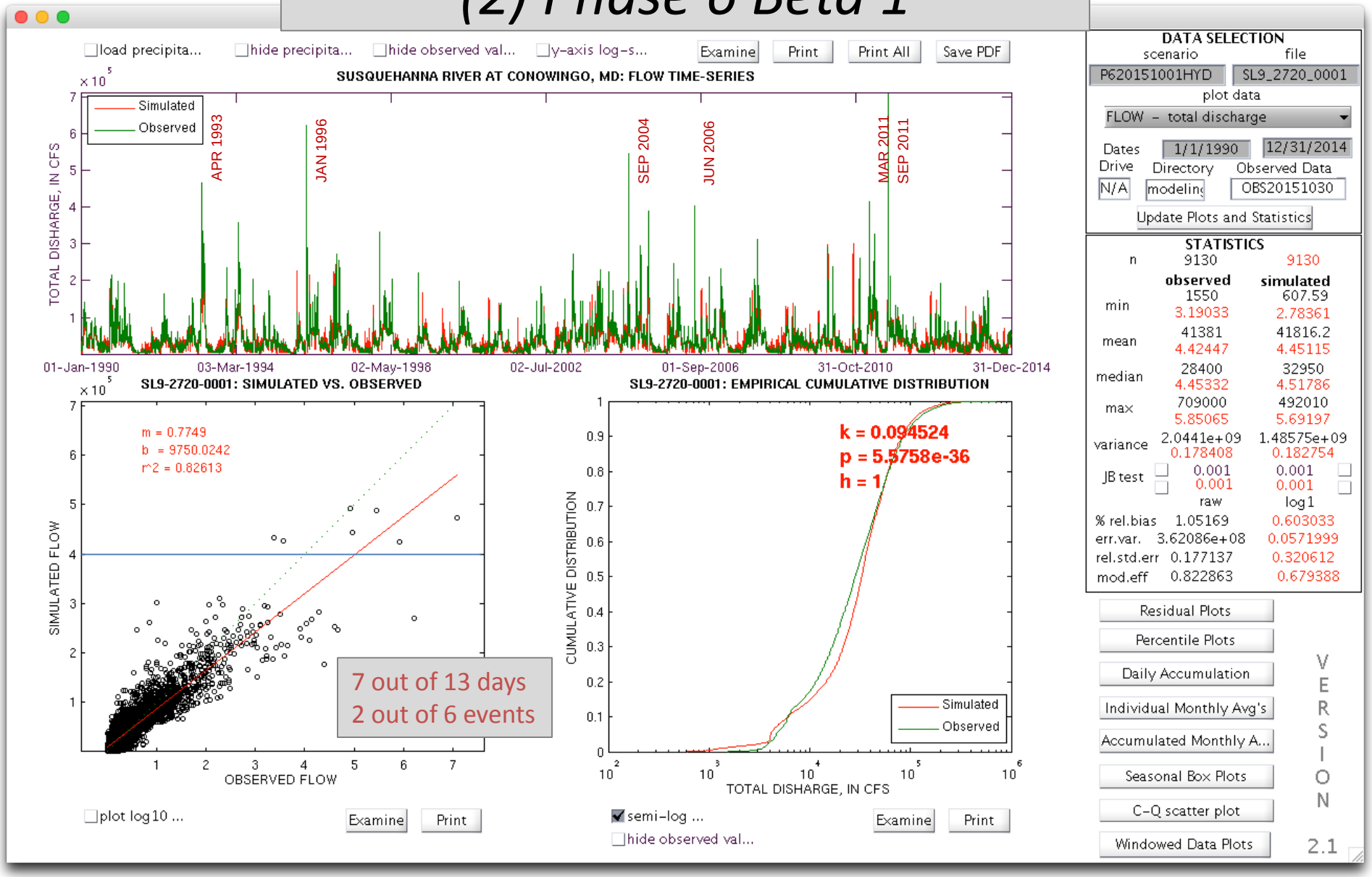




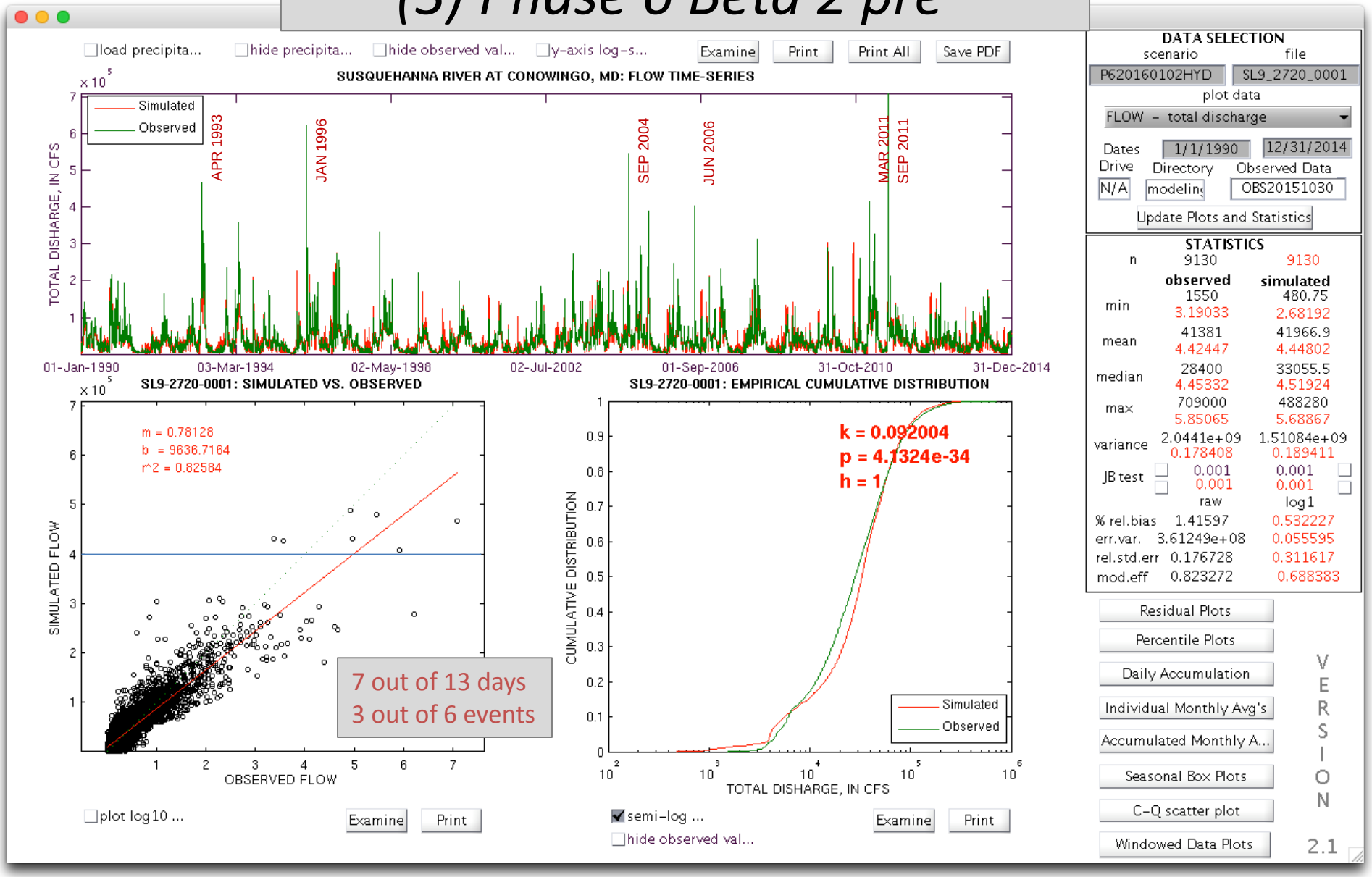
(1) Phase 5


load precipita...
hide precipita...
hide observed val...
y-axis log-s...
Examine
Print
Print All
Save PDF
SUSQUEHANNA RIVER AT CONOWINGO, MD: FLOW TIME-SERIES
Simulated
Observed
APR 1993
JAN 1996
SEP 2004
TOTAL DISHARGE, IN CFS
01-Jan-1990
01-Nov-1992
01-Sep-1995
02-Jul-1998
02-May-2001
01-Mar-2004
31-Dec-2006
SL9-2720-0001: SIMULATED VS. OBSERVED
m = 0.8373
b = 7349.7477
r^2 = 0.84088
SIMULATED FLOW
OBSERVED FLOW
5 out of 8 days
2 out of 3 events
plot log10 ...
Examine
Print
SL9-2720-0001: EMPIRICAL CUMULATIVE DISTRIBUTION
k = 0.063142
p = 1.3694e-10
h = 1
CUMULATIVE DISTRIBUTION
Simulated
Observed
TOTAL DISHARGE, IN CFS
semi-log ...
hide observed val...
Examine
Print
DATA SELECTION
scenario
file
p532cal_102413
SL9_2720_0001
plot data
FLOW - total discharge
Dates
1/1/1990
12/31/2014
Drive
Directory
Observed Data
N/A
modelinç
alldata
Update Plots and Statistics
STATISTICS
n 5844 5844
observed
simulated
min 1550 621.4
3.19033 2.79337
mean 41897.2 42430.1
4.41829 4.42545
median 28600 32581
4.45637 4.51296
max 622000 475740
5.79379 5.67737
variance 2.14359e+09 1.78716e+09
0.19187 0.219327
JB test 0.001 0.001
0.001 0.001
raw log1
% rel.bias 1.272 0.161927
err.var. 3.41395e+08 0.0543161
rel.std.err 0.159264 0.283088
mod.eff 0.840736 0.716912
Residual Plots
Percentile Plots
Daily Accumulation
Individual Monthly Avg's
Accumulated Monthly A...
Seasonal Box Plots
C-Q scatter plot
Windowed Data Plots
VERSION 2.1

(2) Phase 6 Beta 1

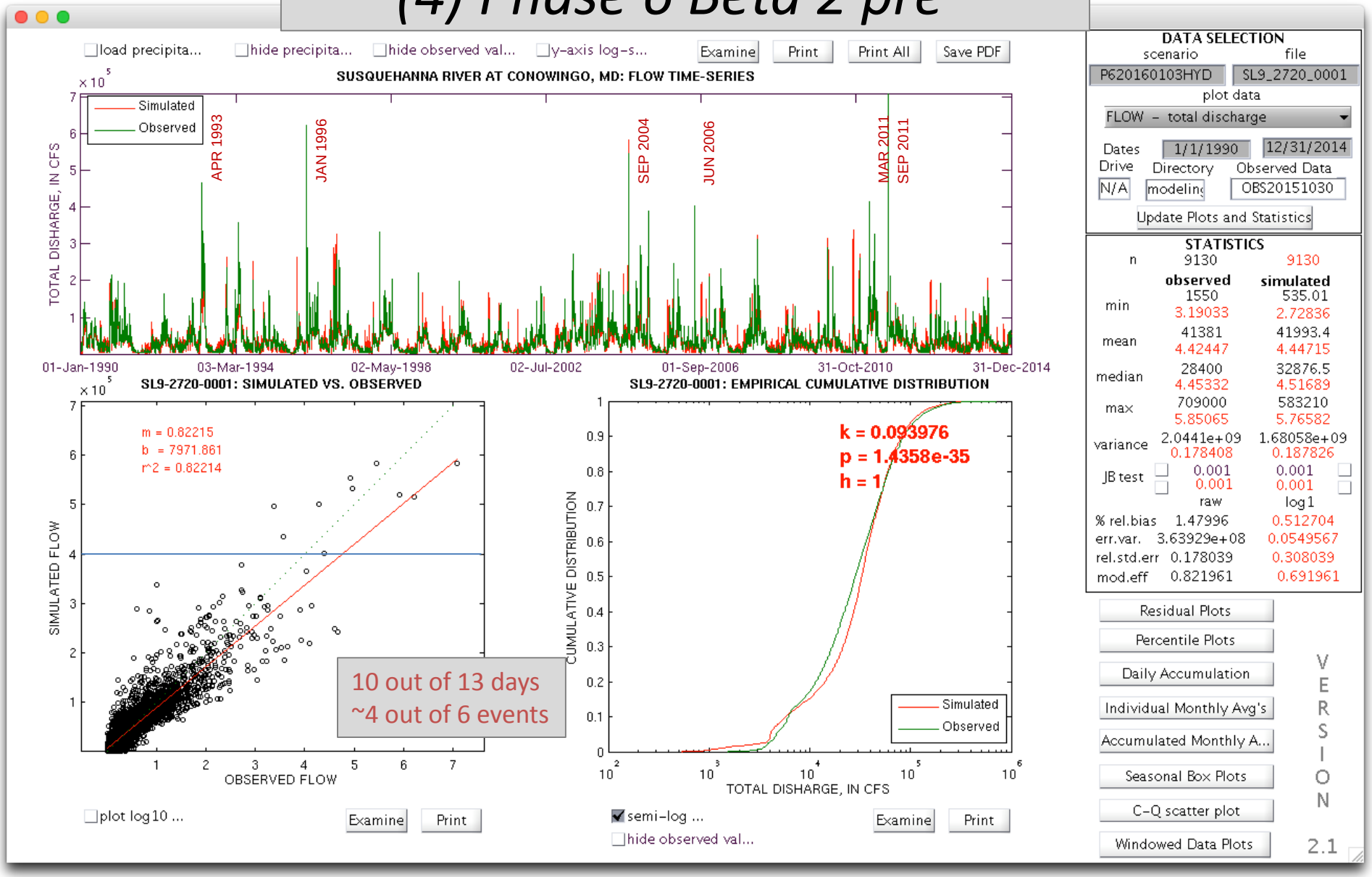


(3) Phase 6 Beta 2 pre*



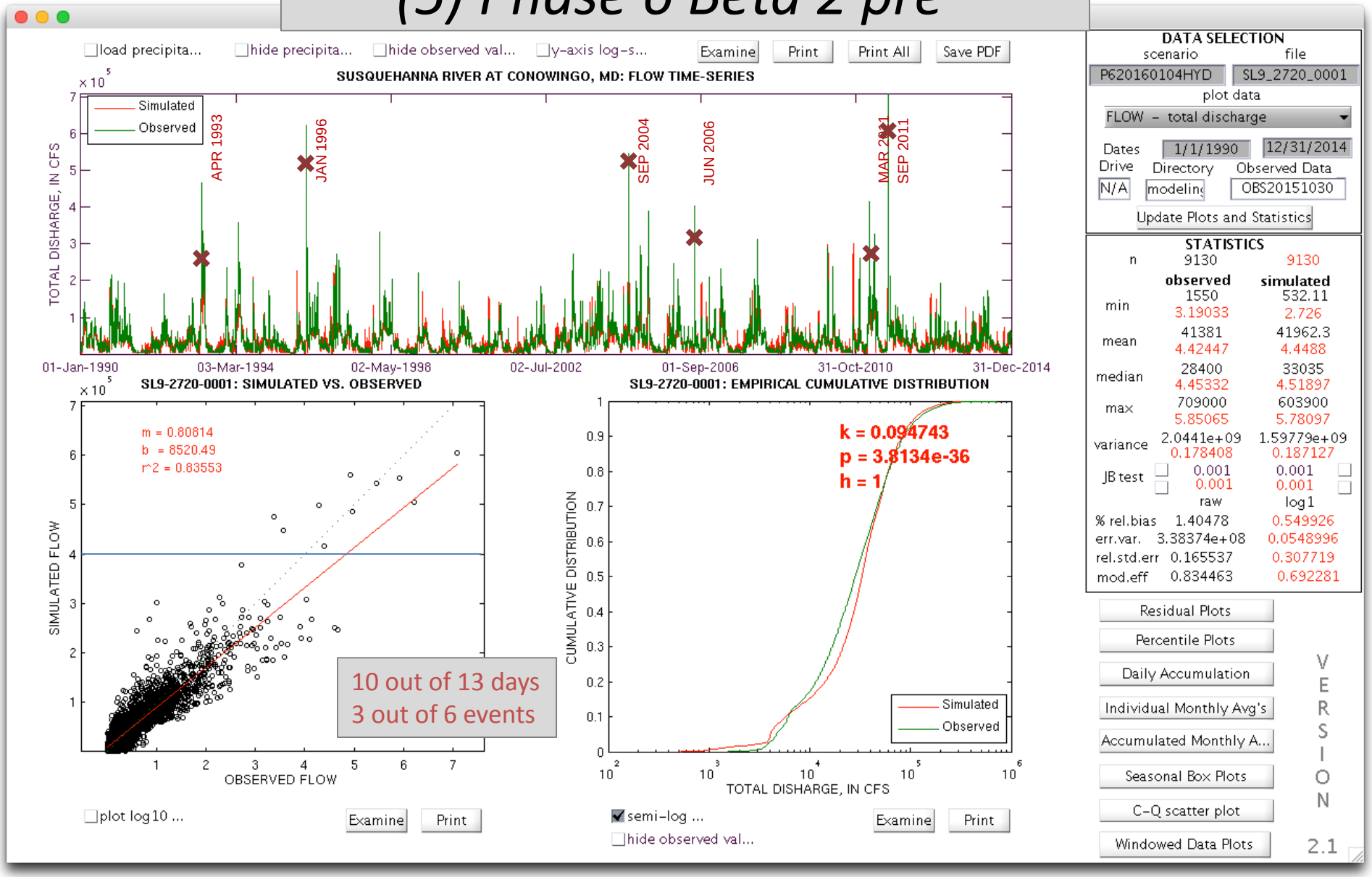
* PARAMETER RANGE

(4) Phase 6 Beta 2 pre*



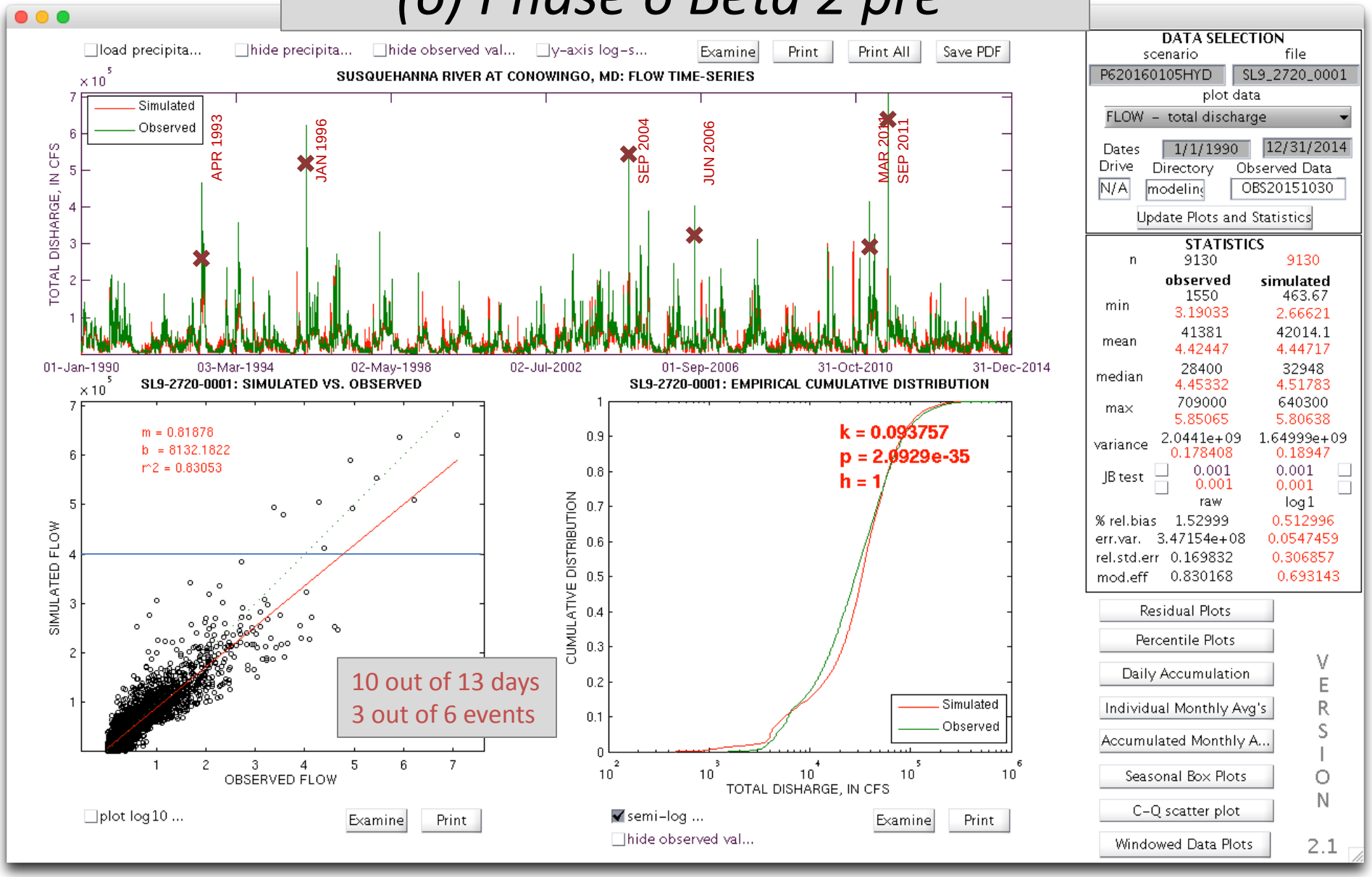
* *INFEXP* SPECIAL ACTION
> 1.25 INCHES / DAY

(5) Phase 6 Beta 2 pre*



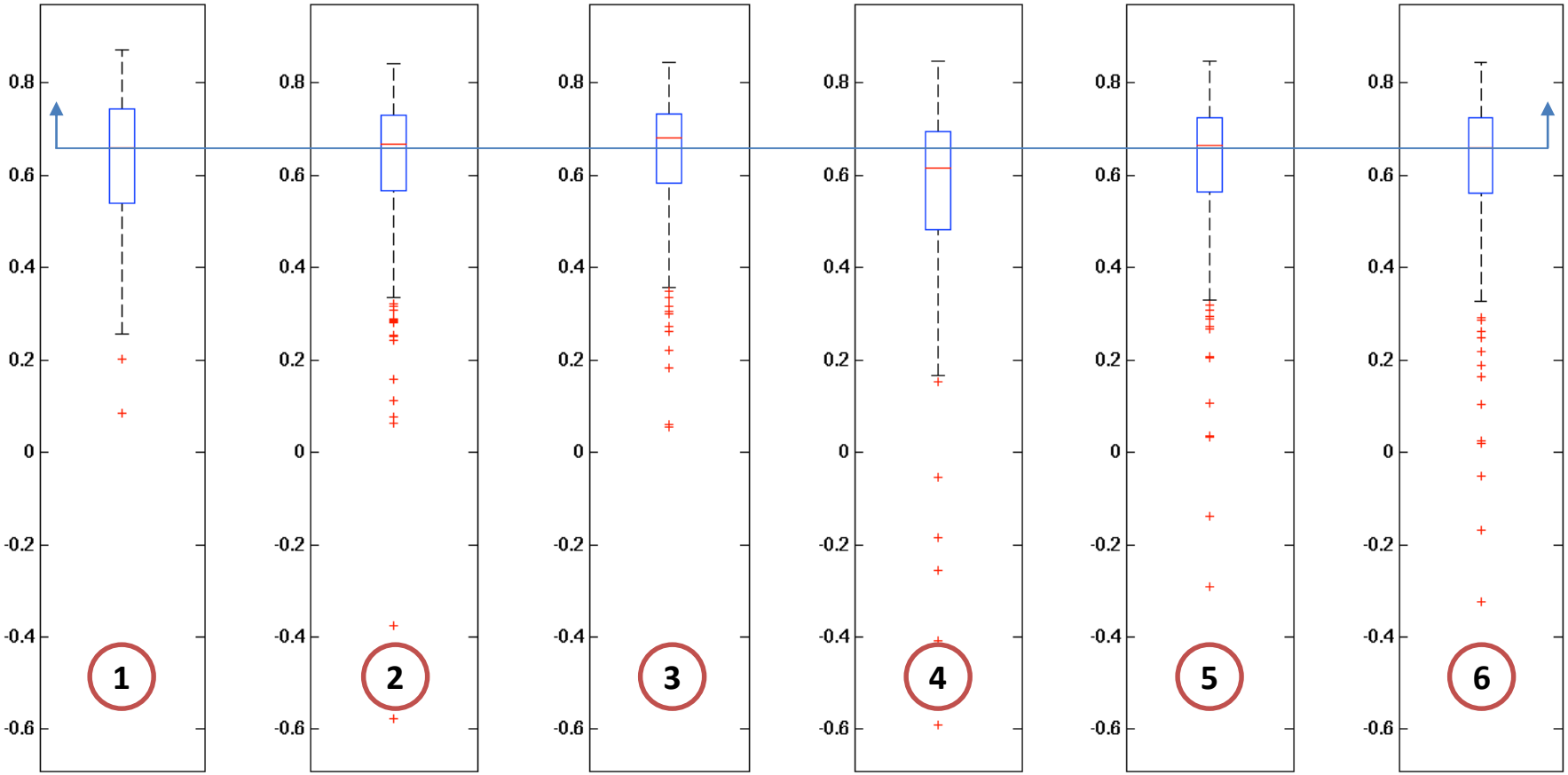
* *INFEXP* SPECIAL ACTION
> 6 INCHES / 14 DAY

(6) Phase 6 Beta 2 pre*



* *INFILT* & *LZSN* SPECIAL ACTION
> 6 INCHES / 14 DAY

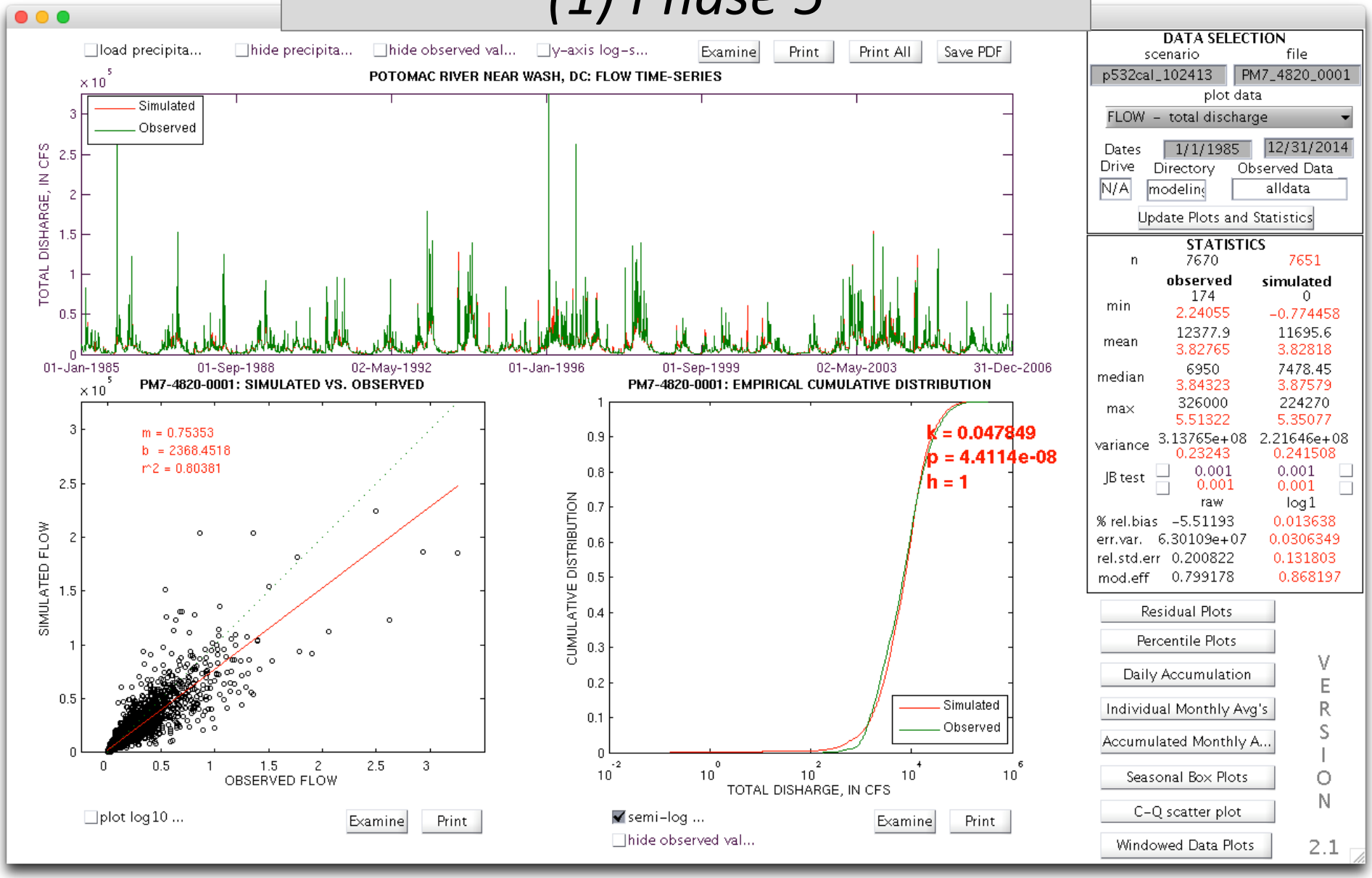
Nash-Sutcliffe Efficiency at 191 Calibration Stations



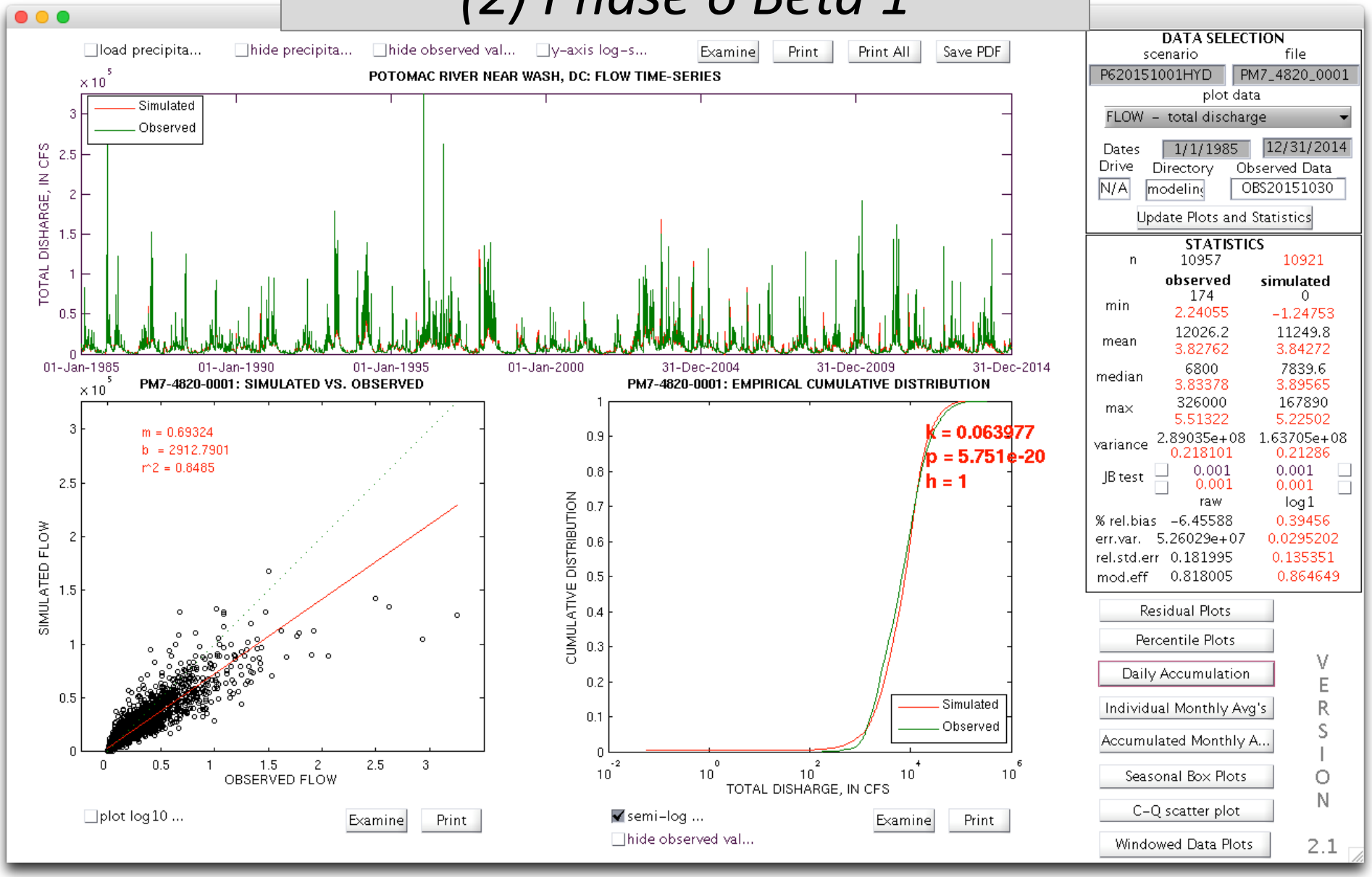
Phase 5 [1985-2005]	Phase 6 Beta 1 [1985-2014]	Phase 6 Beta 1+ [1985-2014] Parameter Range	Phase 6 Beta 1+ [1985-2014] *INFEXP* Parameter > 1.25 inches/day	Phase 6 Beta 1+ [1985-2014] *INFEXP* Parameter > 6 inches/14 day	Phase 6 Beta 1+ [1985-2014] *INFILT* Parameter > 6 inches/14 day

?

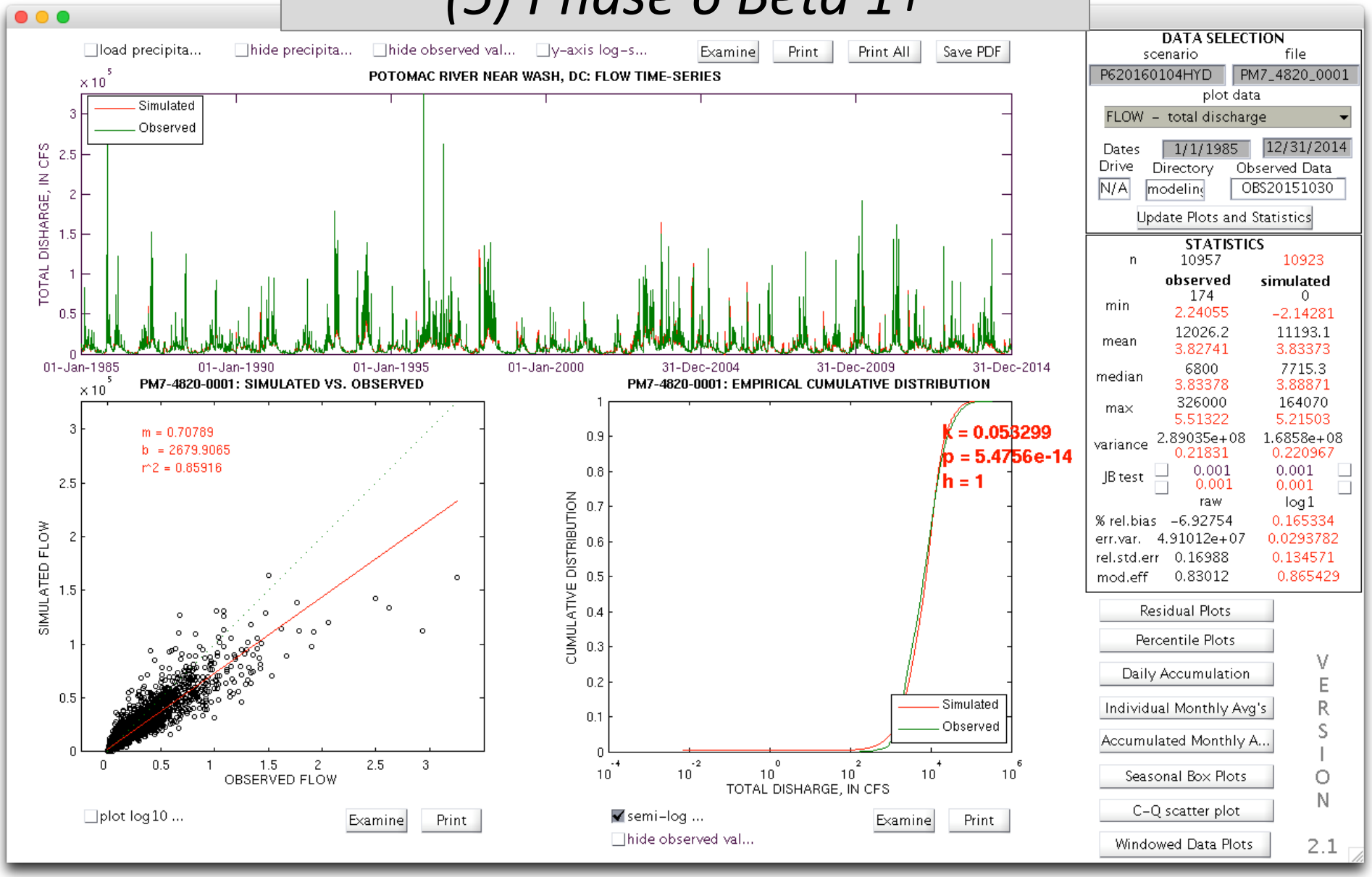
(1) Phase 5


load precipita...
hide precipita...
hide observed val...
y-axis log-s...
Examine
Print
Print All
Save PDF
POTOMAC RIVER NEAR WASH, DC: FLOW TIME-SERIES
Simulated
Observed
TOTAL DISHARGE, IN CFS
01-Jan-1985
01-Sep-1988
02-May-1992
01-Jan-1996
01-Sep-1999
02-May-2003
31-Dec-2006
PM7-4820-0001: SIMULATED VS. OBSERVED
m = 0.75353
b = 2368.4518
r^2 = 0.80381
SIMULATED FLOW
OBSERVED FLOW
plot log10 ...
Examine
Print
PM7-4820-0001: EMPIRICAL CUMULATIVE DISTRIBUTION
k = 0.047849
p = 4.4114e-08
h = 1
CUMULATIVE DISTRIBUTION
TOTAL DISHARGE, IN CFS
Simulated
Observed
semi-log ...
hide observed val...
Examine
Print
DATA SELECTION
scenario
file
p532cal_102413
PM7_4820_0001
plot data
FLOW - total discharge
Dates
1/1/1985
12/31/2014
Drive
Directory
Observed Data
N/A
modeling
alldata
Update Plots and Statistics
STATISTICS
n 7670 7651
observed simulated
min 174 0
2.24055 -0.774458
mean 12377.9 11695.6
3.82765 3.82818
median 6950 7478.45
3.84323 3.87579
max 326000 224270
5.51322 5.35077
variance 3.13765e+08 2.21646e+08
0.23243 0.241508
JB test 0.001 0.001
0.001 0.001
raw log1
% rel.bias -5.51193 0.013638
err.var. 6.30109e+07 0.0306349
rel.std.err 0.200822 0.131803
mod.eff 0.799178 0.868197
Residual Plots
Percentile Plots
Daily Accumulation
Individual Monthly Avg's
Accumulated Monthly A...
Seasonal Box Plots
C-Q scatter plot
Windowed Data Plots
VERSION 2.1

(2) Phase 6 Beta 1

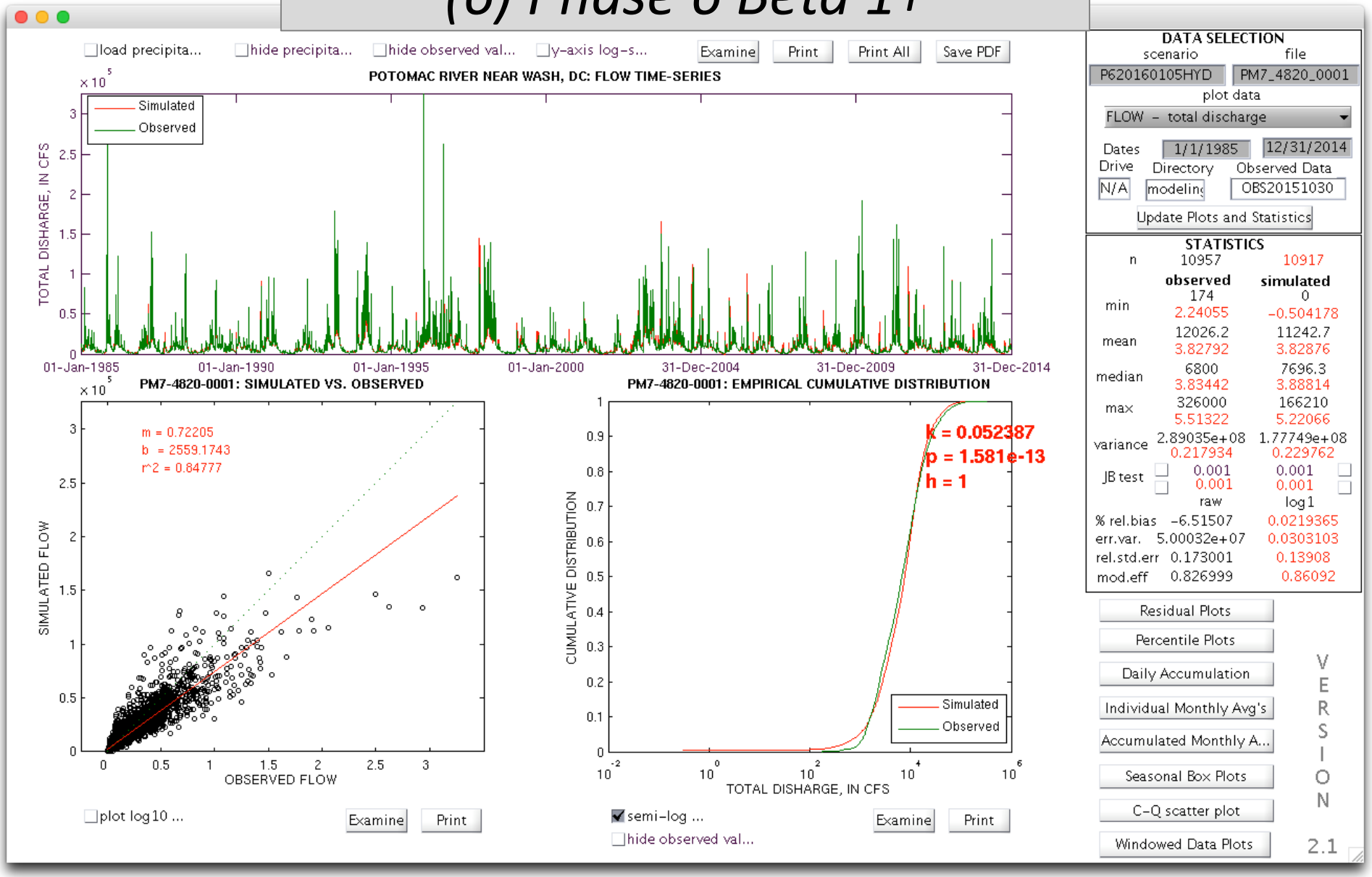


(5) Phase 6 Beta 1+



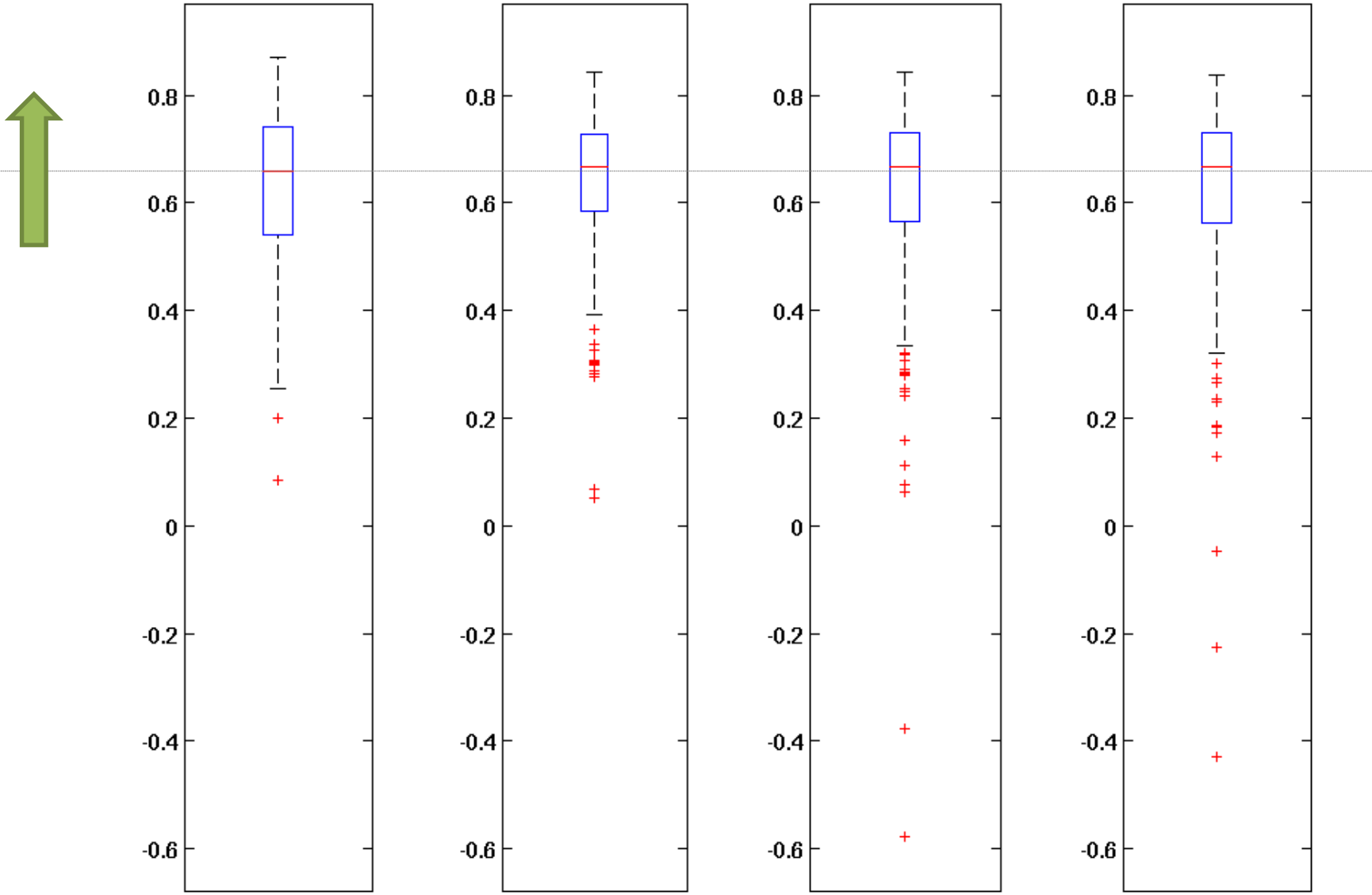
INFEXP SPECIAL ACTION
> 6 INCHES / 14 DAY

(6) Phase 6 Beta 1+



INFILT & *LZSN* SPECIAL ACTION
> 6 INCHES / 14 DAY

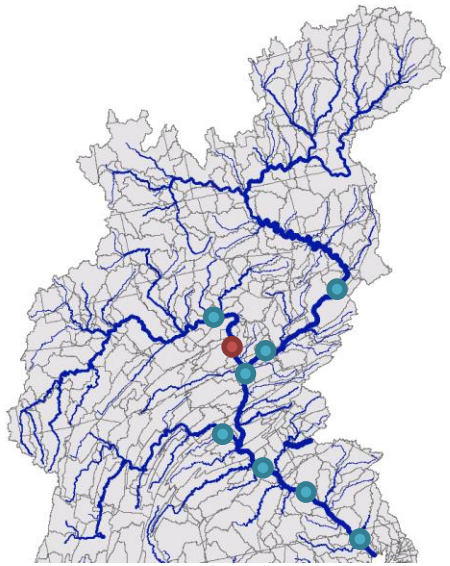
Nash-Sutcliffe Efficiency at 191 Calibration Stations



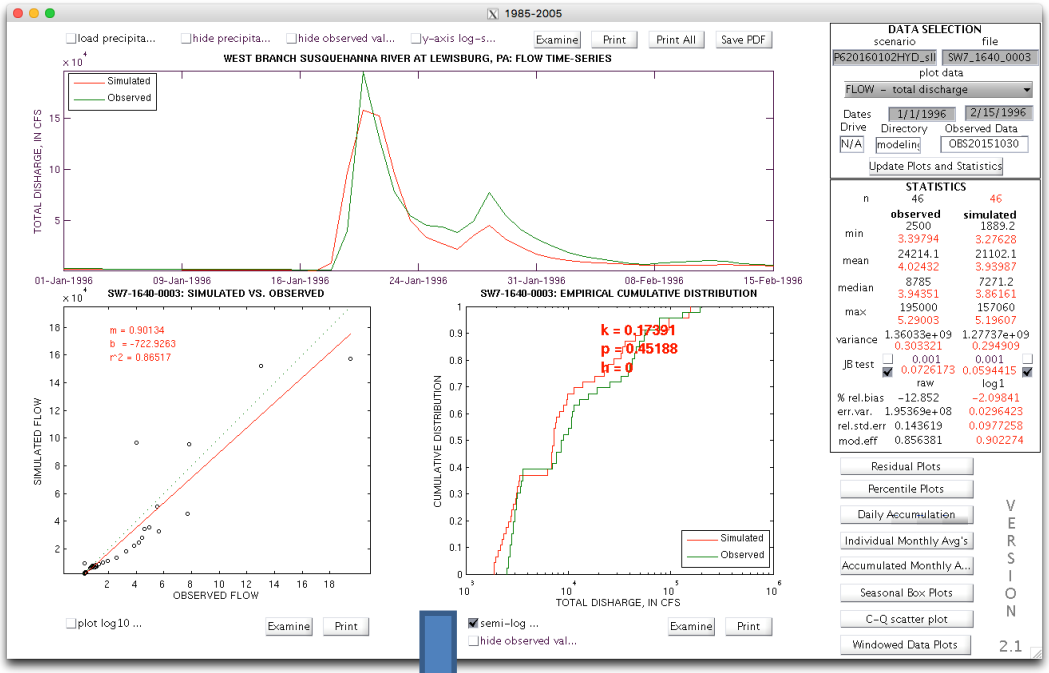
Phase 5 [1985-2005] | Phase 6 [1985-2014] | Phase 6 [1985-2014] | Phase 6 [1985-2005]

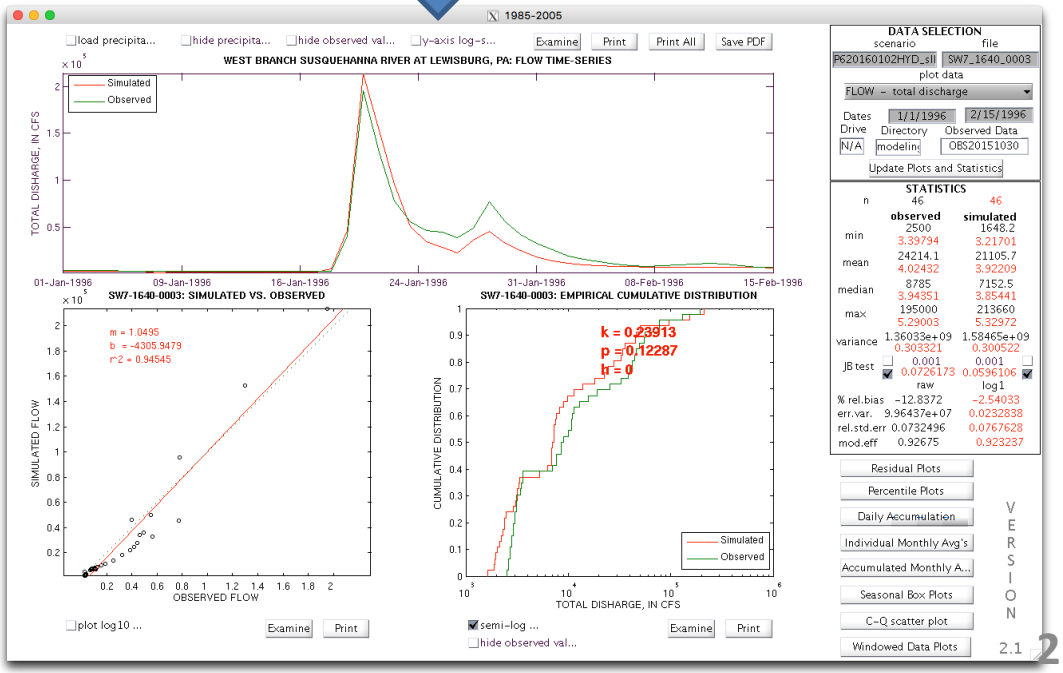
{P6 land segments and landuse}*

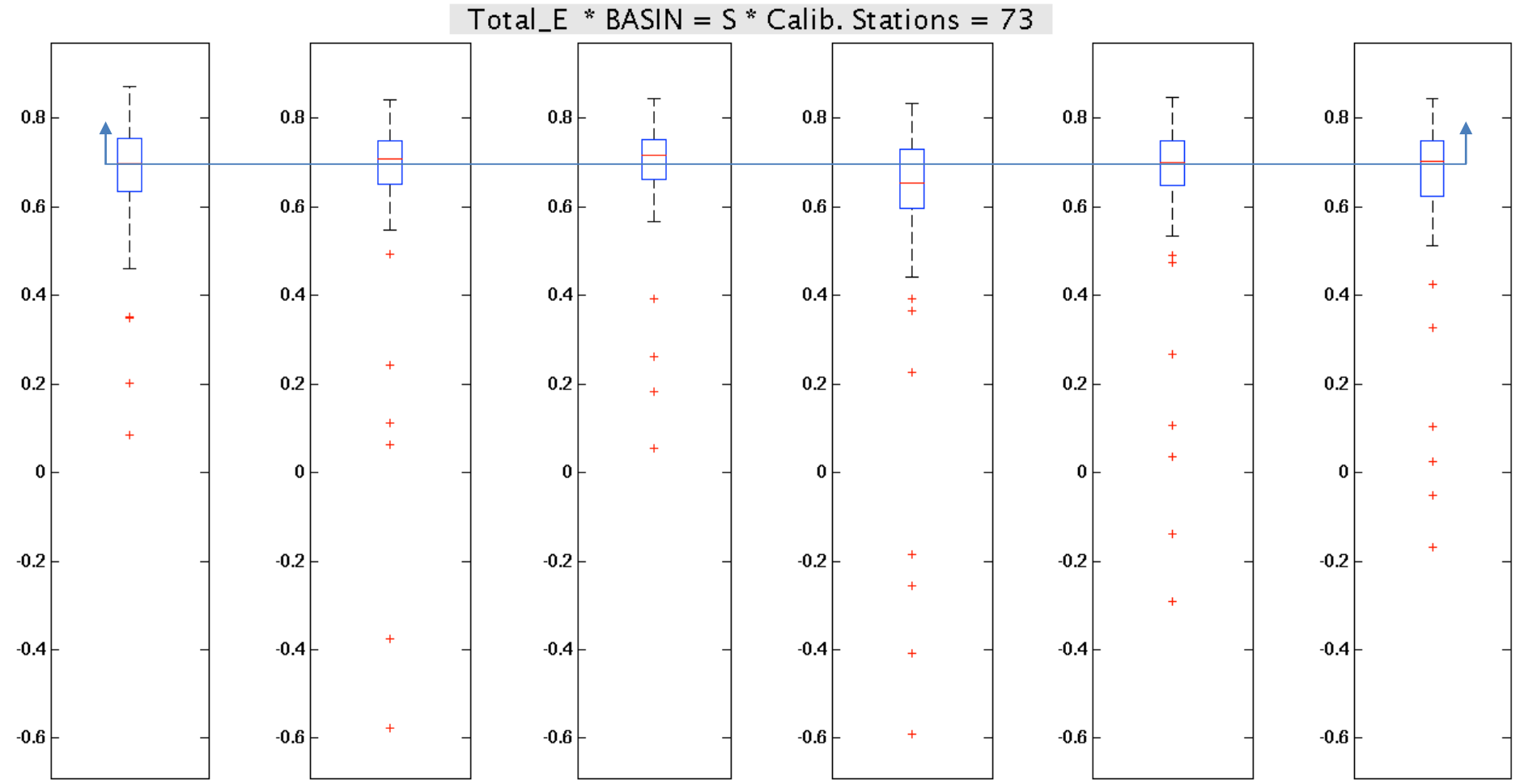
* Aug 2015 version with provisional datasets



Improvement through the simulation of Ice Jams







Phase 5 [1985-2005]

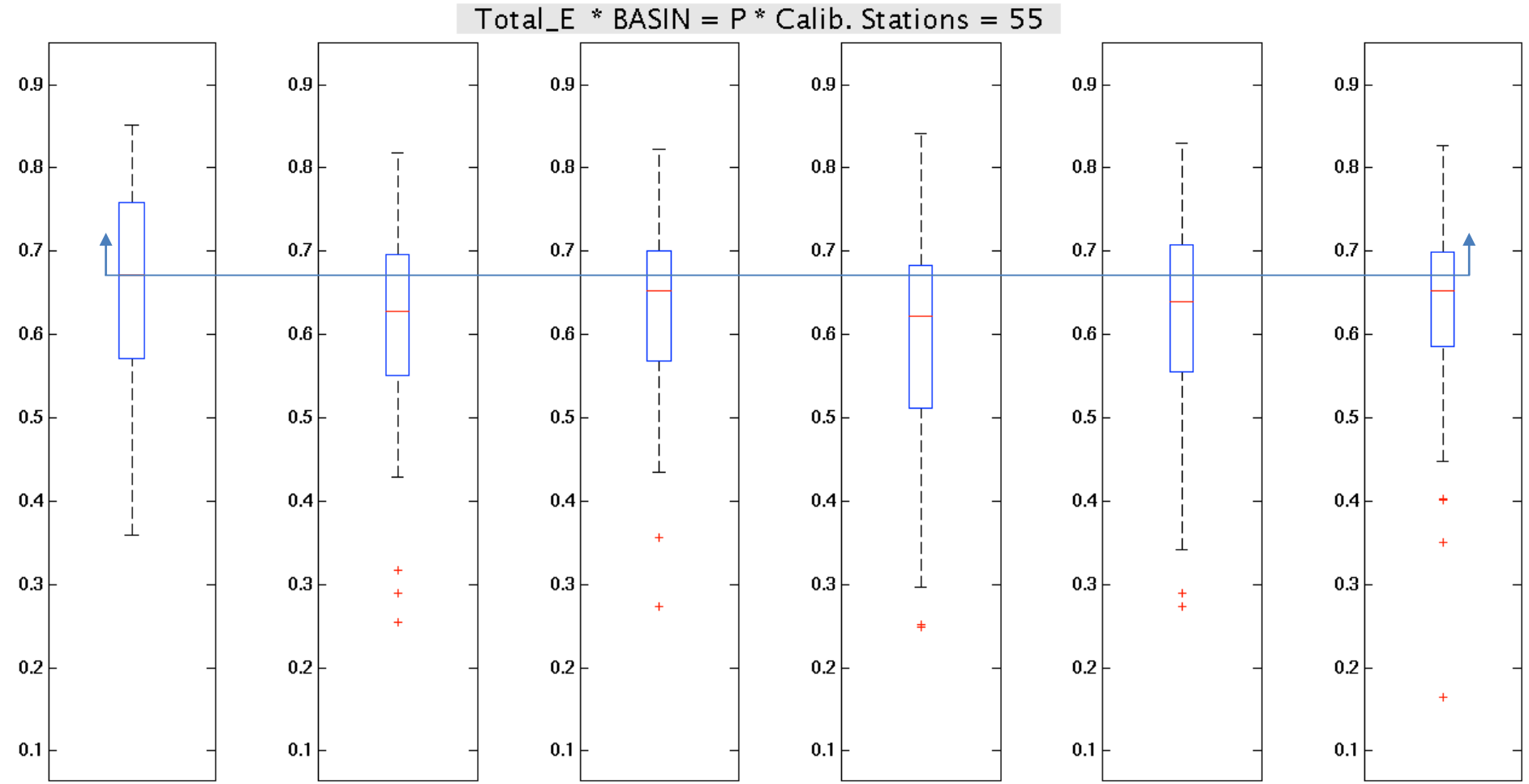
Phase 6 Beta 1 [1985-2014]

Phase 6 Beta 1+ [1985-2014] Parameter Range

Phase 6 Beta 1+ [1985-2014] *INFEXP* Parameter > 1.25 inches/day

Phase 6 Beta 1+ [1985-2014] *INFEXP* Parameter > 6 inches/14 day

Phase 6 Beta 1+ [1985-2014] *INFILT* Parameter > 6 inches/14 day



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Phase 6 Beta 1 [1985-2014]

Phase 6 Beta 1+ [1985-2014] Parameter Range

Phase 6 Beta 1+ [1985-2014] *INFEXP* Parameter > 1.25 inches/day

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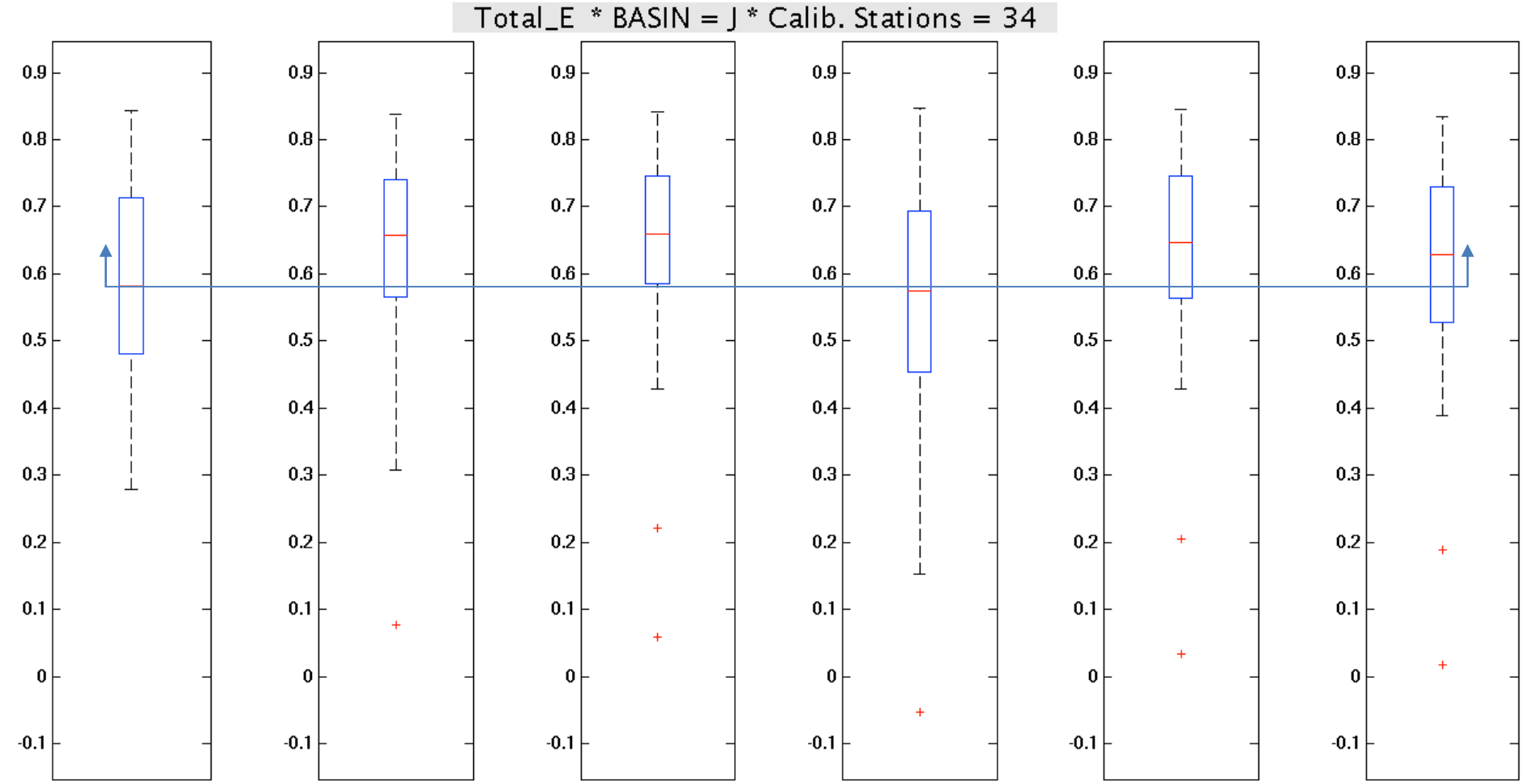
Phase 6 Beta 1+ [1985-2014] *INFILT* Parameter > 6 inches/14 day



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Phase 6 Beta 1+ [1985-2014] Parameter Range

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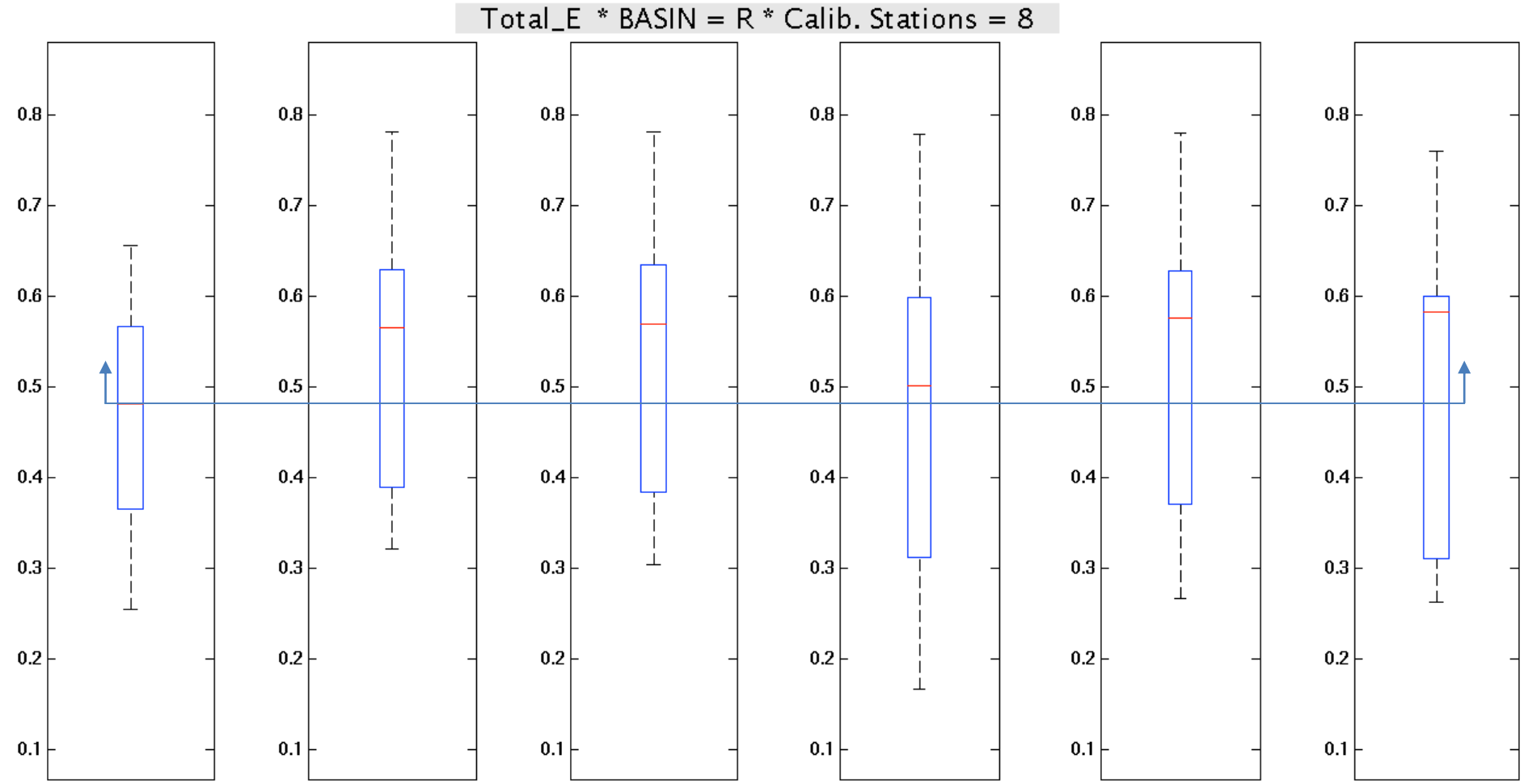
Phase 6 Beta 1+ [1985-2014] *INFILT* Parameter > 6 inches/14 day



Phase 5 [1985-2005]

Phase 6 Beta 1 [1985-2014]

Phase 6 Beta 1+ [1985-2014] Parameter Range

Phase 6 Beta 1+ [1985-2014] *INFEXP* Parameter > 1.25 inches/day

Phase 6 Beta 1+ [1985-2014] *INFEXP* Parameter > 6 inches/14 day

Phase 6 Beta 1+ [1985-2014] *INFILT* Parameter > 6 inches/14 day