pestpp-ies_the_wrong_way

July 1, 2019

1 Run PESTPP-IES the wrong way...

```
In [1]: %matplotlib inline
    import os
    import shutil
    import numpy as np
    import pandas as pd
    import matplotlib.pyplot as plt
    import matplotlib as mpl
    plt.rcParams['font.size']=12
    import flopy
    import pyemu
    %matplotlib inline
```

flopy is installed in /Users/jeremyw/Dev/gw1876/activities_csiro/notebooks/flopy

1.1 SUPER IMPORTANT: SET HOW MANY PARALLEL WORKERS TO USE

```
In [2]: num_workers = 15
In [3]: t_d = "template"
       m_d = "master_wrong_ies"
In [4]: pst = pyemu.Pst(os.path.join(t_d, "freyberg.pst"))
       pst.write_par_summary_table(filename="none")
Out[4]:
                           type transform count initial value upper bound \
       cn_hk8
                         cn_hk8
                                                1
                                                             0
                                                                         1
                                      log
                                                1
                                                             0
       cn_ss6
                         cn_ss6
                                      log
                                                                         1
       gr_hk3
                         gr_hk3
                                      log
                                             705
                                                             0
                                                                         1
       pp_strt1
                                              32
                                                             0 0.0211893
                       pp_strt1
                                      log
                                                             0
                                                                  0.243038
       cn_sy8
                         cn_sy8
                                      log
                                                1
                                                             0 0.0211893
       gr_strt4
                       gr_strt4
                                      log
                                             705
                                              32
                                                             0
                                                                  0.243038
       pp_sy2
                        pp_sy2
                                      log
       cn_vka8
                       cn_vka8
                                      log
                                              1
                                                             0
                        pp_hk2
                                              32
                                                             0
                                                                         1
       pp_hk2
                                      log
                                              32
                                                                 0.0211893
                       pp_strt0
                                      log
       pp_strt0
```

4	•	7	705	0	0 470004
gr_prsity4	gr_prsity4	log	705	0	0.176091
cn_sy7	cn_sy7	log	1	0	0.243038
cn_strt8	cn_strt8	log	1	0	0.0211893
welflux_k02	welflux_k02	log	6	0	1
pp_sy1	pp_sy1	log	32	0	0.243038
cn_prsity7	cn_prsity7	log	1	0	0.176091
pp_vka0	pp_vka0	log	32	0	1
pp_prsity2	pp_prsity2	log	32	0	0.176091
gr_sy3	gr_sy3	log	705	0	0.243038
cn_vka7	cn_vka7	log	1	0	1
cn_sy6	cn_sy6	log	1	0	0.243038
gr_sy4	gr_sy4	log	705	0	0.243038
gr_hk5	gr_hk5	log	705	0	1
gr_ss4	${\tt gr_ss4}$	log	705	0	1
cn_prsity8	cn_prsity8	log	1	0	0.176091
cn_ss8	cn_ss8	log	1	0	1
cn_strt6	cn_strt6	log	1	0	0.0211893
cn_hk7	cn_hk7	log	1	0	1
gr_ss3	gr_ss3	log	705	0	1
cn_strt7	cn_strt7	log	1	0	0.0211893
gr_strt5	gr_strt5	log	705	0	0.0211893
pp_prsity0	pp_prsity0	log	32	0	0.176091
cn_prsity6	cn_prsity6	log	1	0	0.176091
gr_sy5	gr_sy5	log	705	0	0.243038
cn_ss7	cn_ss7	log	1	0	1
gr_vka5	gr_vka5	log	705	0	1
drncond_k00	drncond_k00	log	10	0	1
pp_rech1	pp_rech1	log	32	0	0.0413927
strk	strk	log	40	0	2
pp_vka2	pp_vka2	log	32	0	1
gr_vka3	gr_vka3	log	705	0	1
welflux	welflux	log	2	0	1
pp_ss0	pp_ss0	log	32	0	1
pp_hk1	pp_hk1	log	32	0	1
cn_rech5	cn_rech5	log	1	0	0.0413927
pp_hk0	pp_hk0	log	32	0	1
pp_wka1	pp_vka1	log	32	0	1
cn_hk6	cn_hk6	log	1	0	1
flow	flow	log	1	0	0.09691
gr_rech2	gr_rech2	_	705	0	0.0413927
	gr_recnz gr_vka4	log	705		
gr_vka4	_	log	705	0	1 0.176091
gr_prsity5	gr_prsity5	log		0	
gr_rech3	gr_rech3	log	705	0	0.0413927
pp_ss2	pp_ss2	log	32	0	1
pp_strt2	pp_strt2	log	32	0	0.0211893
pp_prsity1	pp_prsity1	log	32	0	0.176091
pp_sy0	pp_sy0	log	32	0	0.243038

gr_hk4 gr_ss5 gr_ss5 log 705 0 1 lower bound standard deviation	gr_nk4 gr_nk4 log 705 0 1 gr_ss5 log 705 0 1 lower bound standard deviation cn_nk8 -1 0.5 cn_ss6 -1 0.5 gr_kk3 -1 0.5 pp_strt1 -0.0222764 0.0108664 cn_sy8 -0.60206 0.211275 gr_strt4 -0.0222764 0.0108664 pp_sy2 -0.60206 0.211275 cn_vka8 -1 0.5 pp_nktr0 -0.0222764 0.0108664 gr_prsity4 -0.30103 0.11928 cn_sy7 -0.60206 0.211275 cn_ytk8 -0.0222764 0.0108664 welflux_k02 -1 0.5 pp_sy1 -0.60206 0.211275 cn_prsity7 -0.30103 0.11928 cn_sy7 -0.60206 0.211275 cn_prsity8 -0.0222764 0.0108664 welflux_k02 -1 0.5 pp_sy1 -0.60206 0.211275 cn_prsity7 -0.30103 0.11928 gr_sy3 -0.60206 0.211275 cn_prsity7 -0.30103 0.11928 gr_sy3 -0.60206 0.211275 gr_nyka0 -1 0.5 pp_prsity2 -0.30103 0.11928 gr_sy3 -0.60206 0.211275 gr_nyk8 -0.60206 0.211275 gr_nyk8 -0.60206 0.211275 gr_sy4 -0.60206 0.211275 gr_sy84 -1 0.5 cn_prsity8 -0.30103 0.11928 cn_ss8 -1 0.5 cn_prsity8 -0.30103 0.11928 cn_ss8 -1 0.5 cn_strf -0.0222764 0.0108664 cn_hk7 -1 0.5 gr_ss3 -1 0.5 cn_strt7 -0.0222764 0.0108664 cn_hk7 -1 0.5 gr_ss3 -1 0.5 cn_strt7 -0.0222764 0.0108664 cn_prsity0 -0.30103 0.11928 gr_sy5 -0.60206 0.211275 cn_ss7 -1 0.5 gr_sy4s5 -1 0.5 gr_sy5 -0.60206 0.211275 cn_ss7 -1 0.5 gr_sy5 -0.60206 0.211275 cn_ss7 -1 0.5 gr_sy4s5 -1 0.5 gr_sy5 -0.60206 0.211275 cn_ss7 -1 0.5 gr_sy6 -0.60206 0.211275 cn_ss7 -1 0.5 gr_sy7 -0.60206 0.211275 cn_ss7 -1 0.5 gr_sy85 -0.60206 0.211275 cn_ss7 -1 0.5 gr_yk85 -1 0.5 gr_yk82 -1 0.5 gr_yk82 -1 0.5 gr_yk82 -1 0.5 gr_yk83 -1 0.5	cn_rech4	cn_rech4	log	1	0	0.0413927					
Section Sect	Company Comp			_								
lower bound standard deviation cn_hk8	Nower bound standard deviation Cn_hk8	-	_	_								
cn_ss6 -1 0.5 gr_hk3 -1 0.5 pp_strt1 -0.0222764 0.0108664 cn_sy8 -0.60206 0.211275 gr_strt4 -0.0222764 0.0108664 pp_sy2 -0.60206 0.211275 cn_yka8 -1 0.5 pp_hk2 -1 0.5 pp_strt0 -0.0222764 0.0108664 gr_prsity4 -0.30103 0.11928 cn_sy7 -0.60206 0.211275 cn_strt8 -0.0222764 0.0108664 welflux,k02 -1 0.5 pp_sy1 -0.60206 0.211275 cn_prsity7 -0.30103 0.11928 pp_vka0 -1 0.5 pp_prsity2 -0.30103 0.11928 gr_sy3 -0.60206 0.211275 cn_yka7 -1 0.5 cn_sy6 -0.60206 0.211275 gr_sy4 -0.60206 0.211275 gr_sy4 -0.60206 0.211275	cn_ss6 -1 0.5 gr_hk3 -1 0.5 pp_strt1 -0.022764 0.0108664 cn_sy8 -0.60206 0.211275 gr_strt4 -0.0222764 0.0108664 pp_sy2 -0.60206 0.211275 cn_vka8 -1 0.5 pp_strt0 -0.0222764 0.0108664 gr_prsity4 -0.30103 0.11928 cn_sy7 -0.60206 0.211275 cn_strt8 -0.0222764 0.0108664 welflux_k02 -1 0.5 pp_sy1 -0.60206 0.211275 cn_prsity7 -0.30103 0.11928 gr_sy1 -0.60206 0.211275 cn_prsity7 -0.30103 0.11928 gr_sy3 -0.60206 0.211275 cn_vka7 -1 0.5 cn_sy6 -0.60206 0.211275 gr_sy4 -0.60206 0.211275 gr_sy4 -0.60206 0.211275 gr_sy4 -0.60206 <t< td=""><td>81_550</td><td>81_550</td><td>108</td><td>100</td><td>Ŭ</td><td>-</td></t<>	81_550	81_550	108	100	Ŭ	-					
Cn_ss6	Cn_ss6	lower bound standard deviation										
cn_ss6 -1 0.5 gr_hk3 -1 0.5 pp_strt1 -0.0222764 0.0108664 cn_sy8 -0.60206 0.211275 gr_strt4 -0.0222764 0.0108664 pp_sy2 -0.60206 0.211275 cn_vka8 -1 0.5 pp_hk2 -1 0.5 pp_strt0 -0.0222764 0.0108664 gr_prsity4 -0.30103 0.11928 cn_sy7 -0.60206 0.211275 cn_strt8 -0.0222764 0.0108664 welflux_k02 -1 0.5 pp_sy1 -0.60206 0.211275 cn_prsity7 -0.30103 0.11928 pp_vka0 -1 0.5 pp_prsity2 -0.30103 0.11928 gr_sy3 -0.60206 0.211275 cn_vka7 -1 0.5 gr_sy4 -0.60206 0.211275 gr_sy4 -0.60206 0.211275 gr_sy4 -1 0.5 <	cn_ss6 -1 0.5 gr_hk3 -1 0.5 pp_strt1 -0.0222764 0.0108664 cn_sy8 -0.60206 0.211275 gr_strt4 -0.0222764 0.0108664 pp_sy2 -0.60206 0.211275 cn_vka8 -1 0.5 pp_hk2 -1 0.5 pp_strt0 -0.0222764 0.0108664 gr_prsity4 -0.30103 0.11928 cn_sy7 -0.60206 0.211275 cn_strt8 -0.0222764 0.0108664 welflux_k02 -1 0.5 pp_sy1 -0.60206 0.211275 cn_prsity7 -0.30103 0.11928 gr_sy3 -0.60206 0.211275 cn_vka7 -1 0.5 cn_sy6 -0.60206 0.211275 gr_sy4 -0.60206 0.211275 gr_sy4 -0.60206 0.211275 gr_sy4 -0.60206 0.211275 gr_sy4 -0.60206 0.211275 <td>cn hk8</td> <td>-1</td> <td></td> <td>0.5</td> <td></td> <td></td>	cn hk8	-1		0.5							
gr_hk3	gr_hk3		-1		0.5							
pp_strt1 -0.0222764 0.0108664 cn_sy8 -0.60206 0.211275 gr_strt4 -0.0222764 0.0108664 pp_sy2 -0.60206 0.211275 cn_vka8 -1 0.5 pp_hk2 -1 0.5 pp_strt0 -0.0222764 0.0108664 gr_prsity4 -0.30103 0.11928 cn_strt8 -0.0222764 0.0108664 welflux_k02 -1 0.5 pp_sy1 -0.60206 0.211275 cn_prsity7 -0.30103 0.11928 pp_sy4 -0.60206 0.211275 cn_prsity2 -0.30103 0.11928 gr_sy3 -0.60206 0.211275 cn_vka7 -1 0.5 cn_sy6 -0.60206 0.211275 gr_sy4 -0.60206 0.211275 gr_sy4 -0.60206 0.211275 gr_sy4 -0.30103 0.11928 cn_ss8 -1 0.5 cn_strt6 -0.0222764	pp_strt1	-	-1		0.5							
gr_strt4 -0.0222764 0.0108664 pp_sy2 -0.60206 0.211275 cn_vka8 -1 0.5 pp_hk2 -1 0.5 pp_strt0 -0.0222764 0.0108664 gr_prsity4 -0.30103 0.11928 cn_sy7 -0.60206 0.211275 cn_strt8 -0.0222764 0.0108664 welflux_k02 -1 0.5 pp_sy1 -0.60206 0.211275 cn_prsity7 -0.30103 0.11928 pp_vka0 -1 0.5 pp_prsity2 -0.30103 0.11928 gr_sy3 -0.60206 0.211275 cn_sy6 -0.60206 0.211275 gr_sy4 -0.60206 0.211275 gr_sy4 -0.60206 0.211275 gr_prsity8 -0.30103 0.11928 cn_ss8 -1 0.5 cn_ss8 -1 0.5 cn_strt6 -0.0222764 0.0108664 cn_strt7 -0.0222764 0	gr_strt4 -0.0222764 0.0108664 pp_sy2 -0.60206 0.211275 cn_vka8 -1 0.5 pp_hk2 -1 0.5 pp_strt0 -0.0222764 0.0108664 gr_prsity4 -0.30103 0.11928 cn_sy7 -0.60206 0.211275 cn_strt8 -0.0222764 0.0108664 welflux_k02 -1 0.5 pp_sy1 -0.60206 0.211275 cn_prsity7 -0.30103 0.11928 pp_vka0 -1 0.5 pp_prsity2 -0.30103 0.11928 gr_sy3 -0.60206 0.211275 cn_vka7 -1 0.5 cn_sy6 -0.60206 0.211275 gr_sy4 -0.60206 0.211275 gr_hk5 -1 0.5 cn_prsity8 -0.30103 0.11928 cn_ss8 -1 0.5 cn_strt6 -0.0222764 0.0108664 cn_prsity6 -0.30103 0.11928 <td>•</td> <td>-0.0222764</td> <td>0.0</td> <td>0108664</td> <td></td> <td></td>	•	-0.0222764	0.0	0108664							
gr_strt4 -0.0222764 0.0108664 pp_sy2 -0.60206 0.211275 cn_vka8 -1 0.5 pp_hk2 -1 0.5 pp_strt0 -0.0222764 0.0108664 gr_prsity4 -0.30103 0.11928 cn_sy7 -0.60206 0.211275 cn_strt8 -0.022764 0.0108664 welflux_k02 -1 0.5 pp_sy1 -0.60206 0.211275 cn_prsity7 -0.30103 0.11928 pp_vka0 -1 0.5 pp_prsity2 -0.30103 0.11928 gr_sy3 -0.60206 0.211275 cn_vka7 -1 0.5 cn_sy6 -0.60206 0.211275 gr_sy4 -0.60206 0.211275 gr_sy4 -0.60206 0.211275 gr_ss4 -1 0.5 cn_prsity8 -0.30103 0.11928 cn_ss8 -1 0.5 cn_strt6 -0.0222764 0.0108664	gr_strt4 -0.0222764 0.0108664 pp_sy2 -0.60206 0.211275 cn_vka8 -1 0.5 pp_hk2 -1 0.5 pp_strt0 -0.0222764 0.0108664 gr_prsity4 -0.30103 0.11928 cn_sy7 -0.60206 0.211275 cn_strt8 -0.0222764 0.0108664 welflux_k02 -1 0.5 pp_sy1 -0.60206 0.211275 cn_prsity7 -0.30103 0.11928 pp_vka0 -1 0.5 pp_prsity2 -0.30103 0.11928 gr_sy3 -0.60206 0.211275 cn_vka7 -1 0.5 cn_sy6 -0.60206 0.211275 gr_sy4 -0.60206 0.211275 gr_sy4 -0.60206 0.211275 gr_ss4 -1 0.5 cn_prsity8 -0.30103 0.11928 cn_ss8 -1 0.5 cn_strt6 -0.0222764 0.0108664	cn_sy8	-0.60206	0	.211275							
cn_vka8 -1 0.5 pp_hk2 -1 0.5 pp_strt0 -0.0222764 0.0108664 gr_prsity4 -0.30103 0.11928 cn_sy7 -0.60206 0.211275 cn_strt8 -0.0222764 0.0108664 welflux_k02 -1 0.5 pp_sy1 -0.60206 0.211275 cn_prsity7 -0.30103 0.11928 pp_vka0 -1 0.5 pp_prsity2 -0.30103 0.11928 gr_sy3 -0.60206 0.211275 cn_vka7 -1 0.5 cn_sy6 -0.60206 0.211275 gr_sy4 -0.60206 0.211275 gr_sy4 -0.60206 0.211275 gr_hk5 -1 0.5 cn_prsity8 -0.30103 0.11928 cn_ss8 -1 0.5 cn_strt6 -0.022764 0.0108664 cn_strt7 -0.0222764 0.0108664 cn_prsity6 -0.30103 0.11928 gr_sy5 -0.60206 0.211275 cn_	cn_vka8 -1 0.5 pp_hk2 -1 0.5 pp_strt0 -0.0222764 0.0108664 gr_prsity4 -0.30103 0.11928 cn_sy7 -0.60206 0.211275 cn_strt8 -0.0222764 0.0108664 welflux_k02 -1 0.5 pp_sy1 -0.60206 0.211275 cn_prsity7 -0.30103 0.11928 pp_vka0 -1 0.5 pp_prsity2 -0.30103 0.11928 gr_sy3 -0.60206 0.211275 cn_sy6 -0.60206 0.211275 gr_sy4 -0.60206 0.211275 gr_ss4 -1 0.5 cn_prsity8 -0.30103 0.11928 cn_ss8 -1 0.5 cn_strt6 -0.0222764 0.0108664		-0.0222764	0.0	0108664							
cn_vka8 -1 0.5 pp_hk2 -1 0.5 pp_strt0 -0.0222764 0.0108664 gr_prsity4 -0.30103 0.11928 cn_sy7 -0.60206 0.211275 cn_strt8 -0.0222764 0.0108664 welflux_k02 -1 0.5 pp_sy1 -0.60206 0.211275 cn_prsity7 -0.30103 0.11928 pp_vka0 -1 0.5 pp_prsity2 -0.30103 0.11928 gr_sy3 -0.60206 0.211275 cn_vka7 -1 0.5 cn_sy6 -0.60206 0.211275 gr_sy4 -0.60206 0.211275 gr_sy4 -0.60206 0.211275 gr_hk5 -1 0.5 cn_prsity8 -0.30103 0.11928 cn_ss8 -1 0.5 cn_ss8 -1 0.5 cn_strt6 -0.022764 0.0108664 cn -0.5 0.5 cn_strt7 -0.30103 0.11928 cn_prsity6 -0.30103	cn_vka8 -1 0.5 pp_hk2 -1 0.5 pp_strt0 -0.0222764 0.0108664 gr_prsity4 -0.30103 0.11928 cn_sy7 -0.60206 0.211275 cn_strt8 -0.0222764 0.0108664 welflux_k02 -1 0.5 pp_sy1 -0.60206 0.211275 cn_prsity7 -0.30103 0.11928 pp_vka0 -1 0.5 pp_prsity2 -0.30103 0.11928 gr_sy3 -0.60206 0.211275 cn_sy6 -0.60206 0.211275 gr_sy4 -0.60206 0.211275 gr_ss4 -1 0.5 cn_prsity8 -0.30103 0.11928 cn_ss8 -1 0.5 cn_strt7 -0.0222764 0.0108664	pp_sy2	-0.60206	0	.211275							
pp_strt0	pp_strt0		-1		0.5							
pp_strt0 -0.0222764 0.0108664 gr_prsity4 -0.30103 0.11928 cn_sy7 -0.60206 0.211275 cn_strt8 -0.0222764 0.0108664 welflux_k02 -1 0.5 pp_sy1 -0.60206 0.211275 cn_prsity7 -0.30103 0.11928 pp_vka0 -1 0.5 pp_prsity2 -0.30103 0.11928 gr_sy3 -0.60206 0.211275 cn_vka7 -1 0.5 cn_sy6 -0.60206 0.211275 gr_sy4 -0.60206 0.211275 gr_sy4 -0.60206 0.211275 gr_hk5 -1 0.5 cn_prsity8 -0.30103 0.11928 cn_ss8 -1 0.5 cn_ss8 -1 0.5 cn_strt6 -0.0222764 0.0108664 cn_br -0.0222764 0.0108664 pp_prsity0 -0.30103 0.11928 cn_ss7 -1 0.5	pp_strt0 -0.0222764 0.0108664 gr_prsity4 -0.30103 0.11928 cn_sy7 -0.60206 0.211275 cn_strt8 -0.0222764 0.0108664 welflux_k02 -1 0.5 pp_sy1 -0.60206 0.211275 cn_prsity7 -0.30103 0.11928 pp_vka0 -1 0.5 pp_prsity2 -0.30103 0.11928 gr_sy3 -0.60206 0.211275 cn_vka7 -1 0.5 cn_sy6 -0.60206 0.211275 gr_sy4 -0.60206 0.211275 gr_sy4 -0.60206 0.211275 gr_sy4 -0.60206 0.211275 gr_sy4 -0.60206 0.211275 gr_ss4 -1 0.5 cn_prsity8 -0.30103 0.11928 cn_ss8 -1 0.5 cn_ss7 -1 0.5 cn_strt7 -0.0222764 0.0108664 cn_prsity6 -0.30103 0.1192	pp_hk2	-1		0.5							
gr_prsity4 -0.30103 0.11928 cn_sy7 -0.60206 0.211275 cn_strt8 -0.0222764 0.0108664 welflux_k02 -1 0.5 pp_sy1 -0.60206 0.211275 cn_prsity7 -0.30103 0.11928 pp_vka0 -1 0.5 pp_prsity2 -0.30103 0.11928 gr_sy3 -0.60206 0.211275 cn_vka7 -1 0.5 cn_sy6 -0.60206 0.211275 gr_sy4 -0.60206 0.211275 gr_hk5 -1 0.5 cn_prsity8 -0.30103 0.11928 cn_ss4 -1 0.5 cn_prsity8 -0.30103 0.11928 cn_ss8 -1 0.5 gr_ss3 -1 0.5 cn_strt6 -0.0222764 0.0108664 cn_strt7 -0.0222764 0.0108664 cn_prsity6 -0.30103 0.11928 cn_ss7 -1 0.5 cn_ss7 -1 0.5 cn_ss7 -1 <td>gr_prsity4 -0.30103 0.11928 cn_sy7 -0.60206 0.211275 cn_strt8 -0.0222764 0.0108664 welflux_k02 -1 0.5 pp_sy1 -0.60206 0.211275 cn_prsity7 -0.30103 0.11928 pp_vka0 -1 0.5 pp_prsity2 -0.30103 0.11928 gr_sy3 -0.60206 0.211275 cn_vka7 -1 0.5 cn_sy6 -0.60206 0.211275 gr_sy4 -0.60206 0.211275 gr_sy4 -0.60206 0.211275 gr_prsity8 -0.30103 0.11928 cn_prsity8 -0.30103 0.11928 cn_ss8 -1 0.5 cn_strt6 -0.0222764 0.0108664 cn_hk7 -1 0.5 gr_ss3 -1 0.5 cn_strt7 -0.0222764 0.0108664 pp_prsity0 -0.30103 0.11928 gr_sy5 -0.60206 0.211275 cn_ss7 -1 0.5 gr_vk</td> <td></td> <td>-0.0222764</td> <td>0.0</td> <td>0108664</td> <td></td> <td></td>	gr_prsity4 -0.30103 0.11928 cn_sy7 -0.60206 0.211275 cn_strt8 -0.0222764 0.0108664 welflux_k02 -1 0.5 pp_sy1 -0.60206 0.211275 cn_prsity7 -0.30103 0.11928 pp_vka0 -1 0.5 pp_prsity2 -0.30103 0.11928 gr_sy3 -0.60206 0.211275 cn_vka7 -1 0.5 cn_sy6 -0.60206 0.211275 gr_sy4 -0.60206 0.211275 gr_sy4 -0.60206 0.211275 gr_prsity8 -0.30103 0.11928 cn_prsity8 -0.30103 0.11928 cn_ss8 -1 0.5 cn_strt6 -0.0222764 0.0108664 cn_hk7 -1 0.5 gr_ss3 -1 0.5 cn_strt7 -0.0222764 0.0108664 pp_prsity0 -0.30103 0.11928 gr_sy5 -0.60206 0.211275 cn_ss7 -1 0.5 gr_vk		-0.0222764	0.0	0108664							
cn_strt8 -0.0222764 0.0108664 welflux_k02 -1 0.5 pp_sy1 -0.60206 0.211275 cn_prsity7 -0.30103 0.11928 pp_vka0 -1 0.5 pp_prsity2 -0.30103 0.11928 gr_sy3 -0.60206 0.211275 cn_vka7 -1 0.5 cn_sy6 -0.60206 0.211275 gr_sy4 -0.60206 0.211275 gr_ss4 -1 0.5 cn_prsity8 -0.30103 0.11928 cn_ss7 -1 0.5 cn_strt6 -0.0222764 0.0108664 cn -1 0.5 sr_sy5 -0.60206 0.211275 cn_ss7 -1 0.5 pp_rek1 -0.0457575 0.0217875 <	cn_strt8 -0.0222764 0.0108664 welflux_k02 -1 0.5 pp_sy1 -0.60206 0.211275 cn_prsity7 -0.30103 0.11928 pp_vka0 -1 0.5 pp_prsity2 -0.30103 0.11928 gr_sy3 -0.60206 0.211275 cn_vka7 -1 0.5 cn_sy6 -0.60206 0.211275 gr_sy4 -0.60206 0.211275 gr_ss4 -1 0.5 cn_prsity8 -0.30103 0.11928 cn_ss8 -1 0.5 cn_strt6 -0.0222764 0.0108664 cn_strt7 -0.0222764 0.0108664 cn_strt7 -0.0222764 0.0108664 pp_prsity0 -0.30103 0.11928 cn_ss7 -1		-0.30103	(0.11928							
welflux_k02 -1 0.5 pp_sy1 -0.60206 0.211275 cn_prsity7 -0.30103 0.11928 pp_vka0 -1 0.5 pp_pprsity2 -0.30103 0.11928 gr_sy3 -0.60206 0.211275 cn_vka7 -1 0.5 cn_sy6 -0.60206 0.211275 gr_sy4 -0.60206 0.211275 gr_hk5 -1 0.5 gr_ps4 -0.60206 0.211275 gr_ss4 -1 0.5 cn_prsity8 -0.30103 0.11928 cn_ss8 -1 0.5 cn_ss8 -1 0.5 gr_ss3 -1 0.5 cn_strt6 -0.0222764 0.0108664 cn -0.0222764 0.0108664 cn_prsity6 -0.30103 0.11928 gr_sy5 -0.60206 0.211275 cn_ss7 -1 0.5 gr_vka5 -1 0.5 drncond_k00	welflux_k02 -1 0.5 pp_sy1 -0.60206 0.211275 cn_prsity7 -0.30103 0.11928 pp_vka0 -1 0.5 pp_prsity2 -0.30103 0.11928 gr_sy3 -0.60206 0.211275 cn_vka7 -1 0.5 cn_sy6 -0.60206 0.211275 gr_sy4 -0.60206 0.211275 gr_hk5 -1 0.5 cn_prsity8 -0.30103 0.11928 cn_ss4 -1 0.5 cn_ss8 -1 0.5 cn_strt6 -0.0222764 0.0108664 cn_hk7 -1 0.5 gr_ss3 -1 0.5 cn_strt7 -0.0222764 0.0108664 cn_pp_prsity0 -0.30103 0.11928 cn_prsity6 -0.30103 0.11928 cn_ss7 -1 0.5 gr_vka5 -1 0.5 dncond_k00 -1 0.5 pp_rech1	cn_sy7	-0.60206	0	.211275							
pp_sy1 -0.60206 0.211275 cn_prsity7 -0.30103 0.11928 pp_vka0 -1 0.5 pp_pprsity2 -0.30103 0.11928 gr_sy3 -0.60206 0.211275 cn_vka7 -1 0.5 cn_sy6 -0.60206 0.211275 gr_sy4 -0.60206 0.211275 gr_hk5 -1 0.5 gr_ss4 -1 0.5 cn_prsity8 -0.30103 0.11928 cn_ss8 -1 0.5 cn_strt6 -0.0222764 0.0108664 cn_hk7 -1 0.5 gr_ss3 -1 0.5 cn_strt7 -0.0222764 0.0108664 gr_strt5 -0.0222764 0.0108664 pp_prsity0 -0.30103 0.11928 gr_sy5 -0.60206 0.211275 cn_ss7 -1 0.5 gr_vka5 -1 0.5 drncond_k00 <td>pp_sy1 -0.60206 0.211275 cn_prsity7 -0.30103 0.11928 pp_vka0 -1 0.5 pp_ppsity2 -0.30103 0.11928 gr_sy3 -0.60206 0.211275 cn_vka7 -1 0.5 cn_sy6 -0.60206 0.211275 gr_sy4 -0.60206 0.211275 gr_sk5 -1 0.5 cn_prsity8 -0.30103 0.11928 cn_ss4 -1 0.5 cn_prsity8 -0.30103 0.11928 cn_ss8 -1 0.5 cn_strt6 -0.0222764 0.0108664 cn_strt7 -0.0222764 0.0108664 gr_strt5 -0.0222764 0.0108664 pp_prsity0 -0.30103 0.11928 cn_prsity6 -0.30103 0.11928 gr_sy5 -0.60206 0.211275 cn_ss7 -1 0.5 gr_vka5 -1 0.5</td> <td>cn_strt8</td> <td>-0.0222764</td> <td>0.0</td> <td>0108664</td> <td></td> <td></td>	pp_sy1 -0.60206 0.211275 cn_prsity7 -0.30103 0.11928 pp_vka0 -1 0.5 pp_ppsity2 -0.30103 0.11928 gr_sy3 -0.60206 0.211275 cn_vka7 -1 0.5 cn_sy6 -0.60206 0.211275 gr_sy4 -0.60206 0.211275 gr_sk5 -1 0.5 cn_prsity8 -0.30103 0.11928 cn_ss4 -1 0.5 cn_prsity8 -0.30103 0.11928 cn_ss8 -1 0.5 cn_strt6 -0.0222764 0.0108664 cn_strt7 -0.0222764 0.0108664 gr_strt5 -0.0222764 0.0108664 pp_prsity0 -0.30103 0.11928 cn_prsity6 -0.30103 0.11928 gr_sy5 -0.60206 0.211275 cn_ss7 -1 0.5 gr_vka5 -1 0.5	cn_strt8	-0.0222764	0.0	0108664							
cn_prsity7 -0.30103 0.11928 pp_vka0 -1 0.5 pp_prsity2 -0.30103 0.11928 gr_sy3 -0.60206 0.211275 cn_vka7 -1 0.5 cn_sy6 -0.60206 0.211275 gr_sy4 -0.60206 0.211275 gr_hk5 -1 0.5 cn_prsity8 -0.30103 0.11928 cn_ss4 -1 0.5 cn_ss8 -1 0.5 cn_strt6 -0.0222764 0.0108664 cn_hk7 -1 0.5 gr_ss3 -1 0.5 cn_strt7 -0.0222764 0.0108664 gr_strt5 -0.0222764 0.0108664 pp_prsity0 -0.30103 0.11928 gr_sy5 -0.60206 0.211275 cn_ss7 -1 0.5 gr_vka5 -1 0.5 drncond_k00 -1 0.5 pp_rech1 -0.0457575 0.0217875 strk -2 1 </td <td>cn_prsity7 -0.30103 0.11928 pp_vka0 -1 0.5 pp_prsity2 -0.30103 0.11928 gr_sy3 -0.60206 0.211275 cn_vka7 -1 0.5 cn_sy6 -0.60206 0.211275 gr_sy4 -0.60206 0.211275 gr_hk5 -1 0.5 gr_ss4 -1 0.5 cn_prsity8 -0.30103 0.11928 cn_ss8 -1 0.5 cn_strt6 -0.0222764 0.0108664 cn_hk7 -1 0.5 gr_ss3 -1 0.5 cn_strt7 -0.0222764 0.0108664 gr_strt5 -0.0222764 0.0108664 pp_prsity0 -0.30103 0.11928 cn_prsity6 -0.30103 0.11928 gr_sy5 -0.60206 0.211275 cn_ss7 -1 0.5 gr_vka5 -1 0.5 drncond_k00 -1 0.5 pp_rech1 -0.0457575 0.0</td> <td>welflux_k02</td> <td>-1</td> <td></td> <td>0.5</td> <td></td> <td></td>	cn_prsity7 -0.30103 0.11928 pp_vka0 -1 0.5 pp_prsity2 -0.30103 0.11928 gr_sy3 -0.60206 0.211275 cn_vka7 -1 0.5 cn_sy6 -0.60206 0.211275 gr_sy4 -0.60206 0.211275 gr_hk5 -1 0.5 gr_ss4 -1 0.5 cn_prsity8 -0.30103 0.11928 cn_ss8 -1 0.5 cn_strt6 -0.0222764 0.0108664 cn_hk7 -1 0.5 gr_ss3 -1 0.5 cn_strt7 -0.0222764 0.0108664 gr_strt5 -0.0222764 0.0108664 pp_prsity0 -0.30103 0.11928 cn_prsity6 -0.30103 0.11928 gr_sy5 -0.60206 0.211275 cn_ss7 -1 0.5 gr_vka5 -1 0.5 drncond_k00 -1 0.5 pp_rech1 -0.0457575 0.0	welflux_k02	-1		0.5							
cn_prsity7 -0.30103 0.11928 pp_vka0 -1 0.5 pp_prsity2 -0.30103 0.11928 gr_sy3 -0.60206 0.211275 cn_vka7 -1 0.5 cn_sy6 -0.60206 0.211275 gr_sy4 -0.60206 0.211275 gr_hk5 -1 0.5 cn_prsity8 -0.30103 0.11928 cn_ss4 -1 0.5 cn_prsity8 -0.30103 0.11928 cn_ss8 -1 0.5 cn_strt6 -0.0222764 0.0108664 cn_hk7 -1 0.5 gr_ss3 -1 0.5 cn_strt7 -0.0222764 0.0108664 v gr_strt5 -0.0222764 0.0108664 pp_prsity0 -0.30103 0.11928 gr_sy5 -0.60206 0.211275 cn_ss7 -1 0.5 gr_vka5 -1 0.5 drncond_k00 -1 0.5 pp_rech1 -0.0457575 0.	cn_prsity7 -0.30103 0.11928 pp_vka0 -1 0.5 pp_prsity2 -0.30103 0.11928 gr_sy3 -0.60206 0.211275 cn_vka7 -1 0.5 cn_sy6 -0.60206 0.211275 gr_sy4 -0.60206 0.211275 gr_lk5 -1 0.5 gr_ss4 -1 0.5 cn_prsity8 -0.30103 0.11928 cn_ss8 -1 0.5 cn_strt6 -0.0222764 0.0108664 cn_hk7 -1 0.5 gr_ss3 -1 0.5 cn_strt7 -0.0222764 0.0108664 gr_strt5 -0.0222764 0.0108664 pp_prsity0 -0.30103 0.11928 cn_prsity6 -0.30103 0.11928 gr_sy5 -0.60206 0.211275 cn_ss7 -1 0.5 gr_vka5 -1 0.5 pp_rech1 -0.0457575 0.0217875 strk -2 1 <td>pp_sy1</td> <td>-0.60206</td> <td>0</td> <td>.211275</td> <td></td> <td></td>	pp_sy1	-0.60206	0	.211275							
pp_prsity2 -0.30103 0.11928 gr_sy3 -0.60206 0.211275 cn_sy6 -0.60206 0.211275 gr_sy4 -0.60206 0.211275 gr_hk5 -1 0.5 gr_ss4 -1 0.5 cn_prsity8 -0.30103 0.11928 cn_ss8 -1 0.5 cn_strt6 -0.0222764 0.0108664 cn_hk7 -1 0.5 gr_ss3 -1 0.5 cn_strt7 -0.0222764 0.0108664 gr_strt5 -0.0222764 0.0108664 pp_prsity0 -0.30103 0.11928 cn_prsity6 -0.30103 0.11928 gr_sy5 -0.60206 0.211275 cn_ss7 -1 0.5 gr_vka5 -1 0.5 drncond_k00 -1 0.5 pp_rech1 -0.0457575 0.0217875 strk -2 1 pp_vka2 <td>pp_prsity2 -0.30103 0.11928 gr_sy3 -0.60206 0.211275 cn_vka7 -1 0.5 cn_sy6 -0.60206 0.211275 gr_sy4 -0.60206 0.211275 gr_hk5 -1 0.5 gr_ss4 -1 0.5 cn_prsity8 -0.30103 0.11928 cn_ss8 -1 0.5 cn_strt6 -0.0222764 0.0108664 cn_hk7 -1 0.5 gr_ss3 -1 0.5 cn_strt7 -0.0222764 0.0108664 gr_strt5 -0.0222764 0.0108664 pp_prsity0 -0.30103 0.11928 gr_sy5 -0.60206 0.211275 cn_ss7 -1 0.5 gr_vka5 -1 0.5 drncond_k00 -1 0.5 pp_rech1 -0.0457575 0.0217875 strk -2 1 pp_vka2 <td< td=""><td></td><td>-0.30103</td><td>(</td><td>0.11928</td><td></td><td></td></td<></td>	pp_prsity2 -0.30103 0.11928 gr_sy3 -0.60206 0.211275 cn_vka7 -1 0.5 cn_sy6 -0.60206 0.211275 gr_sy4 -0.60206 0.211275 gr_hk5 -1 0.5 gr_ss4 -1 0.5 cn_prsity8 -0.30103 0.11928 cn_ss8 -1 0.5 cn_strt6 -0.0222764 0.0108664 cn_hk7 -1 0.5 gr_ss3 -1 0.5 cn_strt7 -0.0222764 0.0108664 gr_strt5 -0.0222764 0.0108664 pp_prsity0 -0.30103 0.11928 gr_sy5 -0.60206 0.211275 cn_ss7 -1 0.5 gr_vka5 -1 0.5 drncond_k00 -1 0.5 pp_rech1 -0.0457575 0.0217875 strk -2 1 pp_vka2 <td< td=""><td></td><td>-0.30103</td><td>(</td><td>0.11928</td><td></td><td></td></td<>		-0.30103	(0.11928							
gr_sy3 -0.60206 0.211275 cn_sy6 -0.60206 0.211275 gr_sy4 -0.60206 0.211275 gr_hk5 -1 0.5 gr_ss4 -1 0.5 cn_prsity8 -0.30103 0.11928 cn_ss8 -1 0.5 cn_strt6 -0.0222764 0.0108664 cn_hk7 -1 0.5 gr_ss3 -1 0.5 cn_strt7 -0.0222764 0.0108664 gr_strt5 -0.0222764 0.0108664 pp_prsity0 -0.30103 0.11928 cn_prsity6 -0.30103 0.11928 gr_sy5 -0.60206 0.211275 cn_ss7 -1 0.5 gr_vka5 -1 0.5 drncond_k00 -1 0.5 pp_rech1 -0.0457575 0.0217875 strk -2 1 pp_vka2 -1 0.5	gr_sy3 -0.60206 0.211275 cn_sy6 -0.60206 0.211275 gr_sy4 -0.60206 0.211275 gr_hk5 -1 0.5 gr_ss4 -1 0.5 cn_prsity8 -0.30103 0.11928 cn_ss8 -1 0.5 cn_strt6 -0.0222764 0.0108664 cn_hk7 -1 0.5 gr_ss3 -1 0.5 cn_strt7 -0.0222764 0.0108664 gr_strt5 -0.0222764 0.0108664 pp_prsity0 -0.30103 0.11928 cn_prsity6 -0.30103 0.11928 gr_sy5 -0.60206 0.211275 cn_ss7 -1 0.5 gr_vka5 -1 0.5 drncond_k00 -1 0.5 pp_rech1 -0.0457575 0.0217875 strk -2 1 pp_vka2 -1 0.5 gr_vka3 -1 0.5	pp_vka0	-1		0.5							
gr_sy3 -0.60206 0.211275 cn_sy6 -0.60206 0.211275 gr_sy4 -0.60206 0.211275 gr_hk5 -1 0.5 gr_ss4 -1 0.5 cn_prsity8 -0.30103 0.11928 cn_ss8 -1 0.5 cn_strt6 -0.0222764 0.0108664 cn_hk7 -1 0.5 gr_ss3 -1 0.5 cn_strt7 -0.0222764 0.0108664 gr_strt5 -0.0222764 0.0108664 pp_prsity0 -0.30103 0.11928 cn_prsity6 -0.30103 0.11928 gr_sy5 -0.60206 0.211275 cn_ss7 -1 0.5 gr_vka5 -1 0.5 drncond_k00 -1 0.5 pp_rech1 -0.0457575 0.0217875 strk -2 1 pp_vka2 -1 0.5	gr_sy3 -0.60206 0.211275 cn_sy6 -0.60206 0.211275 gr_sy4 -0.60206 0.211275 gr_hk5 -1 0.5 gr_ss4 -1 0.5 cn_prsity8 -0.30103 0.11928 cn_ss8 -1 0.5 cn_strt6 -0.0222764 0.0108664 cn_hk7 -1 0.5 gr_ss3 -1 0.5 cn_strt7 -0.0222764 0.0108664 gr_strt5 -0.0222764 0.0108664 pp_prsity0 -0.30103 0.11928 cn_prsity6 -0.30103 0.11928 gr_sy5 -0.60206 0.211275 cn_ss7 -1 0.5 gr_vka5 -1 0.5 drncond_k00 -1 0.5 pp_rech1 -0.0457575 0.0217875 strk -2 1 pp_vka2 -1 0.5 gr_vka3 -1 0.5		-0.30103		0.11928							
cn_sy6 -0.60206 0.211275 gr_sy4 -0.60206 0.211275 gr_hk5 -1 0.5 gr_ss4 -1 0.5 cn_prsity8 -0.30103 0.11928 cn_ss8 -1 0.5 cn_strt6 -0.0222764 0.0108664 cn_hk7 -1 0.5 gr_ss3 -1 0.5 cn_strt7 -0.0222764 0.0108664 gr_strt5 -0.0222764 0.0108664 pp_prsity0 -0.30103 0.11928 cn_prsity6 -0.30103 0.11928 gr_sy5 -0.60206 0.211275 cn_ss7 -1 0.5 gr_vka5 -1 0.5 drncond_k00 -1 0.5 pp_rech1 -0.0457575 0.0217875 strk -2 1 pp_vka2 -1 0.5	cn_sy6 -0.60206 0.211275 gr_sy4 -0.60206 0.211275 gr_hk5 -1 0.5 gr_ss4 -1 0.5 cn_prsity8 -0.30103 0.11928 cn_ss8 -1 0.5 cn_strt6 -0.0222764 0.0108664 cn_hk7 -1 0.5 gr_ss3 -1 0.5 cn_strt7 -0.0222764 0.0108664 gr_strt5 -0.0222764 0.0108664 pp_prsity0 -0.30103 0.11928 cn_prsity6 -0.30103 0.11928 gr_sy5 -0.60206 0.211275 cn_ss7 -1 0.5 gr_vka5 -1 0.5 drncond_k00 -1 0.5 pp_rech1 -0.0457575 0.0217875 strk -2 1 pp_vka2 -1 0.5 gr_vka3 -1 0.5		-0.60206	0	.211275							
gr_sy4 -0.60206 0.211275 gr_hk5 -1 0.5 gr_ss4 -1 0.5 cn_prsity8 -0.30103 0.11928 cn_ss8 -1 0.5 cn_strt6 -0.0222764 0.0108664 cn_hk7 -1 0.5 gr_ss3 -1 0.5 cn_strt7 -0.0222764 0.0108664 gr_strt5 -0.0222764 0.0108664 pp_prsity0 -0.30103 0.11928 cn_prsity6 -0.30103 0.11928 gr_sy5 -0.60206 0.211275 cn_ss7 -1 0.5 gr_vka5 -1 0.5 drncond_k00 -1 0.5 pp_rech1 -0.0457575 0.0217875 strk -2 1 pp_vka2 -1 0.5	gr_sy4 -0.60206 0.211275 gr_hk5 -1 0.5 gr_ss4 -1 0.5 cn_prsity8 -0.30103 0.11928 cn_ss8 -1 0.5 cn_strt6 -0.0222764 0.0108664 cn_hk7 -1 0.5 gr_ss3 -1 0.5 cn_strt7 -0.0222764 0.0108664 gr_strt5 -0.0222764 0.0108664 pp_prsity0 -0.30103 0.11928 cn_prsity6 -0.30103 0.11928 gr_sy5 -0.60206 0.211275 cn_ss7 -1 0.5 gr_vka5 -1 0.5 drncond_k00 -1 0.5 pp_rech1 -0.0457575 0.0217875 strk -2 1 pp_vka2 -1 0.5 gr_vka3 -1 0.5	cn_vka7	-1		0.5							
gr_hk5 -1 0.5 gr_ss4 -1 0.5 cn_prsity8 -0.30103 0.11928 cn_ss8 -1 0.5 cn_strt6 -0.0222764 0.0108664 cn_hk7 -1 0.5 gr_ss3 -1 0.5 cn_strt7 -0.0222764 0.0108664 gr_strt5 -0.0222764 0.0108664 pp_prsity0 -0.30103 0.11928 cn_prsity6 -0.30103 0.11928 gr_sy5 -0.60206 0.211275 cn_ss7 -1 0.5 gr_vka5 -1 0.5 drncond_k00 -1 0.5 pp_rech1 -0.0457575 0.0217875 strk -2 1 pp_vka2 -1 0.5	gr_hk5 -1 0.5 gr_ss4 -1 0.5 cn_prsity8 -0.30103 0.11928 cn_ss8 -1 0.5 cn_strt6 -0.0222764 0.0108664 cn_hk7 -1 0.5 gr_ss3 -1 0.5 cn_strt7 -0.0222764 0.0108664 gr_strt5 -0.0222764 0.0108664 pp_prsity0 -0.30103 0.11928 cn_prsity6 -0.30103 0.11928 gr_sy5 -0.60206 0.211275 cn_ss7 -1 0.5 gr_vka5 -1 0.5 drncond_k00 -1 0.5 pp_rech1 -0.0457575 0.0217875 strk -2 1 pp_vka2 -1 0.5 gr_vka3 -1 0.5	cn_sy6	-0.60206	0	.211275							
gr_ss4 -1 0.5 cn_prsity8 -0.30103 0.11928 cn_ss8 -1 0.5 cn_strt6 -0.0222764 0.0108664 cn_hk7 -1 0.5 gr_ss3 -1 0.5 cn_strt7 -0.0222764 0.0108664 gr_strt5 -0.0222764 0.0108664 pp_prsity0 -0.30103 0.11928 cn_prsity6 -0.30103 0.11928 gr_sy5 -0.60206 0.211275 cn_ss7 -1 0.5 gr_vka5 -1 0.5 drncond_k00 -1 0.5 pp_rech1 -0.0457575 0.0217875 strk -2 1 pp_vka2 -1 0.5	gr_ss4 -1 0.5 cn_prsity8 -0.30103 0.11928 cn_ss8 -1 0.5 cn_strt6 -0.0222764 0.0108664 cn_hk7 -1 0.5 gr_ss3 -1 0.5 cn_strt7 -0.0222764 0.0108664 gr_strt5 -0.0222764 0.0108664 pp_prsity0 -0.30103 0.11928 cn_prsity6 -0.30103 0.11928 gr_sy5 -0.60206 0.211275 cn_ss7 -1 0.5 gr_vka5 -1 0.5 drncond_k00 -1 0.5 pp_rech1 -0.0457575 0.0217875 strk -2 1 pp_vka2 -1 0.5 gr_vka3 -1 0.5	gr_sy4	-0.60206	0	.211275							
cn_prsity8 -0.30103 0.11928 cn_ss8 -1 0.5 cn_strt6 -0.0222764 0.0108664 cn_hk7 -1 0.5 gr_ss3 -1 0.5 cn_strt7 -0.0222764 0.0108664 gr_strt5 -0.0222764 0.0108664 pp_prsity0 -0.30103 0.11928 cn_prsity6 -0.30103 0.11928 gr_sy5 -0.60206 0.211275 cn_ss7 -1 0.5 gr_vka5 -1 0.5 drncond_k00 -1 0.5 pp_rech1 -0.0457575 0.0217875 strk -2 1 pp_vka2 -1 0.5	cn_prsity8 -0.30103 0.11928 cn_ss8 -1 0.5 cn_strt6 -0.0222764 0.0108664 cn_hk7 -1 0.5 gr_ss3 -1 0.5 cn_strt7 -0.0222764 0.0108664 gr_strt5 -0.0222764 0.0108664 pp_prsity0 -0.30103 0.11928 cn_prsity6 -0.30103 0.11928 gr_sy5 -0.60206 0.211275 cn_ss7 -1 0.5 gr_vka5 -1 0.5 drncond_k00 -1 0.5 pp_rech1 -0.0457575 0.0217875 strk -2 1 pp_vka2 -1 0.5 gr_vka3 -1 0.5	gr_hk5	-1		0.5							
cn_ss8 -1 0.5 cn_strt6 -0.0222764 0.0108664 cn_hk7 -1 0.5 gr_ss3 -1 0.5 cn_strt7 -0.0222764 0.0108664 gr_strt5 -0.0222764 0.0108664 pp_prsity0 -0.30103 0.11928 cn_prsity6 -0.30103 0.11928 gr_sy5 -0.60206 0.211275 cn_ss7 -1 0.5 gr_vka5 -1 0.5 drncond_k00 -1 0.5 pp_rech1 -0.0457575 0.0217875 strk -2 1 pp_vka2 -1 0.5	cn_ss8 -1 0.5 cn_strt6 -0.0222764 0.0108664 cn_hk7 -1 0.5 gr_ss3 -1 0.5 cn_strt7 -0.0222764 0.0108664 gr_strt5 -0.0222764 0.0108664 pp_prsity0 -0.30103 0.11928 cn_prsity6 -0.30103 0.11928 gr_sy5 -0.60206 0.211275 cn_ss7 -1 0.5 gr_vka5 -1 0.5 drncond_k00 -1 0.5 pp_rech1 -0.0457575 0.0217875 strk -2 1 pp_vka2 -1 0.5 gr_vka3 -1 0.5	gr_ss4	-1		0.5							
cn_strt6 -0.0222764 0.0108664 cn_hk7 -1 0.5 gr_ss3 -1 0.5 cn_strt7 -0.0222764 0.0108664 gr_strt5 -0.0222764 0.0108664 pp_prsity0 -0.30103 0.11928 cn_prsity6 -0.30103 0.11928 gr_sy5 -0.60206 0.211275 cn_ss7 -1 0.5 gr_vka5 -1 0.5 drncond_k00 -1 0.5 pp_rech1 -0.0457575 0.0217875 strk -2 1 pp_vka2 -1 0.5	cn_strt6 -0.0222764 0.0108664 cn_hk7 -1 0.5 gr_ss3 -1 0.5 cn_strt7 -0.0222764 0.0108664 gr_strt5 -0.0222764 0.0108664 pp_prsity0 -0.30103 0.11928 cn_prsity6 -0.30103 0.11928 gr_sy5 -0.60206 0.211275 cn_ss7 -1 0.5 gr_vka5 -1 0.5 drncond_k00 -1 0.5 pp_rech1 -0.0457575 0.0217875 strk -2 1 pp_vka2 -1 0.5 gr_vka3 -1 0.5	cn_prsity8	-0.30103	(0.11928							
cn_hk7 -1 0.5 gr_ss3 -1 0.5 cn_strt7 -0.0222764 0.0108664 gr_strt5 -0.0222764 0.0108664 pp_prsity0 -0.30103 0.11928 cn_prsity6 -0.30103 0.11928 gr_sy5 -0.60206 0.211275 cn_ss7 -1 0.5 gr_vka5 -1 0.5 drncond_k00 -1 0.5 pp_rech1 -0.0457575 0.0217875 strk -2 1 pp_vka2 -1 0.5	cn_hk7 -1 0.5 gr_ss3 -1 0.5 cn_strt7 -0.0222764 0.0108664 gr_strt5 -0.0222764 0.0108664 pp_prsity0 -0.30103 0.11928 cn_prsity6 -0.30103 0.11928 gr_sy5 -0.60206 0.211275 cn_ss7 -1 0.5 gr_vka5 -1 0.5 drncond_k00 -1 0.5 pp_rech1 -0.0457575 0.0217875 strk -2 1 pp_vka2 -1 0.5 gr_vka3 -1 0.5	cn_ss8	-1		0.5							
gr_ss3 -1 0.5 cn_strt7 -0.0222764 0.0108664 gr_strt5 -0.0222764 0.0108664 pp_prsity0 -0.30103 0.11928 cn_prsity6 -0.30103 0.11928 gr_sy5 -0.60206 0.211275 cn_ss7 -1 0.5 gr_vka5 -1 0.5 drncond_k00 -1 0.5 pp_rech1 -0.0457575 0.0217875 strk -2 1 pp_vka2 -1 0.5	gr_ss3 -1 0.5 cn_strt7 -0.0222764 0.0108664 gr_strt5 -0.0222764 0.0108664 pp_prsity0 -0.30103 0.11928 cn_prsity6 -0.30103 0.11928 gr_sy5 -0.60206 0.211275 cn_ss7 -1 0.5 gr_vka5 -1 0.5 drncond_k00 -1 0.5 pp_rech1 -0.0457575 0.0217875 strk -2 1 pp_vka2 -1 0.5 gr_vka3 -1 0.5	cn_strt6	-0.0222764	0.0	0108664							
cn_strt7 -0.0222764 0.0108664 gr_strt5 -0.0222764 0.0108664 pp_prsity0 -0.30103 0.11928 cn_prsity6 -0.30103 0.11928 gr_sy5 -0.60206 0.211275 cn_ss7 -1 0.5 gr_vka5 -1 0.5 drncond_k00 -1 0.5 pp_rech1 -0.0457575 0.0217875 strk -2 1 pp_vka2 -1 0.5	cn_strt7 -0.0222764 0.0108664 gr_strt5 -0.0222764 0.0108664 pp_prsity0 -0.30103 0.11928 cn_prsity6 -0.30103 0.11928 gr_sy5 -0.60206 0.211275 cn_ss7 -1 0.5 gr_vka5 -1 0.5 drncond_k00 -1 0.5 pp_rech1 -0.0457575 0.0217875 strk -2 1 pp_vka2 -1 0.5 gr_vka3 -1 0.5	cn_hk7	-1		0.5							
gr_strt5	gr_strt5	gr_ss3	-1		0.5							
gr_strt5 -0.0222764 0.0108664 pp_prsity0 -0.30103 0.11928 cn_prsity6 -0.30103 0.11928 gr_sy5 -0.60206 0.211275 cn_ss7 -1 0.5 gr_vka5 -1 0.5 drncond_k00 -1 0.5 pp_rech1 -0.0457575 0.0217875 strk -2 1 pp_vka2 -1 0.5	gr_strt5 -0.0222764 0.0108664 pp_prsity0 -0.30103 0.11928 cn_prsity6 -0.30103 0.11928 gr_sy5 -0.60206 0.211275 cn_ss7 -1 0.5 gr_vka5 -1 0.5 drncond_k00 -1 0.5 pp_rech1 -0.0457575 0.0217875 strk -2 1 pp_vka2 -1 0.5 gr_vka3 -1 0.5	cn_strt7	-0.0222764	0.0	0108664							
pp_prsity0 -0.30103 0.11928 cn_prsity6 -0.30103 0.11928 gr_sy5 -0.60206 0.211275 cn_ss7 -1 0.5 gr_vka5 -1 0.5 drncond_k00 -1 0.5 pp_rech1 -0.0457575 0.0217875 strk -2 1 pp_vka2 -1 0.5	pp_prsity0 -0.30103 0.11928 cn_prsity6 -0.30103 0.11928 gr_sy5 -0.60206 0.211275 cn_ss7 -1 0.5 gr_vka5 -1 0.5 drncond_k00 -1 0.5 pp_rech1 -0.0457575 0.0217875 strk -2 1 pp_vka2 -1 0.5 gr_vka3 -1 0.5											
cn_prsity6 -0.30103 0.11928 gr_sy5 -0.60206 0.211275 cn_ss7 -1 0.5 gr_vka5 -1 0.5 drncond_k00 -1 0.5 pp_rech1 -0.0457575 0.0217875 strk -2 1 pp_vka2 -1 0.5	cn_prsity6 -0.30103 0.11928 gr_sy5 -0.60206 0.211275 cn_ss7 -1 0.5 gr_vka5 -1 0.5 drncond_k00 -1 0.5 pp_rech1 -0.0457575 0.0217875 strk -2 1 pp_vka2 -1 0.5 gr_vka3 -1 0.5	-	-0.0222764	0.0	0108664							
gr_sy5 -0.60206 0.211275 cn_ss7 -1 0.5 gr_vka5 -1 0.5 drncond_k00 -1 0.5 pp_rech1 -0.0457575 0.0217875 strk -2 1 pp_vka2 -1 0.5	gr_sy5 -0.60206 0.211275 cn_ss7 -1 0.5 gr_vka5 -1 0.5 drncond_k00 -1 0.5 pp_rech1 -0.0457575 0.0217875 strk -2 1 pp_vka2 -1 0.5 gr_vka3 -1 0.5		-0.30103	(0.11928							
cn_ss7 -1 0.5 gr_vka5 -1 0.5 drncond_k00 -1 0.5 pp_rech1 -0.0457575 0.0217875 strk -2 1 pp_vka2 -1 0.5	cn_ss7 -1 0.5 gr_vka5 -1 0.5 drncond_k00 -1 0.5 pp_rech1 -0.0457575 0.0217875 strk -2 1 pp_vka2 -1 0.5 gr_vka3 -1 0.5	cn_prsity6	-0.30103	(0.11928							
gr_vka5 -1 0.5 drncond_k00 -1 0.5 pp_rech1 -0.0457575 0.0217875 strk -2 1 pp_vka2 -1 0.5	gr_vka5 -1 0.5 drncond_k00 -1 0.5 pp_rech1 -0.0457575 0.0217875 strk -2 1 pp_vka2 -1 0.5 gr_vka3 -1 0.5	gr_sy5	-0.60206	0	.211275							
drncond_k00 -1 0.5 pp_rech1 -0.0457575 0.0217875 strk -2 1 pp_vka2 -1 0.5	drncond_k00 -1 0.5 pp_rech1 -0.0457575 0.0217875 strk -2 1 pp_vka2 -1 0.5 gr_vka3 -1 0.5		-1		0.5							
pp_rech1 -0.0457575 0.0217875 strk -2 1 pp_vka2 -1 0.5	pp_rech1 -0.0457575 0.0217875 strk -2 1 pp_vka2 -1 0.5 gr_vka3 -1 0.5	•	-1		0.5							
strk -2 1 pp_vka2 -1 0.5	strk -2 1 pp_vka2 -1 0.5 gr_vka3 -1 0.5	_										
pp_vka2 -1 0.5	pp_vka2 -1 0.5 gr_vka3 -1 0.5			0.0								
	gr_vka3 -1 0.5											
	TIGIFILEY -1 0 5	•										
welflux -1 0.5	WGIIIUA I U.U	welflux	-1		0.5							

```
0.5
pp_ss0
                     -1
pp_hk1
                     -1
                                        0.5
             -0.0457575
                                  0.0217875
cn_rech5
                     -1
                                        0.5
pp_hk0
pp_vka1
                      -1
                                        0.5
cn_hk6
                      -1
                                        0.5
flow
              -0.124939
                                  0.0554622
gr_rech2
             -0.0457575
                                  0.0217875
                                        0.5
gr_vka4
                     -1
               -0.30103
gr_prsity5
                                    0.11928
             -0.0457575
                                  0.0217875
gr_rech3
pp_ss2
                                        0.5
             -0.0222764
                                  0.0108664
pp_strt2
                                    0.11928
               -0.30103
pp_prsity1
pp_sy0
               -0.60206
                                   0.211275
             -0.0457575
                                  0.0217875
cn_rech4
gr_hk4
                      -1
                                        0.5
                      -1
                                        0.5
gr_ss5
```

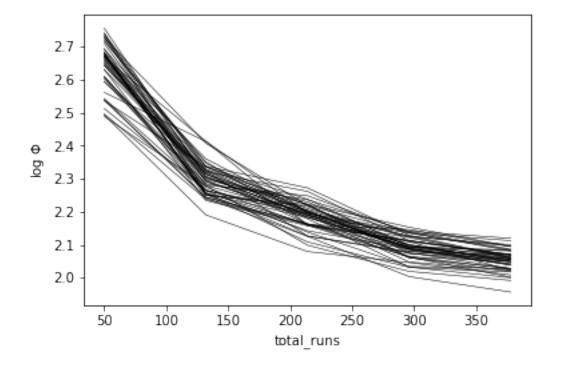
[65 rows x 7 columns]

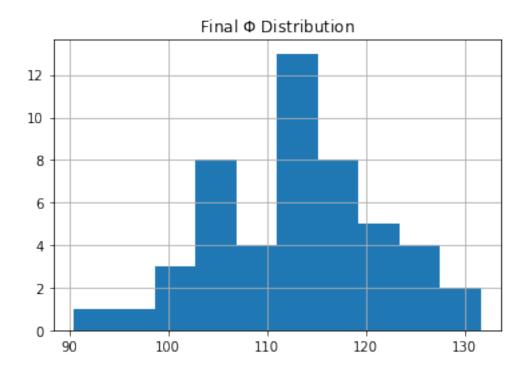
Let's be true academics and fix every parameter except grid-scale HK...sounds like every paper ever published in WRR...

```
In [5]: par = pst.parameter_data
        # grid pars
        should_fix = par.loc[par.pargp.apply(lambda x: "gr_hk" not in x),"parnme"]
        # if we want to fix some pars, do it here
        pst.parameter_data.loc[should_fix,"partrans"] = "fixed"
        pst.npar,pst.npar_adj
Out[5]: (14819, 2115)
```

```
1.1.1 Run PESTPP-IES in original mode and post process
In [6]: pst.pestpp_options["ies_num_reals"] = 50
        #pst.pestpp_options["ies_par_en"] = "prior.jcb"
        #pst.pestpp_options["ies_bad_phi_sigma"] = 2.0
        #pst.pestpp_options["overdue_giveup_fac"] = 10.0
        pst.control_data.noptmax = 4
In [7]: pst.write(os.path.join(t_d, "freyberg_ies.pst"))
noptmax:4, npar_adj:2115, nnz_obs:14
In [8]: pyemu.os_utils.start_slaves(t_d,"pestpp-ies","freyberg_ies.pst",num_slaves=num_workers
  A cheap phi progress plot
```

Out[9]: Text(0.5, 1.0, 'Final \$\\Phi\$ Distribution')





Plot forecast prior and posterior histograms with "truth" (red line)

```
In [10]: oe_pr = pd.read_csv(os.path.join(m_d,"freyberg_ies.0.obs.csv"),index_col=0)
    oe_pt = pd.read_csv(os.path.join(m_d,"freyberg_ies.{0}.obs.csv".format(pst.control_da'
    obs = pst.observation_data
    fnames = pst.pestpp_options["forecasts"].split(",")
    for forecast in fnames:
        ax = plt.subplot(111)
        oe_pr.loc[:,forecast].hist(ax=ax,color="0.5",alpha=0.5)
        oe_pt.loc[:,forecast].hist(ax=ax,color="b",alpha=0.5)
        ax.plot([obs.loc[forecast,"obsval"],obs.loc[forecast,"obsval"]],ax.get_ylim(),"r"
        ax.legend(['truth','prior','posterior'], loc='upper right')

ax.set_title(forecast)
    plt.show()
```

