

=== Plugin Name ===

Sequential Monte Carlo sampler with Bayesian inference tested with the Australian Water Balance Model and written on MATLAB.

Here is a short description of the plugin

== Description ==

Definitions:

Model used: Australian Water Balance Model (AWBM)

- * nter = number of particles (N)
- * n = length of data with initial burn in
- * data_length = length of data without initial burn in. (Bates and Campbell, 2001)
- * dimen = number of parameters
- * ndimen = column for the parameter variance
- * ESS = Effective Sample Size
- * gammax_ss = dynamic sequential distribution
- * A1, A2, A3 = AWBM spatial areas
- * C1, C2, C3 = AWBM surface storages
- * K = daily recession constant
- * BFI = base flow index
- * V = parameter variance

Inputs = prt:Percipitation (daily), et:Evapotranspiration (daily),
ot:Observed Runoff (daily)

Output = matrix of parameters (nter x dimen)

- * The columns are arranged accordingly as below;
C1 C2 C3 A1 A2 K V BFI
- * ESS values per iteration
- * Weighted Nash-Sutcliffe efficiency (NSE)
- * maximum a posterio (MAP)

Catchment's information:

- * Never Never River, a 51km² catchment located at the Gleniffer Bridge in New South Wales, Australia.

Sequential Distributional sequence

- If the SMC is having difficulty in converging to the targeted posterior distribution or collapsing in the first iteration, it may probably require smaller change between each sequence hence higher number of iterations (S) before converging.
- The table below provides a indication of the changes needed for x and v (as per stated in the article; Section 3).

Iterations, S	~200	~250	~300	~350	~400
x	3.11	2.99	2.89	2.81	2.75
v	1	2	3	4	5

Note: x is known as PP in the program
 v is known as Sg in the program

The SMC sampler aids optimization process of the hydrological model parameters using the given data through Bayesian inference.

== Installation ==

1. Upload the zip file
2. Extract the zip file content to the MATLAB working directory folder
3. Select the file, SMC.m and click 'Save and Run'.

== Results on Command Window==

1. Number of iterations
2. Mean values of the model parameters
3. Sum of weighted MAP after converging
4. Figures – NSE trend over the iterations
Effective Sample Size trend.