**MCMC Algorithm settings**

To test MCMC with a simple Carbon balance model:

Setting lower and upper bounds of the prior parameter pdf, and start point of the chain [lower value, starting value, upper value]:

k = [0.1,0.55,1]

af = [0,1/7,0.35]

as = [0.2,3/7,0.75]

sf = [0,1/30,1/10]

Generate synthetic data for GPP, Rd, Cstorage with Mean and SD:

GPP (with mean=15, sd=3)

Rd (with mean=4, sd=0.8)

Cstorage (with mean=7.5, sd=2), just to create a measurement sets of Cleaf, Cstem, Croot

* Using random parameter sets within the lower and upper bounds calculate Cleaf, Cstem, Croot to form synthetic data sets and uncertainties associated with these data
* Perform MCMC algorithm with a prior probability distribution for the parameters and a likelihood function
* Defining the model to iteratively calculate Cstorage, Cleaf, Cstem, Croot:

function (GPP,Rd,Cleaf.true,Cstem.true,Croot.true,Y,k,af,as,sf)

* Calculating model outputs for the starting point of the chain and then the log likelihood based on measurements of Cleaf, Cstem, Croot
* Store the first parameter set with log likelihood
* Calculate the next candidate parameter vector, as a multivariate normal jump away from the current point
* Reflected back if the candidate is not within the range to generate another candidate value
* Calculate the prior probability density for the candidate parameter vector
* Calculate the outputs for the candidate parameter vector and log likelihood
* Calculate the logarithm of the Metropolis ratio
* Accept or reject the candidate vector
* Get a representative sample of parameter sets (k1,…..,kn; ….) where n = length of chain­­­
* Calculate final output set from the predicted parameter set and then the cumulative sums over the length of time
* Find the acceptance rate of the chain
* Find the correlation coefficients between original measurements and predictions
* Plot few accepted parameter values over time to find whether the chain converged
* Plot original measurements vs predictions for Cstorage, Cleaf, Cstem, Croot