1 Changes between versions 1.0 and 1.1

Bugs and issues:

error printing formatting issues Cleaned up and standardized the error message printing across all files.

allow NA and NaN to be used for miss.value In vrs 1.0, the code would crash if you tried to use miss.value=NA or NaN.

bug in MARSSmcinit MCMC init function would crash for anything except the default model.

ungraceful exiting when minit > maxit This was not being caught in is.marss().

ungraceful exiting when method=BFGS threw error This was actually a formatting issue. I had the try() error appended to the errors element of the output. I removed the try() output from the errors messages.

Add more info to ?MARSS and help("MARSS-package") Changed MARSS.Rd and MARSS-package to have reference to manual, index, and MARSS-package help page.

Change convergence test In the convergence diagnostics test, we check that the slope of logLik vs (log iteration num) is close to zero. This is a standard convergence test. But Shumway and Stoffers code uses a delta logLik test which checks that the logLik.new-logLik.old is less than some absolute (user specified) tolerance. This turns out to be a bad convergence test because the log-log plot (described above) can still have a fairly clear slope. I switched over to using the log-log test as the default test, but I allow the user to specify a abstol (delta logLik) if they want that instead. This change slows down model fitting considerably but model fits that are actually converged.

fix to is.design() function A design matrix must have more or equal rows than columns.

R was changing dims on some matrices in MARSSkf R has a flaw in terms of how it behaves when you subscript a matrix and the new

matrix has a dimension length of 1 for one (or more dimensions). For example, if a=array(0,dim=c(1,2,4)), then a[„1] is no longer a matrix but instead is a vector and dim(a[„1]) is NULL. This can cause all sorts of mysterious bugs. Sometimes adding drop=FALSE will prevent this unpleasant behavior. If b=matrix(0,2,2), dim(b[,1,drop=FALSE]) is c(2,1) while dim(b[,1]) is NULL. drop=FALSE works great with 2-dimensional matrices, but with 3-dimensional matrices it doesn't work. If a=array(0,dim=c(1,2,4)), dim(a[„1,drop=FALSE]) is c(1,2,1) instead of c(1,2) which is what you want if a[„1] is what is going to appear in some matrix operation. This problem came up in the Kt[, , t] %*% innov[, t] line in MARSSkf. Normally Kt[„t] is square and a square matrix or a scalar is returned, but if Kt[„t] happened to be something like dim=c(1,3,20) then Kt[„t] returned a VECTOR of length 3. In this case, Kt[, , t] %*% innov[, t] crashed the code. I had to use a kluge to force R to keep the dimensions after subscripting. This bug only occurred in models where Z is not a design matrix.

formatting issues in summary(marssm object) The naming of elements in the model matrices did not match summary(marssMLE object).

allow list matrices In version 2.0, the standard way to specify model parameters with fixed and free values will be with a list matrix. a=matrix(list(0,"a",1,"a")) for example. I changed checkpopWrap() and as_marssm() to allow this although the documentation will be updated when 2.0 is released as this will mean a fairly major revision to the manual to emphasize the list matrices over the text shortcuts. The use of factor() will be de-emphasized although that feature will remain.

added function MARSSoptions() This allows you to change the defaults for the MARSS() function. See ?MARSSoptions.

added function MARSSLLprofile() This allows you to plot some basic log-likelihood profiles. See ?MARSSLLprofile.

typos in manual Made some updates to the text in the user guide per comments from our August 2010 workshop.