# Dataset S10

# R code to compute spectral analyses of HMM turnover probability time series

# for the interval between 466 and 460 Ma

# HMM turnover probabilities should be placed in the data frame “turnProb”

# Download these data from the Astrochron server

turnProb=getData(“graptolite”)

# Load the library Astrochron

library(astrochron)

# Isolate the turnover probability series between 460 and 466 Ma

turnProbLower=iso(turnProb, xmin=460, xmax=466)

# Conduct MTM spectral analysis with LOWSPEC background, apply Bonferroni correction,

# and evaluate a range of multiple testing procedures

specLow=lowspec(turnProbLower, detrend=T, tbw=2, padfac=1, pl=2, sigID=F, output=1)

flow=c((1/2.4)- 0.3361345,(1/1.2)- 0.3361345)

fhigh=c((1/2.4)+ 0.3361345,(1/1.2)+ 0.3361345)

confAdjust(specLow, npts=119, dt=0.05, tbw=2, ntap=3, pl=2, flow=flow, fhigh=fhigh)

multiTest(specLow, flow=flow, fhigh=fhigh)

# Conduct MTM-PL analysis, apply Bonferroni correction, and evaluate a range of

# multiple testing procedures

specPL1=mtmPL(turnProbLower, detrend=T, tbw=2, padfac=1, pl=2, sigID=F, output=1)

flow=c((1/2.4)- 0.3333333,(1/1.2)- 0.3333333)

fhigh=c((1/2.4)+ 0.3333333,(1/1.2)+ 0.3333333)

confAdjust(specPL1, npts=120, dt=0.05, tbw=2, ntap=3, pl=2, flow=flow, fhigh=fhigh)

multiTest(specPL1, flow=flow, fhigh=fhigh)

# Conduct Periodogram-AR1 analysis, apply Bonferroni correction, and evaluate a range

# of multiple testing procedures

specAR1=periodogram(cosTaper(turnProbLower, demean=T, detrend=T), demean=F,   
 background=1, fNyq=F, padfac=1, output=1)

confAdjust(specAR1, npts=120, dt=0.05, tbw=2, ntap=3, pl=2, flow=flow, fhigh=fhigh)

multiTest(specAR1, flow=flow, fhigh=fhigh)

# Conduct Periodogram-PL analysis, apply Bonferroni correction, and evaluate a range

# of multiple testing procedures

specPL2=periodogram(cosTaper(turnProbLower, demean=T, detrend=T), demean=F,   
 background=2, fNyq=F, padfac=1, output=1)

confAdjust(specPL2, npts=120, dt=0.05, tbw=2, ntap=1, pl=2, flow=flow, fhigh=fhigh)

multiTest(specPL2, flow=flow, fhigh=fhigh)