

Tutorial 3: Paleoclimate Change

Tutorial 3 uses J-DSP/ESE to analyze the coherency of *G. bulloides* $\delta^{18}\text{O}$ and % *C. davisiana* abundance records from the RC11-120 deep sea sediment core with an astronomical forcing (ETP) climatic signal. The records are “deep-time” Earth signals, in which core depth is a time proxy. Conversion from depth to time is achieved using an age model and resampling to a uniform sample rate of 7.06 samples/kyr are performed prior to coherency analysis. Details appear in Ramamurthy et al. (Journal of Geoscience Education, August 2014).

Step 1: Set up the blocks as in Figure 1. For the upper branch *Earth Signals*, choose RC11-120 d^{18}O . For the lower branch *Earth Signals*, choose standardized ETP.

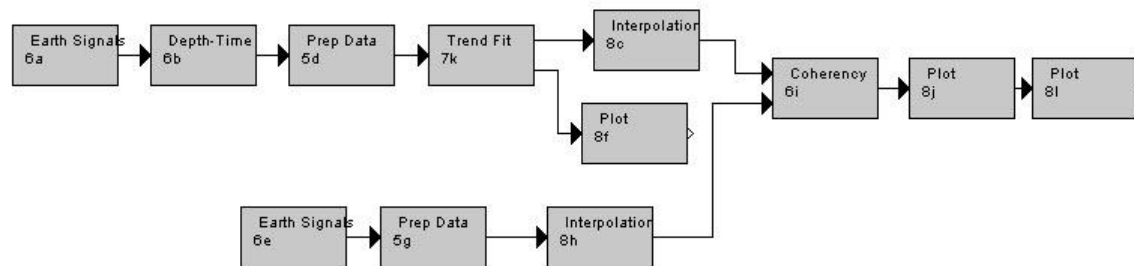


Figure 1. Block diagram for Tutorial 3

Step 2: For the RC11-120 data, use age model 2 in *Depth-Time* to change the depth series signal into a time series signal. Then use the *Prep Data* to restrict the two time series to the interval 2.97-293 (Figure 2).

Step 3: Set *Trend Fit* parameters to linear trend (Figure 3).

Step 4: Use *Interpolation* to get total of 2048 samples as in Figure 4.

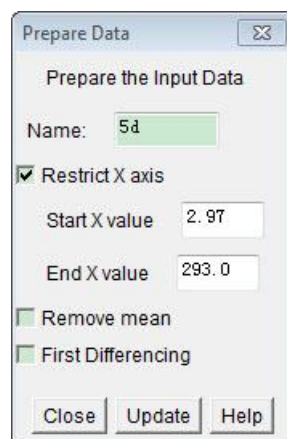


Figure 2. *Prep Data* parameters

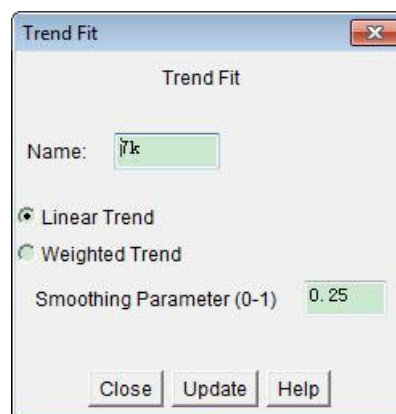


Figure 3. *Trend Fit* parameters.

Step 4: In *Coherency Analysis*, set the frame size to 116.16 and FFT size to 8192 (Figure 5).

Step 5: Plot coherency and cross phase spectra (Figure 6 and Figure 7).

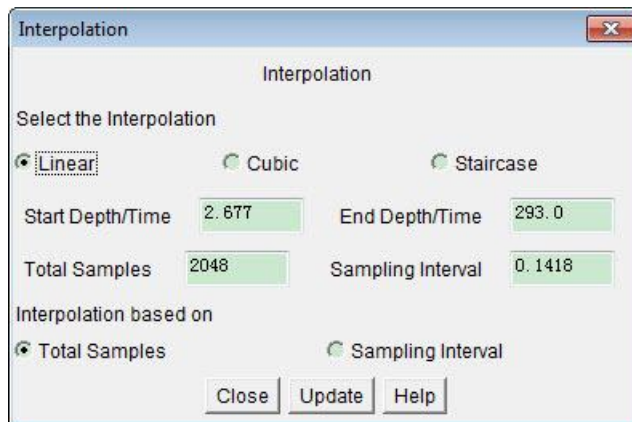


Figure 4. *Interpolation* parameters.

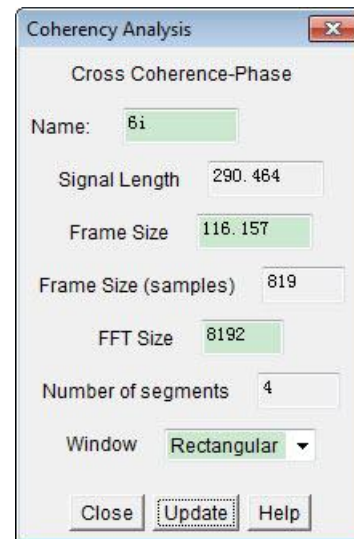


Figure 5. *Coherency* parameters.

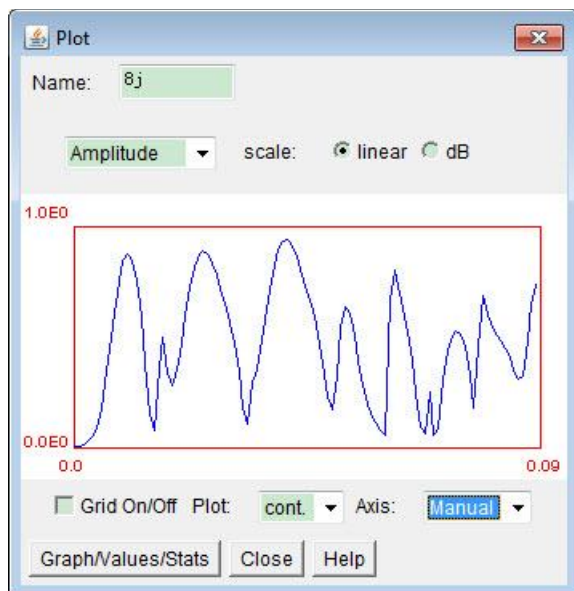


Figure 6. Coherency spectrum.

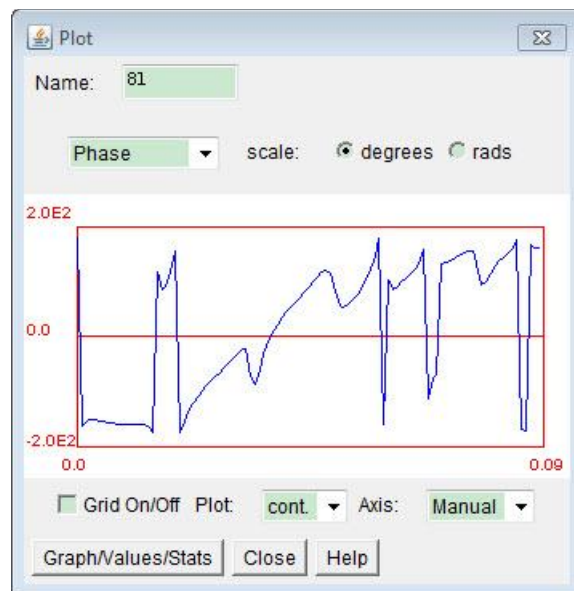


Figure 7. Cross-phase spectrum.