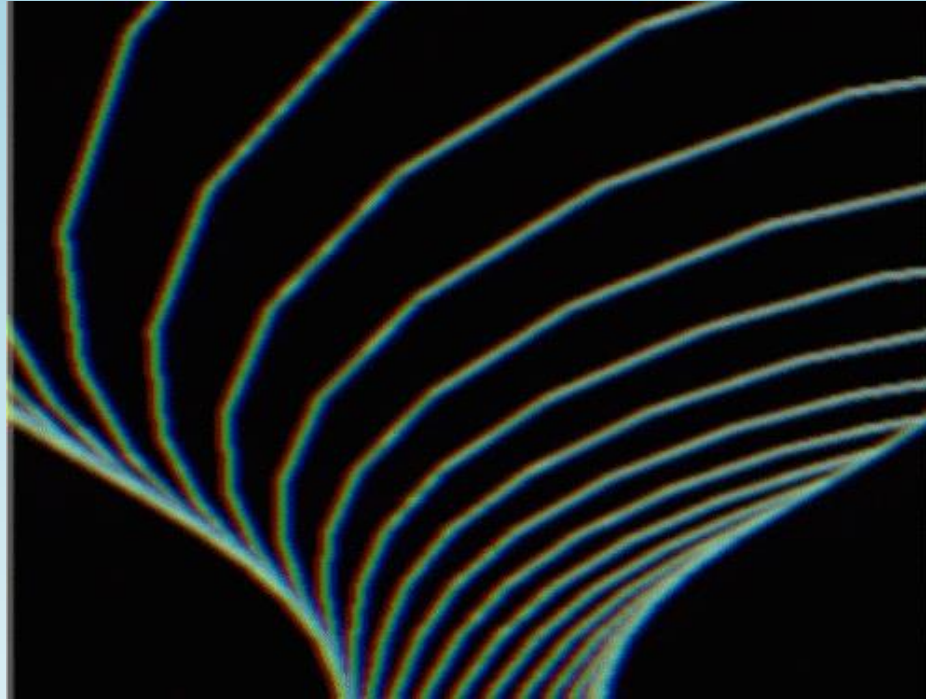


The Spectral Signature of Water Quality Stressors in Chesapeake Bay Triblets

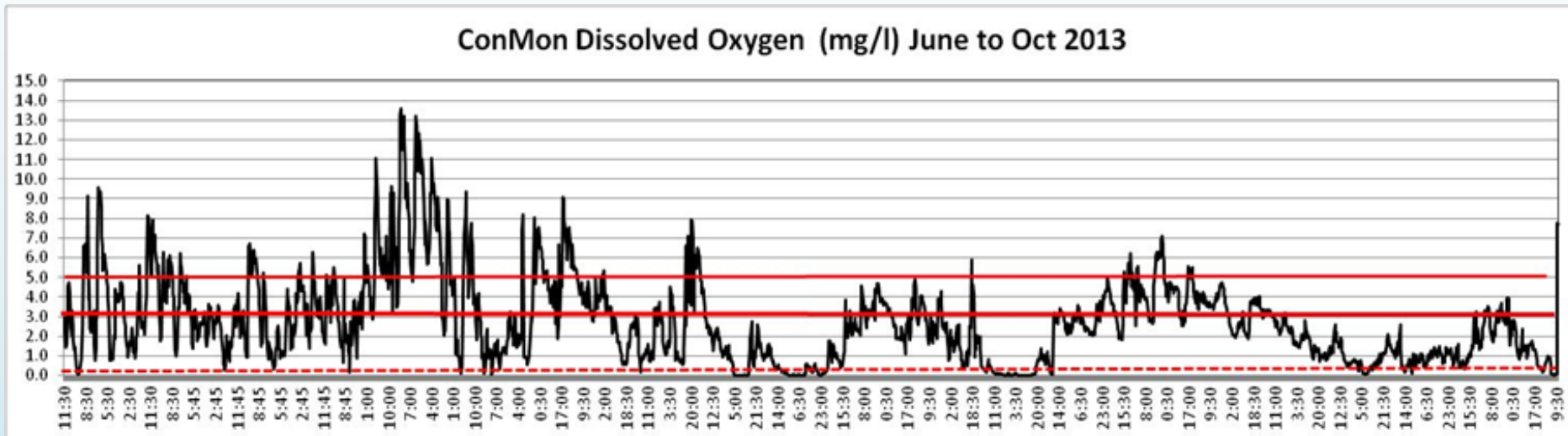


Andrew C. Muller, Ph.D.
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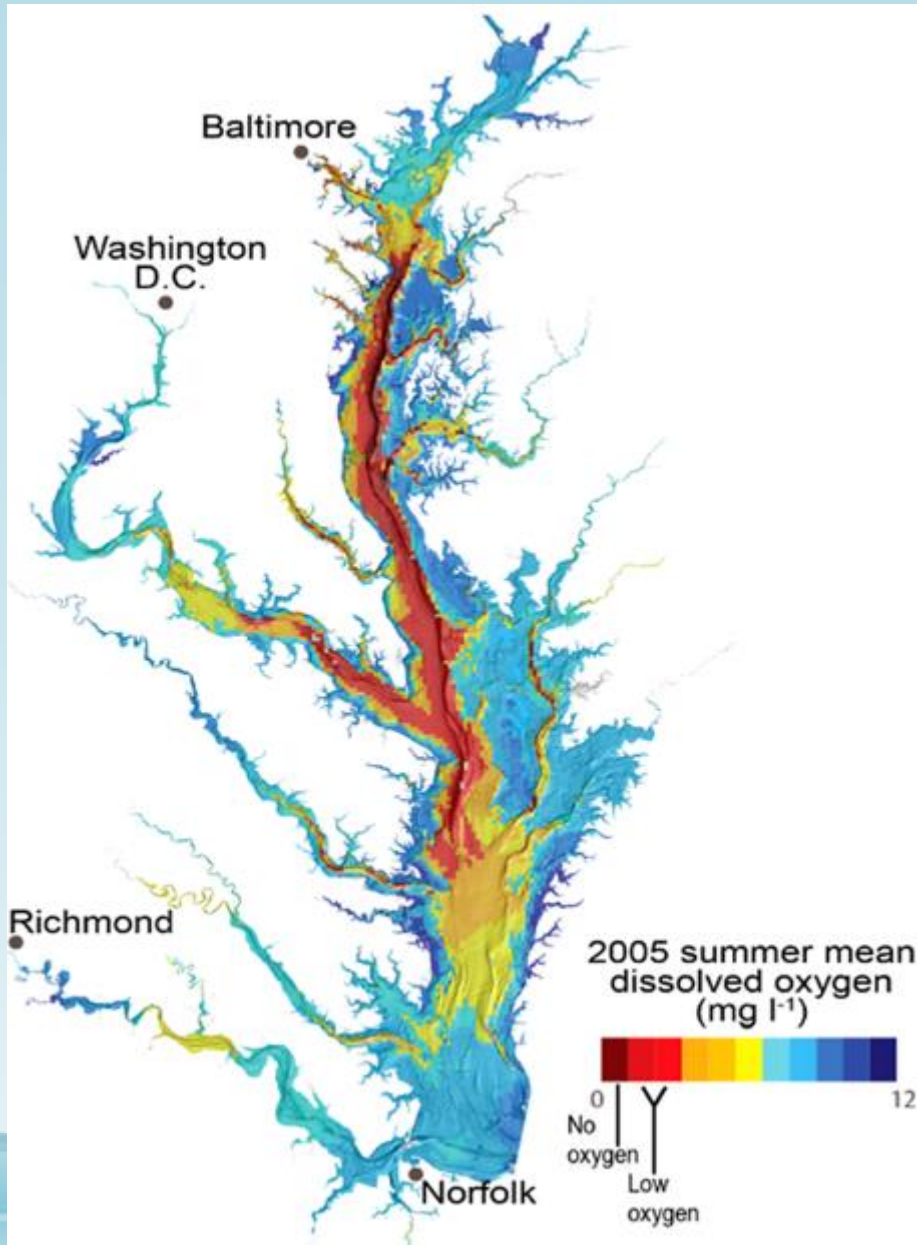


Church Creek Dissolved oxygen

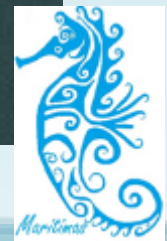
Why do we need continuous monitoring data in triplets and spectral approaches to data analysis?



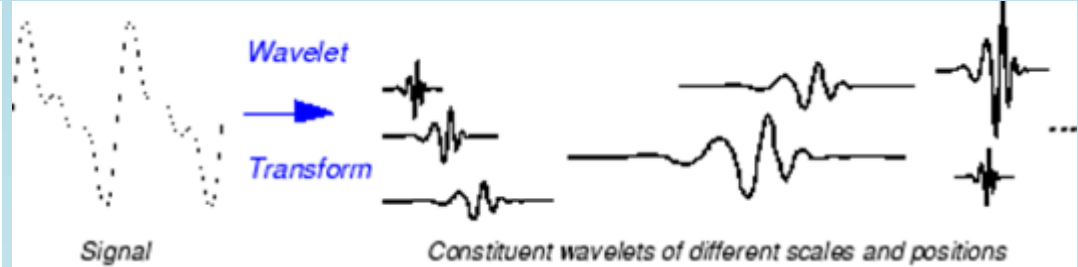
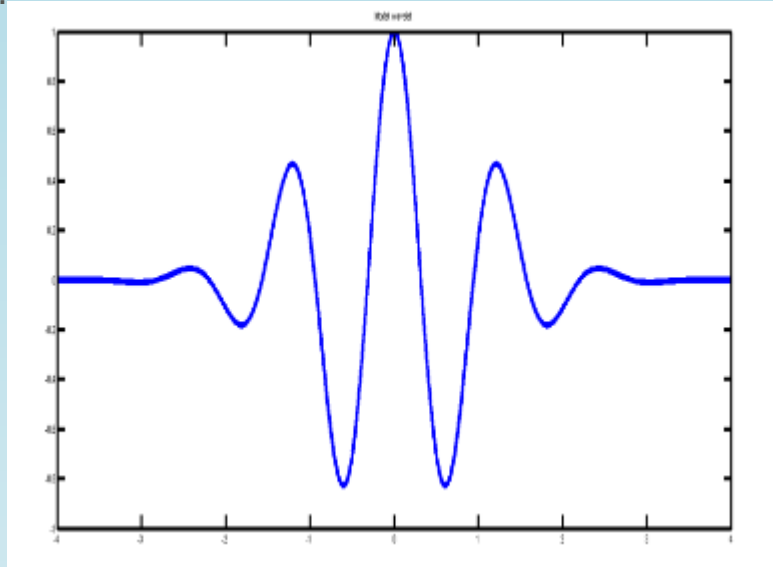
Triblet Locations in Chesapeake Bay



South and Severn Rivers



Continuous Wavelet Analysis (CWT)



Continuous Wavelet Transform (CWT)

translation parameter, measure of time scale parameter (measure of frequency)

Forward CWT:
$$C(\tau, s) = \frac{1}{\sqrt{s}} \int_{-\infty}^{\infty} f(t) \psi^* \left(\frac{t - \tau}{s} \right) dt$$

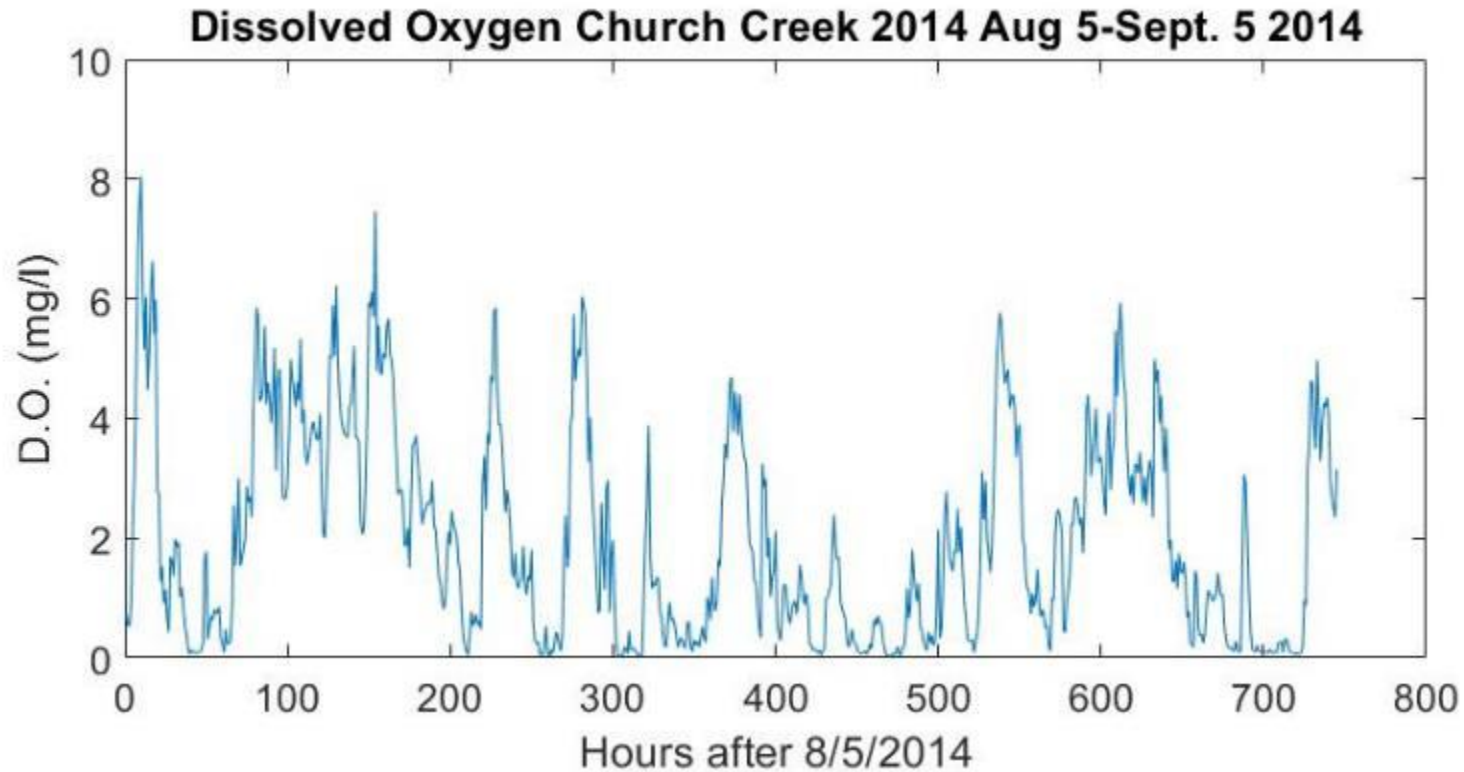
normalization constant Mother wavelet (window)

scale = $1/2^j = 1/\text{frequency}$

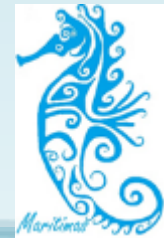
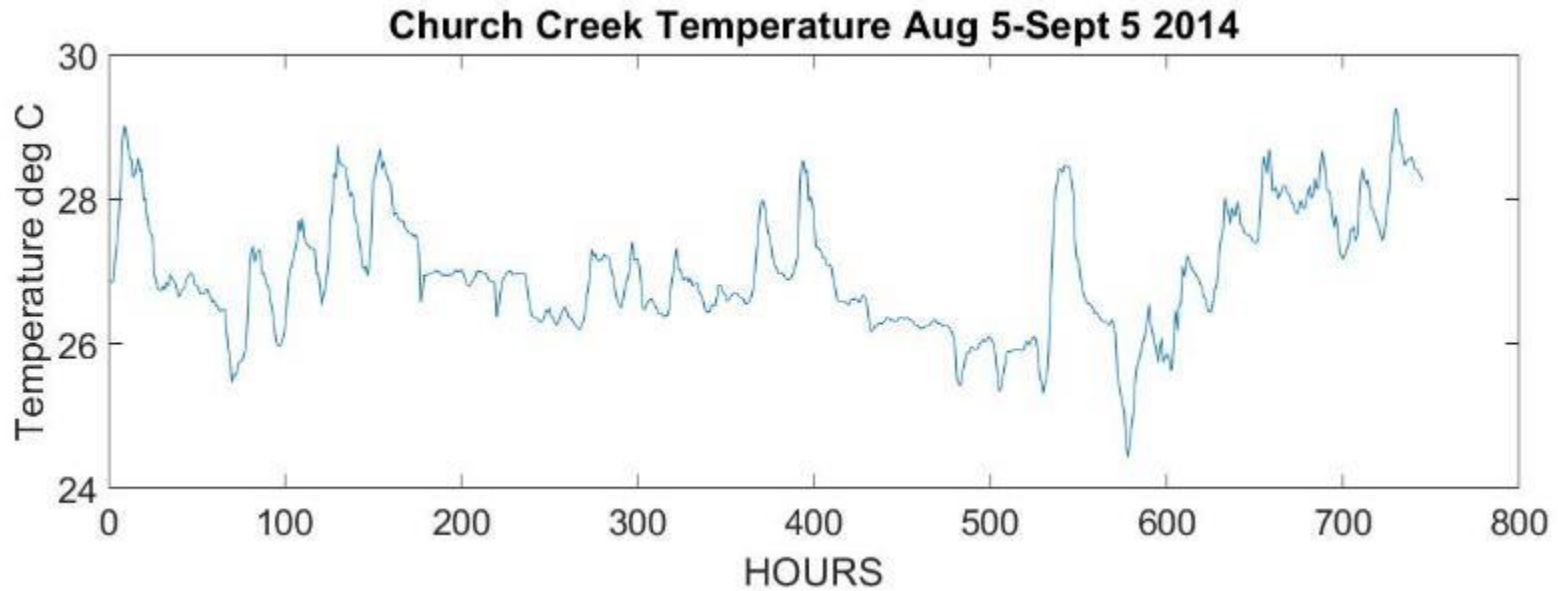
- In mathematics, a continuous wavelet transform (CWT) is used to divide a continuous-time function into wavelets. Unlike Fourier transform, the continuous wavelet transform possesses the ability to construct a time-frequency representation of a signal that offers very good time and frequency localization.



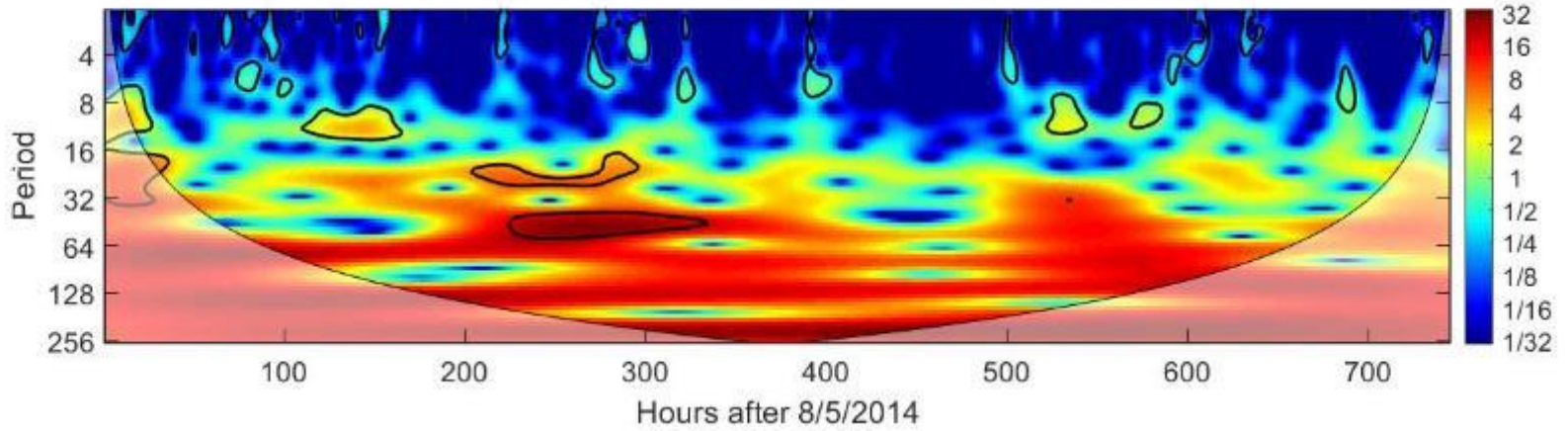
Church Creek 2014- Aug 5-Sept 5



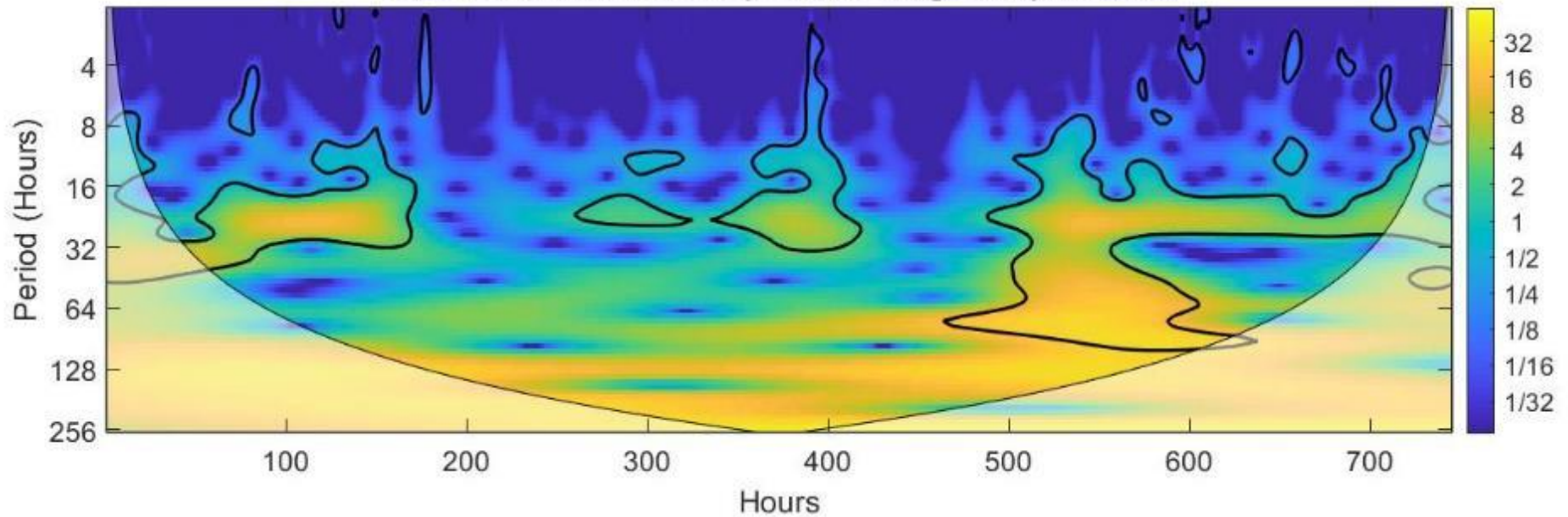
Church Creek Temperature



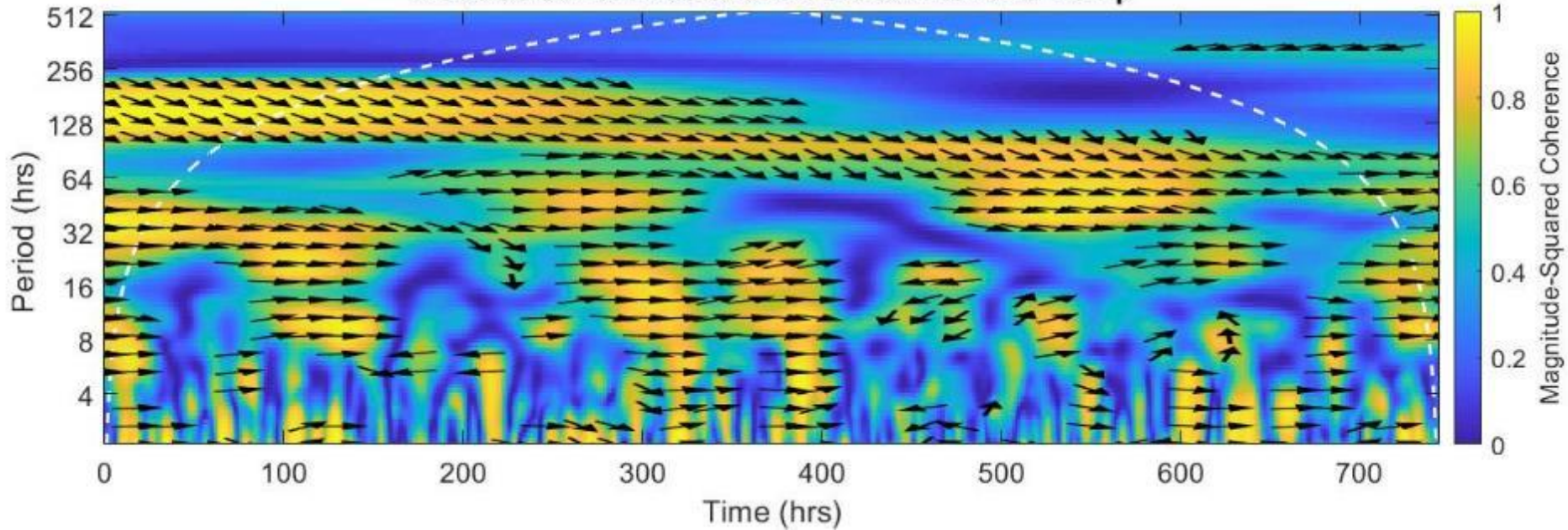
CWT of Church Creek D.O.



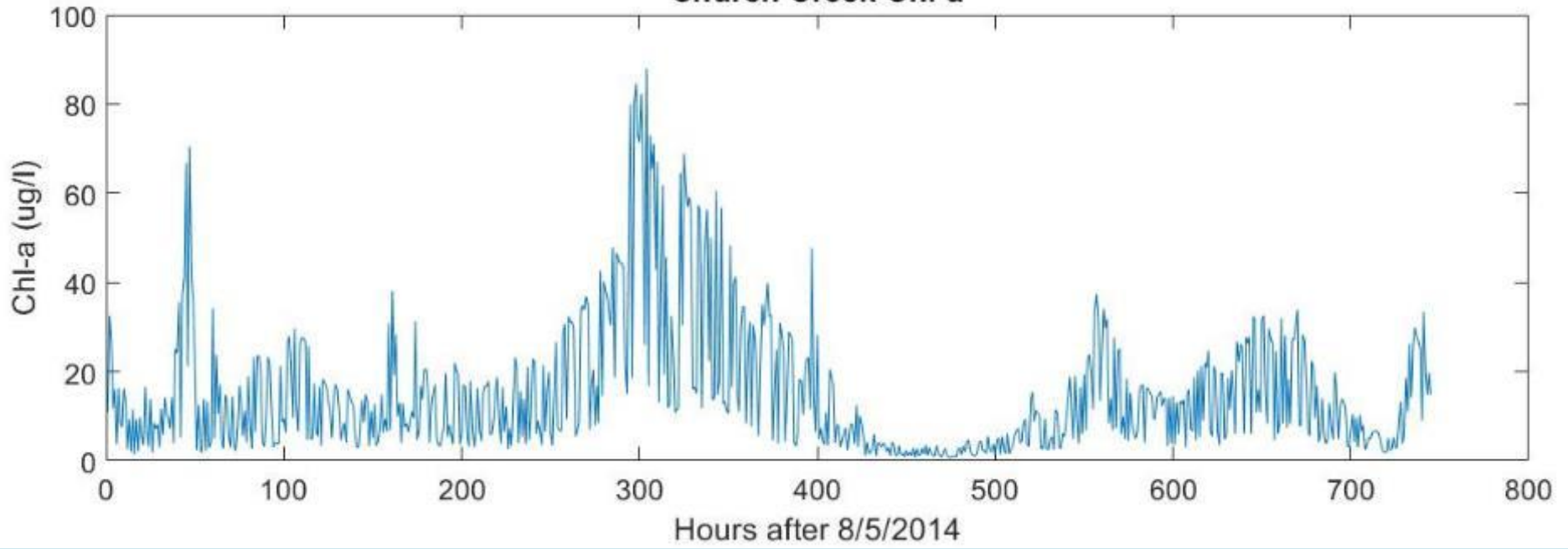
CWT Church Creek Temperature Aug. 5-Sept. 5 2014



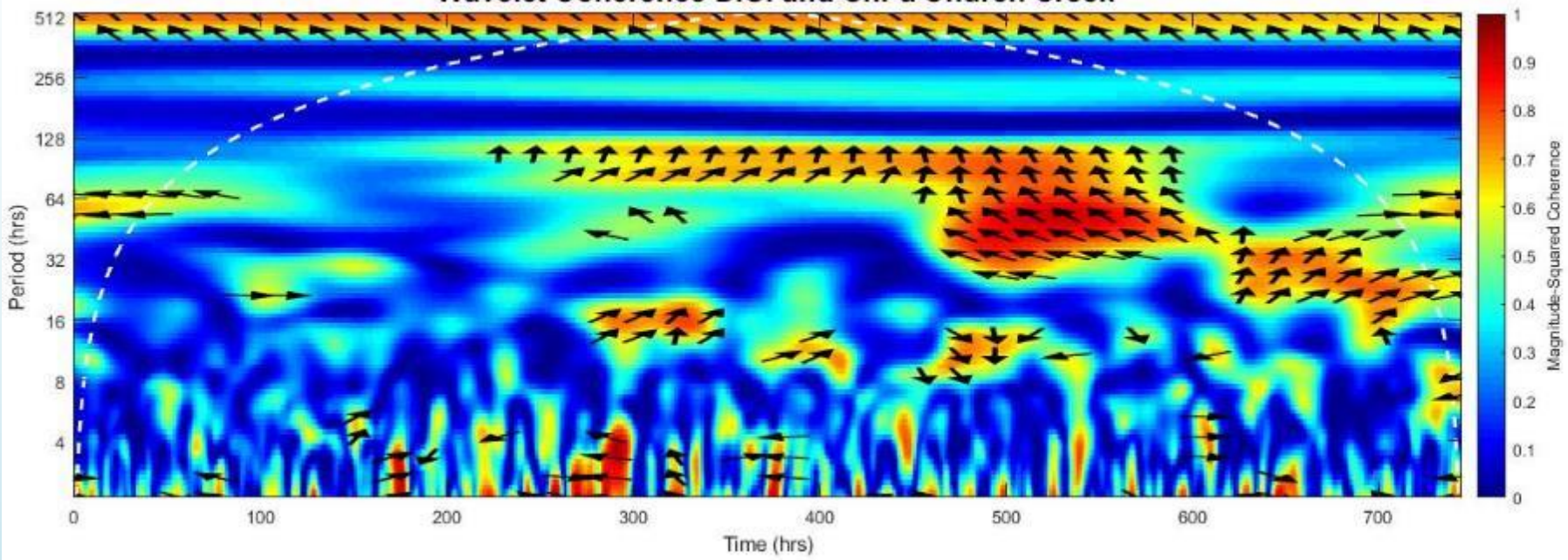
Wavelet Coherence Church Creek D.O. and Temp



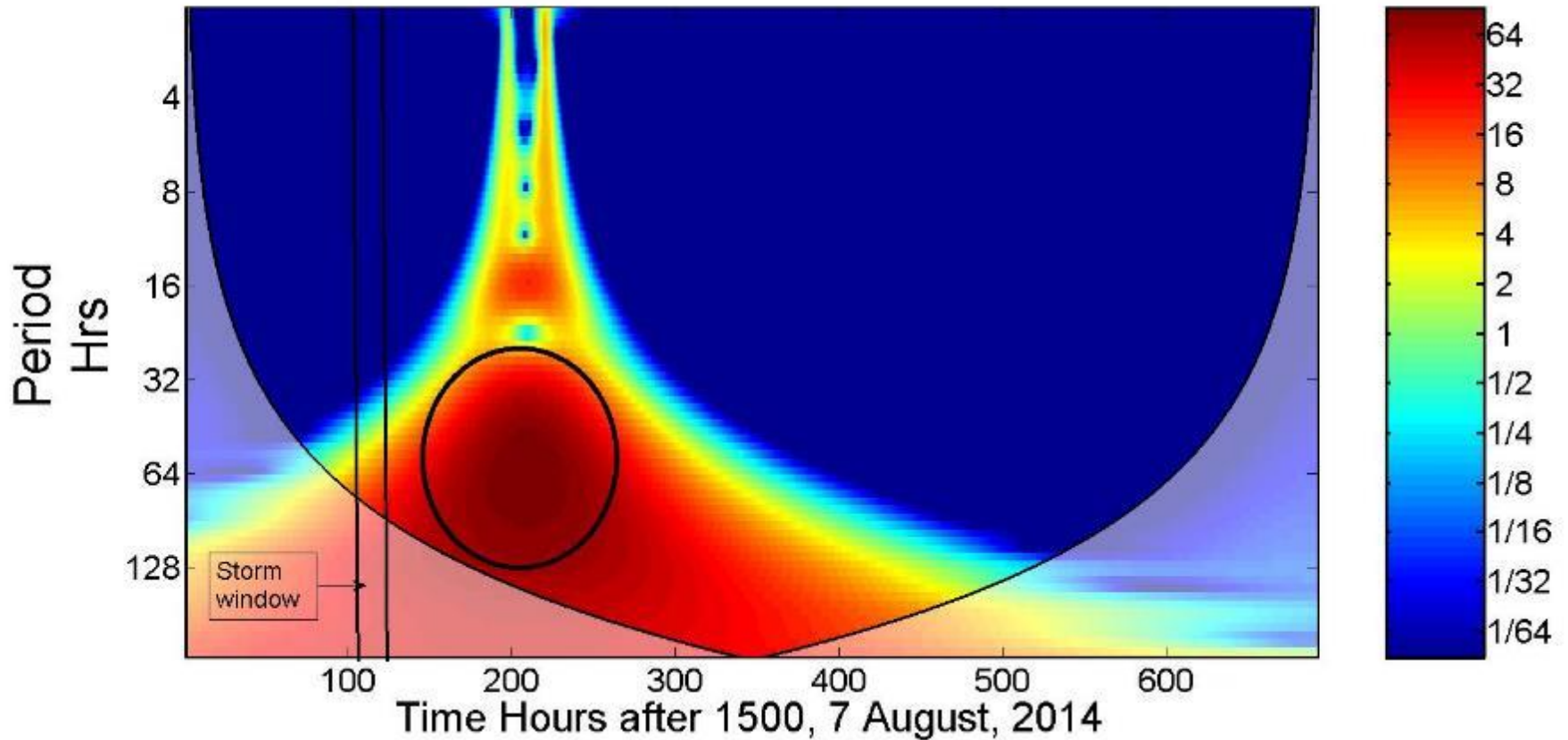
Church Creek Chl-a



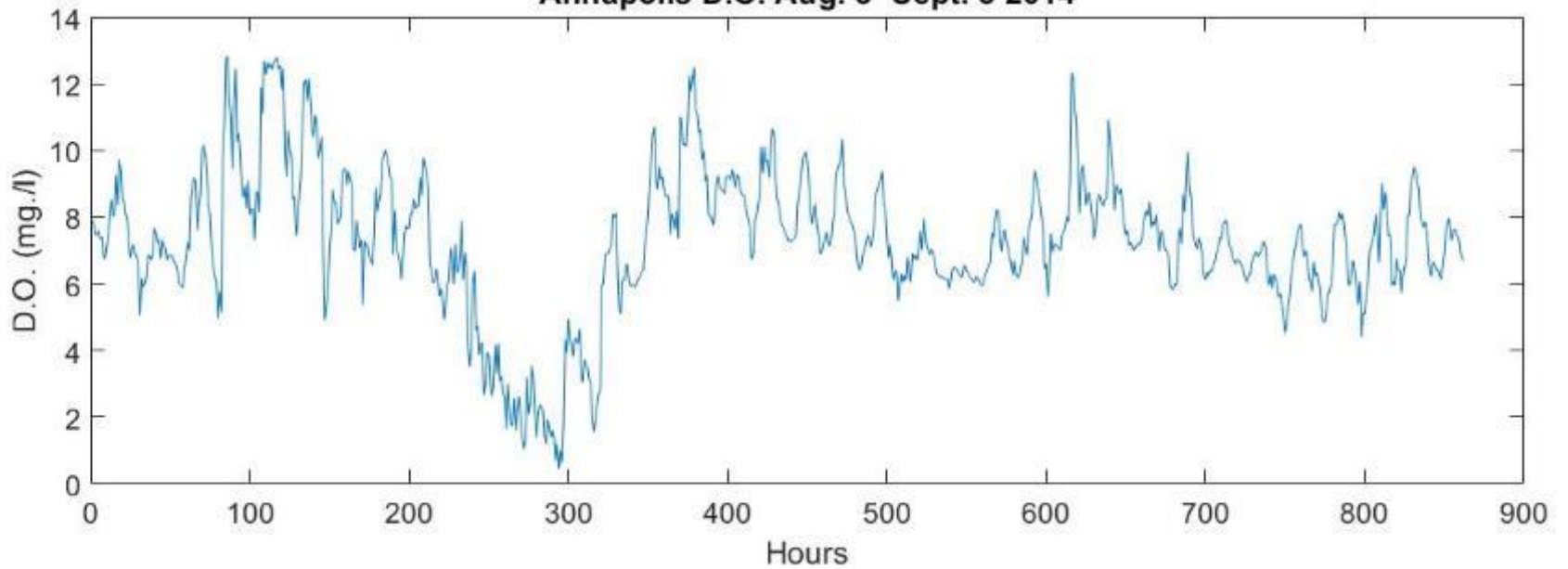
Wavelet Coherence D.O. and Chl-a Church Creek



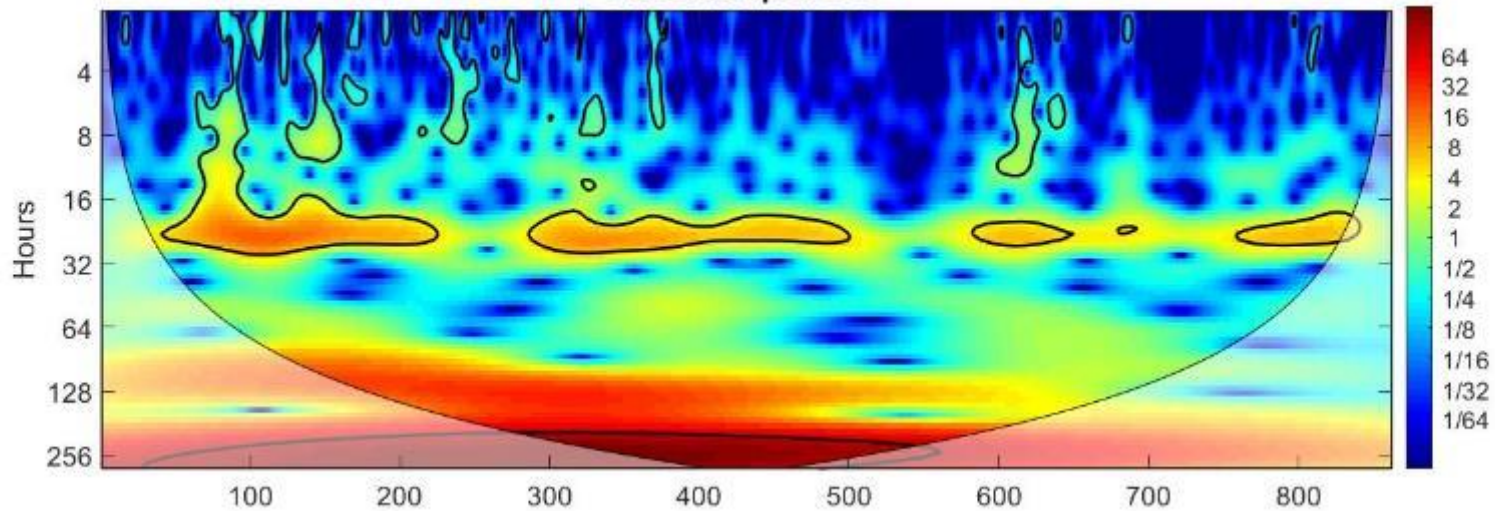
Morlet Wavelet Transformation for Turbidity (NTU)- Church Creek Tidal Section Aug. 7- Sept. 5, 2014



Annapolis D.O. Aug. 5- Sept. 5 2014

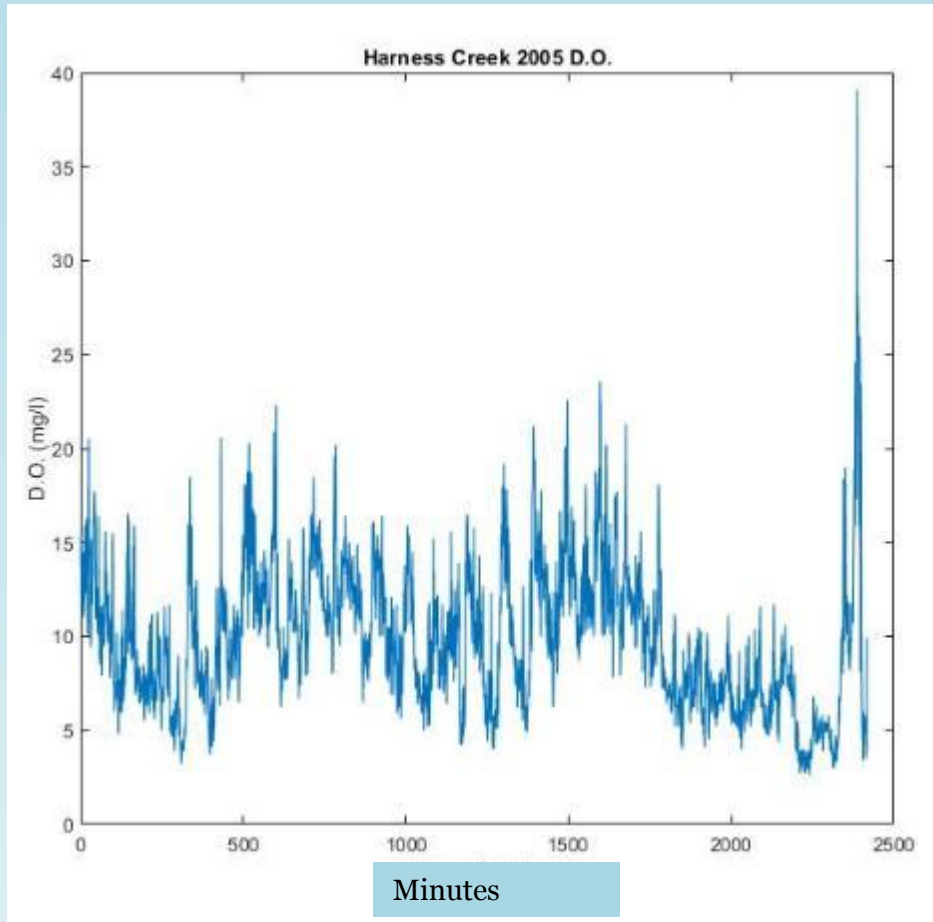


CWT Annapolis DO

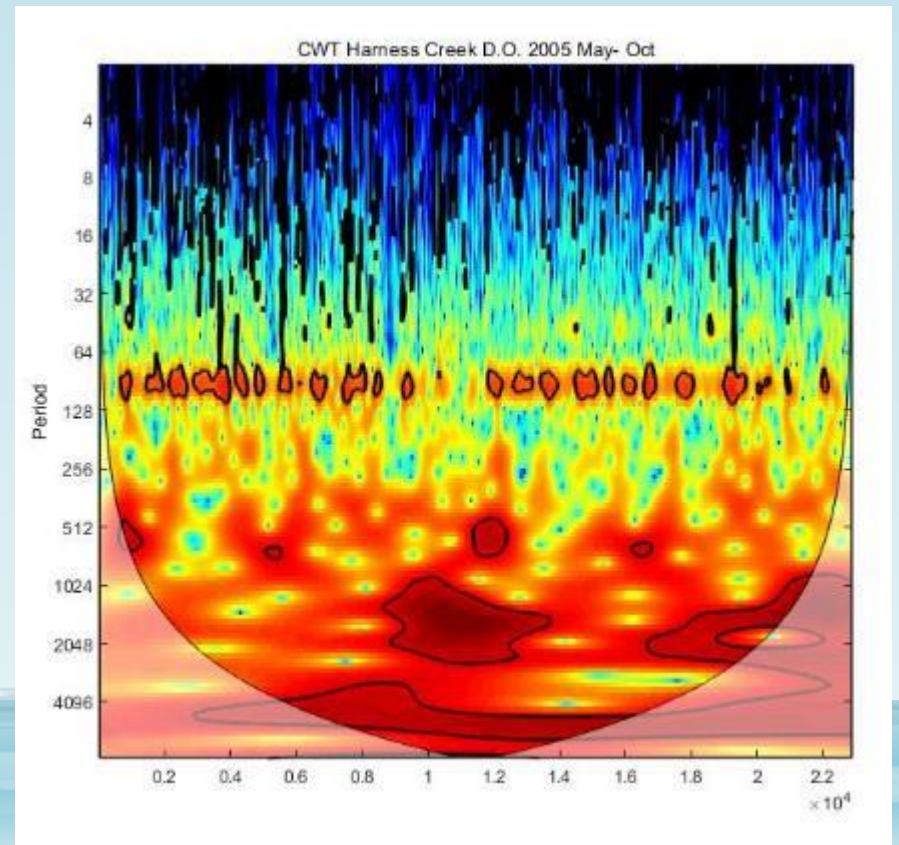


Harness Creek May-Oct

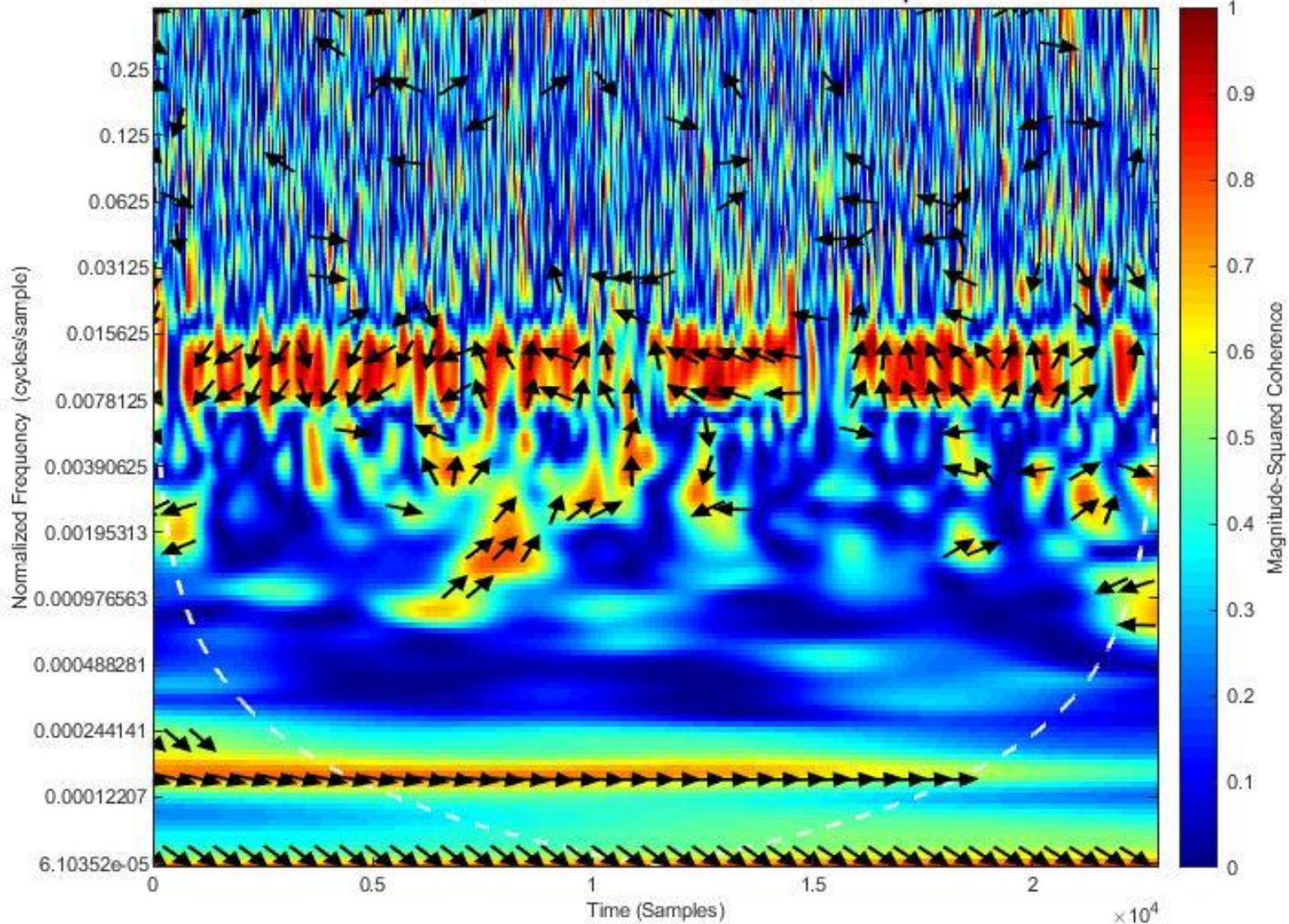
Original Signal DO

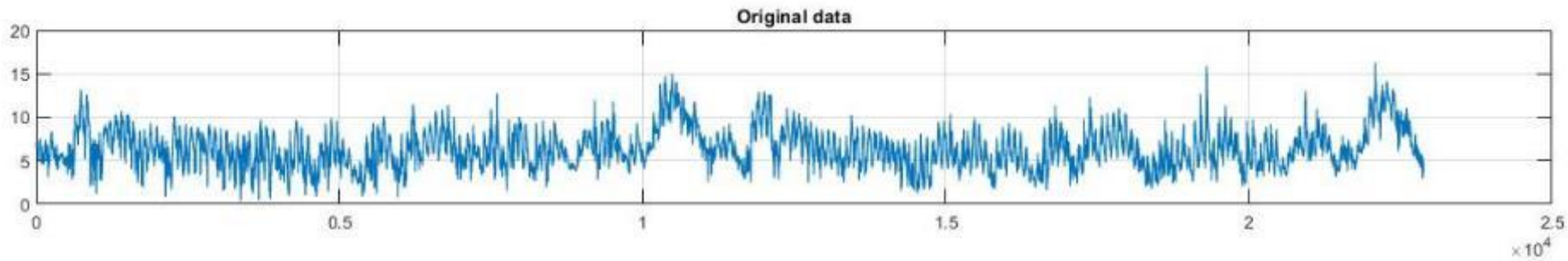


CWT DO

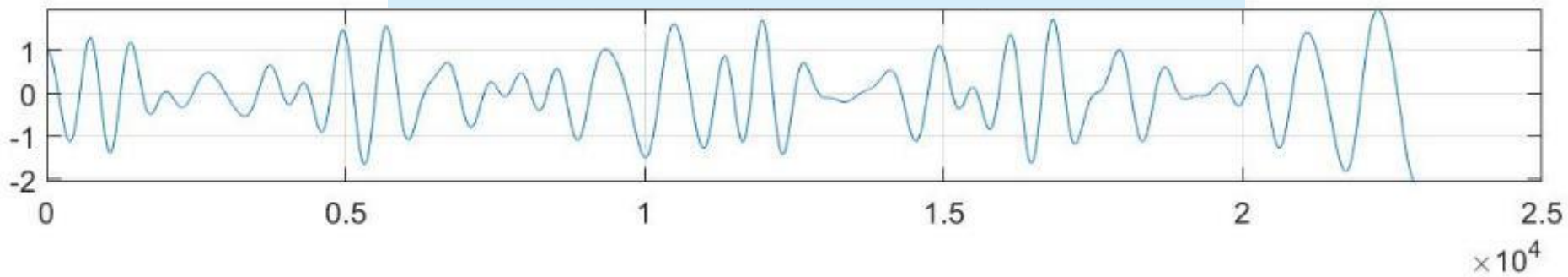


Wavelet Coherence Harness Creek D.O. and Temp





Harness Creek Spectral Decomposition



Continuous monitoring data is useful for understanding processes over multiple temporal scales. This data is critical in tidal creeks because tidal creeks are the connection between Land and Triblets, which then connect to the Sea.

Wavelet analysis assists in identifying energy shift in the time domain

For management purposes; this allow us to identify the important physical processes and the scales in which they should be modeled.



Thank You
Andrew
&
Diana
Muller

