PIWavelet

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Packages

- namespace piwavelet

Variables

- string __name = 'piwavelet'
- string __authors = 'Eduardo dos Santos Pereira, Regla D. Somoza'
- string __data = '13/03/2013'
- string __email = 'pereira.somoza@gmail.com,duthit@gmail.com'
- tuple HOME = os.path.expanduser('~')
- tuple local = os.path.dirname(piwavelet.__file__)
- list __all__

5.3.1 Variable Documentation

5.3.1.1 list projects.piwavelet.piwavelet.__all__

Initial value:

```
1 ['waveletCC', 'Morlet', 'Paul', 'DOG',
2           'Mexican_hat']
```

5.3.1.2 string projects.piwavelet.piwavelet.__authors = 'Eduardo dos Santos Pereira, Regla D. Somoza'

5.3.1.3 string projects.piwavelet.piwavelet.__data = '13/03/2013'

5.3.1.4 string projects.piwavelet.piwavelet.__email = 'pereira.somoza@gmail.com,duthit@gmail.com'

5.3.1.5 string projects.piwavelet.piwavelet.__name = 'piwavelet'

5.3.1.6 tuple projects.piwavelet.piwavelet.HOME = os.path.expanduser('~')

5.3.1.7 tuple projects.piwavelet.piwavelet.local = os.path.dirname(piwavelet.__file__)

5.4 projects.piwavelet.piwavelet.piwavelet Namespace Reference

Classes

- class Morlet

  Implements the Morlet wavelet class.
- class Paul

  Implements the Paul wavelet class.
- class DOG

  Implements the derivative of a Guassian wavelet class.
- class Mexican_hat

  Implements the Mexican hat wavelet class.
- class wcoherence

  This class is an Python interface for the Wavelet Coherence matlab functions of the package for wavelet, cross-wavelet and coherence-wavelet analises profided by Aslak Grinsted, John C.
- class wcross

  This class is an Python interface for the Cross wavelet Spectrun matlab functions of the package for wavelet, cross-wavelet and coherence-wavelet analises profided by Aslak Grinsted, John C.
- class smooth

  This class is an Python interface for the Smoothing matlab functions of the package for wavelet, cross-wavelet and coherence-wavelet analises profided by Aslak Grinsted, John C.
- class waveletCC

  Continuous wavelet transform of the signal at specified scales.

Functions

- def ar1

  Allen and Smith autoregressive lag-1 autocorrelation alpha.
- def ar1_spectrum

  Lag-1 autoregressive theoretical power spectrum.
- def cwt

  Continuous wavelet transform of the signal at specified scales.
- def significance

  Significance testing for the onde dimensional wavelet transform.
- def plotWavelet

  Plot Wavelet Transfor for one signal.

Variables

- string __name = 'piwavelets'
- string __authors = 'Eduardo dos Santos Pereira, Regla D. Somoza'
- string __data = '13/03/2013'
- string __email = 'pereira.somoza@gmail.com,duthit@gmail.com'

5.4.1 Function Documentation

5.4.1.1 def projects.piwavelet.piwavelet.piwavelet.ar1 (*x*)

Allen and Smith autoregressive lag-1 autocorrelation alpha.

In a AR(1) model

```
x(t) - <x> = \gamma(x(t-1) - <x>) + \alpha z(t) ,
```

where <x> is the process mean, and are process parameters and z(t) is a Gaussian unit-variance white noise.

PARAMETERS x (array like) : Univariate time series

RETURNS g (float) : Estimate of the lag-one autocorrelation. a (float) : Estimate of the noise variance [var(x) ~= a**2/(1-g**2)] mu2 (foat) : Estimated square on the mean of a finite segment of AR(1) noise, mormalized by the process variance.

REFERENCES [1] Allen, M. R. and Smith, L. A. (1996). Monte Carlo SSA: detecting irregular oscillations in the presence of colored noise. Journal of Climate, 9(12), 3373-3404.

5.4.1.2 def projects.piwavelet.piwavelet.piwavelet.ar1_spectrum (*freqs, ar1 =* `0.`)

Lag-1 autoregressive theoretical power spectrum.

PARAMETERS ar1 (float) : Lag-1 autoregressive correlation coefficient. freqs (array like) : Frequencies at which to calculate the theoretical power spectrum.

RETURNS Pk (array like) : Theoretical discrete Fourier power spectrum of noise signal.

5.4.1.3 def projects.piwavelet.piwavelet.piwavelet.cwt (*signal, dt =* `1.`, *dj =* `1./12`, *s0 =* `-1`, *J =* `-1`, *wavelet =* `Morlet()`, *result =* `None`)

Continuous wavelet transform of the signal at specified scales.

PARAMETERS signal (array like) : Input signal array dt (float) : Sample spacing. dj (float, optional) : Spacing between discrete scales. Default value is 0.25. Smaller values will result in better scale resolution, but slower calculation and plot. s0 (float, optional) : Smallest scale of the wavelet. Default value is 2*dt. J (float, optional) : Number of scales less one. Scales range from s0 up to s0 * 2**(J * dj), which gives a total of (J + 1) scales. Default is J = (log2(N*dt/so))/dj. wavelet (class, optional) : Mother wavelet class. Default is Morlet() result (string, optional) : If set to 'dictionary' returns the result arrays as itens of a dictionary.

RETURNS W (array like) : Wavelet transform according to the selected mother wavelet. Has (J+1) x N dimensions. sj (array like) : Vector of scale indices given by sj = s0 * 2**(j * dj), j={0, 1, ..., J}. freqs (array like) : Vector of Fourier frequencies (in 1 / time units) that corresponds to the wavelet scales. coi (array like) : Returns the cone of influence, which is a vector of N points containing the maximum Fourier period of useful information at that particular time. Periods greater than those are subject to edge effects. fft (array like) : Normalized fast Fourier transform of the input signal. fft_freqs (array like): Fourier frequencies (in 1/time units) for the calculated FFT spectrum.

EXAMPLE mother = wavelet.Morlet(6.) wave, scales, freqs, coi, fft, fftfreqs = wavelet.cwt(var, 0.25, 0.25, 0.5, 28, mother)

5.4.1.4 def projects.piwavelet.piwavelet.piwavelet.plotWavelet (*signal, title, label, units, mother* = `Morlet(6.)`, *t0* = `1.0`, *dt* = `1.0`, *dj* = `0.25`, *s0* = `-1`, *J* = `-1`, *alpha* = `0.0`, *slevel* = `0.95`, *avg1* = `15`, *avg2* = `20`, *nameSave* = `None`)

Plot Wavelet Transfor for one signal.

PARAMETER: signal : The signal that will be transformed title : Title of the plot label : Label units : unit of the data mother : The Mother Wavelet. Default Morlet mother wavelet with wavenumber=6 t0 : Initial time step dt : time step dj : Four sub-octaves per octaves s0 : Starting scale, here 6 months J : Seven powers of two with dj sub-octaves alpha: Lag-1 autocorrelation for white noise slevel : Significance level avg1,avg2 : Range of periods to average nameSave : Path plus name to save the plot

5.4.1.5 def projects.piwavelet.piwavelet.piwavelet.significance (*signal, dt, scales, sigma_test* = `0`, *alpha* = `0.`, *significance_level* = `0.95`, *dof* = `-1`, *wavelet* = `Morlet()`)

Significance testing for the onde dimensional wavelet transform.

PARAMETERS signal (array like or float) : Input signal array. If a float number is given, then the variance is assumed to have this value. If an array is given, then its variance is automatically computed. dt (float, optional) : Sample spacing. Default is 1.0. scales (array like) : Vector of scale indices given returned by cwt function. sigma_test (int, optional) : Sets the type of significance test to be performed. Accepted values are 0, 1 or 2. If omitted assume 0.

If set to 0, performs a regular chi-square test, according to Torrence and Compo (1998) equation 18.

If set to 1, performs a time-average test (equation 23). In this case, dof should be set to the number of local wavelet spectra that where averaged together. For the global wavelet spectra it would be dof=N, the number of points in the time-series.

If set to 2, performs a scale-average test (equations 25 to 28). In this case dof should be set to a two element vector [s1, s2], which gives the scale range that were averaged together. If, for example, the average between scales 2 and 8 was taken, then dof=[2, 8]. alpha (float, optional) : Lag-1 autocorrelation, used for the significance levels. Default is 0.0. significance_level (float, optional) : Significance level to use. Default is 0.95. dof (variant, optional) : Degrees of freedom for significance test to be set according to the type set in sigma_test. wavelet (class, optional) : Mother wavelet class. Default is Morlet().

RETURNS signif (array like) : Significance levels as a function of scale. fft_theor (array like): Theoretical red-noise spectrum as a function of period.

5.4.2 Variable Documentation

5.4.2.1 string projects.piwavelet.piwavelet.piwavelet.__authors = 'Eduardo dos Santos Pereira, Regla D. Somoza'

5.4.2.2 string projects.piwavelet.piwavelet.piwavelet.__data = '13/03/2013'

5.4.2.3 string projects.piwavelet.piwavelet.piwavelet.__email = 'pereira.somoza@gmail.com,duthit@gmail.com'

5.4.2.4 string projects.piwavelet.piwavelet.piwavelet.__name = 'piwavelets'

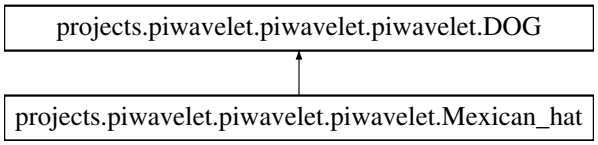
Chapter 6

Class Documentation

6.1 projects.piwavelet.piwavelet.piwavelet.DOG Class Reference

Implements the derivative of a Guassian wavelet class.

Inheritance diagram for projects.piwavelet.piwavelet.piwavelet.DOG:



Public Member Functions

- def __init__
- def psi_ft

  Fourier transform of the DOG wavelet.
- def psi

  DOG wavelet as described in Torrence and Compo (1998)
- def flambda

  Fourier wavelength as of Torrence and Compo (1998)
- def coi

  e-Folding Time as of Torrence and Compo (1998)
- def sup

  Wavelet support defined by the e-Folding time.

Public Attributes

- m
- dofmin
- cdelta
- gamma
- deltaj0

Static Public Attributes

- string name = 'DOG'

6.1.1 Detailed Description

Implements the derivative of a Guassian wavelet class.

Note that the input parameter f is the angular frequency and that for m=2 the DOG becomes the Mexican hat wavelet, which is then default.

6.1.2 Constructor & Destructor Documentation

6.1.2.1 def projects.piwavelet.piwavelet.piwavelet.DOG.__init__ (*self, m = 2*)

6.1.3 Member Function Documentation

6.1.3.1 def projects.piwavelet.piwavelet.piwavelet.DOG.coi (*self*)

e-Folding Time as of Torrence and Compo (1998)

6.1.3.2 def projects.piwavelet.piwavelet.piwavelet.DOG.flambda (*self*)

Fourier wavelength as of Torrence and Compo (1998)

6.1.3.3 def projects.piwavelet.piwavelet.piwavelet.DOG.psi (*self, t*)

DOG wavelet as described in Torrence and Compo (1998)

The derivative of a Gaussian of order n can be determined using the probabilistic Hermite polynomials. They are explicitly written as: Hn(x) = 2 ** (-n / s) * n! * sum ((-1) ** m) * (2 ** 0.5 * x) ** (n - 2 * m) / (m! * (n - 2*m)!) or in the recursive form: Hn(x) = x * Hn(x) - nHn-1(x)

Source: http://www.ask.com/wiki/Hermite_polynomials

6.1.3.4 def projects.piwavelet.piwavelet.piwavelet.DOG.psi_ft (*self, f*)

Fourier transform of the DOG wavelet.

6.1.3.5 def projects.piwavelet.piwavelet.piwavelet.DOG.sup (*self*)

Wavelet support defined by the e-Folding time.

6.1.4 Member Data Documentation

6.1.4.1 projects.piwavelet.piwavelet.piwavelet.DOG.cdelta

6.1.4.2 projects.piwavelet.piwavelet.piwavelet.DOG.deltaj0

6.1.4.3 projects.piwavelet.piwavelet.piwavelet.DOG.dofmin

6.1.4.4 projects.piwavelet.piwavelet.piwavelet.DOG.gamma

6.1.4.5 projects.piwavelet.piwavelet.piwavelet.DOG.m

6.1.4.6 string projects.piwavelet.piwavelet.piwavelet.DOG.name = 'DOG' [static]

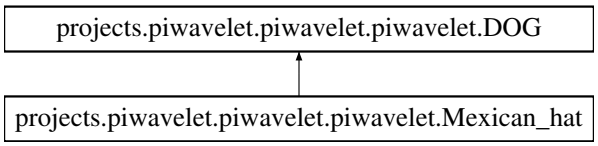
The documentation for this class was generated from the following file:

- piwavelet/piwavelet.py

6.2 projects.piwavelet.piwavelet.piwavelet.Mexican_hat Class Reference

Implements the Mexican hat wavelet class.

Inheritance diagram for projects.piwavelet.piwavelet.piwavelet.Mexican_hat:



Public Member Functions

- def __init__

Static Public Attributes

- string name = 'Mexican hat'

Additional Inherited Members

6.2.1 Detailed Description

Implements the Mexican hat wavelet class.

This class inherits the DOG class using m=2.

6.2.2 Constructor & Destructor Documentation

6.2.2.1 def projects.piwavelet.piwavelet.piwavelet.Mexican_hat.__init__ (*self*)

6.2.3 Member Data Documentation

6.2.3.1 string projects.piwavelet.piwavelet.piwavelet.Mexican_hat.name = 'Mexican hat' [static]

The documentation for this class was generated from the following file:

- piwavelet/piwavelet.py

6.3 projects.piwavelet.piwavelet.piwavelet.Morlet Class Reference

Implements the Morlet wavelet class.

Public Member Functions

- def __init__
- def psi_ft

Fourier transform of the approximate Morlet wavelet.

- def psi

  Morlet wavelet as described in Torrence and Compo (1998)

- def flambda

  Fourier wavelength as of Torrence and Compo (1998)

- def coi

  e-Folding Time as of Torrence and Compo (1998)

- def sup

  Wavelet support defined by the e-Folding time.

Public Attributes

- f0
- dofmin
- cdelta
- gamma
- deltaj0

Static Public Attributes

- string name = 'Morlet'

6.3.1 Detailed Description

Implements the Morlet wavelet class.

Note that the input parameters f and f0 are angular frequencies. f0 should be more than 0.8 for this function to be correct, its default value is f0=6.

6.3.2 Constructor & Destructor Documentation

6.3.2.1 def projects.piwavelet.piwavelet.piwavelet.Morlet.__init__ (*self, f0 =* 6.0)

6.3.3 Member Function Documentation

6.3.3.1 def projects.piwavelet.piwavelet.piwavelet.Morlet.coi (*self*)

e-Folding Time as of Torrence and Compo (1998)

6.3.3.2 def projects.piwavelet.piwavelet.piwavelet.Morlet.flambda (*self*)

Fourier wavelength as of Torrence and Compo (1998)

6.3.3.3 def projects.piwavelet.piwavelet.piwavelet.Morlet.psi (*self, t*)

Morlet wavelet as described in Torrence and Compo (1998)

6.3.3.4 def projects.piwavelet.piwavelet.piwavelet.Morlet.psi_ft (*self, f*)

Fourier transform of the approximate Morlet wavelet.

6.3.3.5 def projects.piwavelet.piwavelet.piwavelet.Morlet.sup (*self*)

Wavelet support defined by the e-Folding time.

6.3.4 Member Data Documentation

6.3.4.1 projects.piwavelet.piwavelet.piwavelet.Morlet.cdelta

6.3.4.2 projects.piwavelet.piwavelet.piwavelet.Morlet.deltaj0

6.3.4.3 projects.piwavelet.piwavelet.piwavelet.Morlet.dofmin

6.3.4.4 projects.piwavelet.piwavelet.piwavelet.Morlet.f0

6.3.4.5 projects.piwavelet.piwavelet.piwavelet.Morlet.gamma

6.3.4.6 string projects.piwavelet.piwavelet.piwavelet.Morlet.name = 'Morlet' [static]

The documentation for this class was generated from the following file:

- piwavelet/piwavelet.py

6.4 projects.piwavelet.piwavelet.piwavelet.Paul Class Reference

Implements the Paul wavelet class.

Public Member Functions

- def __init__
- def psi_ft

  Fourier transform of the Paul wavelet.
- def psi

  Paul wavelet as described in Torrence and Compo (1998)
- def flambda

  Fourier wavelength as of Torrence and Compo (1998)
- def coi

  e-Folding Time as of Torrence and Compo (1998)
- def sup

  Wavelet support defined by the e-Folding time.

Public Attributes

- m
- dofmin
- cdelta
- gamma
- deltaj0

Static Public Attributes

- string name = 'Paul'

6.4.1 Detailed Description

Implements the Paul wavelet class.

Note that the input parameter f is the angular frequency and that the default order for this wavelet is m=4.

6.4.2 Constructor & Destructor Documentation

6.4.2.1 def projects.piwavelet.piwavelet.piwavelet.Paul.__init__ (*self, m* = 4)

6.4.3 Member Function Documentation

6.4.3.1 def projects.piwavelet.piwavelet.piwavelet.Paul.coi (*self*)

e-Folding Time as of Torrence and Compo (1998)

6.4.3.2 def projects.piwavelet.piwavelet.piwavelet.Paul.flambda (*self*)

Fourier wavelength as of Torrence and Compo (1998)

6.4.3.3 def projects.piwavelet.piwavelet.piwavelet.Paul.psi (*self, t*)

Paul wavelet as described in Torrence and Compo (1998)

6.4.3.4 def projects.piwavelet.piwavelet.piwavelet.Paul.psi_ft (*self, f*)

Fourier transform of the Paul wavelet.

6.4.3.5 def projects.piwavelet.piwavelet.piwavelet.Paul.sup (*self*)

Wavelet support defined by the e-Folding time.

6.4.4 Member Data Documentation

6.4.4.1 projects.piwavelet.piwavelet.piwavelet.Paul.cdelta

6.4.4.2 projects.piwavelet.piwavelet.piwavelet.Paul.deltaj0

6.4.4.3 projects.piwavelet.piwavelet.piwavelet.Paul.dofmin

6.4.4.4 projects.piwavelet.piwavelet.piwavelet.Paul.gamma

6.4.4.5 projects.piwavelet.piwavelet.piwavelet.Paul.m

6.4.4.6 string projects.piwavelet.piwavelet.piwavelet.Paul.name = '**Paul**' [static]

The documentation for this class was generated from the following file:

- piwavelet/piwavelet.py

6.5 projects.piwavelet.piwavelet.piwavelet.smooth Class Reference

This class is an Python interface for the Smoothing matlab functions of the package for wavelet, cross-wavelet and coherence-wavelet analises profided by Aslak Grinsted, John C.

Public Member Functions

- def __init__
- def __call__

Public Attributes

- wtcPath
- scale

6.5.1 Detailed Description

This class is an Python interface for the Smoothing matlab functions of the package for wavelet, cross-wavelet and coherence-wavelet analises profided by Aslak Grinsted, John C.

Moore and Svetlana Jevrejeva.

```
http://noc.ac.uk/using-science/crosswavelet-wavelet-coherence

However, the Continuous wavelet transform of the signal, in this class, is a pure python
function.

Smoothing as in the appendix of Torrence and Webster "Inter decadal changes in the ENSO-Monsoon System" 1998
used in wavelet coherence calculations. Only applicable for the Morlet wavelet.
```

6.5.2 Constructor & Destructor Documentation

6.5.2.1 def projects.piwavelet.piwavelet.piwavelet.smooth.__init__ (*self, wave, dt, period, dj, scale*)

6.5.3 Member Function Documentation

6.5.3.1 def projects.piwavelet.piwavelet.piwavelet.smooth.__call__ (*self*)

6.5.4 Member Data Documentation

6.5.4.1 projects.piwavelet.piwavelet.piwavelet.smooth.scale

6.5.4.2 projects.piwavelet.piwavelet.piwavelet.smooth.wtcPath

The documentation for this class was generated from the following file:

- piwavelet/piwavelet.py

6.6 projects.piwavelet.piwavelet.piwavelet.waveletCC Class Reference

Continuous wavelet transform of the signal at specified scales.

Public Member Functions

- def __init__
- def cwt

  Continuous wavelet transform of the signal at specified scales.
- def significance

  Significance testing for the onde dimensional wavelet transform.
- def plotWavelet

  Plot Wavelet Transfor for one signal.

6.6.1 Detailed Description

Continuous wavelet transform of the signal at specified scales.

6.6.2 Constructor & Destructor Documentation

6.6.2.1 def projects.piwavelet.piwavelet.piwavelet.waveletCC.__init__ (*self*)

6.6.3 Member Function Documentation

6.6.3.1 def projects.piwavelet.piwavelet.piwavelet.waveletCC.cwt (*self, signal, dt, dj* = 0.25, *s0* = −1, *J* = −1, *wavelet* = **Morlet**())

Continuous wavelet transform of the signal at specified scales.

PARAMETERS signal (array like) : Input signal array dt (float) : Sample spacing. dj (float, optional) : Spacing between discrete scales. Default value is 0.25. Smaller values will result in better scale resolution, but slower calculation and plot. s0 (float, optional) : Smallest scale of the wavelet. Default value is 2∗dt. J (float, optional) : Number of scales less one. Scales range from s0 up to s0 ∗ 2∗∗(J ∗ dj), which gives a total of (J + 1) scales. Default is J = (log2(N∗dt/so))/dj. wavelet (class, optional) : Mother wavelet class. Default is Morlet()

RETURNS W (array like) : Wavelet transform according to the selected mother wavelet. Has (J+1) x N dimensions. sj (array like) : Vector of scale indices given by sj = s0 ∗ 2∗∗(j ∗ dj), j={0, 1, ..., J}. freqs (array like) : Vector of Fourier frequencies (in 1 / time units) that corresponds to the wavelet scales. coi (array like) : Returns the cone of influence, which is a vector of N points containing the maximum Fourier period of useful information at that particular time. Periods greater than those are subject to edge effects. fft (array like) : Normalized fast Fourier transform of the input signal. fft_freqs (array like): Fourier frequencies (in 1/time units) for the calculated FFT spectrum.

EXAMPLE mother = wavelet.Morlet(6.) wave, scales, freqs, coi, fft, fftfreqs = wavelet.cwt(var, 0.25, 0.25, 0.5, 28, mother)

6.6.3.2 def projects.piwavelet.piwavelet.piwavelet.waveletCC.plotWavelet (*self, signal, title, label, units, mother* = **Morlet**(6.), *t0* = 1.0, *dt* = 1.0, *dj* = 0.25, *s0* = −1, *J* = −1, *alpha* = 0.0, *slevel* = 0.95, *avg1* = 15, *avg2* = 20, *nameSave* = None)

Plot Wavelet Transfor for one signal.

PARAMETER: signal : The signal that will be transformed title : Title of the plot label : Label units : unit of the data mother : The Mother Wavelet. Default Morlet mother wavelet with wavenumber=6 t0 : Initial time step dt : time step dj : Four sub-octaves per octaves s0 : Starting scale, here 6 months J : Seven powers of two with dj sub-octaves alpha: Lag-1 autocorrelation for white noise slevel : Significance level avg1,avg2 : Range of periods to average nameSave : Path plus name to save the plot

6.6.3.3 def projects.piwavelet.piwavelet.piwavelet.waveletCC.significance (*self, signal, dt, scales, sigma_test* = 0, *alpha* = 0., *significance_level* = 0.95, *dof* = -1, *wavelet* = **Morlet**())

Significance testing for the onde dimensional wavelet transform.

PARAMETERS signal (array like or float) : Input signal array. If a float number is given, then the variance is assumed to have this value. If an array is given, then its variance is automatically computed. dt (float, optional) : Sample spacing. Default is 1.0. scales (array like) : Vector of scale indices given returned by cwt function. sigma_test (int, optional) : Sets the type of significance test to be performed. Accepted values are 0, 1 or 2. If omitted assume 0.

If set to 0, performs a regular chi-square test, according to Torrence and Compo (1998) equation 18.

If set to 1, performs a time-average test (equation 23). In this case, dof should be set to the number of local wavelet spectra that where averaged together. For the global wavelet spectra it would be dof=N, the number of points in the time-series.

If set to 2, performs a scale-average test (equations 25 to 28). In this case dof should be set to a two element vector [s1, s2], which gives the scale range that were averaged together. If, for example, the average between scales 2 and 8 was taken, then dof=[2, 8]. alpha (float, optional) : Lag-1 autocorrelation, used for the significance levels. Default is 0.0. significance_level (float, optional) : Significance level to use. Default is 0.95. dof (variant, optional) : Degrees of freedom for significance test to be set according to the type set in sigma_test. wavelet (class, optional) : Mother wavelet class. Default is Morlet().

RETURNS signif (array like) : Significance levels as a function of scale. fft_theor (array like): Theoretical red-noise spectrum as a function of period.

The documentation for this class was generated from the following file:

- piwavelet/piwavelet.py

6.7 projects.piwavelet.piwavelet.piwavelet.wcoherence Class Reference

This class is an Python interface for the Wavelet Coherence matlab functions of the package for wavelet, cross-wavelet and coherence-wavelet analises profided by Aslak Grinsted, John C.

Public Member Functions

- def __init__
- def __call__
- def plot

  Plots the wavelet coherence.

Public Attributes

- wtcPath
- signal1
- signal2
- wtcsig
- freqs

6.7.1 Detailed Description

This class is an Python interface for the Wavelet Coherence matlab functions of the package for wavelet, cross-wavelet and coherence-wavelet analises profided by Aslak Grinsted, John C.

Moore and Svetlana Jevrejeva.

```
http://noc.ac.uk/using-science/crosswavelet-wavelet-coherence

However, the Continuous wavelet transform of the signal, in this class, is a pure python
function.
```

6.7.2 Constructor & Destructor Documentation

6.7.2.1 def projects.piwavelet.piwavelet.piwavelet.wcoherence.__init__ (*self, signal1, signal2*)

6.7.3 Member Function Documentation

6.7.3.1 def projects.piwavelet.piwavelet.piwavelet.wcoherence.__call__ (*self*)

6.7.3.2 def projects.piwavelet.piwavelet.piwavelet.wcoherence.plot (*self, t, title, units, levels* = `None`, *labels* = `None`, *pArrow* = `None`, *pSigma* = `True`, *gray* = `None`, *nameSave* = `None`, *scale* = `'log2'`)

Plots the wavelet coherence.

PARAMETERS title: Title of the Plot units: (string) Units of the period and time (e.g. 'days') t : array with time gray: Optional - (boolean) True for gray map .

6.7.4 Member Data Documentation

6.7.4.1 projects.piwavelet.piwavelet.piwavelet.wcoherence.freqs

6.7.4.2 projects.piwavelet.piwavelet.piwavelet.wcoherence.signal1

6.7.4.3 projects.piwavelet.piwavelet.piwavelet.wcoherence.signal2

6.7.4.4 projects.piwavelet.piwavelet.piwavelet.wcoherence.wtcPath

6.7.4.5 projects.piwavelet.piwavelet.piwavelet.wcoherence.wtcsig

The documentation for this class was generated from the following file:

- piwavelet/piwavelet.py

6.8 projects.piwavelet.piwavelet.piwavelet.wcross Class Reference

This class is an Python interface for the Cross wavelet Spectrun matlab functions of the package for wavelet, cross-wavelet and coherence-wavelet analises profided by Aslak Grinsted, John C.

Public Member Functions

- def __init__
- def __call__
- def plot

  Plots the wavelet coherence.

Public Attributes

- wtcPath
- signal1

- signal2
- signif
- freqs

6.8.1 Detailed Description

This class is an Python interface for the Cross wavelet Spectrun matlab functions of the package for wavelet, cross-wavelet and coherence-wavelet analises profided by Aslak Grinsted, John C.

Moore and Svetlana Jevrejeva.

```
http://noc.ac.uk/using-science/crosswavelet-wavelet-coherence

However, the Continuous wavelet transform of the signal, in this class, is a pure python
function.
```

6.8.2 Constructor & Destructor Documentation

6.8.2.1 def projects.piwavelet.piwavelet.piwavelet.wcross.__init__ (*self, signal1, signal2*)

6.8.3 Member Function Documentation

6.8.3.1 def projects.piwavelet.piwavelet.piwavelet.wcross.__call__ (*self*)

6.8.3.2 def projects.piwavelet.piwavelet.piwavelet.wcross.plot (*self, t, title, units, levels* = `None`, *labels* = `None`, *pArrow* = `None`, *pSigma* = `True`, *gray* = `None`, *nameSave* = `None`, *scale* = `'log2'`)

Plots the wavelet coherence.

PARAMETERS title: Title of the Plot units: (string) Units of the period and time (e.g. 'days') t : array with time gray: Optional - (boolean) True for gray map .

6.8.4 Member Data Documentation

6.8.4.1 projects.piwavelet.piwavelet.piwavelet.wcross.freqs

6.8.4.2 projects.piwavelet.piwavelet.piwavelet.wcross.signal1

6.8.4.3 projects.piwavelet.piwavelet.piwavelet.wcross.signal2

6.8.4.4 projects.piwavelet.piwavelet.piwavelet.wcross.signif

6.8.4.5 projects.piwavelet.piwavelet.piwavelet.wcross.wtcPath

The documentation for this class was generated from the following file:

- piwavelet/piwavelet.py

Chapter 7

File Documentation

7.1 piwavelet/__init__.py File Reference

Packages

- namespace projects.piwavelet.piwavelet

Variables

- string projects.piwavelet.piwavelet.__name = 'piwavelet'
- string projects.piwavelet.piwavelet.__authors = 'Eduardo dos Santos Pereira, Regla D. Somoza'
- string projects.piwavelet.piwavelet.__data = '13/03/2013'
- string projects.piwavelet.piwavelet.__email = 'pereira.somoza@gmail.com,duthit@gmail.com'
- tuple projects.piwavelet.piwavelet.HOME = os.path.expanduser('~')
- tuple projects.piwavelet.piwavelet.local = os.path.dirname(piwavelet.__file__)
- list projects.piwavelet.piwavelet.__all__

7.2 piwavelet/piwavelet.py File Reference

Classes

- class projects.piwavelet.piwavelet.piwavelet.Morlet

  Implements the Morlet wavelet class.
- class projects.piwavelet.piwavelet.piwavelet.Paul

  Implements the Paul wavelet class.
- class projects.piwavelet.piwavelet.piwavelet.DOG

  Implements the derivative of a Guassian wavelet class.
- class projects.piwavelet.piwavelet.piwavelet.Mexican_hat

  Implements the Mexican hat wavelet class.
- class projects.piwavelet.piwavelet.piwavelet.wcoherence

  This class is an Python interface for the Wavelet Coherence matlab functions of the package for wavelet, cross-wavelet and coherence-wavelet analises profided by Aslak Grinsted, John C.
- class projects.piwavelet.piwavelet.piwavelet.wcross

  This class is an Python interface for the Cross wavelet Spectrun matlab functions of the package for wavelet, cross-wavelet and coherence-wavelet analises profided by Aslak Grinsted, John C.
- class projects.piwavelet.piwavelet.piwavelet.smooth

  This class is an Python interface for the Smoothing matlab functions of the package for wavelet, cross-wavelet and coherence-wavelet analises profided by Aslak Grinsted, John C.

- class projects.piwavelet.piwavelet.piwavelet.waveletCC

  Continuous wavelet transform of the signal at specified scales.

Packages

- namespace projects.piwavelet.piwavelet.piwavelet

Functions

- def projects.piwavelet.piwavelet.piwavelet.ar1

  Allen and Smith autoregressive lag-1 autocorrelation alpha.
- def projects.piwavelet.piwavelet.piwavelet.ar1_spectrum

  Lag-1 autoregressive theoretical power spectrum.
- def projects.piwavelet.piwavelet.piwavelet.cwt

  Continuous wavelet transform of the signal at specified scales.
- def projects.piwavelet.piwavelet.piwavelet.significance

  Significance testing for the onde dimensional wavelet transform.
- def projects.piwavelet.piwavelet.piwavelet.plotWavelet

  Plot Wavelet Transfor for one signal.

Variables

- string projects.piwavelet.piwavelet.piwavelet.__name = 'piwavelets'
- string projects.piwavelet.piwavelet.piwavelet.__authors = 'Eduardo dos Santos Pereira, Regla D. Somoza'
- string projects.piwavelet.piwavelet.piwavelet.__data = '13/03/2013'
- string projects.piwavelet.piwavelet.piwavelet.__email = 'pereira.somoza@gmail.com,duthit@gmail.com'

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