Airborne eddy covariance measurements of ocean-air VOC fluxes: Distinguishing signal from noise

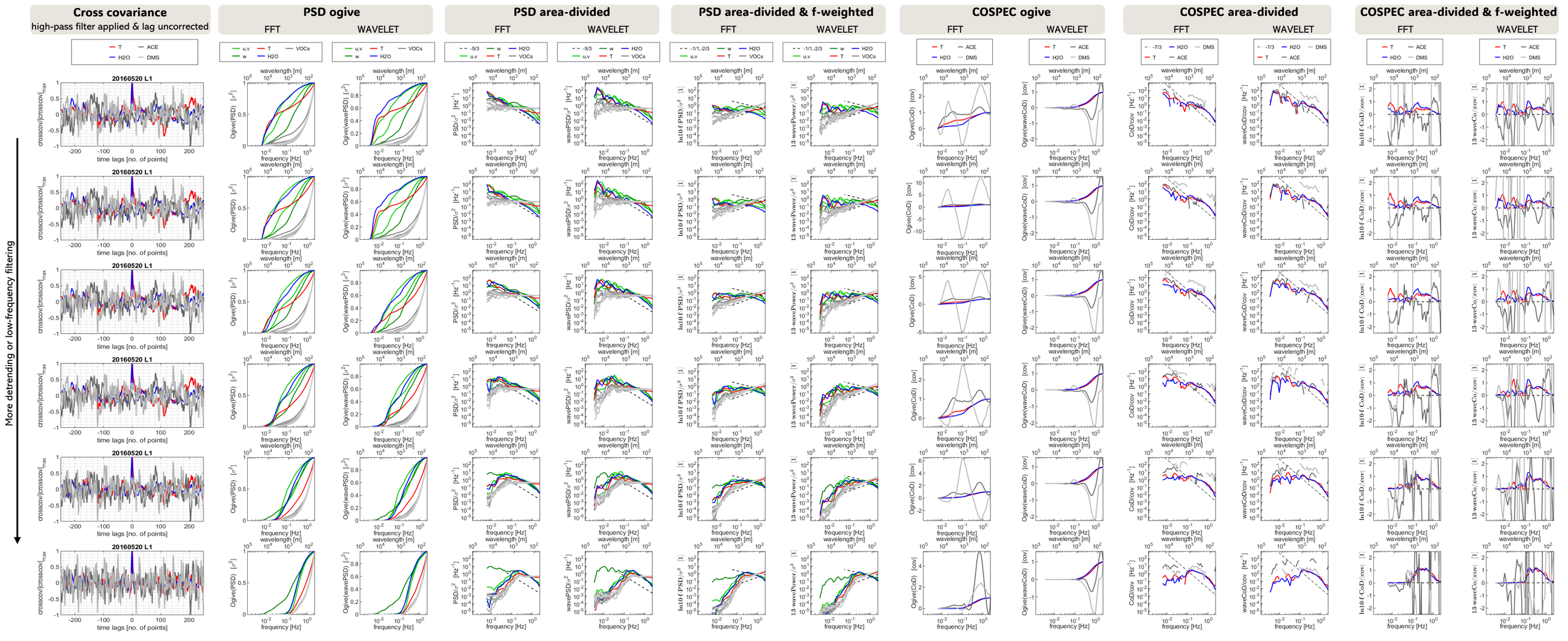
Supplementary Spectra

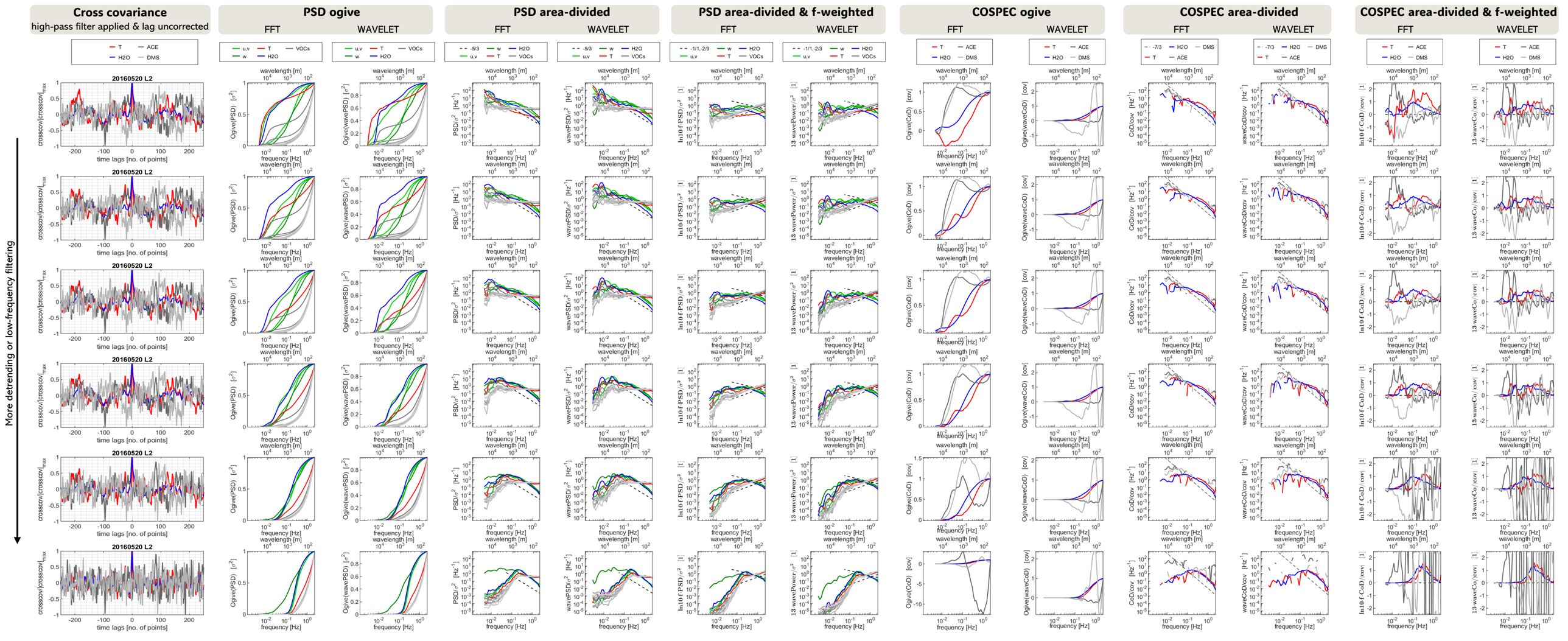
Figures here are relevant to:

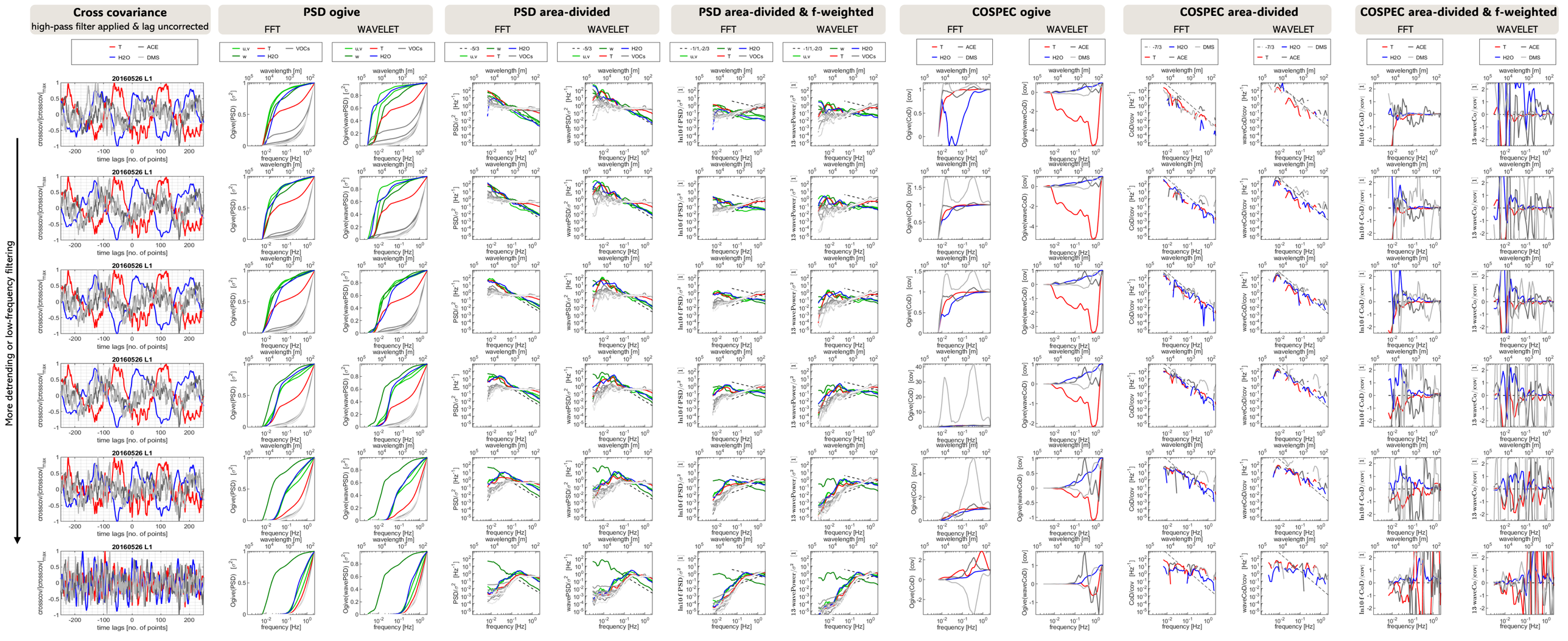
a) VOC detrending discussed in Sections 4.1 and 4.4

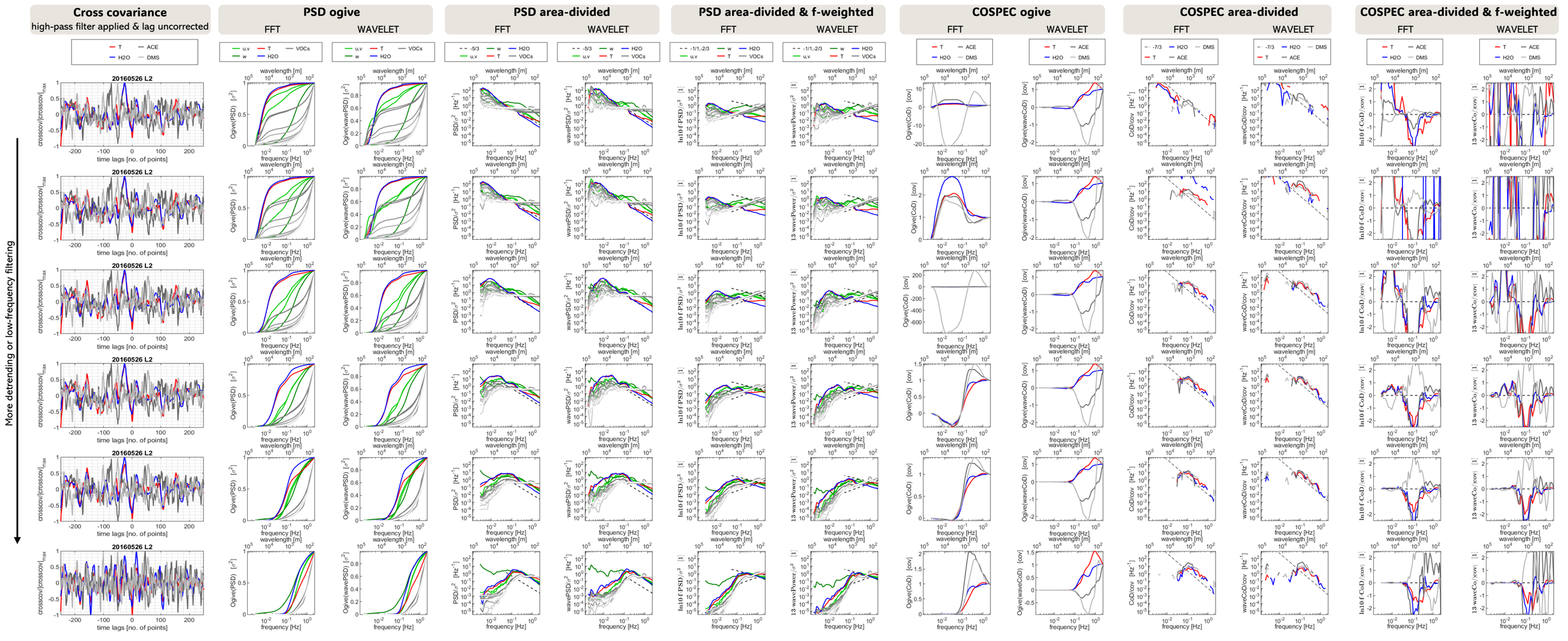
   Rows on each page from the top to the bottom: block mean removal, linear-detrending mean removal, 100 s/50 s/20 s/5 s moving-average mean removal.

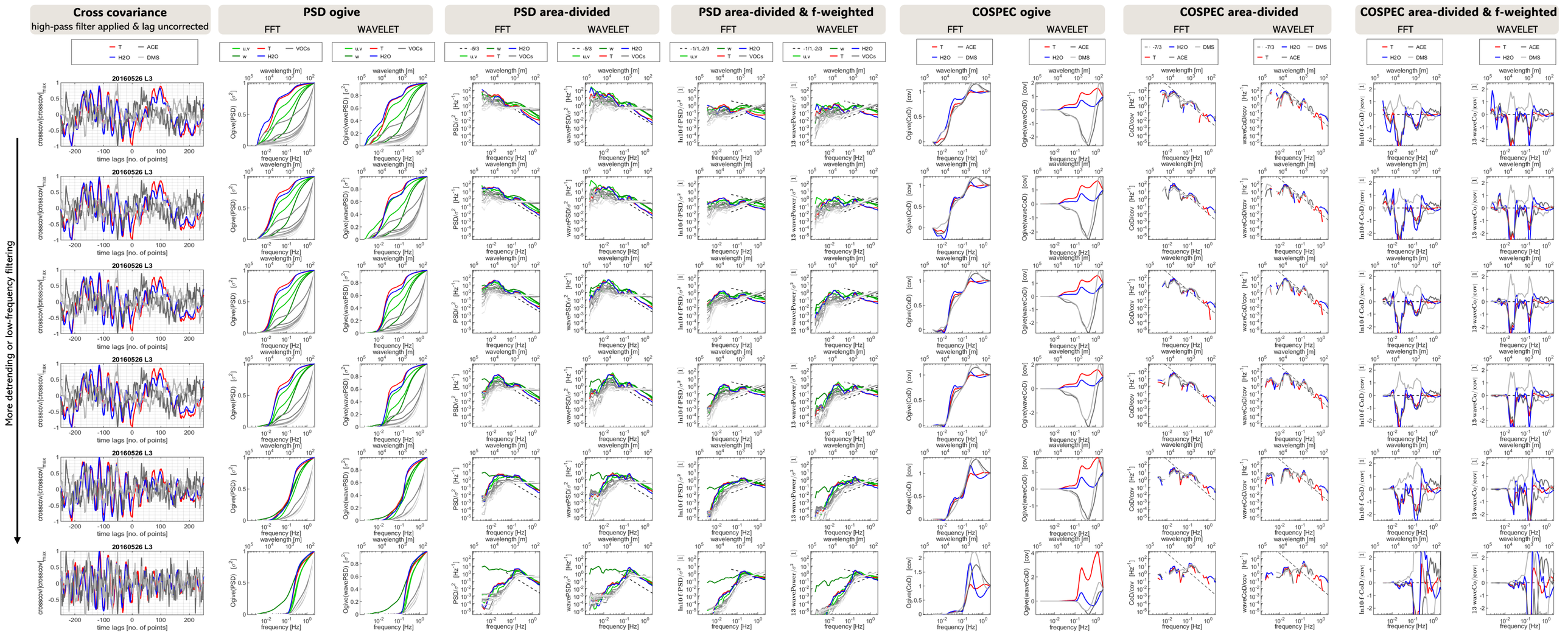
b) Spectral analysis discussed in Sections 4.3 and 4.4

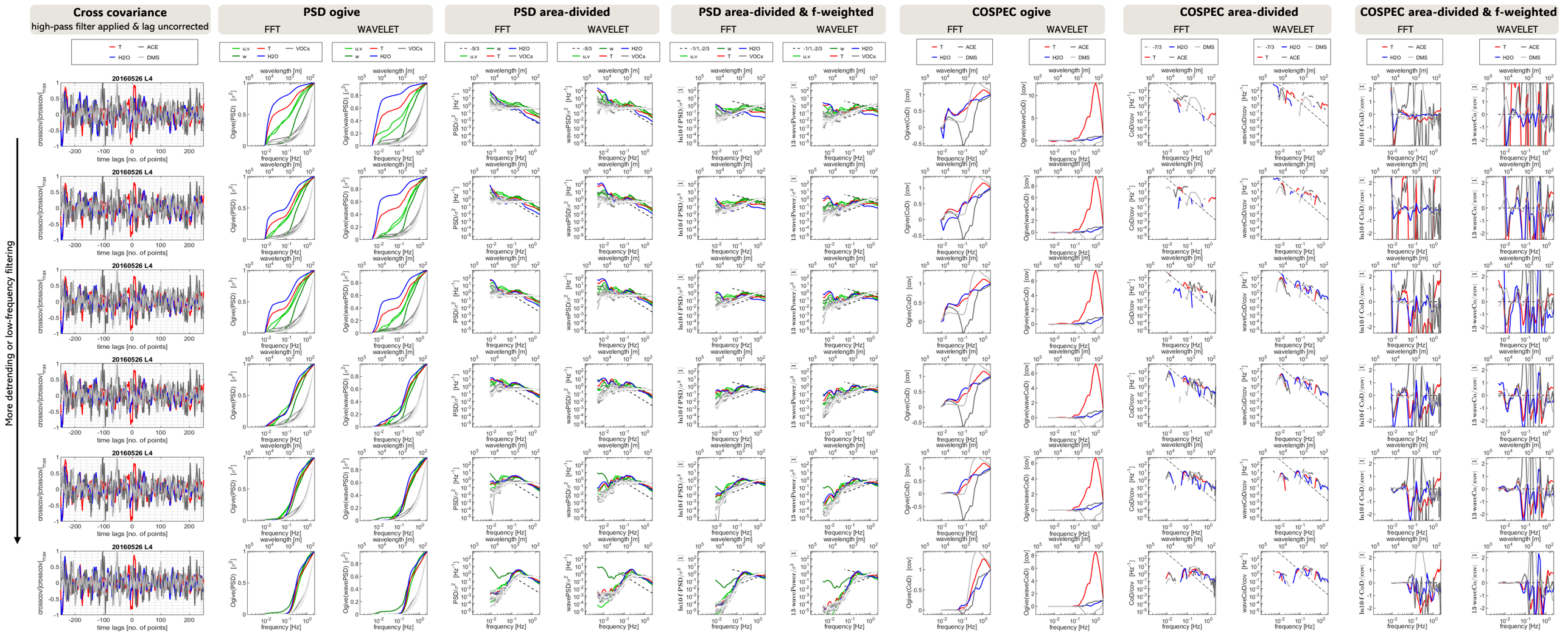

Cross covariance
high-pass filter applied & lag uncorrected
PSD ogive
FFT
WAVELET
PSD area-divided
FFT
WAVELET
PSD area-divided & f-weighted
FFT
WAVELET
COSPEC ogive
FFT
WAVELET
COSPEC area-divided
FFT
WAVELET
COSPEC area-divided & f-weighted
FFT
WAVELET
More detrending or low-frequency filtering
20160520 L1
time lags [no. of points]
frequency [Hz]
wavelength [m]
T
ACE
H2O
DMS
u,v
w
VOCs
-5/3
-1/1,-2/3
-7/3

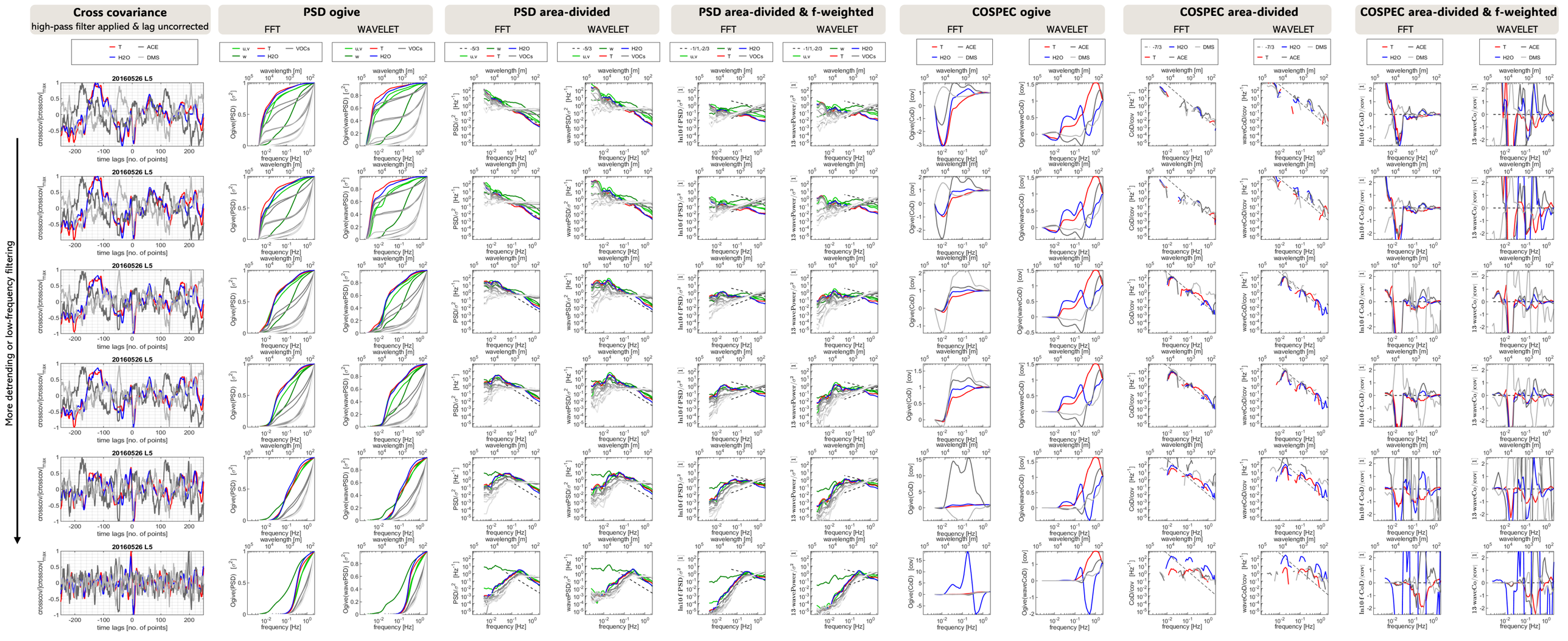

Cross covariance
high-pass filter applied & lag uncorrected
PSD ogive
PSD area-divided
PSD area-divided & f-weighted
COSPEC ogive
COSPEC area-divided
COSPEC area-divided & f-weighted
FFT
WAVELET
More detrending or low-frequency filtering
20160520 L2
time lags [no. of points]
frequency [Hz]
wavelength [m]

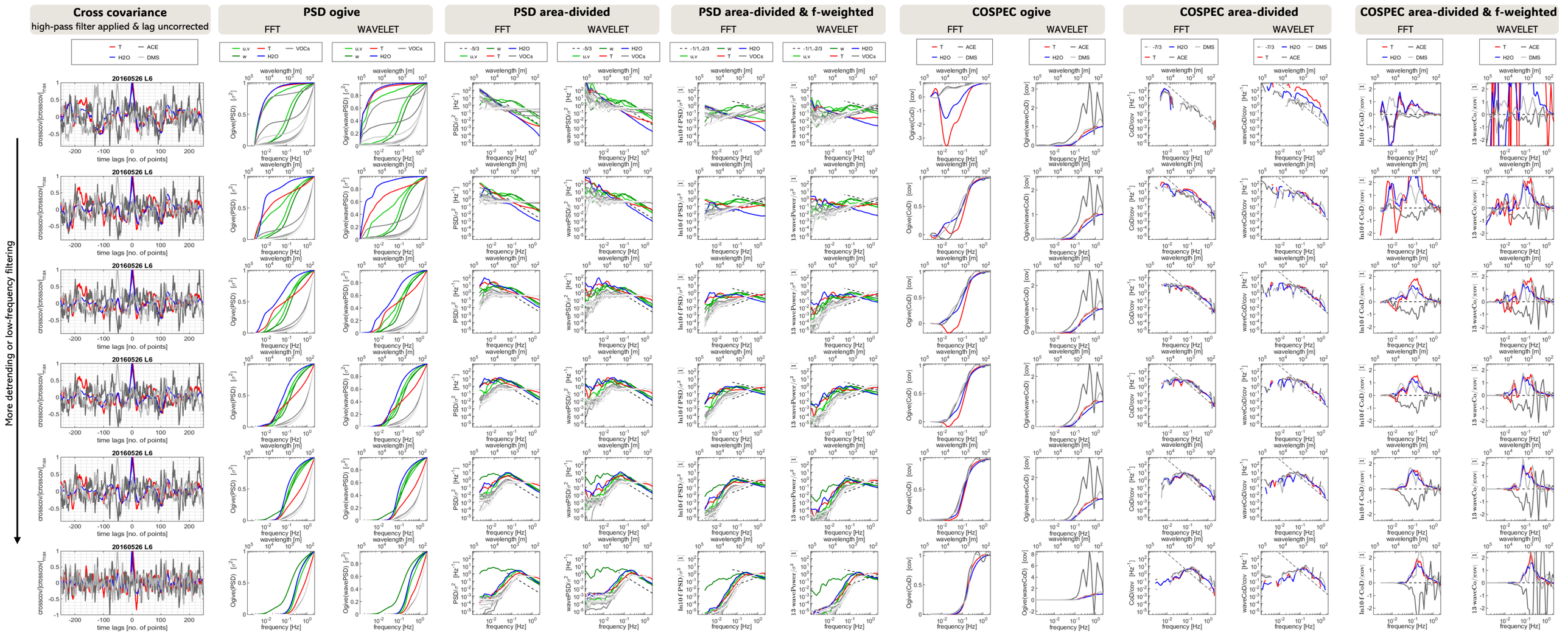

Cross covariance
high-pass filter applied & lag uncorrected
PSD ogive
FFT
WAVELET
PSD area-divided
FFT
WAVELET
PSD area-divided & f-weighted
FFT
WAVELET
COSPEC ogive
FFT
WAVELET
COSPEC area-divided
FFT
WAVELET
COSPEC area-divided & f-weighted
FFT
WAVELET
T
ACE
H2O
DMS
u,v
w
VOCs
-5/3
-1/1,-2/3
-7/3
20160526 L1
crosscov/|crosscov|max
time lags [no. of points]
wavelength [m]
frequency [Hz]
Ogive(PSD) [σ²]
Ogive(wavePSD) [σ²]
PSD/σ² [Hz⁻¹]
wavePSD/σ² [Hz⁻¹]
ln10 f PSD/σ² [1]
13 waveP/σ² [1]
Ogive(CoD) [cov]
Ogive(waveCoD) [cov]
CoD/cov [Hz⁻¹]
waveCoD/cov [Hz⁻¹]
ln10 f CoD/cov [1]
13 waveCo/cov [1]
More detrending or low-frequency filtering

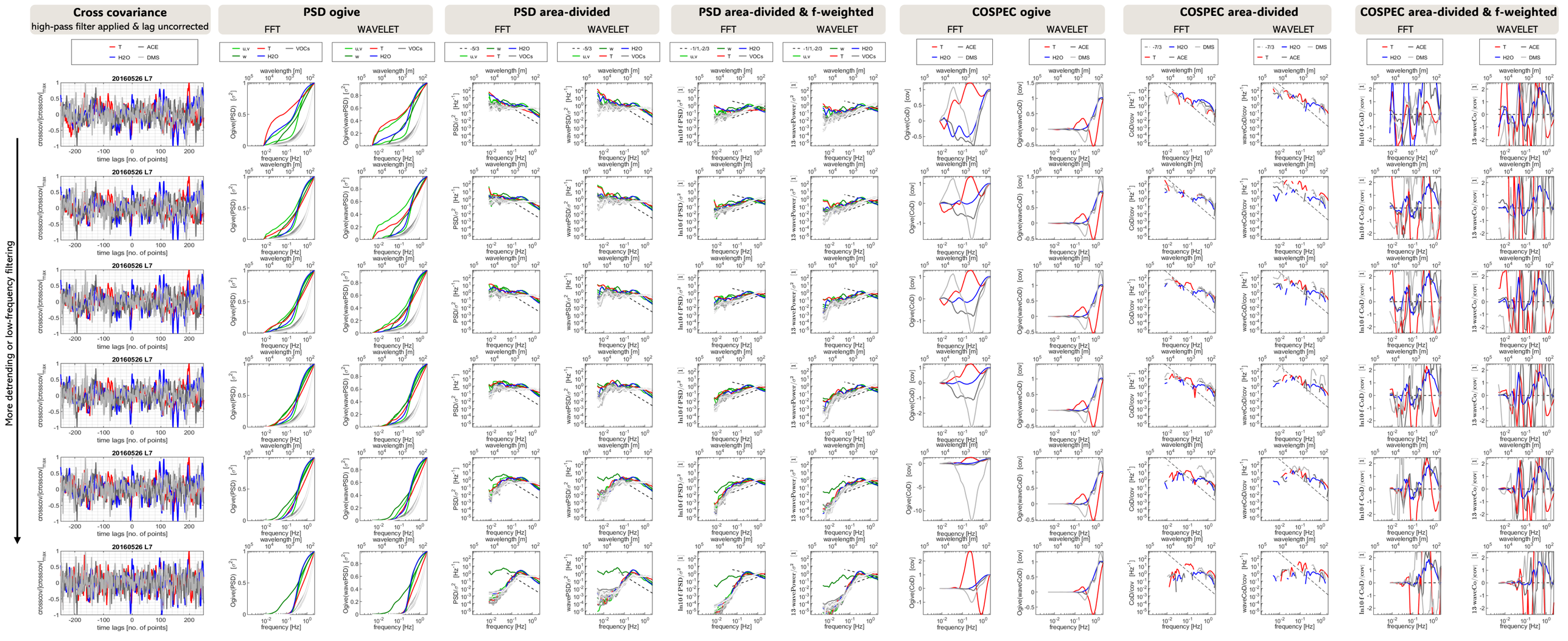

Cross covariance
high-pass filter applied & lag uncorrected
PSD ogive
FFT
WAVELET
PSD area-divided
FFT
WAVELET
PSD area-divided & f-weighted
FFT
WAVELET
COSPEC ogive
FFT
WAVELET
COSPEC area-divided
FFT
WAVELET
COSPEC area-divided & f-weighted
FFT
WAVELET
More detrending or low-frequency filtering
20160526 L2
time lags [no. of points]
wavelength [m]
frequency [Hz]
T
ACE
H2O
DMS
u,v
w
VOCs
-5/3
-1/1,-2/3

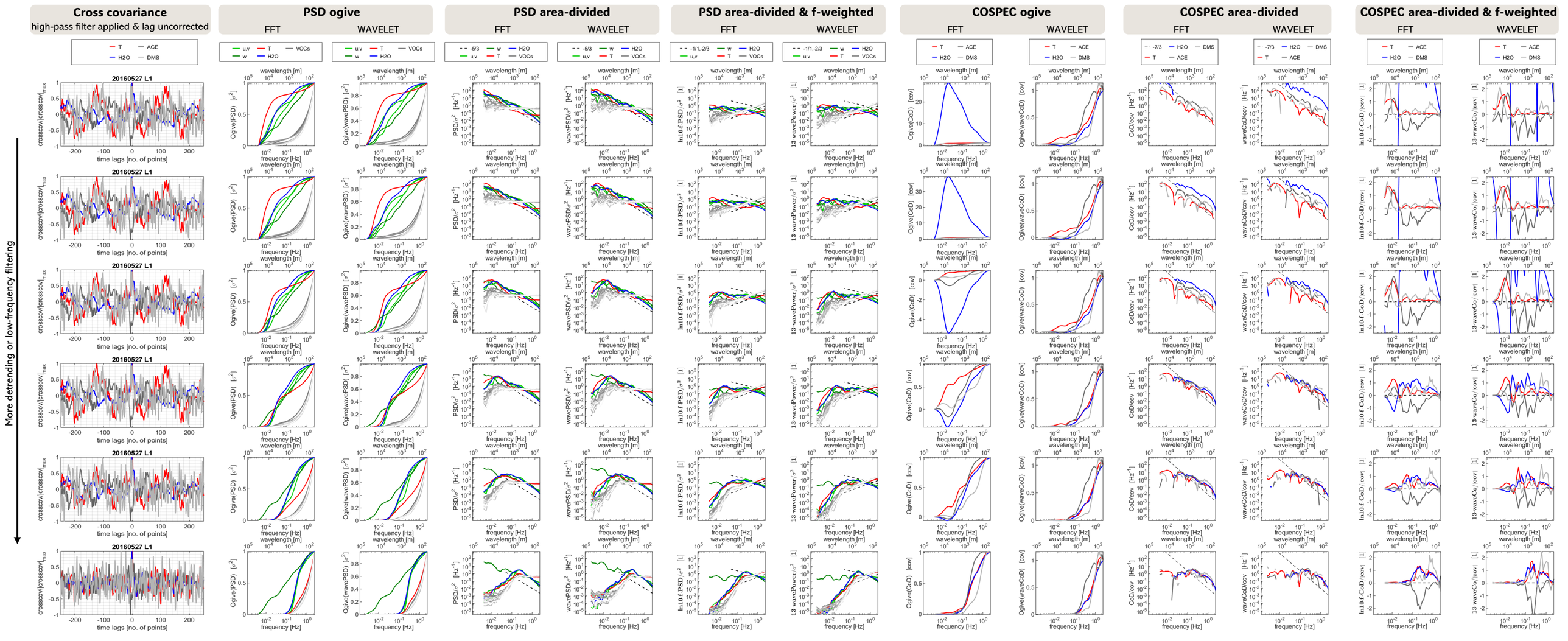

Cross covariance
high-pass filter applied & lag uncorrected
PSD ogive
PSD area-divided
PSD area-divided & f-weighted
COSPEC ogive
COSPEC area-divided
COSPEC area-divided & f-weighted
FFT
WAVELET
More detrending or low-frequency filtering
20160526 L3
time lags [no. of points]
frequency [Hz]
wavelength [m]

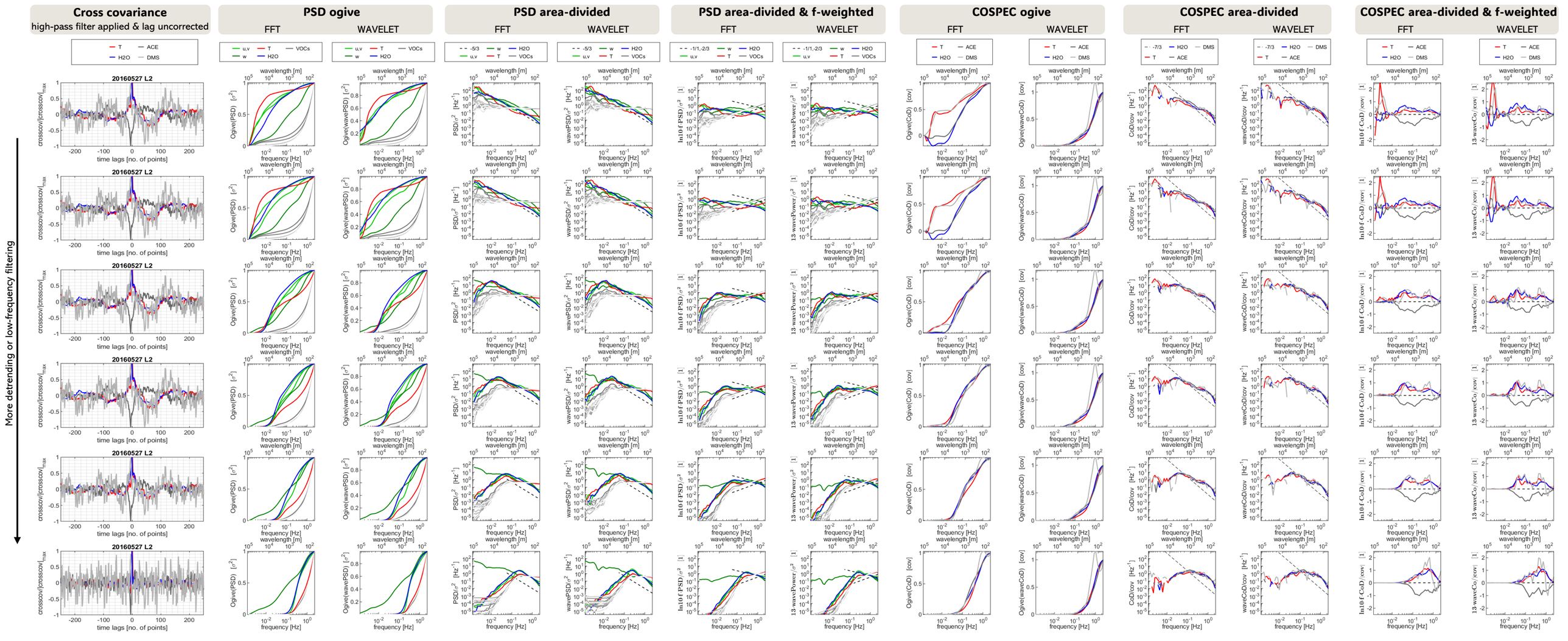

Cross covariance
high-pass filter applied & lag uncorrected
PSD ogive
PSD area-divided
PSD area-divided & f-weighted
COSPEC ogive
COSPEC area-divided
COSPEC area-divided & f-weighted
FFT
WAVELET
More detrending or low-frequency filtering
20160526 L4
time lags [no. of points]
frequency [Hz]
wavelength [m]
T
ACE
H2O
DMS
u,v
w
VOCs

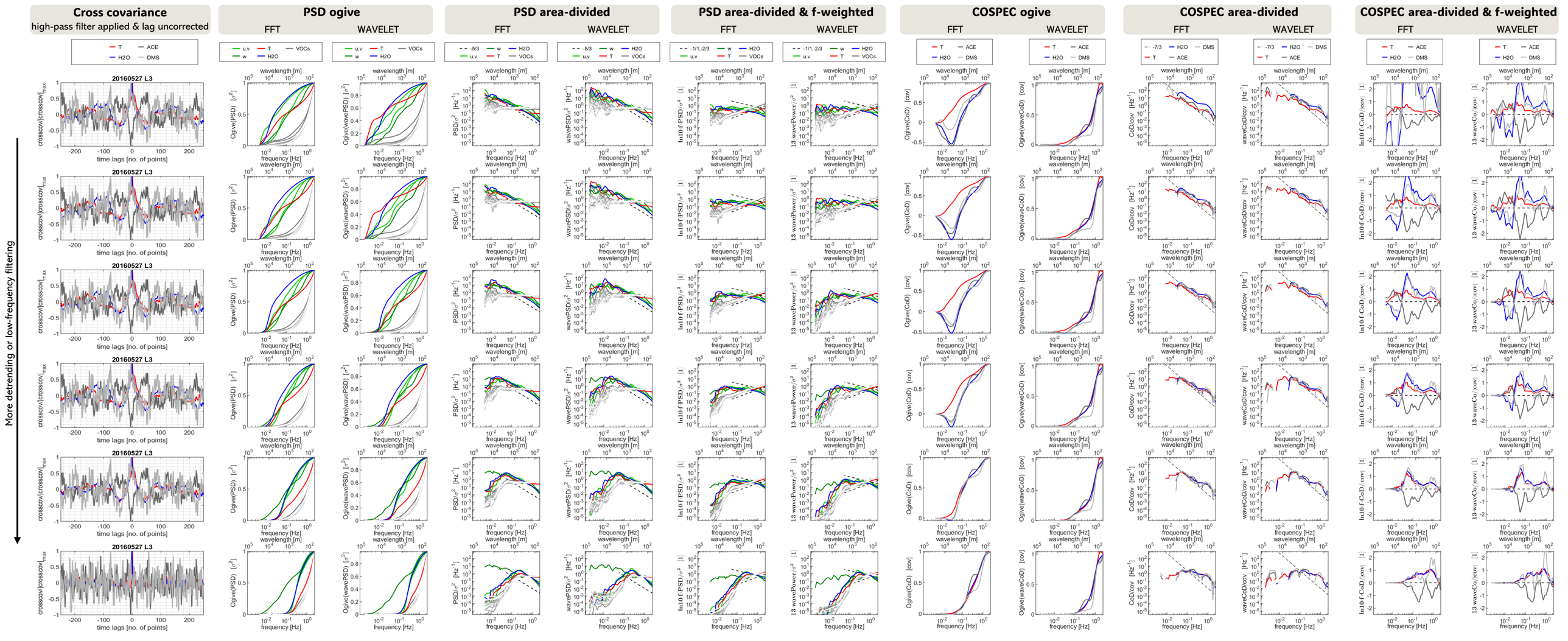

Cross covariance
high-pass filter applied & lag uncorrected
PSD ogive
PSD area-divided
PSD area-divided & f-weighted
COSPEC ogive
COSPEC area-divided
COSPEC area-divided & f-weighted
FFT
WAVELET
More detrending or low-frequency filtering
20160526 L5
time lags [no. of points]
frequency [Hz]
wavelength [m]

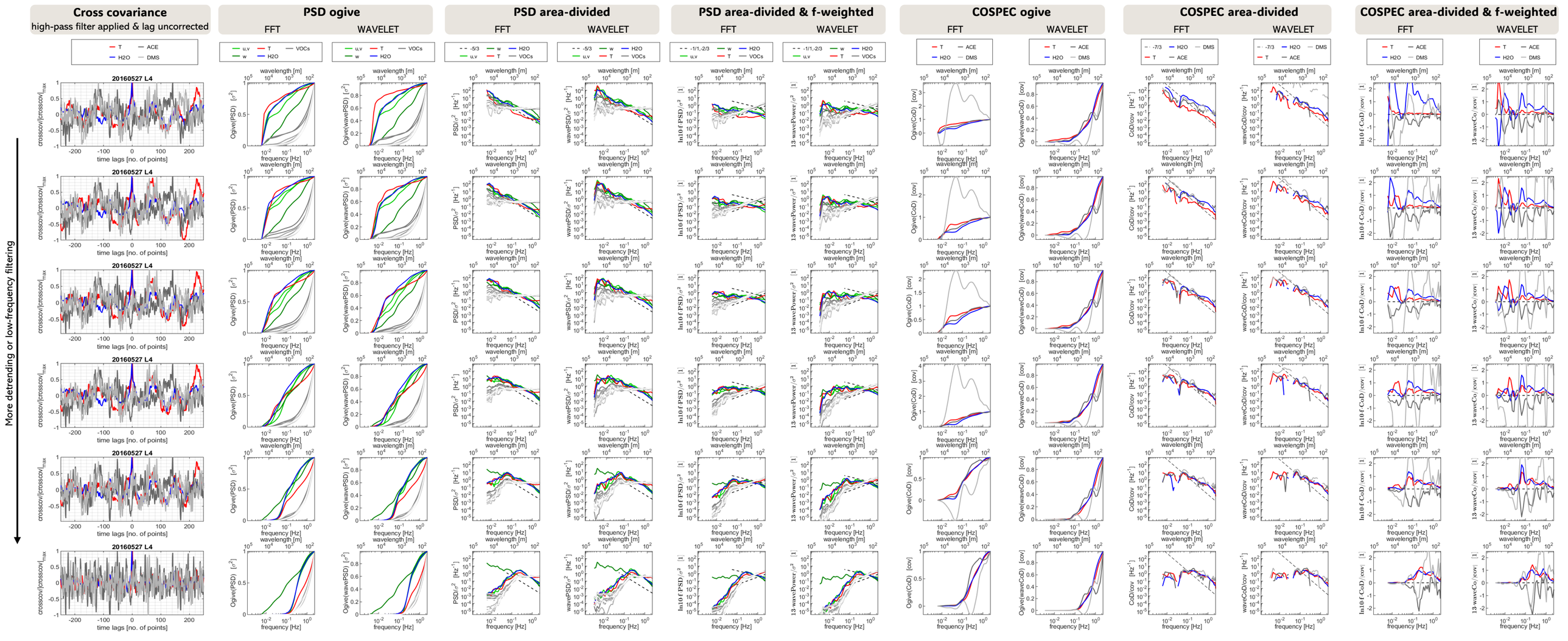

Cross covariance
high-pass filter applied & lag uncorrected
PSD ogive
PSD area-divided
PSD area-divided & f-weighted
COSPEC ogive
COSPEC area-divided
COSPEC area-divided & f-weighted
FFT
WAVELET
More detrending or low-frequency filtering
20160526 L6
time lags [no. of points]
frequency [Hz]
wavelength [m]
T
ACE
H2O
DMS
VOCs
u,v
w

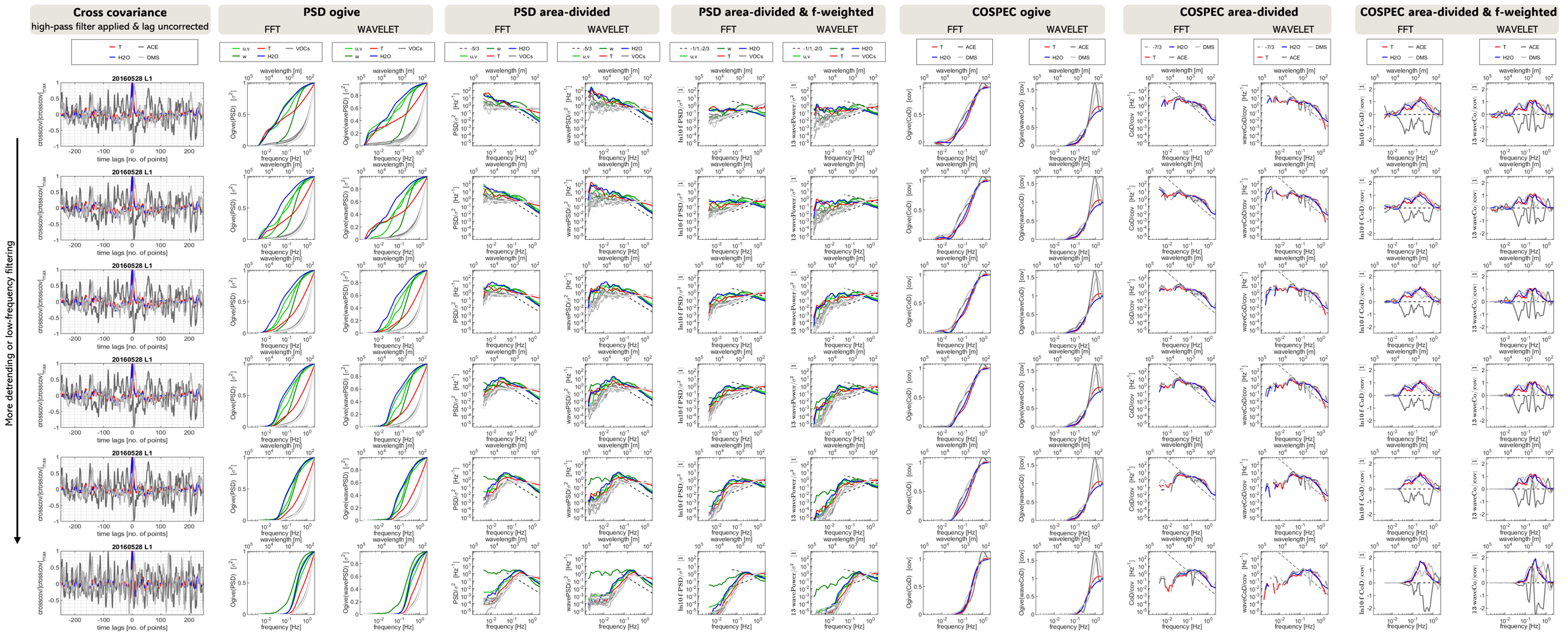

Cross covariance
high-pass filter applied & lag uncorrected
PSD ogive
FFT
WAVELET
PSD area-divided
FFT
WAVELET
PSD area-divided & f-weighted
FFT
WAVELET
COSPEC ogive
FFT
WAVELET
COSPEC area-divided
FFT
WAVELET
COSPEC area-divided & f-weighted
FFT
WAVELET
More detrending or low-frequency filtering
20160526 L7
time lags [no. of points]
wavelength [m]
frequency [Hz]
T
ACE
H2O
DMS
VOCs
u,v
w

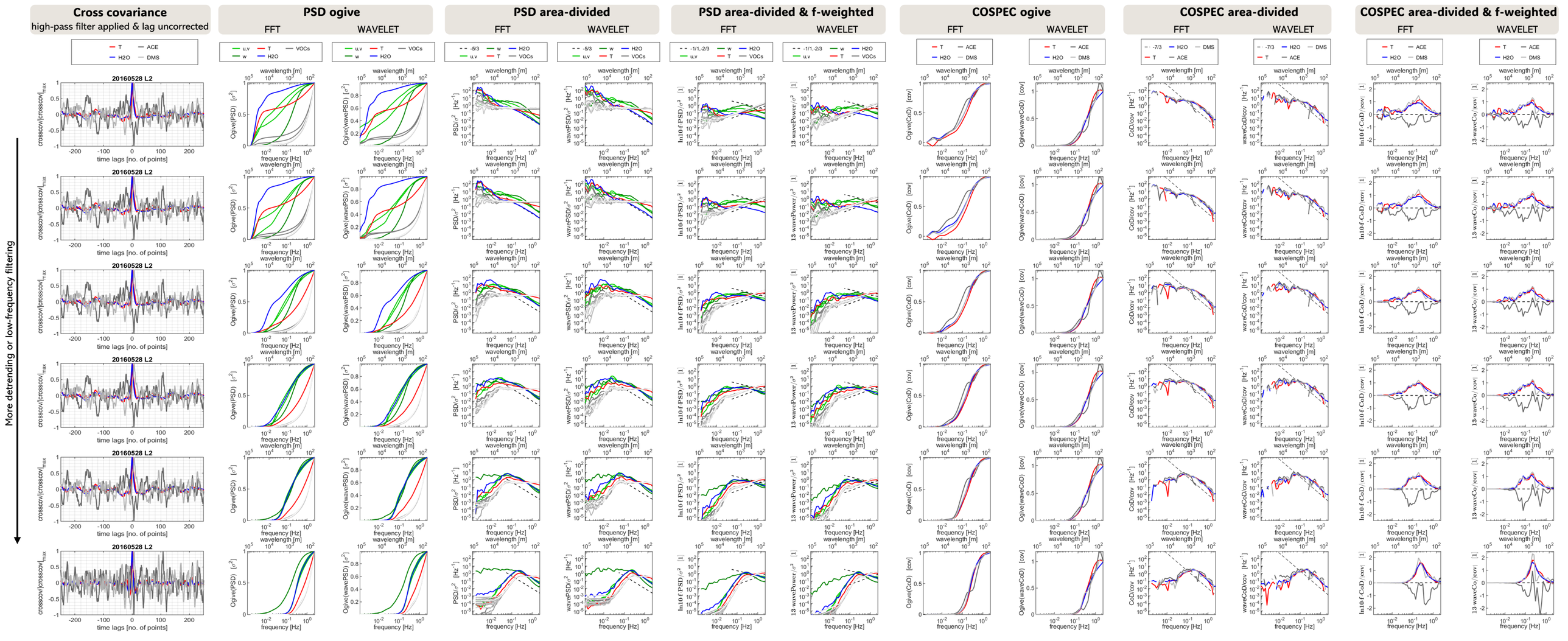

Cross covariance
high-pass filter applied & lag uncorrected
PSD ogive
PSD area-divided
PSD area-divided & f-weighted
COSPEC ogive
COSPEC area-divided
COSPEC area-divided & f-weighted
FFT
WAVELET
More detrending or low-frequency filtering
20160527 L1
time lags [no. of points]
wavelength [m]
frequency [Hz]
T
ACE
H2O
DMS
u,v
w
VOCs
-5/3
-1/1,-2/3
-7/3

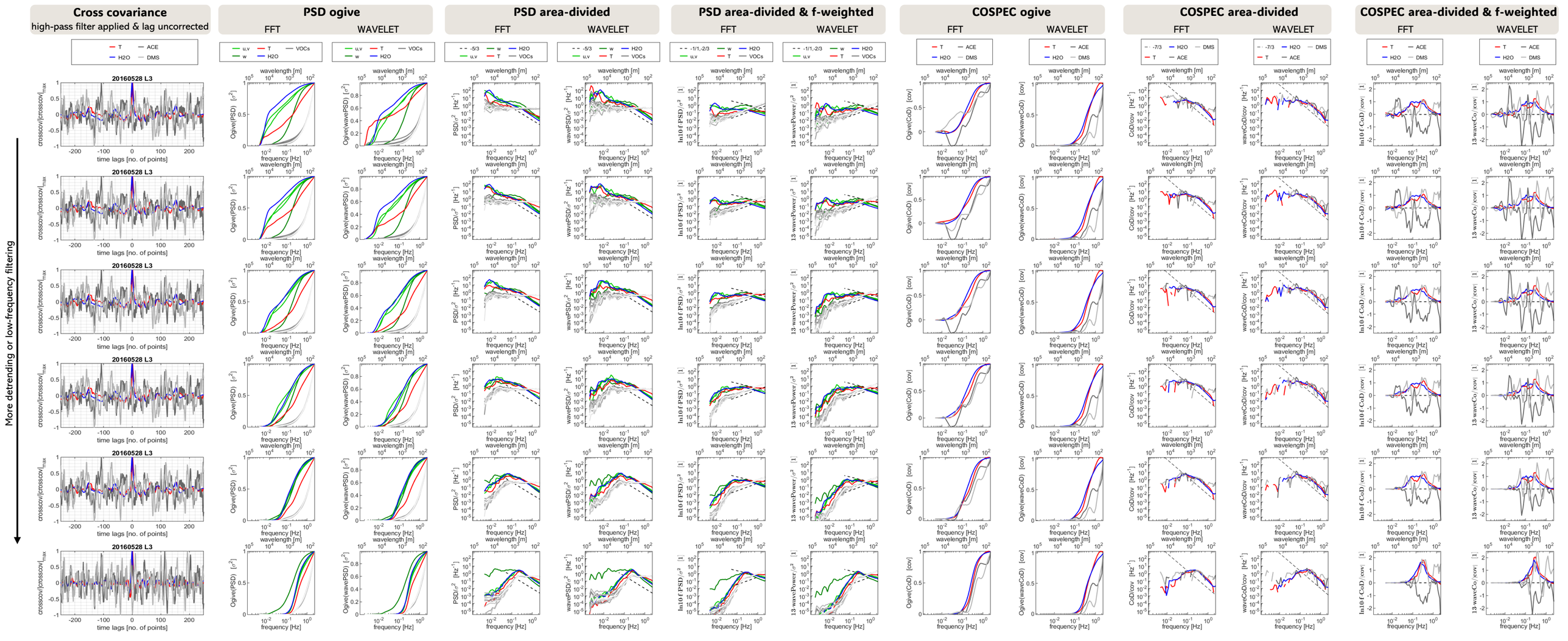

Cross covariance
high-pass filter applied & lag uncorrected
PSD ogive
PSD area-divided
PSD area-divided & f-weighted
COSPEC ogive
COSPEC area-divided
COSPEC area-divided & f-weighted
FFT
WAVELET
More detrending or low-frequency filtering
20160527 L2
time lags [no. of points]
frequency [Hz]
wavelength [m]
T
ACE
H2O
DMS
u,v
w
VOCs

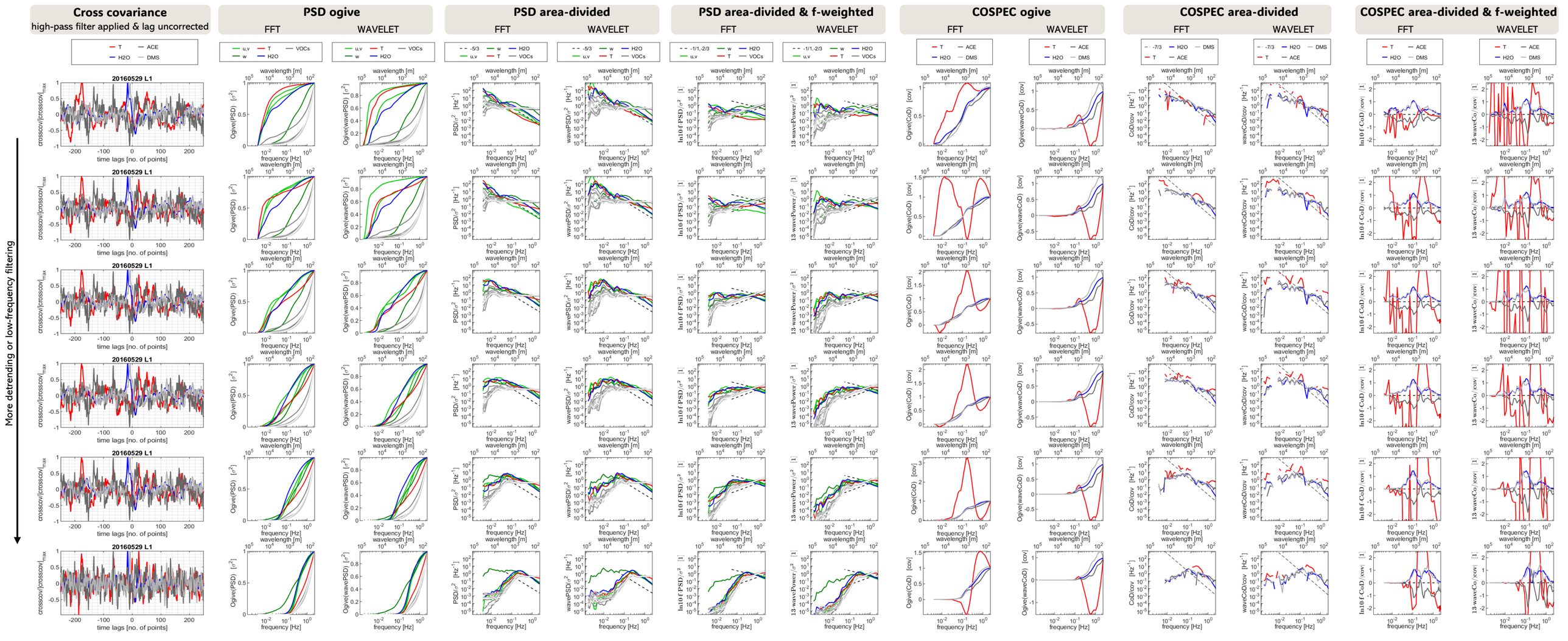

Cross covariance
high-pass filter applied & lag uncorrected
PSD ogive
FFT
WAVELET
PSD area-divided
FFT
WAVELET
PSD area-divided & f-weighted
FFT
WAVELET
COSPEC ogive
FFT
WAVELET
COSPEC area-divided
FFT
WAVELET
COSPEC area-divided & f-weighted
FFT
WAVELET
More detrending or low-frequency filtering
T
ACE
H2O
DMS
u,v
w
VOCs
-5/3
-1/1,-2/3
-7/3
20160527 L3
crosscov/|crosscov|max
time lags [no. of points]
wavelength [m]
frequency [Hz]
Ogive(PSD) [σ²]
Ogive(wavePSD) [σ²]
PSD/σ² [Hz⁻¹]
wavePSD/σ² [Hz⁻¹]
ln10·f·PSD/σ² [-]
13·waveFPower/σ² [-]
Ogive(CoD) [cov]
Ogive(waveCoD) [cov]
CoD/cov [Hz⁻¹]
waveCoD/cov [Hz⁻¹]
ln10·f·CoD/cov [-]
13·waveCo/cov [-]

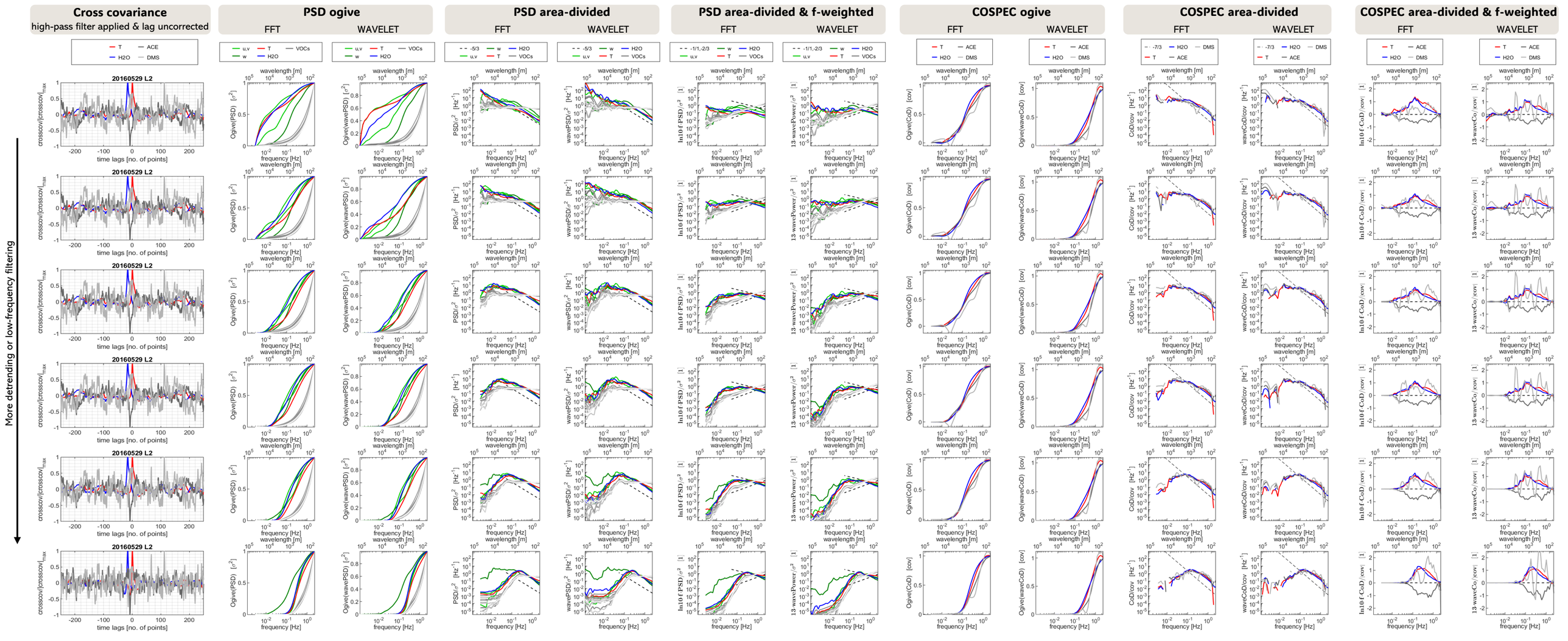

Cross covariance
high-pass filter applied & lag uncorrected
PSD ogive
FFT
WAVELET
PSD area-divided
FFT
WAVELET
PSD area-divided & f-weighted
FFT
WAVELET
COSPEC ogive
FFT
WAVELET
COSPEC area-divided
FFT
WAVELET
COSPEC area-divided & f-weighted
FFT
WAVELET
More detrending or low-frequency filtering
T
ACE
H2O
DMS
u,v
w
VOCs
-5/3
-1/1,-2/3
-7/3
20160527 L4
crosscov/|crosscov|max
time lags [no. of points]
wavelength [m]
frequency [Hz]
Ogive(PSD) [σ²]
Ogive(wavePSD) [σ²]
PSD/σ² [Hz⁻¹]
wavePSD/σ² [Hz⁻¹]
ln10·f·PSD/σ² [1]
13·waveFlux/σ² [1]
Ogive(CoD) [cov]
Ogive(waveCoD) [cov]
CoD/cov [Hz⁻¹]
waveCoD/cov [Hz⁻¹]
ln10·f·CoD/cov [1]
13·waveCo/cov [1]

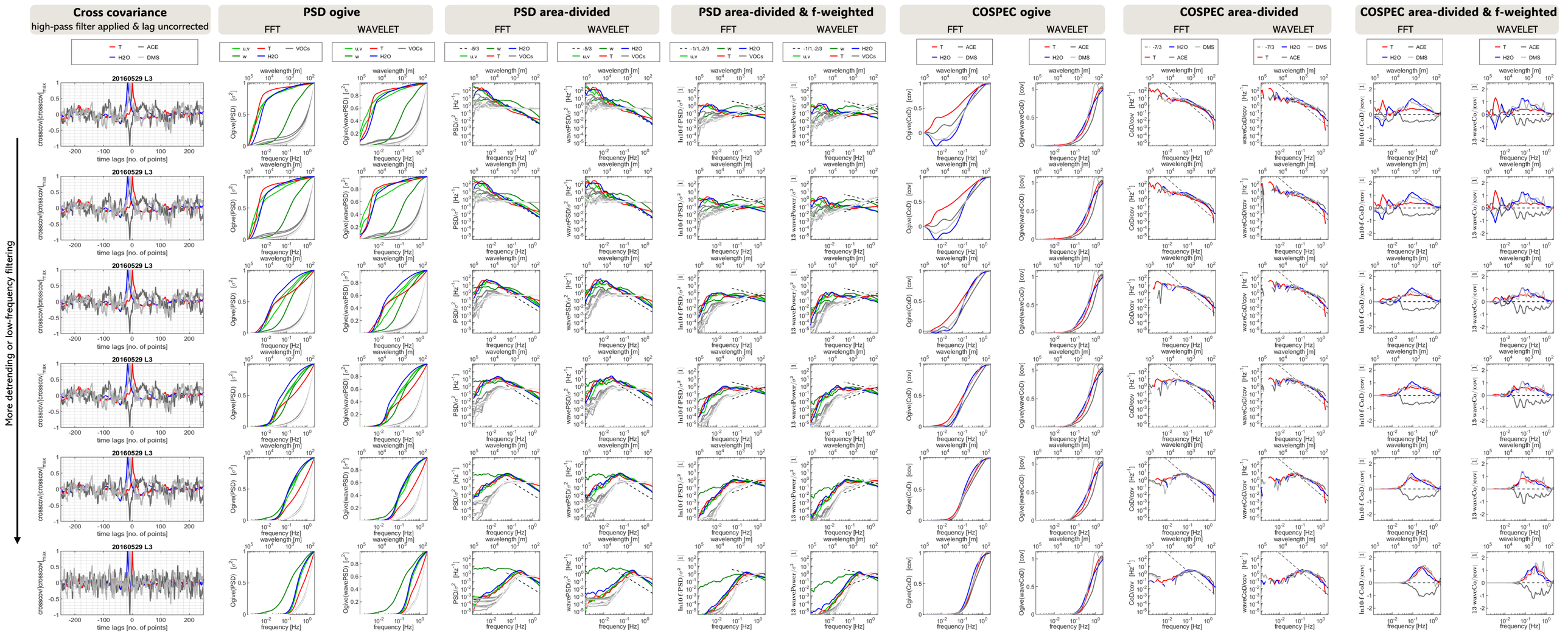

Cross covariance
high-pass filter applied & lag uncorrected
PSD ogive
PSD area-divided
PSD area-divided & f-weighted
COSPEC ogive
COSPEC area-divided
COSPEC area-divided & f-weighted
FFT
WAVELET
More detrending or low-frequency filtering
T
H2O
ACE
DMS
u,v
w
VOCs
20160528 L1
time lags [no. of points]
wavelength [m]
frequency [Hz]

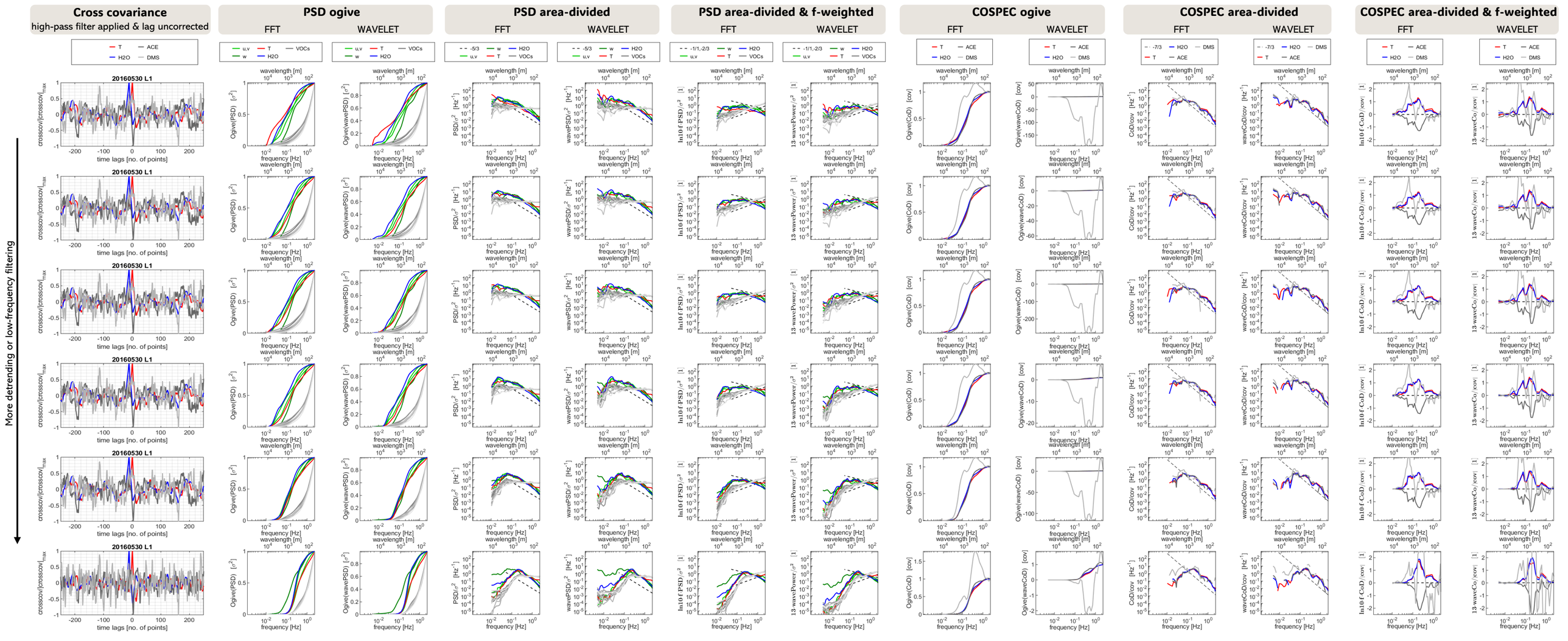

Cross covariance
high-pass filter applied & lag uncorrected
PSD ogive
PSD area-divided
PSD area-divided & f-weighted
COSPEC ogive
COSPEC area-divided
COSPEC area-divided & f-weighted
FFT
WAVELET
More detrending or low-frequency filtering
20160528 L2
time lags [no. of points]
wavelength [m]
frequency [Hz]
T
ACE
H2O
DMS
u,v
w
VOCs

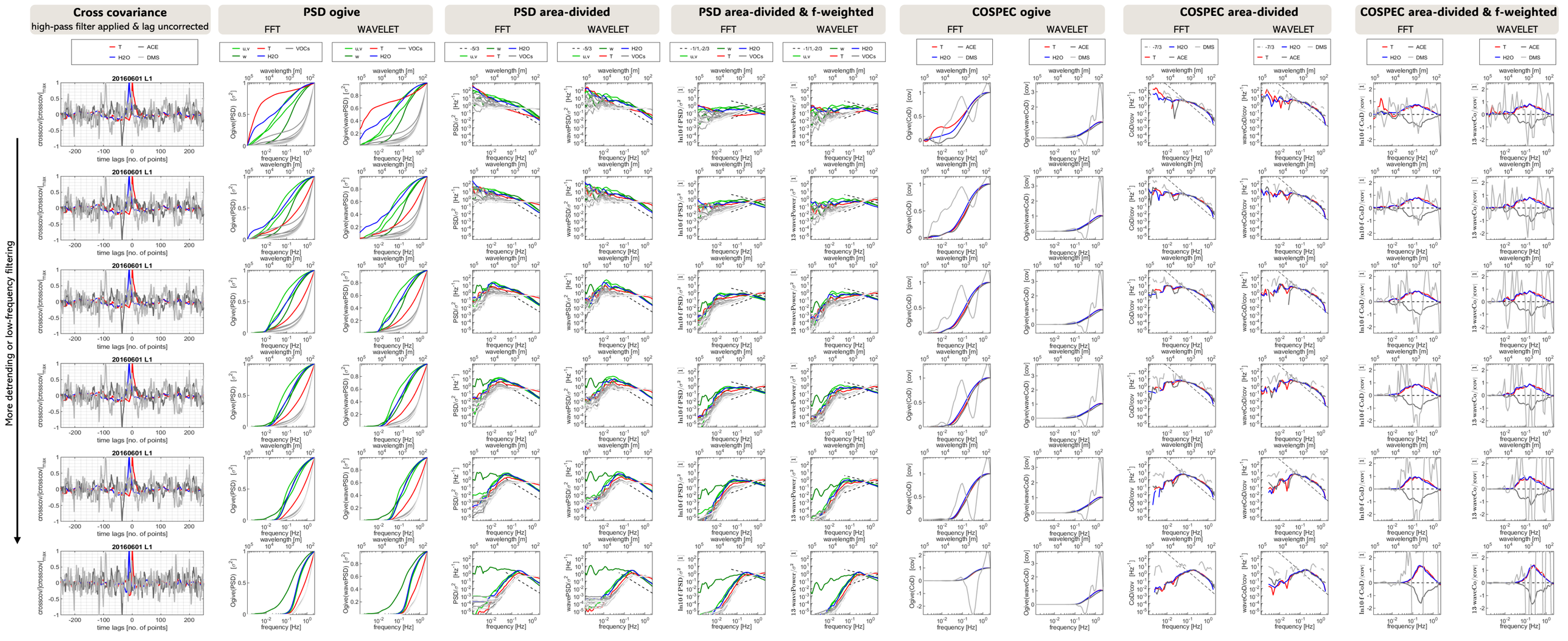

Cross covariance
high-pass filter applied & lag uncorrected
PSD ogive
PSD area-divided
PSD area-divided & f-weighted
COSPEC ogive
COSPEC area-divided
COSPEC area-divided & f-weighted
FFT
WAVELET
More detrending or low-frequency filtering
20160528 L3
time lags [no. of points]
frequency [Hz]
wavelength [m]
T
ACE
H2O
DMS
u,v
w
VOCs

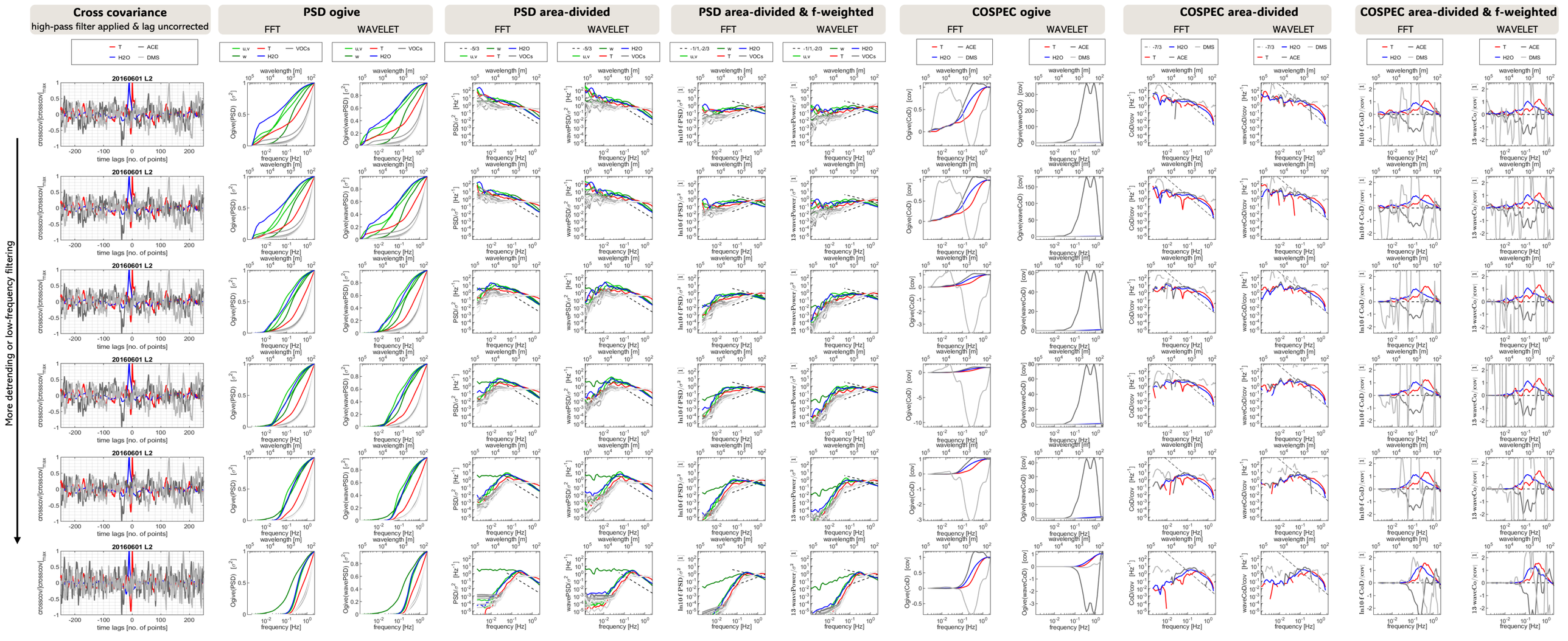

Cross covariance
high-pass filter applied & lag uncorrected
PSD ogive
PSD area-divided
PSD area-divided & f-weighted
COSPEC ogive
COSPEC area-divided
COSPEC area-divided & f-weighted
FFT
WAVELET
More detrending or low-frequency filtering
20160529 L1
time lags [no. of points]
frequency [Hz]
wavelength [m]

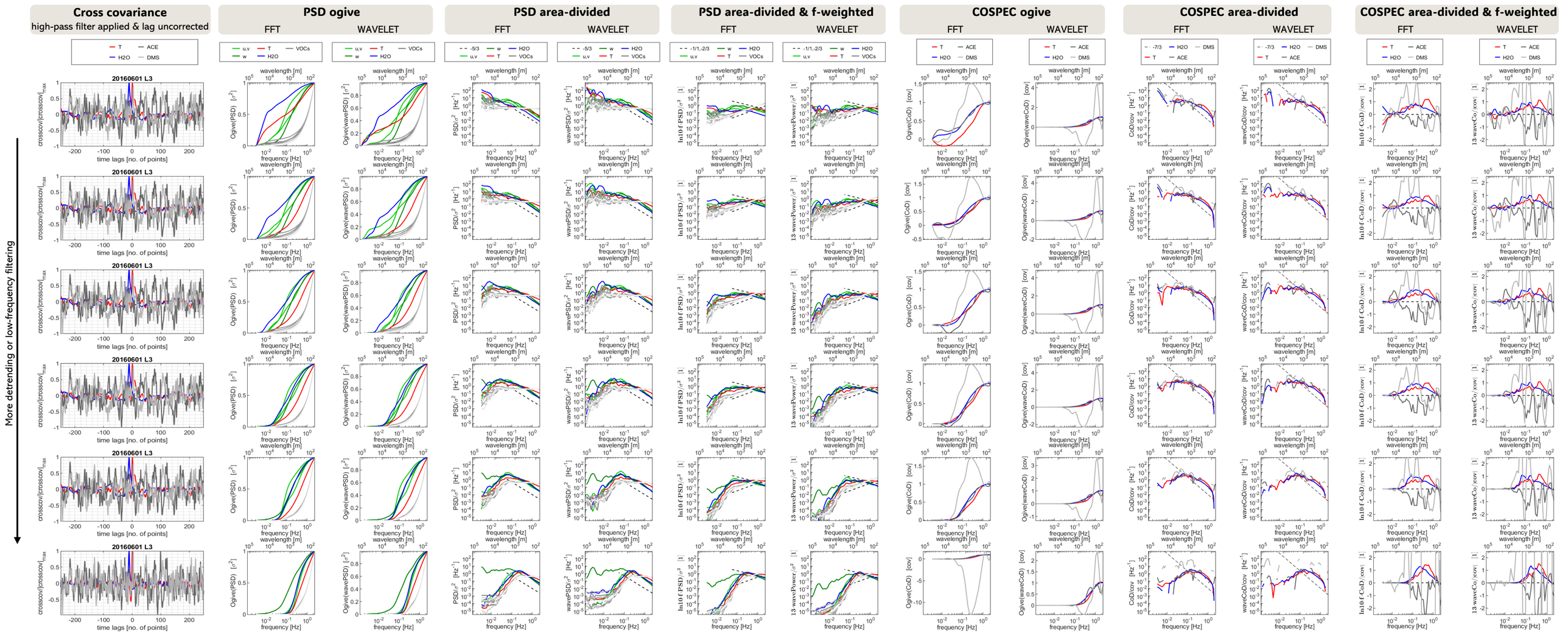

Cross covariance
high-pass filter applied & lag uncorrected
PSD ogive
FFT
WAVELET
PSD area-divided
FFT
WAVELET
PSD area-divided & f-weighted
FFT
WAVELET
COSPEC ogive
FFT
WAVELET
COSPEC area-divided
FFT
WAVELET
COSPEC area-divided & f-weighted
FFT
WAVELET
More detrending or low-frequency filtering
T
ACE
H2O
DMS
u,v
w
VOCs
-5/3
-1/1,-2/3
-7/3
20160529 L2
time lags [no. of points]
wavelength [m]
frequency [Hz]

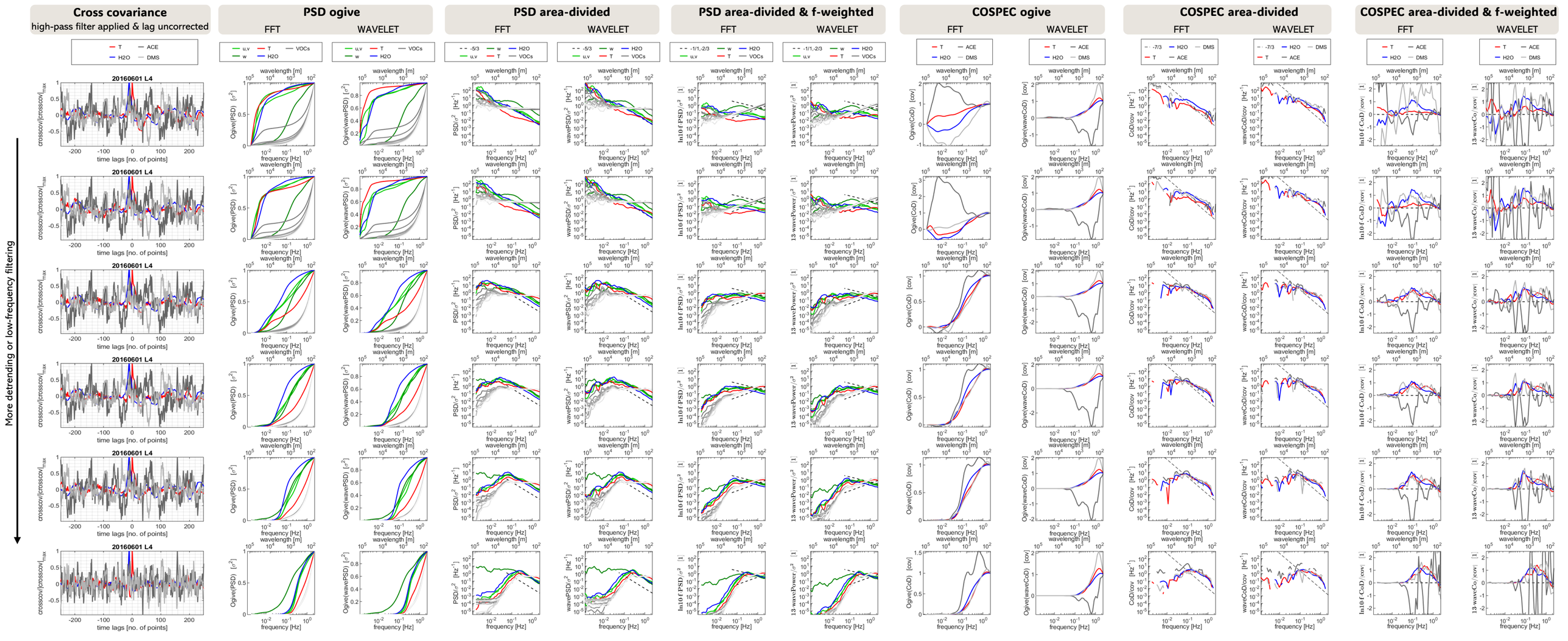

Cross covariance
high-pass filter applied & lag uncorrected
PSD ogive
PSD area-divided
PSD area-divided & f-weighted
COSPEC ogive
COSPEC area-divided
COSPEC area-divided & f-weighted
FFT
WAVELET
More detrending or low-frequency filtering
T
ACE
H2O
DMS
u,v
w
VOCs
20160529 L3
time lags [no. of points]
wavelength [m]
frequency [Hz]
Ogive(PSD) [σ^2]
Ogive(wavePSD) [σ^2]
PSD/σ^2 [Hz^{-1}]
wavePSD/σ^2 [Hz^{-1}]
ln10 f PSD/σ^2 [1]
13·waveP ower/σ^2 [1]
Ogive(CoD) [cov]
Ogive(waveCoD) [cov]
CoD/cov [Hz^{-1}]
waveCoD/cov [Hz^{-1}]
ln10 f·CoD/cov [1]
13·waveCo/cov [1]

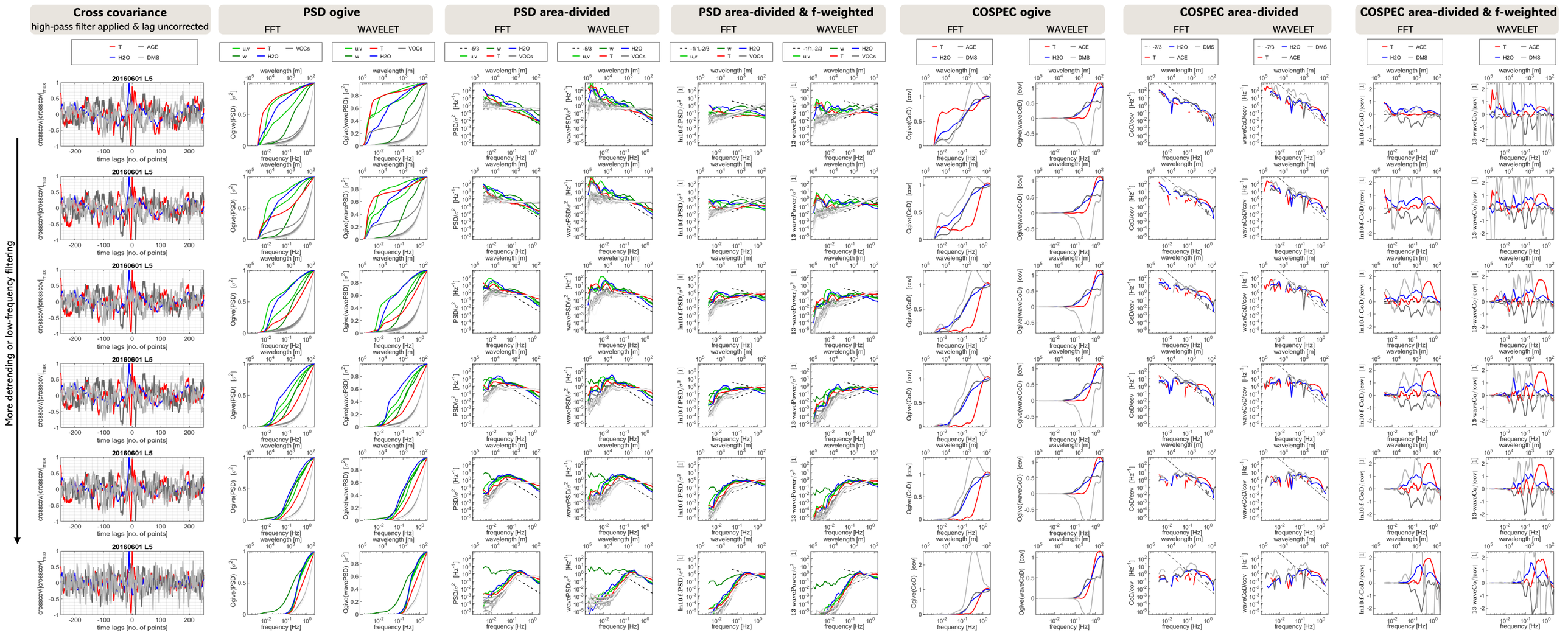

Cross covariance
high-pass filter applied & lag uncorrected
PSD ogive
PSD area-divided
PSD area-divided & f-weighted
COSPEC ogive
COSPEC area-divided
COSPEC area-divided & f-weighted
FFT
WAVELET
More detrending or low-frequency filtering
20160530 L1
time lags [no. of points]
frequency [Hz]
wavelength [m]
T
ACE
H2O
DMS
u,v
w
VOCs

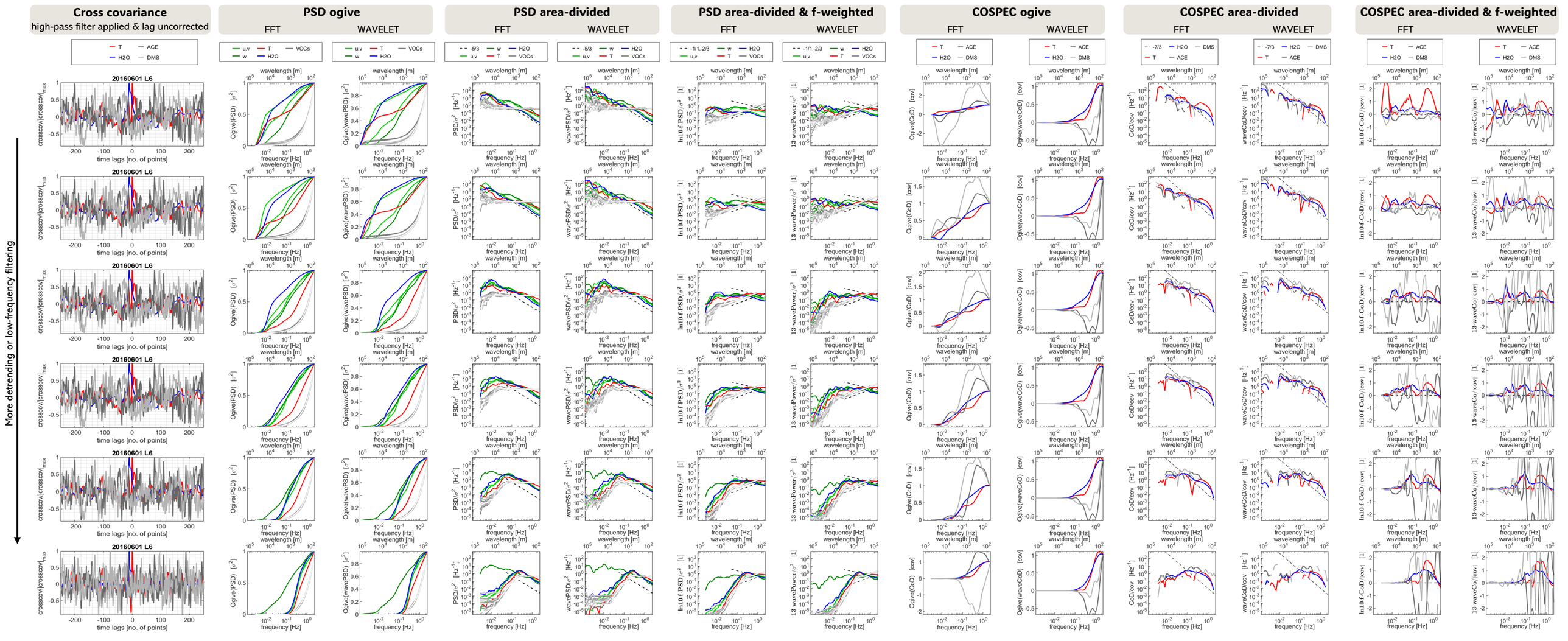

Cross covariance
high-pass filter applied & lag uncorrected
PSD ogive
PSD area-divided
PSD area-divided & f-weighted
COSPEC ogive
COSPEC area-divided
COSPEC area-divided & f-weighted
FFT
WAVELET
More detrending or low-frequency filtering
20160601 L1
time lags [no. of points]
frequency [Hz]
wavelength [m]
T
ACE
H2O
DMS
u,v
w
VOCs

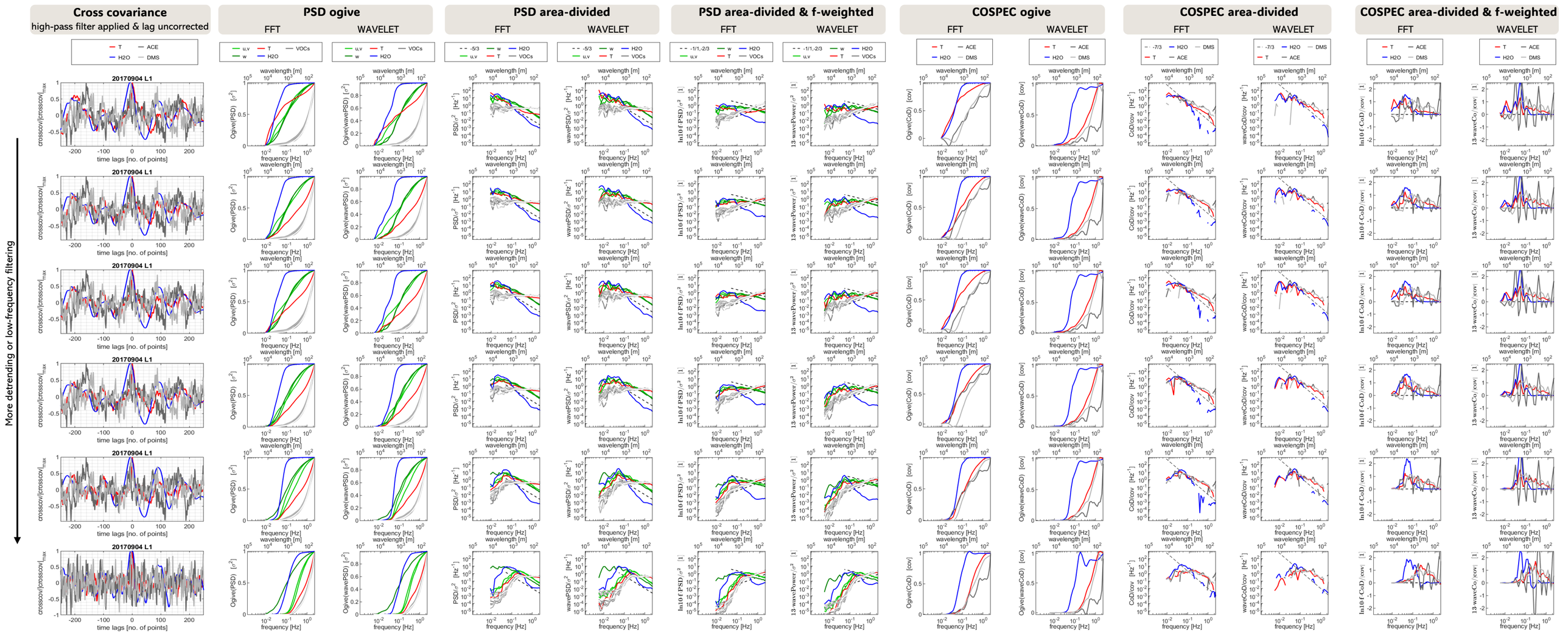

Cross covariance
high-pass filter applied & lag uncorrected
PSD ogive
PSD area-divided
PSD area-divided & f-weighted
COSPEC ogive
COSPEC area-divided
COSPEC area-divided & f-weighted
FFT
WAVELET
More detrending or low-frequency filtering
T
ACE
H2O
DMS
VOCs
u,v
w
20160601 L2
time lags [no. of points]
frequency [Hz]
wavelength [m]

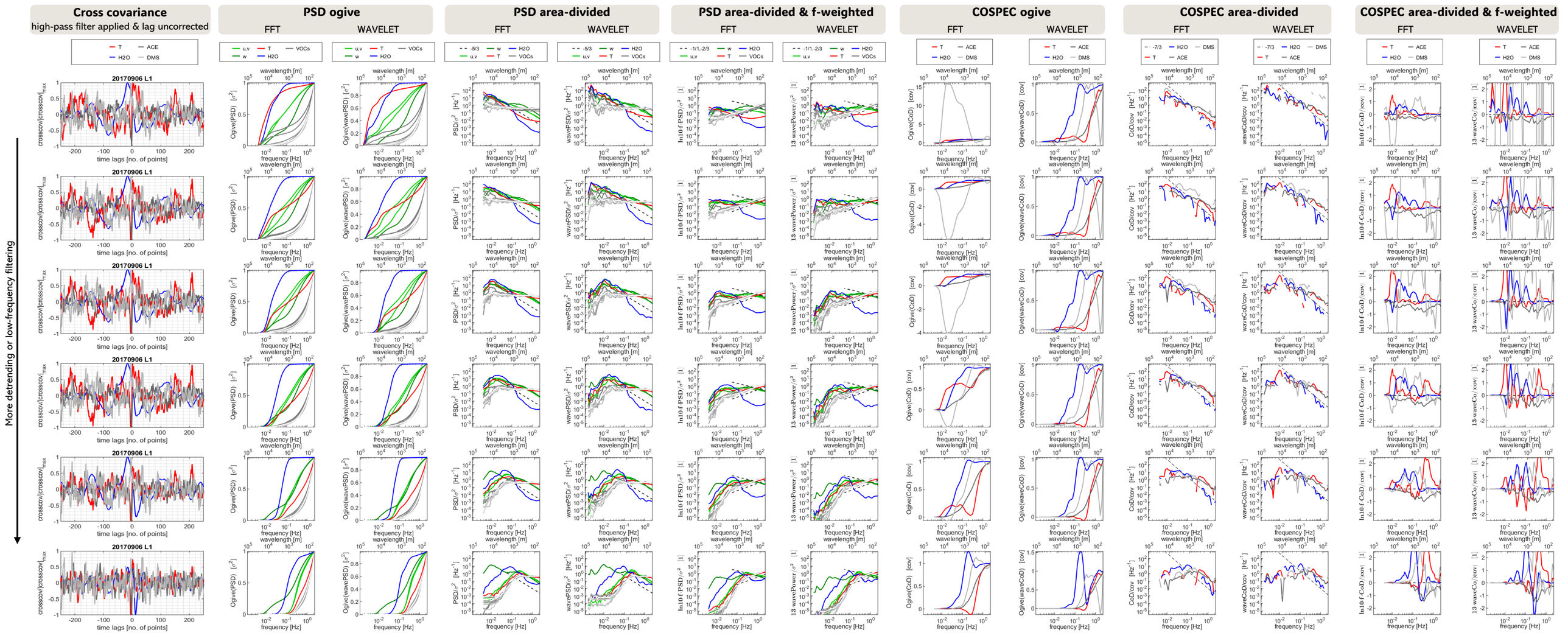

Cross covariance
high-pass filter applied & lag uncorrected
PSD ogive
PSD area-divided
PSD area-divided & f-weighted
COSPEC ogive
COSPEC area-divided
COSPEC area-divided & f-weighted
FFT
WAVELET
More detrending or low-frequency filtering
20160601 L3
time lags [no. of points]
frequency [Hz]
wavelength [m]
T
ACE
H2O
DMS
u,v
w
VOCs

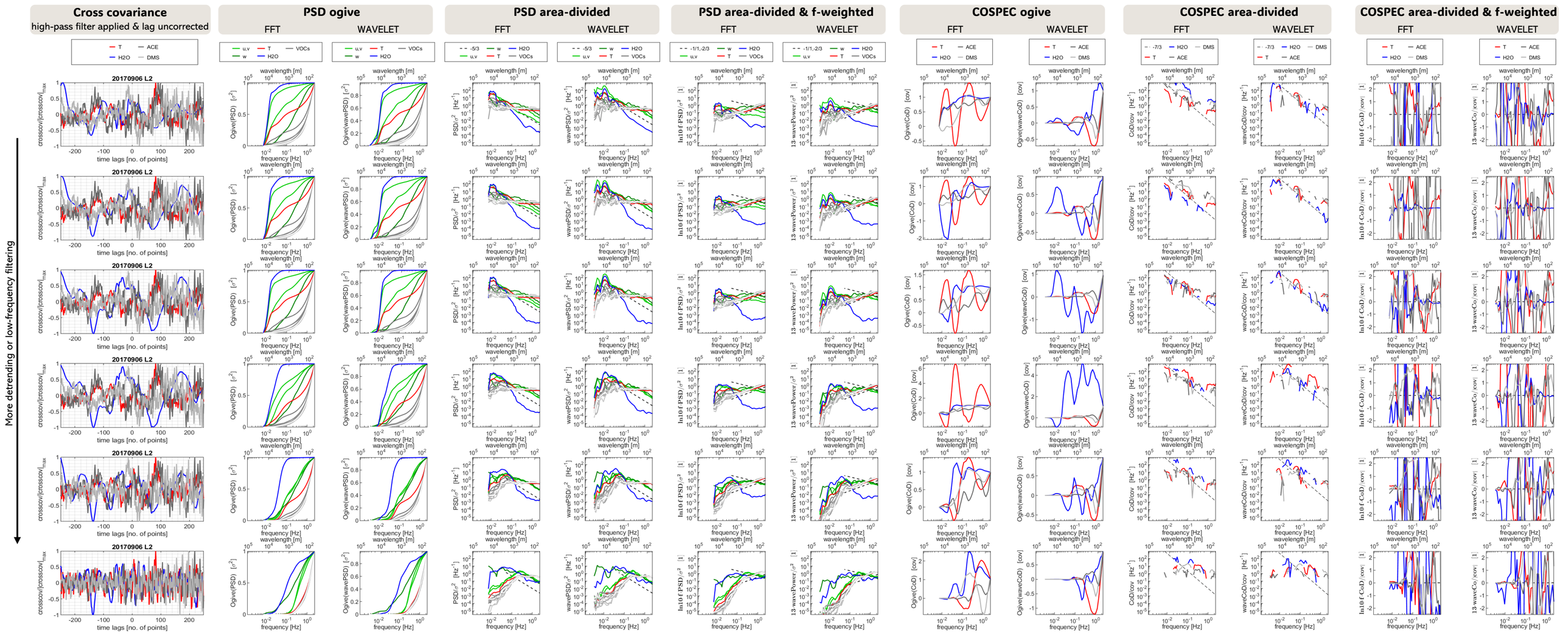

Cross covariance
high-pass filter applied & lag uncorrected
PSD ogive
FFT
WAVELET
PSD area-divided
FFT
WAVELET
PSD area-divided & f-weighted
FFT
WAVELET
COSPEC ogive
FFT
WAVELET
COSPEC area-divided
FFT
WAVELET
COSPEC area-divided & f-weighted
FFT
WAVELET
More detrending or low-frequency filtering
T
ACE
H2O
DMS
u,v
w
VOCs
20160601 L4
time lags [no. of points]
wavelength [m]
frequency [Hz]

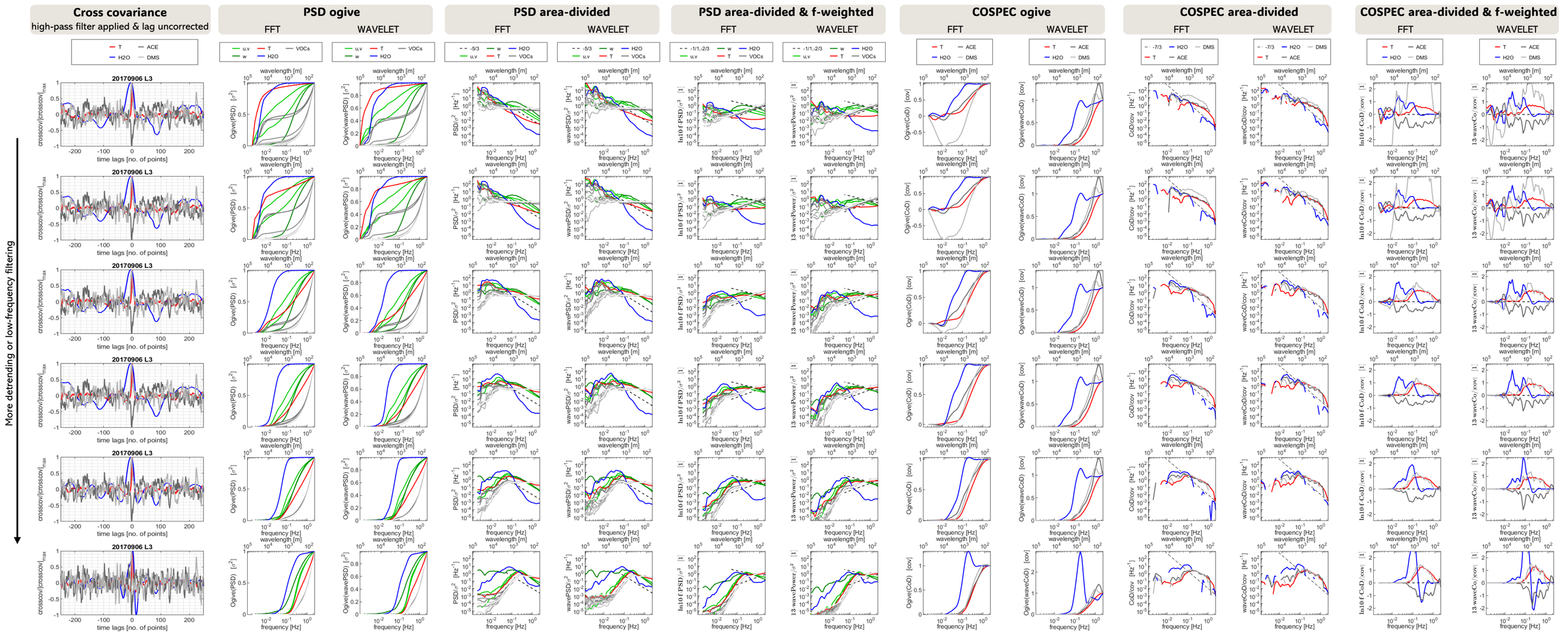

Cross covariance
high-pass filter applied & lag uncorrected
PSD ogive
FFT
WAVELET
PSD area-divided
FFT
WAVELET
PSD area-divided & f-weighted
FFT
WAVELET
COSPEC ogive
FFT
WAVELET
COSPEC area-divided
FFT
WAVELET
COSPEC area-divided & f-weighted
FFT
WAVELET
More detrending or low-frequency filtering
20160601 L5
time lags [no. of points]
wavelength [m]
frequency [Hz]
T
ACE
H2O
DMS
u,v
w
VOCs

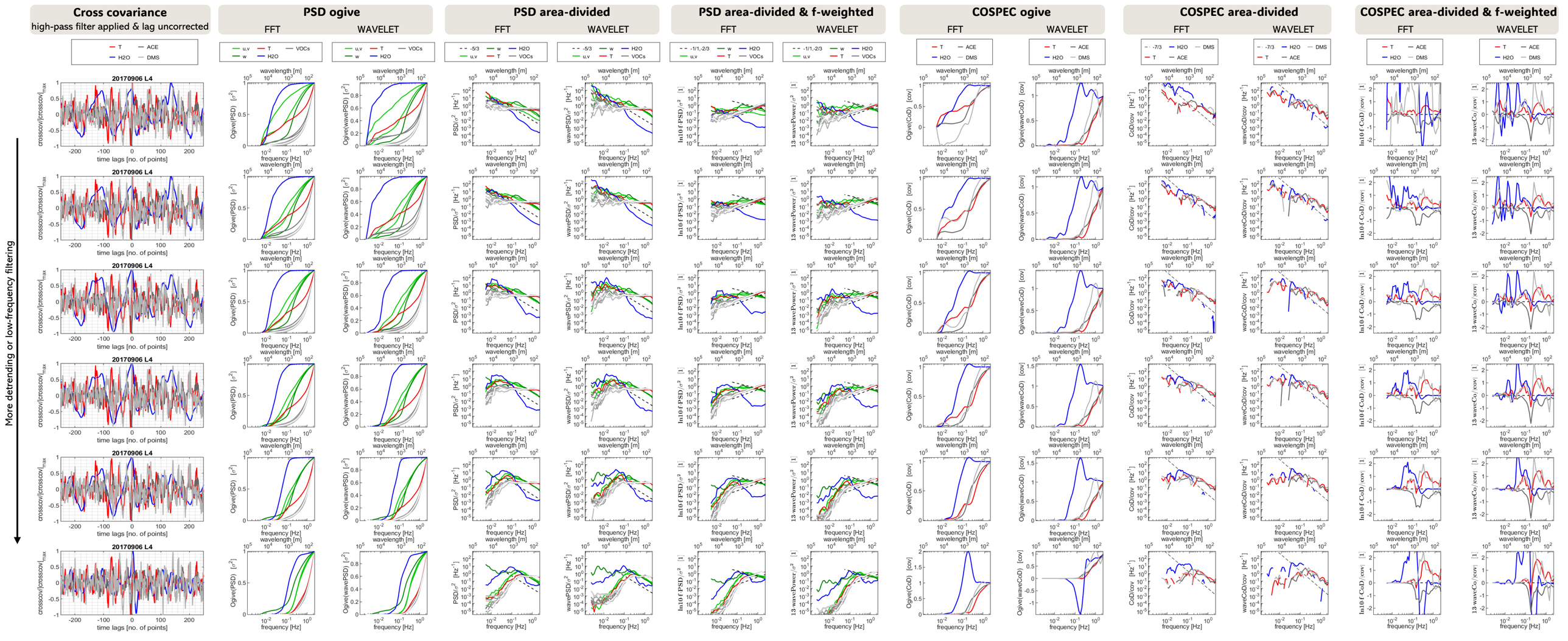

Cross covariance
high-pass filter applied & lag uncorrected
PSD ogive
PSD area-divided
PSD area-divided & f-weighted
COSPEC ogive
COSPEC area-divided
COSPEC area-divided & f-weighted
FFT
WAVELET
More detrending or low-frequency filtering
20160601 L6
time lags [no. of points]
wavelength [m]
frequency [Hz]
T
ACE
H2O
DMS
u,v
w
VOCs

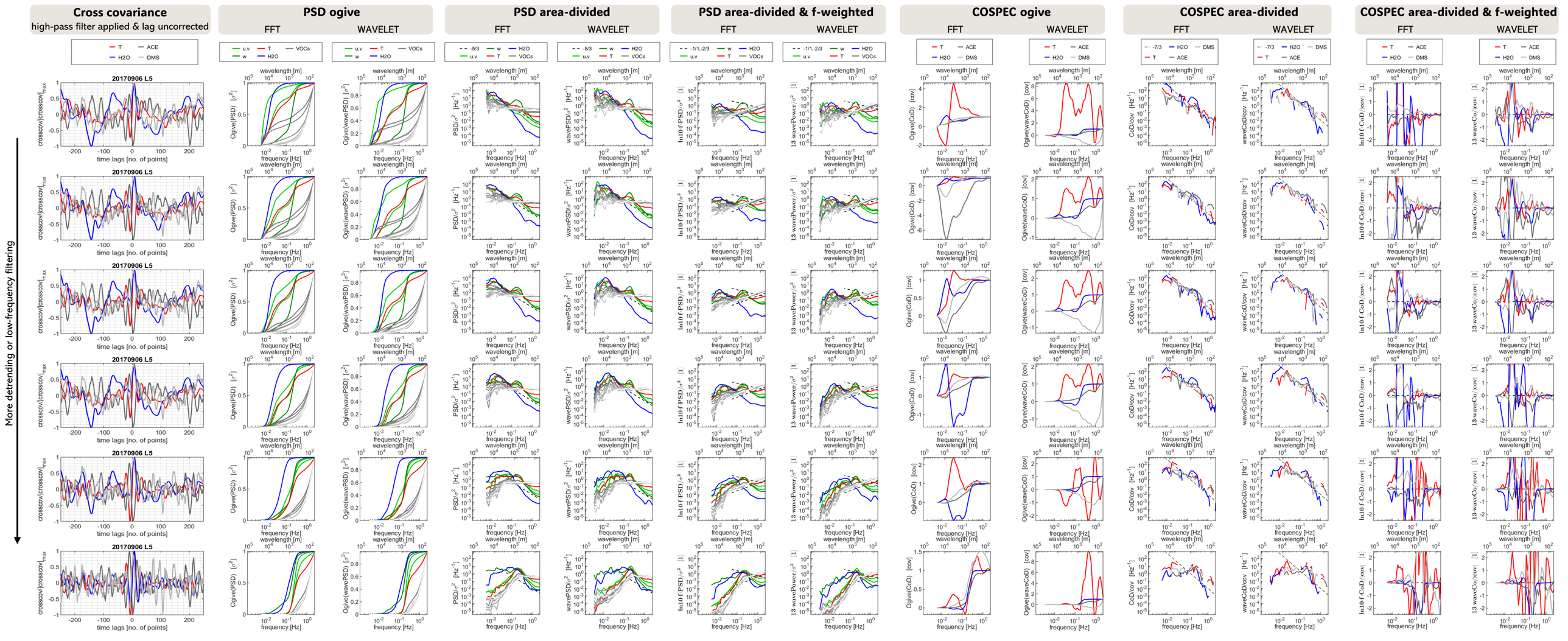

Cross covariance
high-pass filter applied & lag uncorrected
PSD ogive
PSD area-divided
PSD area-divided & f-weighted
COSPEC ogive
COSPEC area-divided
COSPEC area-divided & f-weighted
FFT
WAVELET
More detrending or low-frequency filtering
T
ACE
H2O
DMS
u,v
w
VOCs
20170904 L1
time lags [no. of points]
wavelength [m]
frequency [Hz]

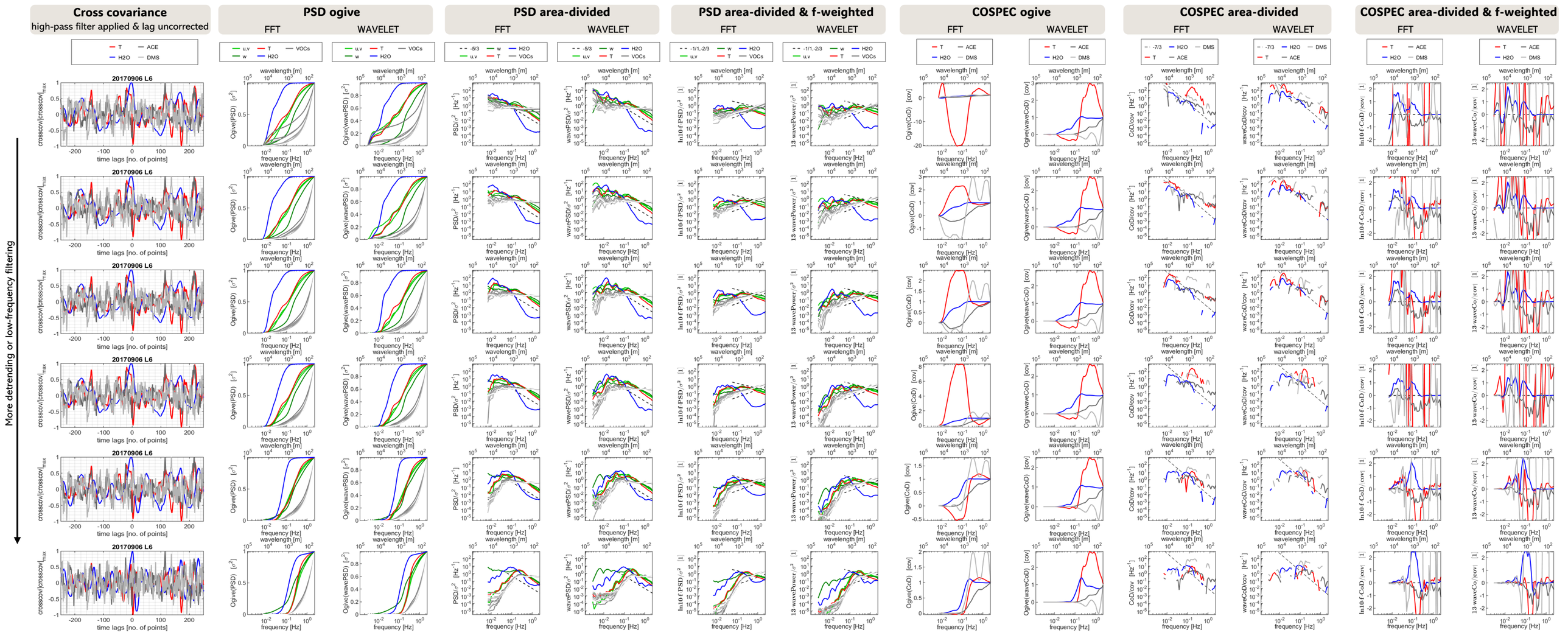

Cross covariance
high-pass filter applied & lag uncorrected
PSD ogive
FFT
WAVELET
PSD area-divided
FFT
WAVELET
PSD area-divided & f-weighted
FFT
WAVELET
COSPEC ogive
FFT
WAVELET
COSPEC area-divided
FFT
WAVELET
COSPEC area-divided & f-weighted
FFT
WAVELET
More detrending or low-frequency filtering
T
H2O
ACE
DMS
VOCs
u,v
w
20170906 L1
time lags [no. of points]
wavelength [m]
frequency [Hz]

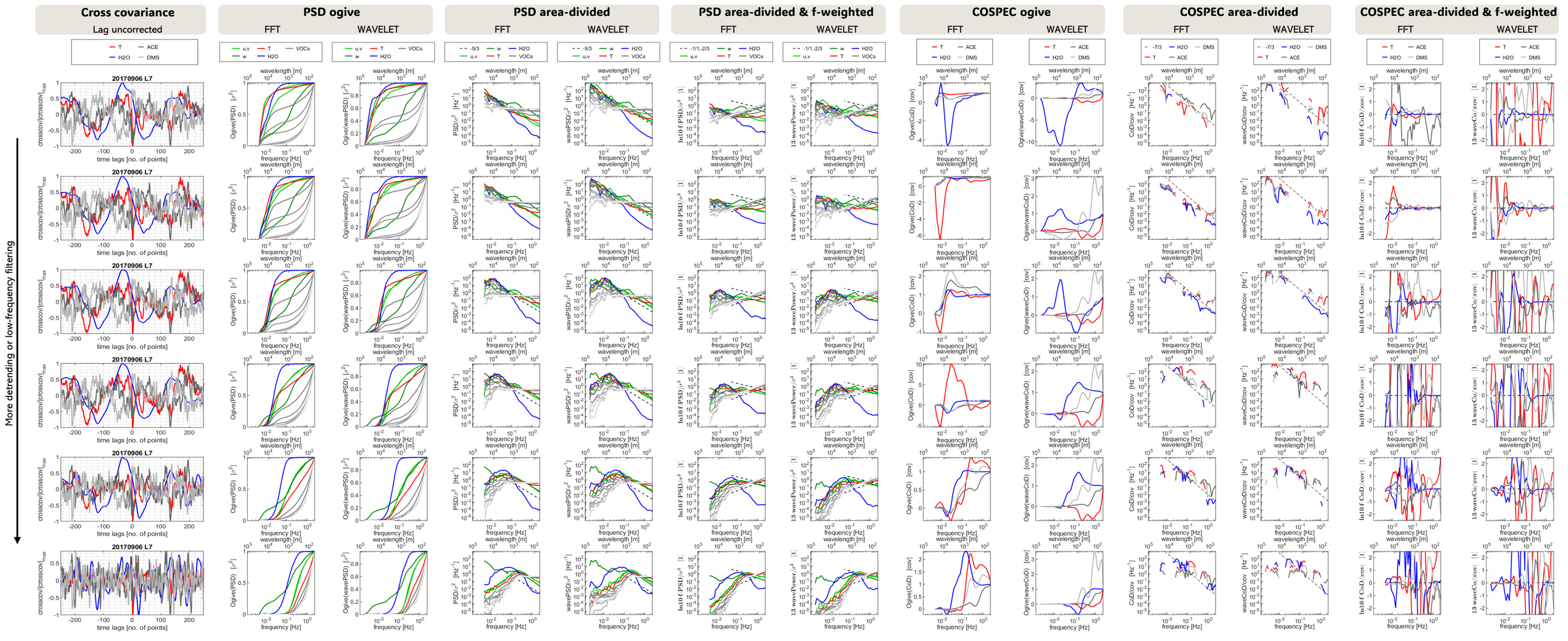

Cross covariance
high-pass filter applied & lag uncorrected
PSD ogive
PSD area-divided
PSD area-divided & f-weighted
COSPEC ogive
COSPEC area-divided
COSPEC area-divided & f-weighted
FFT
WAVELET
More detrending or low-frequency filtering
20170906 L2
time lags [no. of points]
frequency [Hz]
wavelength [m]

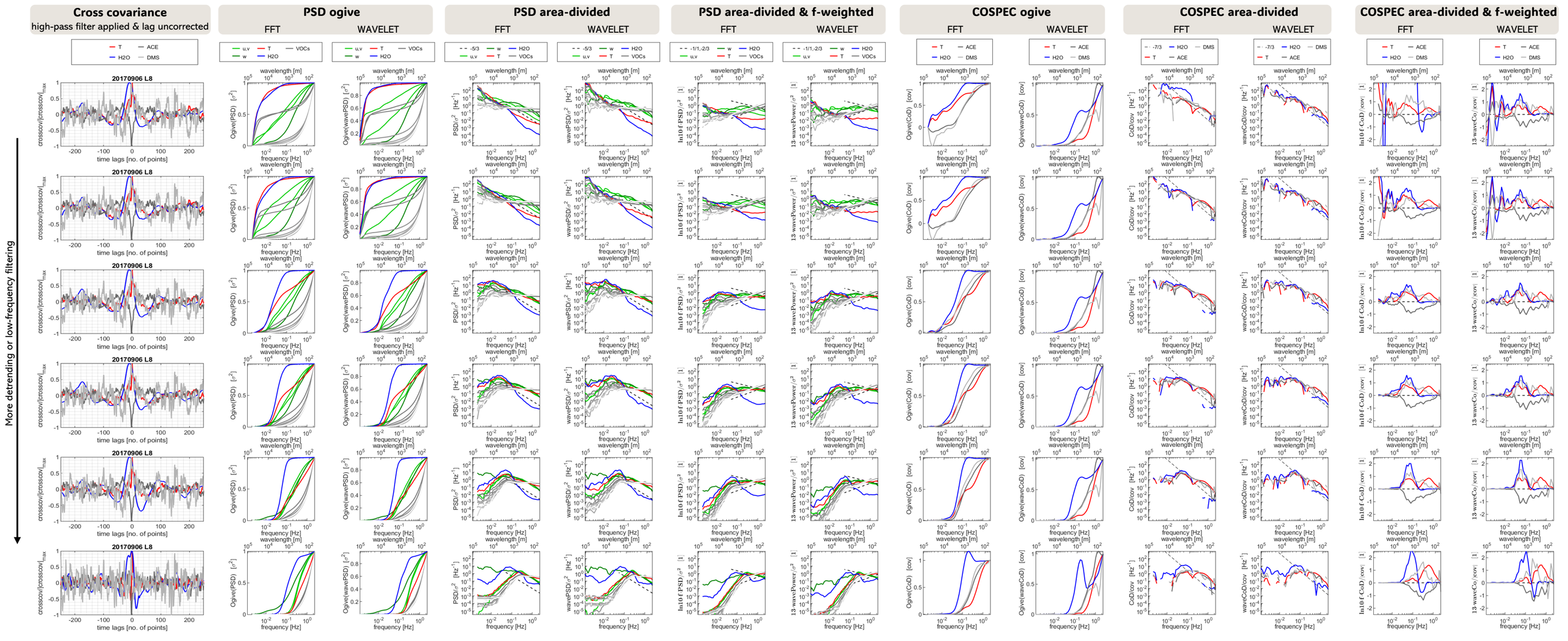

Cross covariance
high-pass filter applied & lag uncorrected
PSD ogive
PSD area-divided
PSD area-divided & f-weighted
COSPEC ogive
COSPEC area-divided
COSPEC area-divided & f-weighted
FFT
WAVELET
More detrending or low-frequency filtering
T
H2O
ACE
DMS
u,v
w
VOCs
20170906 L3
time lags [no. of points]
wavelength [m]
frequency [Hz]

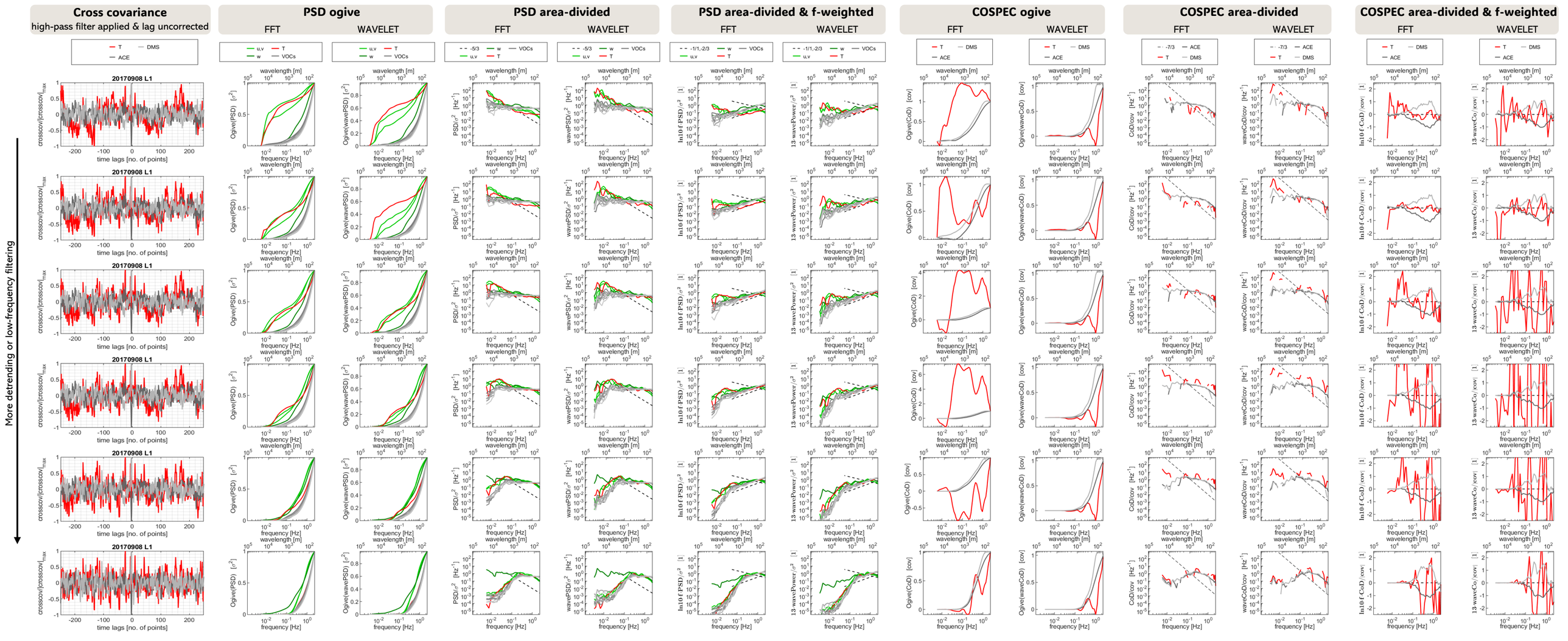

Cross covariance
high-pass filter applied & lag uncorrected
PSD ogive
FFT
WAVELET
PSD area-divided
FFT
WAVELET
PSD area-divided & f-weighted
FFT
WAVELET
COSPEC ogive
FFT
WAVELET
COSPEC area-divided
FFT
WAVELET
COSPEC area-divided & f-weighted
FFT
WAVELET
More detrending or low-frequency filtering
T
ACE
H2O
DMS
u,v
w
VOCs
20170906 L4
time lags [no. of points]
wavelength [m]
frequency [Hz]

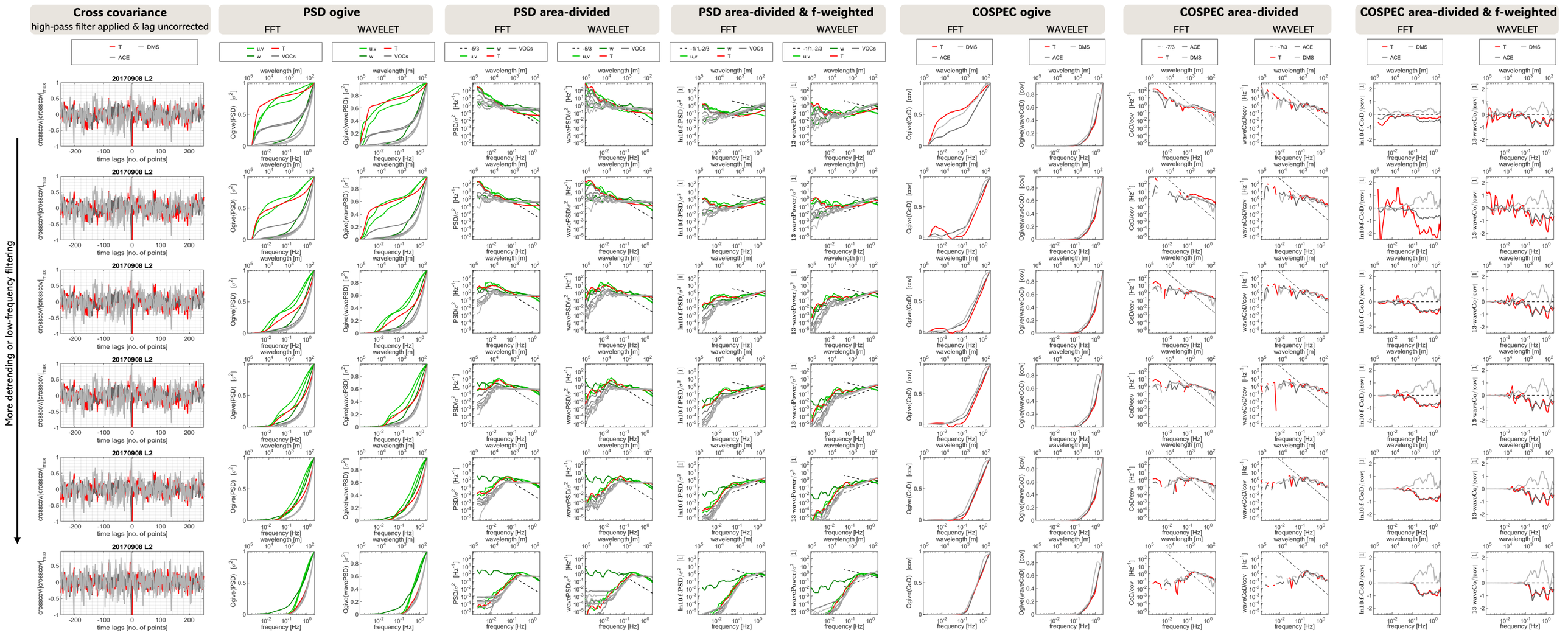

Cross covariance
high-pass filter applied & lag uncorrected
PSD ogive
PSD area-divided
PSD area-divided & f-weighted
COSPEC ogive
COSPEC area-divided
COSPEC area-divided & f-weighted
FFT
WAVELET
More detrending or low-frequency filtering
T
ACE
H2O
DMS
u,v
w
VOCs
20170906 L5
time lags [no. of points]
wavelength [m]
frequency [Hz]

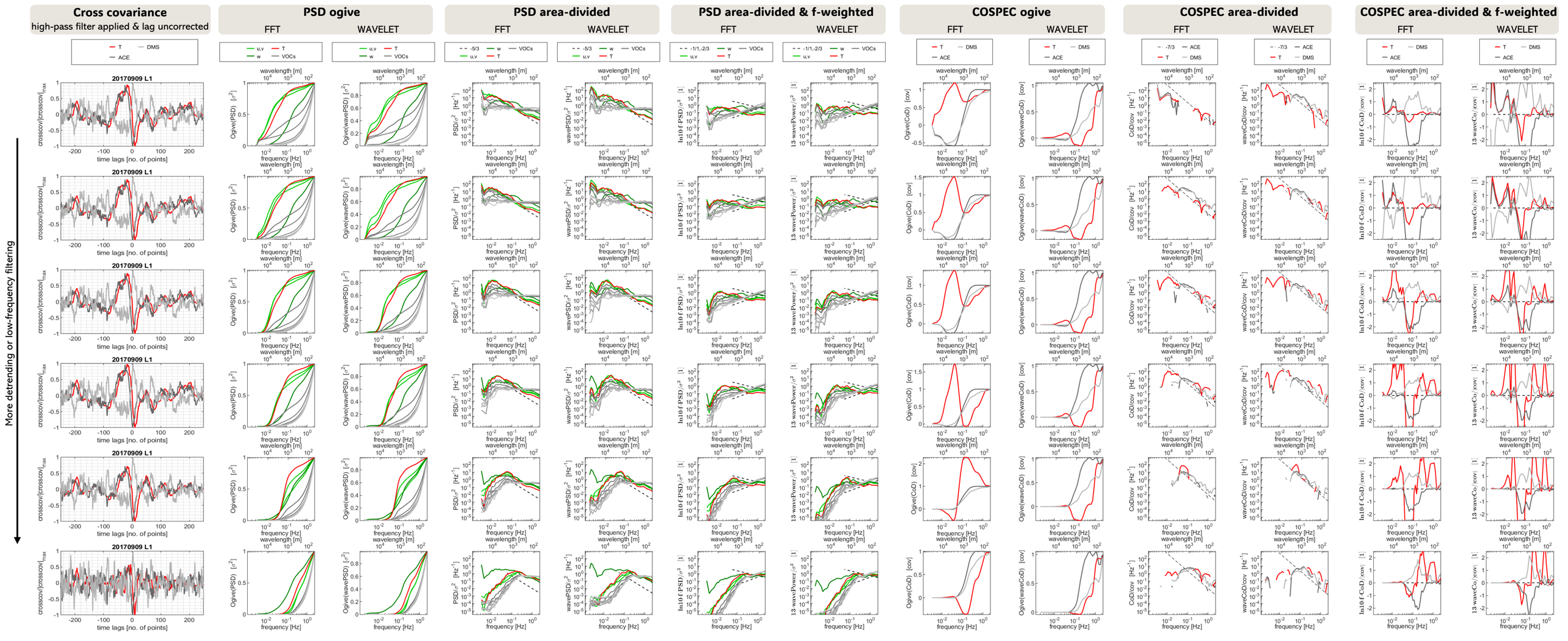

Cross covariance
high-pass filter applied & lag uncorrected
PSD ogive
PSD area-divided
PSD area-divided & f-weighted
COSPEC ogive
COSPEC area-divided
COSPEC area-divided & f-weighted
FFT
WAVELET
More detrending or low-frequency filtering
T
ACE
H2O
DMS
u,v
w
VOCs
20170906 L6
time lags [no. of points]
wavelength [m]
frequency [Hz]

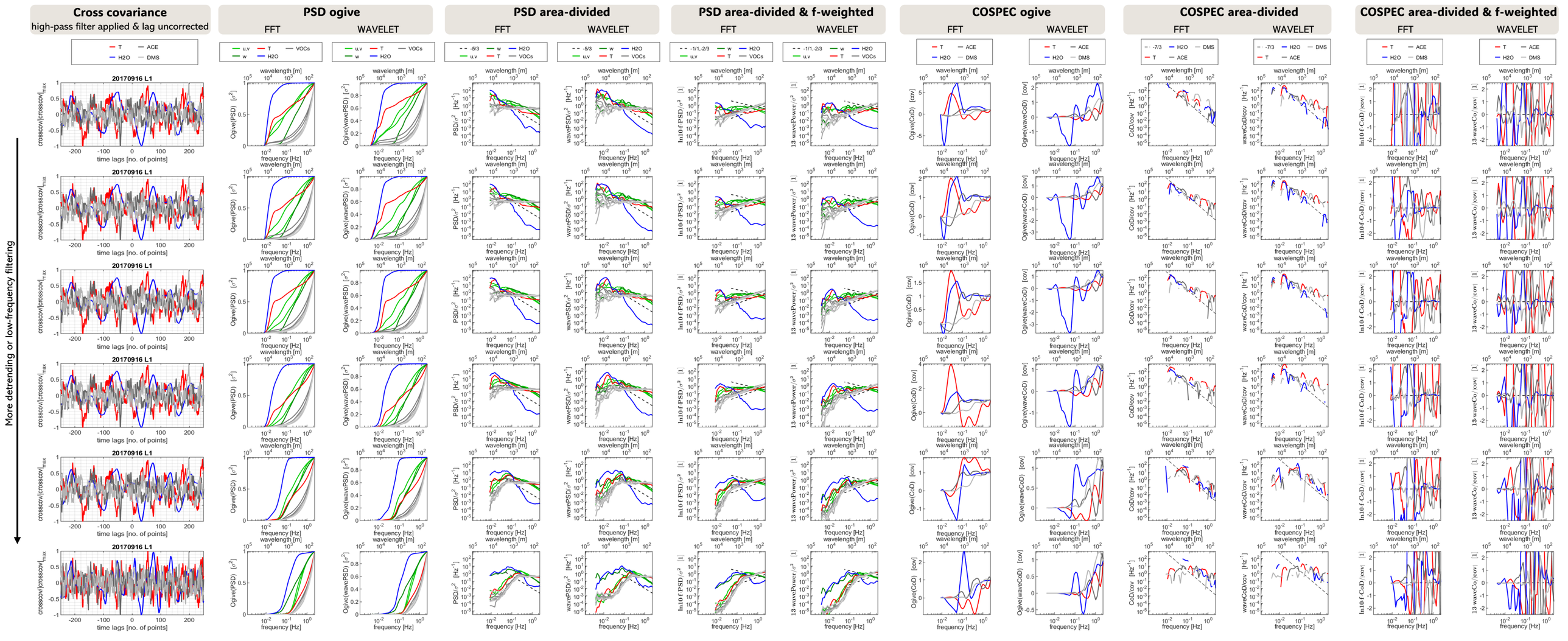

Cross covariance
Lag uncorrected
PSD ogive
FFT
WAVELET
PSD area-divided
FFT
WAVELET
PSD area-divided & f-weighted
FFT
WAVELET
COSPEC ogive
FFT
WAVELET
COSPEC area-divided
FFT
WAVELET
COSPEC area-divided & f-weighted
FFT
WAVELET
More detrending or low-frequency filtering
20170906 L7
time lags [no. of points]
wavelength [m]
frequency [Hz]
T
ACE
H2O
DMS
u,v
w
VOCs

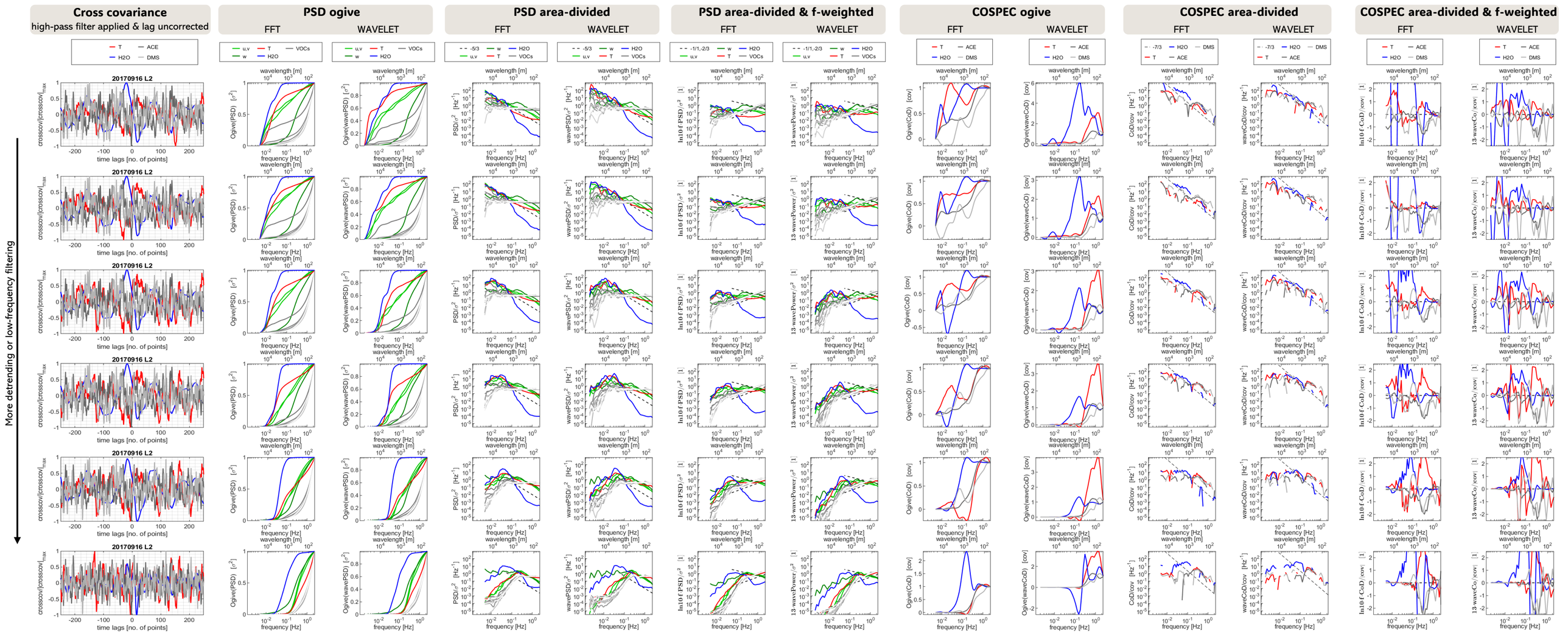

Cross covariance
high-pass filter applied & lag uncorrected
PSD ogive
PSD area-divided
PSD area-divided & f-weighted
COSPEC ogive
COSPEC area-divided
COSPEC area-divided & f-weighted
FFT
WAVELET
More detrending or low-frequency filtering
20170906 L8
time lags [no. of points]
frequency [Hz]
wavelength [m]
T
H2O
ACE
DMS
u,v
w
VOCs

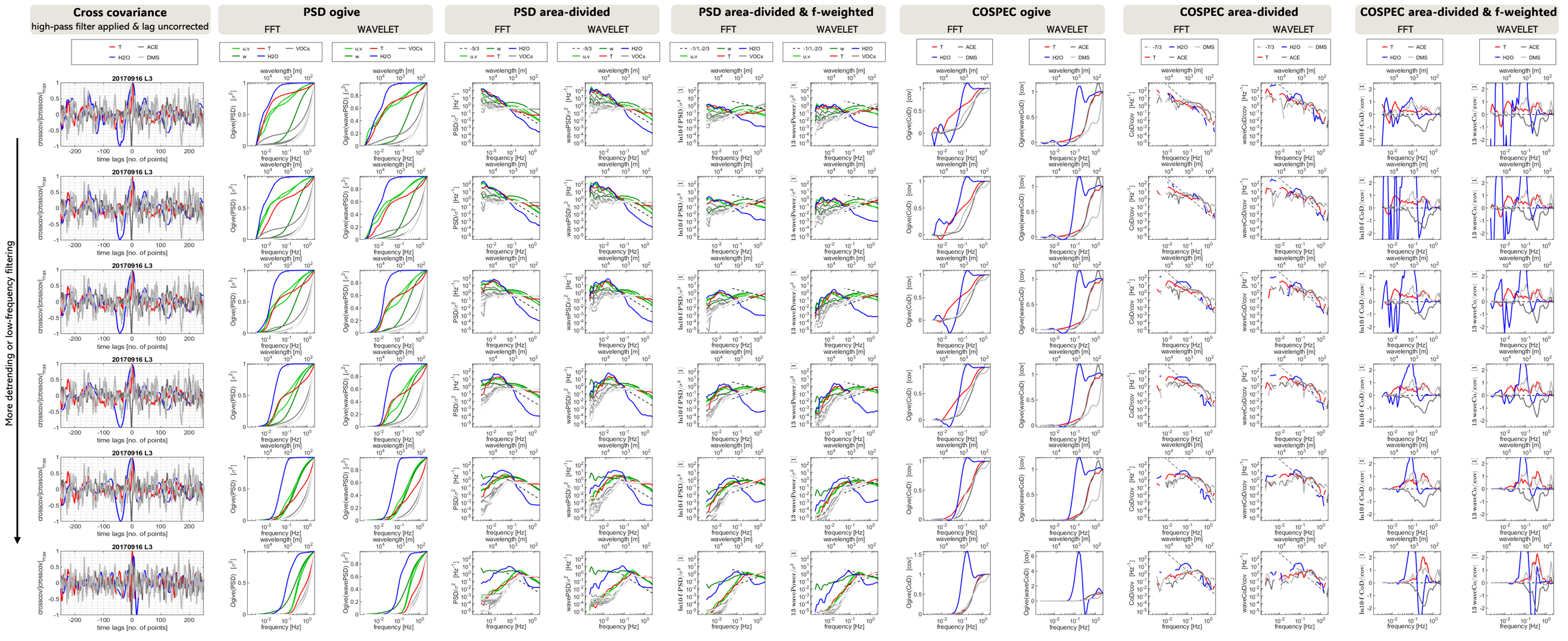

Cross covariance
high-pass filter applied & lag uncorrected
PSD ogive
PSD area-divided
PSD area-divided & f-weighted
COSPEC ogive
COSPEC area-divided
COSPEC area-divided & f-weighted
FFT
WAVELET
More detrending or low-frequency filtering
T
DMS
ACE
u,v
w
VOCs
20170908 L1
time lags [no. of points]
wavelength [m]
frequency [Hz]
-5/3
-1/1,-2/3
-7/3

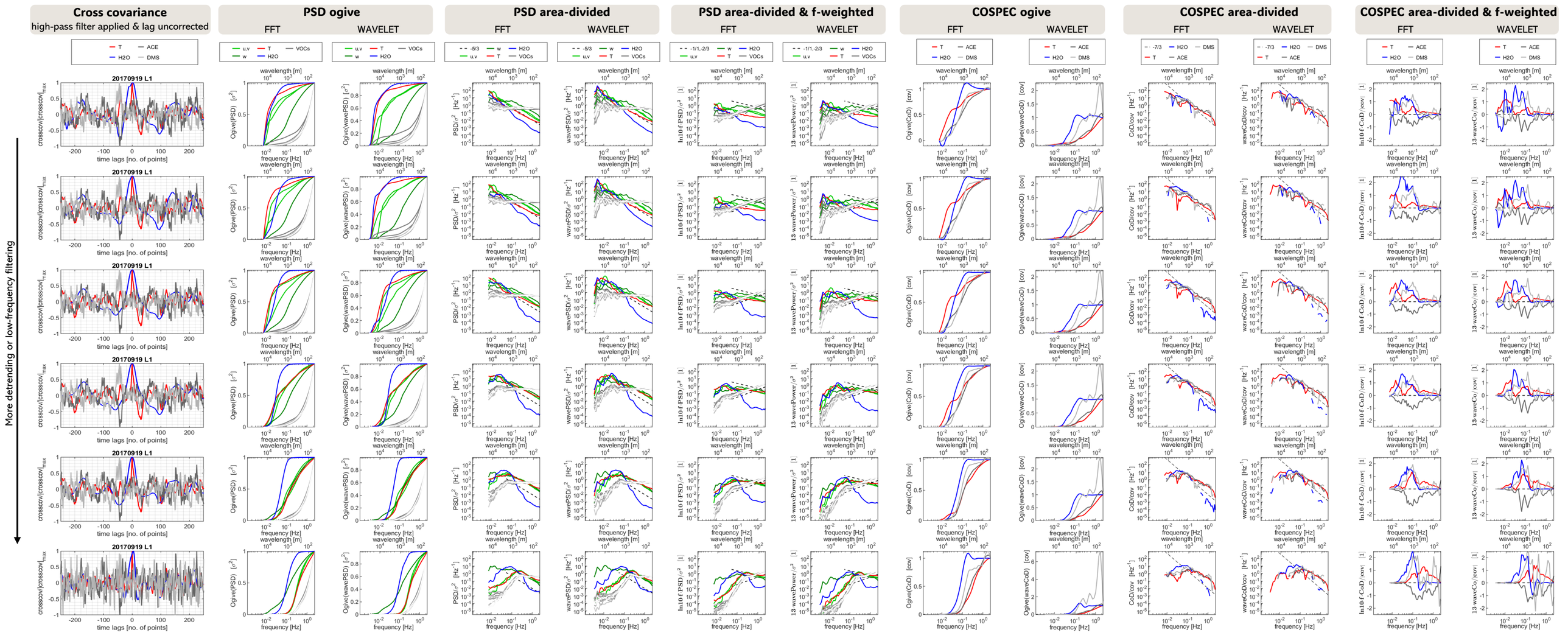

Cross covariance
high-pass filter applied & lag uncorrected
PSD ogive
FFT
WAVELET
PSD area-divided
FFT
WAVELET
PSD area-divided & f-weighted
FFT
WAVELET
COSPEC ogive
FFT
WAVELET
COSPEC area-divided
FFT
WAVELET
COSPEC area-divided & f-weighted
FFT
WAVELET
More detrending or low-frequency filtering
T
DMS
ACE
u,v
w
VOCs
-5/3
-1/1,-2/3
-7/3
20170908 L2
time lags [no. of points]
wavelength [m]
frequency [Hz]

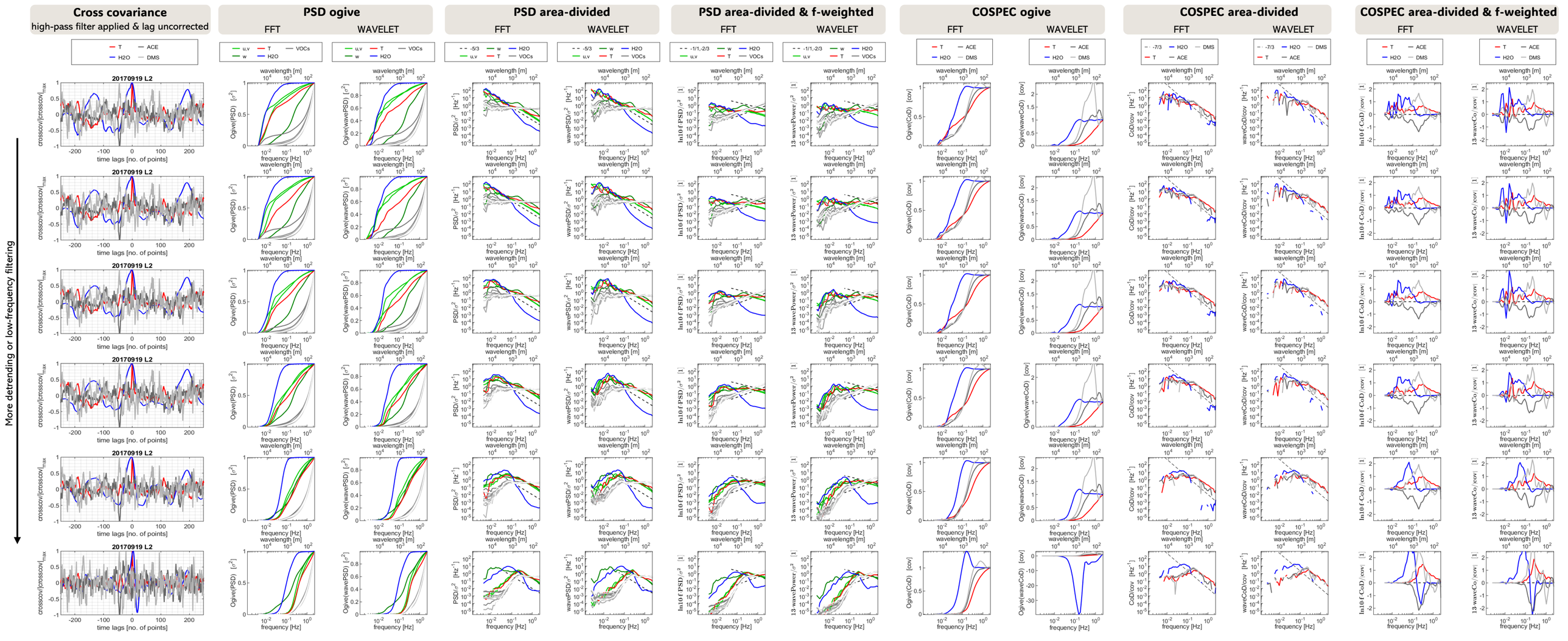

Cross covariance
high-pass filter applied & lag uncorrected
PSD ogive
FFT
WAVELET
PSD area-divided
FFT
WAVELET
PSD area-divided & f-weighted
FFT
WAVELET
COSPEC ogive
FFT
WAVELET
COSPEC area-divided
FFT
WAVELET
COSPEC area-divided & f-weighted
FFT
WAVELET
More detrending or low-frequency filtering
20170909 L1
time lags [no. of points]
frequency [Hz]
wavelength [m]

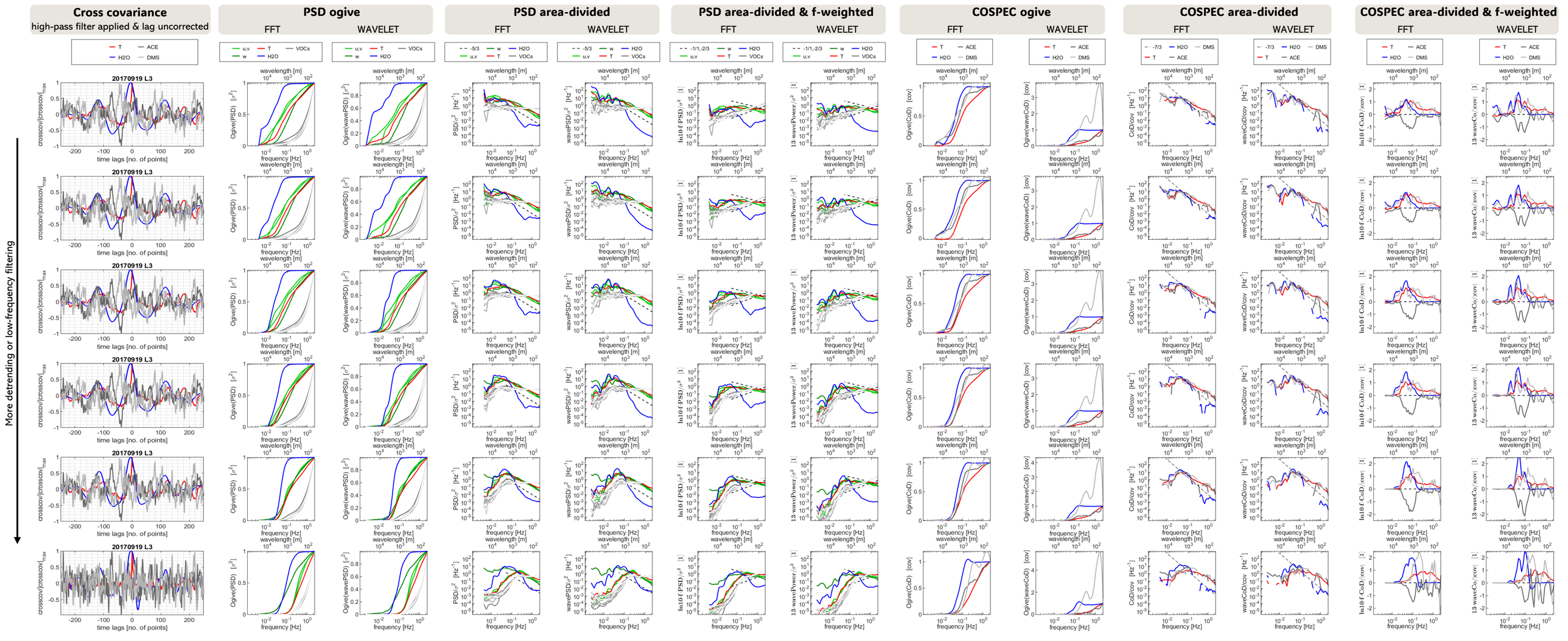

Cross covariance
high-pass filter applied & lag uncorrected
PSD ogive
FFT
WAVELET
PSD area-divided
FFT
WAVELET
PSD area-divided & f-weighted
FFT
WAVELET
COSPEC ogive
FFT
WAVELET
COSPEC area-divided
FFT
WAVELET
COSPEC area-divided & f-weighted
FFT
WAVELET
More detrending or low-frequency filtering
20170916 L1
time lags [no. of points]
frequency [Hz]
wavelength [m]


Cross covariance
high-pass filter applied & lag uncorrected
PSD ogive
PSD area-divided
PSD area-divided & f-weighted
COSPEC ogive
COSPEC area-divided
COSPEC area-divided & f-weighted
FFT
WAVELET
More detrending or low-frequency filtering
20170916 L2
time lags [no. of points]
frequency [Hz]
wavelength [m]


Cross covariance
high-pass filter applied & lag uncorrected
PSD ogive
PSD area-divided
PSD area-divided & f-weighted
COSPEC ogive
COSPEC area-divided
COSPEC area-divided & f-weighted
FFT
WAVELET
More detrending or low-frequency filtering
20170916 L3
time lags [no. of points]
frequency [Hz]
wavelength [m]
T
ACE
H2O
DMS
u,v
w
VOCs


Cross covariance
high-pass filter applied & lag uncorrected
PSD ogive
PSD area-divided
PSD area-divided & f-weighted
COSPEC ogive
COSPEC area-divided
COSPEC area-divided & f-weighted
FFT
WAVELET
More detrending or low-frequency filtering
20170919 L1
time lags [no. of points]
frequency [Hz]
wavelength [m]
T
ACE
H2O
DMS
u,v
w
VOCs


Cross covariance
high-pass filter applied & lag uncorrected
PSD ogive
PSD area-divided
PSD area-divided & f-weighted
COSPEC ogive
COSPEC area-divided
COSPEC area-divided & f-weighted
FFT
WAVELET
More detrending or low-frequency filtering
20170919 L2
time lags [no. of points]
frequency [Hz]
wavelength [m]
T
ACE
H2O
DMS
u,v
w
VOCs


Cross covariance
high-pass filter applied & lag uncorrected
PSD ogive
PSD area-divided
PSD area-divided & f-weighted
COSPEC ogive
COSPEC area-divided
COSPEC area-divided & f-weighted
FFT
WAVELET
T
ACE
H2O
DMS
u,v
w
VOCs
20170919 L3
time lags [no. of points]
wavelength [m]
frequency [Hz]
More detrending or low-frequency filtering