Workflows of Manual Analysis Helper (MAH)

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Outline

- Manual phase picking
- Source spectrum analysis
- CC clustering

1. Manual Phase Picking

- Input
  - fctlg: catalog file, just rough location would be enough
  - data_dir: directory of continuous waveform

- Output
  - fpha & fpha_hyp

Input	**Operation**	**Output**	***Notes***
fctlg & fsta	*ctlg2pha.py*	fpha_org	predicted phase arrival, need manual pick
fpha_org	cut events	events/[event_name] /[net.sta.chn].SAC	
	SAC *ppk* P/S/N in t0/1/2		only use *wh*!
events & fpha_org	*head2pha.py*	fpha	
fpha	cut events	events/[event_name] /[net.sta.chn].SAC	may repeat the manual picking process
fpha	event location	fpha_hyp	use Hypo-Interface-Py

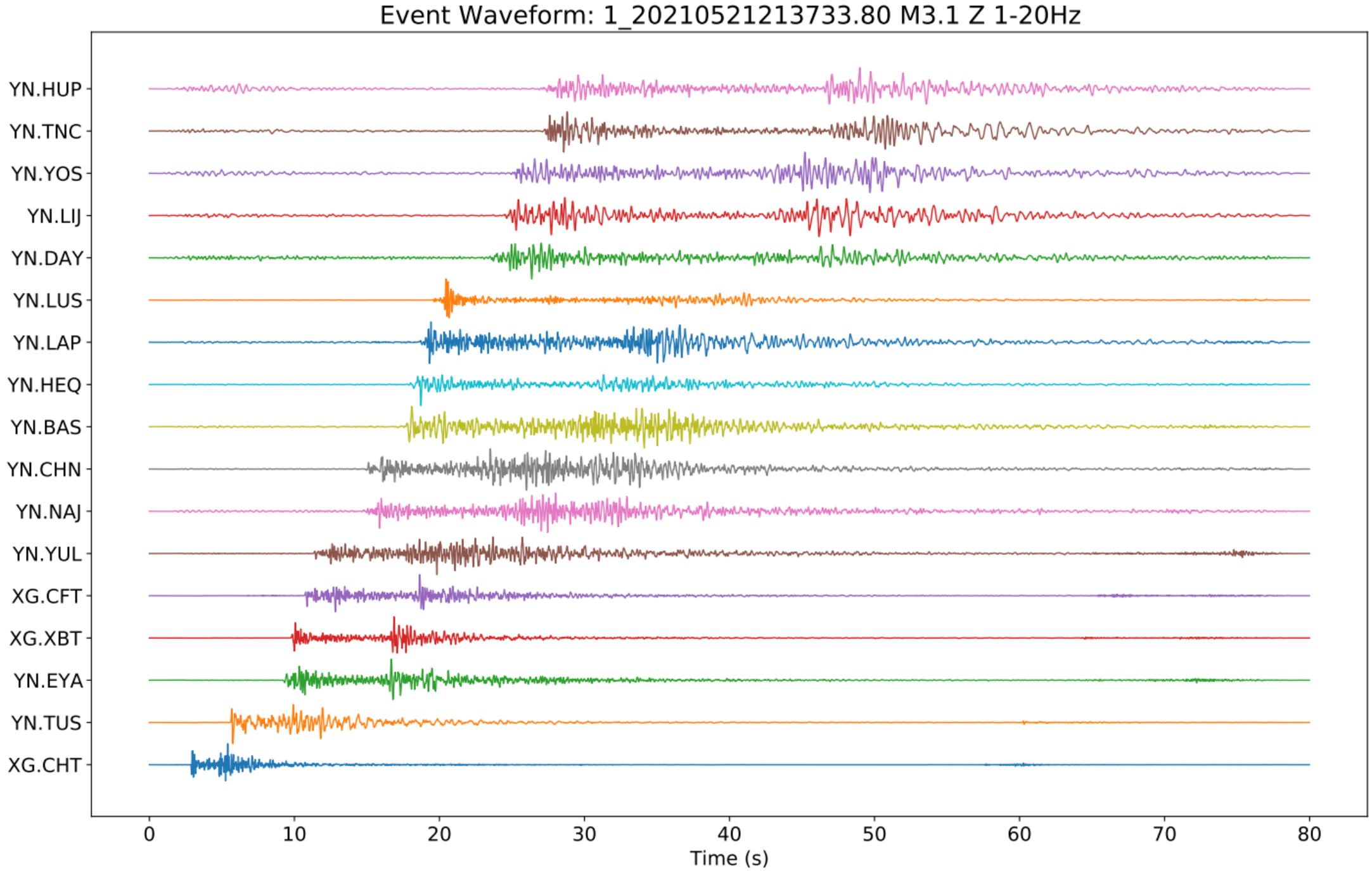
2. PLD for Source Time Function

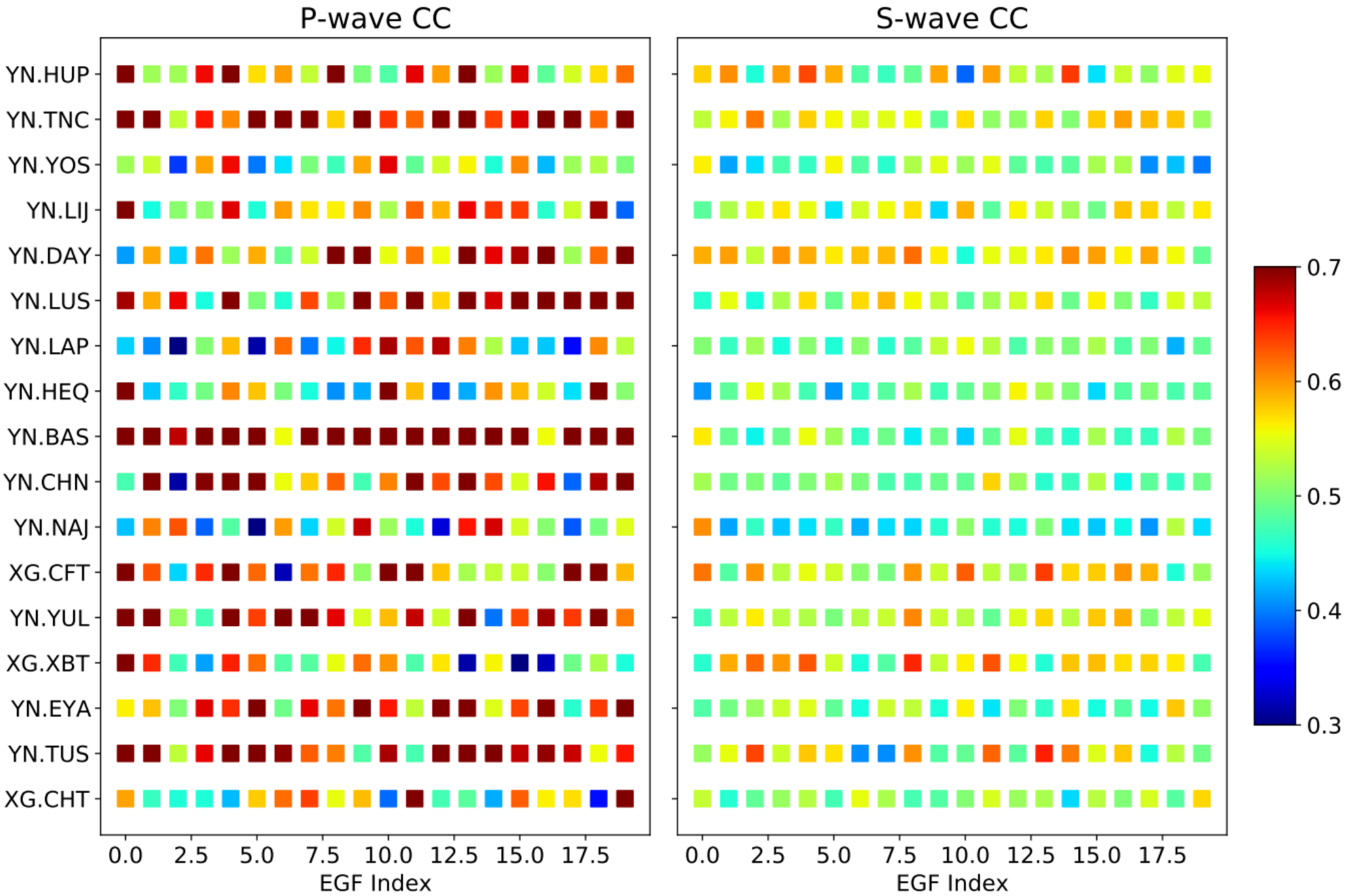
- Input
  - fctlg_tar: catalog that contains target events
  - fctlg_all: catalog that contains all available events
  - fsta: station file
  - data_dir: directory of continuous data
- Output
  - pld_stf_pha.npy

2.1 Prepare Target & EGF Event Data

Input	**Operation**	**Command**	**Output**	***Notes***
fctlg_tar & fsta	make phase file	*ctlg2pha.py*	fpha_tar_org	predicted phase arrival, need manual repick
fpha_tar_org	cut Target events	*cut_events-small.py*	input/events_tar	cut raw data
	SAC *ppk*	*head2pha.py*	fpha_tar	mark P/S/N in t0/1/2, only use *wh*
fpha_tar	cut Target events	*cut_events-small.py*	input/events_tar	optional
fpha_tar	event location		fpha_tar_hyp	optional

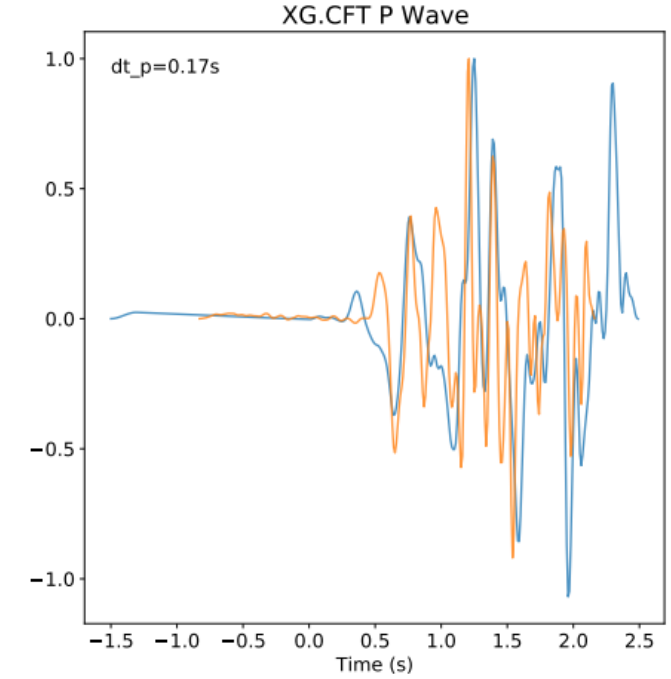
Input	Operation	Command	Output	*Notes*
fctlg_all & fsta	make phase file	*ctlg2pha.py*	fpha_all_org	predicted phase arrival, not accurate
fpha_all_org	cut events (filtered)	*cut_events-big.py*	bigdata/events	low freq_band, e.g. [0.5,5]
events_tar & events_all	CC selection	*calc_egf-cc.py*	fcc_tar-egf	no filter here
		select_egf.py	fpha_egf_org	should remain <20 EGF candidates
fpha_egf_org	inspect event waveform	*plot_waveform-events.py*	evid_name.pdf	check overall SNR of each candidate EGF
	inspect CC	*plot_egf-cc.py*	egf_cc.pdf	check overall CC of each candidate EGF
fpha_egf_org	cut events (raw data)	*cut_events-small.py*	input/events_egf	no filter here
	SAC *ppk*	*head2pha.py*	fpha_egf	optional

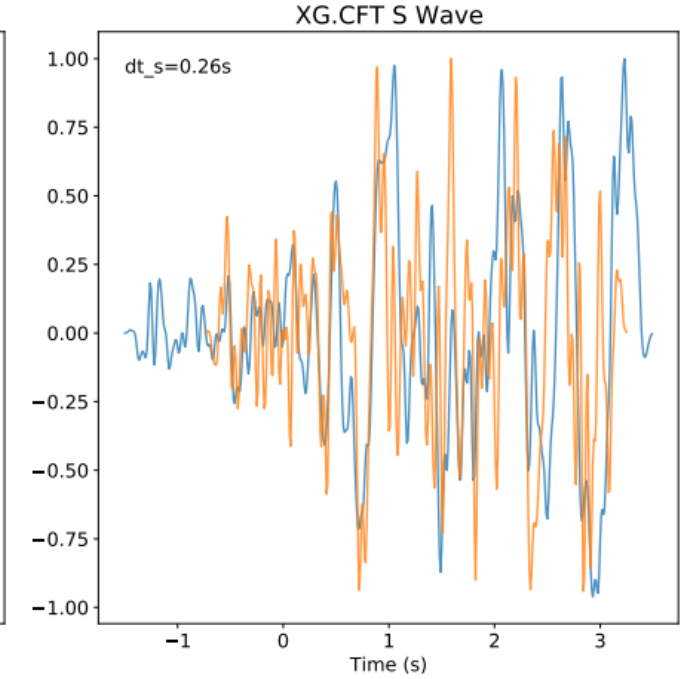

Event Waveform: 1_20210521213733.80 M3.1 Z 1-20Hz
YN.HUP
YN.TNC
YN.YOS
YN.LIJ
YN.DAY
YN.LUS
YN.LAP
YN.HEQ
YN.BAS
YN.CHN
YN.NAJ
YN.YUL
XG.CFT
XG.XBT
YN.EYA
YN.TUS
XG.CHT
0
10
20
30
40
50
60
70
80
Time (s)

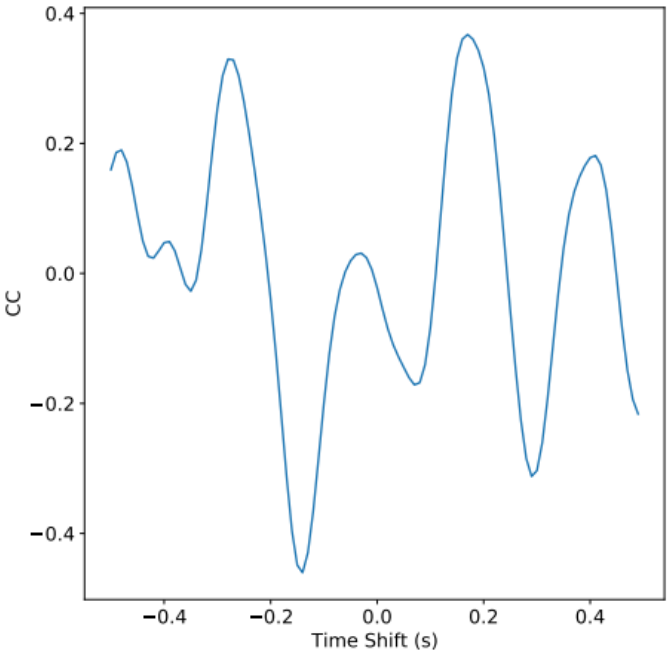

P-wave CC
S-wave CC
YN.HUP
YN.TNC
YN.YOS
YN.LIJ
YN.DAY
YN.LUS
YN.LAP
YN.HEQ
YN.BAS
YN.CHN
YN.NAJ
XG.CFT
YN.YUL
XG.XBT
YN.EYA
YN.TUS
XG.CHT
0.0
2.5
5.0
7.5
10.0
12.5
15.0
17.5
EGF Index
EGF Index
0.7
0.6
0.5
0.4
0.3

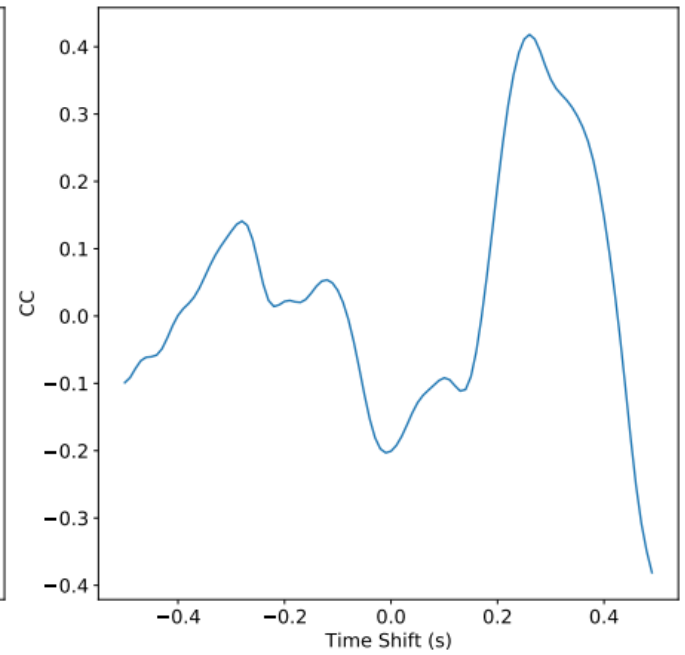
2.2 Perform PLD (for the best EGF)

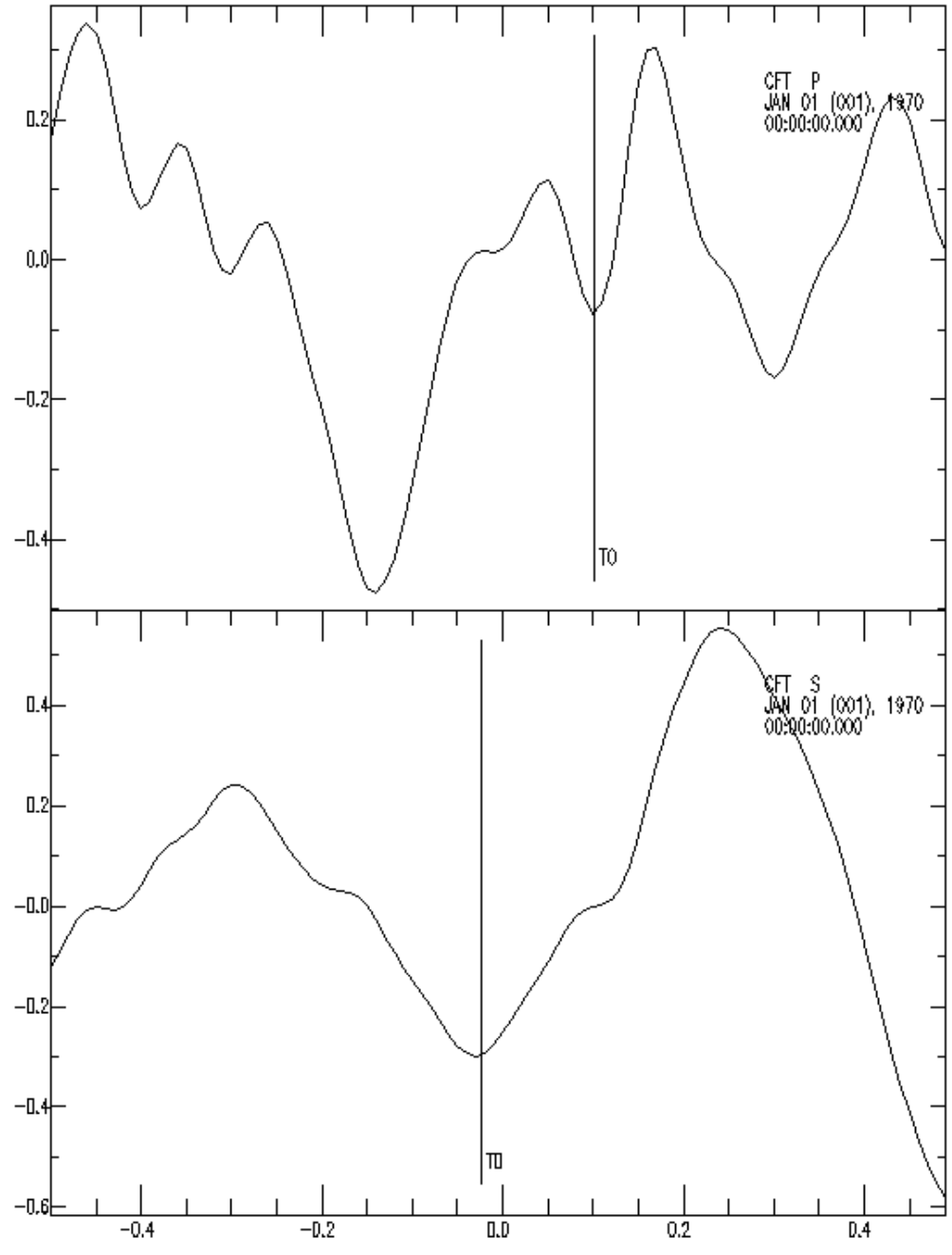
Input	Operation	Command	Output	*Notes*
events_tar & events_egf	CC alignment	*pick_cc.py*	tar/egf/ cc_sta_egf.pdf & sta/cc_pha.sac	
	manual pick CC to align tar & egf	SAC *ppk*	*t0* marks to calc *t1* marks not to calc	pick the first backward amin near global amax
cc_pha.sac	calc PLD misfit	*calc_pld-misfit.py*	tar/egf/sta pld_err_pha.sac & pld_stf_pha.sac	use SAC to pick the end time on misfit curve
	plot final PLD result	*plot_pld.py*	tar/egf/ pld_sta_pha.pdf & sta/pld_stf_pha.npy	

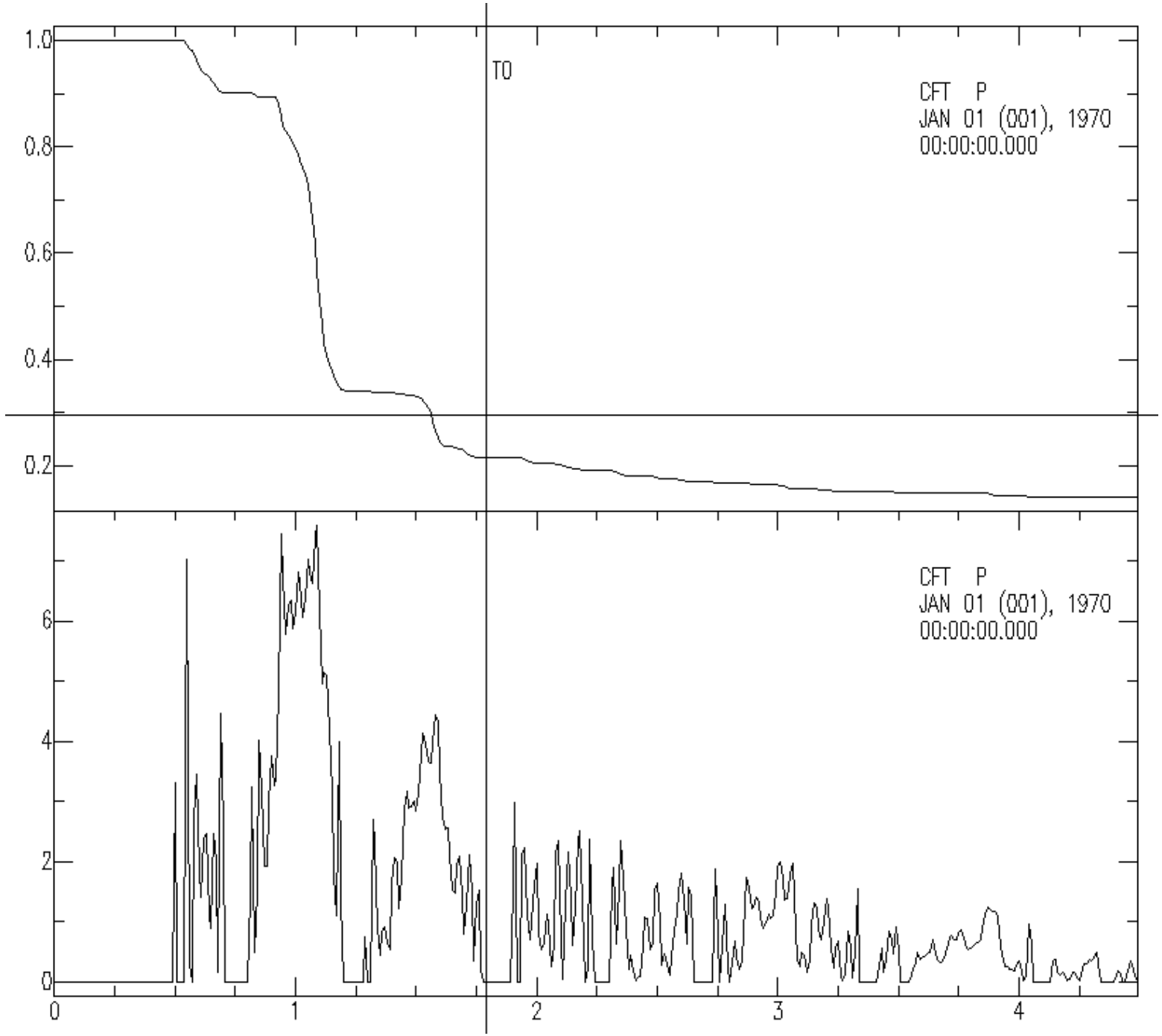

XG.CFT P Wave
dt_p=0.17s
Time (s)

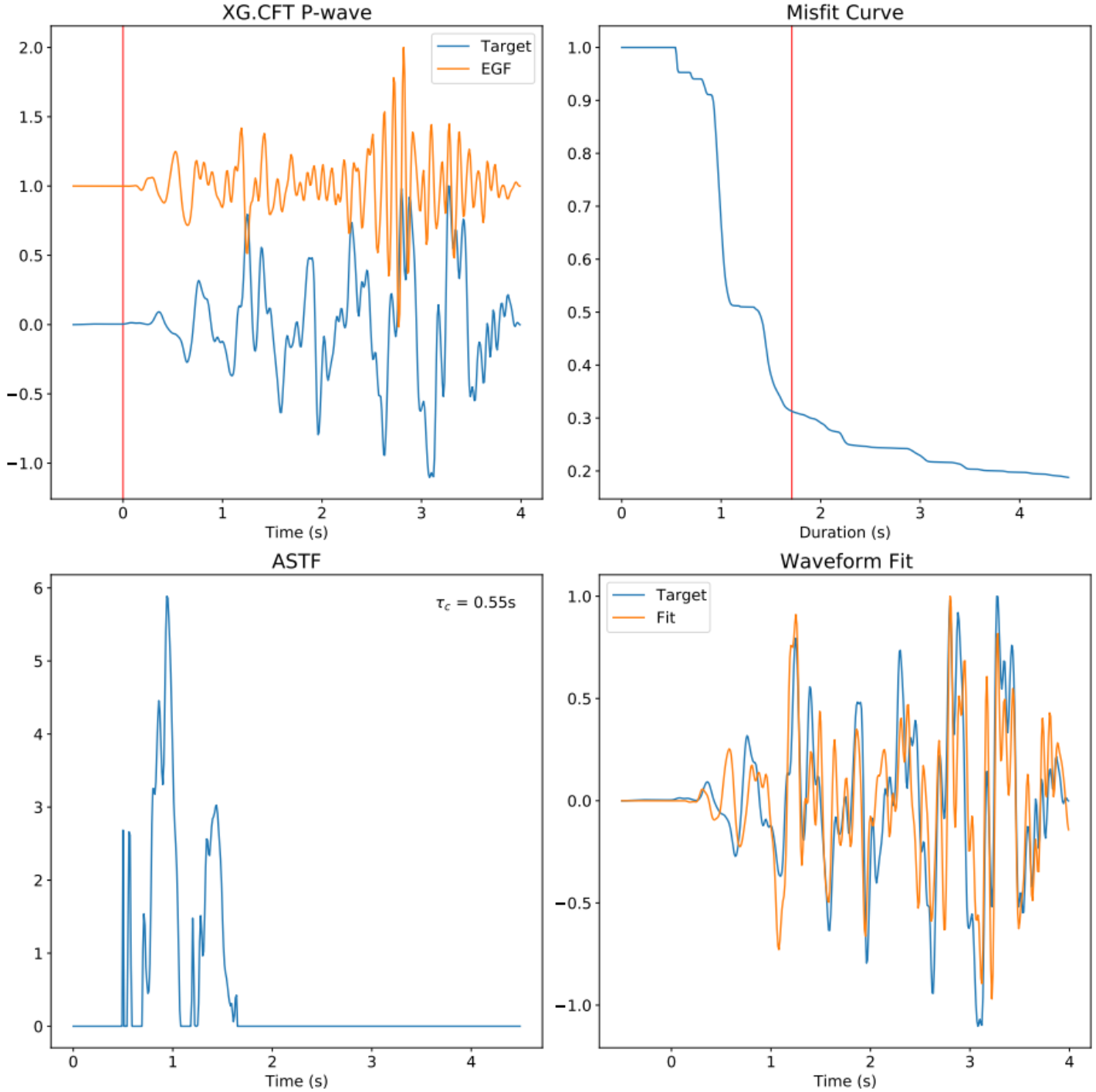

XG.CFT S Wave
dt_s=0.26s
Time (s)


CC
Time Shift (s)


CC
Time Shift (s)


CFT P
JAN 01 (001), 1970
00:00:00.000
T0
CFT S
JAN 01 (001), 1970
00:00:00.000
T0


1.0
0.8
0.6
0.4
0.2
T0
CFT P
JAN 01 (001), 1970
00:00:00.000
6
4
2
0
CFT P
JAN 01 (001), 1970
00:00:00.000
0
1
2
3
4


XG.CFT P-wave
Target
EGF
Time (s)
Misfit Curve
Duration (s)
ASTF
τ_c = 0.55s
Time (s)
Waveform Fit
Target
Fit
Time (s)