Receiver Function (RF) Calculation (Practical Example)

Input:

AMT_2009.245.07.55.01.z   *(Vertical)*

AMT_2009.245.07.55.01.n   *(N-S)*

AMT_2009.245.07.55.01.e   *(E-W)*

Create two directories RF and DATA. Copy the components (E, N, Z) in the RF and DATA directory, and follow the following procedure inside the directory RF
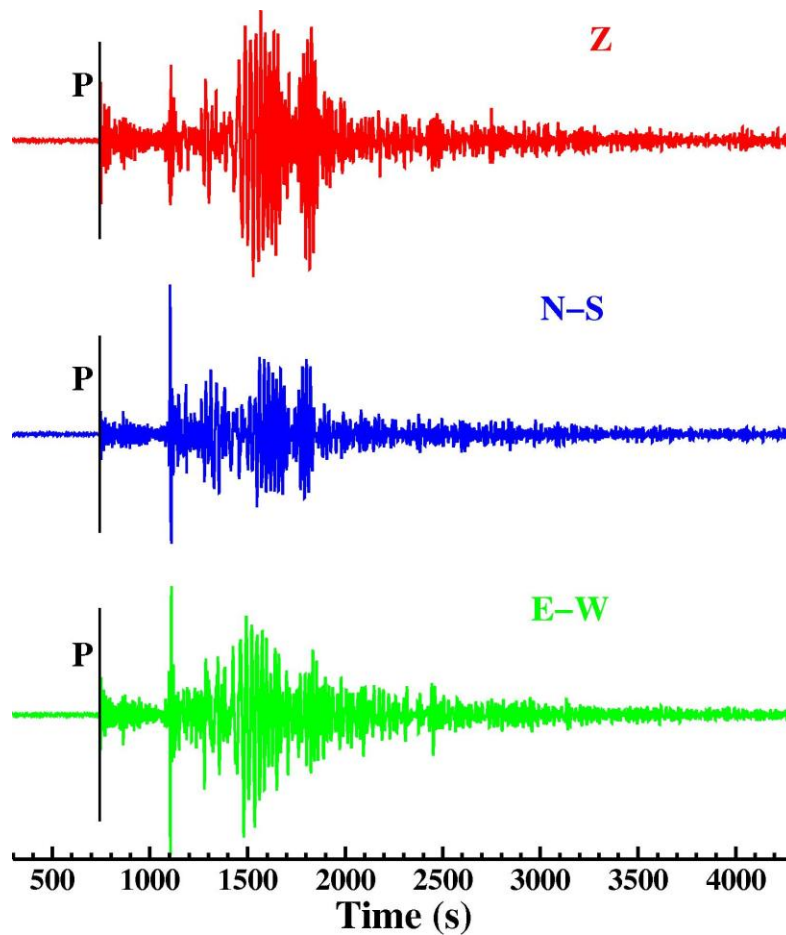
1. Mark P in the E, N and Z component

sac>r AMT_2009.245.07.55.01.z AMT_2009.245.07.55.01.n AMT_2009.245.07.55.01.e

sac>ppk markall   # Mark P using T0 marker

sac>decimate 2   # If 50 samples i.e. delta=0.02sam/s, otherwise no decimation

sac>wh

sac>w over

2. Processing for Vertical (Z) and Horizontal (E and N) and then rotation

sac>r AMT_2009.245.07.55.01.z AMT_2009.245.07.55.01.n AMT_2009.245.07.55.01.e

sac>cut T0 -30 120

sac>r

sac>cut off

sac>rmean   # Remove mean

sac>rtrend   # Remove trend

sac>w AMT_2009.245.07.55.01.z AMT_2009.245.07.55.01.n AMT_2009.245.07.55.01.e

sac>r AMT_2009.245.07.55.01.z AMT_2009.245.07.55.01.n AMT_2009.245.07.55.01.e

sac>bp co .05 1 p 2   # Band pass filter with corner Freq. 0.05 and 1 and pole 2

sac>w over

###Rotation of Horizontal (N and E)

sac>r AMT_2009.245.07.55.01.n AMT_2009.245.07.55.01.e

sac>rotate to gcarc

sac>w AMT_2009.245.07.55.01.r AMT_2009.245.07.55.01.t
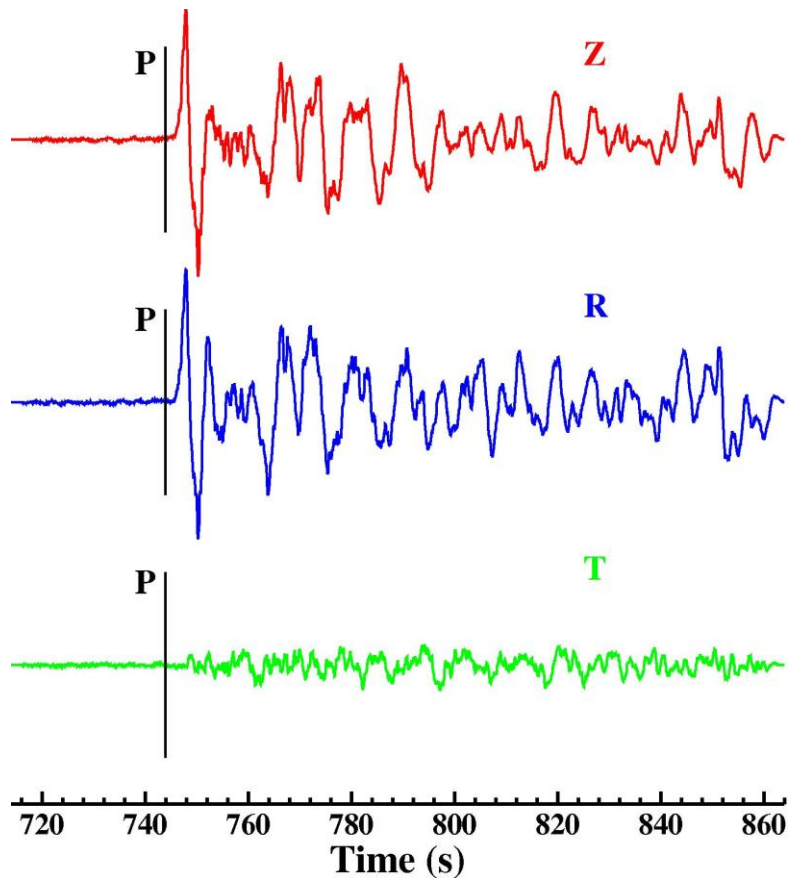
3. RF calculation using iterdecon

#Radial RF

iterdecon<<!

AMT_2009.245.07.55.01.r

AMT_2009.245.07.55.01.z

200

5

0.001

1.6

1

0

!

mv decon.out AMT_2009.245.07.55.01.eqr

#Transverse RF

iterdecon<<!

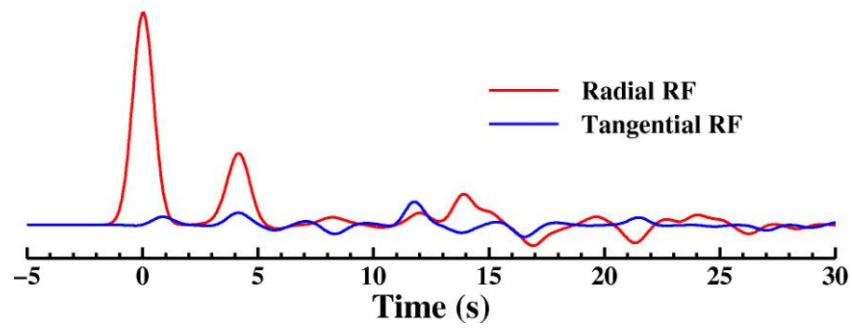AMT_2009.245.07.55.01.t

AMT_2009.245.07.55.01.z

200

5

0.001

1.6

1

0

!

mv decon.out AMT_2009.245.07.55.01.eqt

Calculation of Crustal Thickness/Moho (H) and Vp/Vs ratio

Crust and mantle structure across the Basin and Range–Colorado Plateau boundary at 37°N latitude and implications for Cenozoic extensional mechanism

George Zandt,[1] Stephen C. Myers, and Terry C. Wallace

Southern Arizona Seismic Observatory, Department of Geosciences, University of Arizona, Tucson

---

For details see the above reference

$$H = \frac{t_{Ps} - t_P}{\sqrt{V_s^{-2} - p^2} - \sqrt{V_p^{-2} - p^2}}$$

$$\frac{V_p}{V_s} = \left\{ (1 - p^2 V_p^2) \left[2 \left(\frac{t_{Ps} - t_P}{t_{PpPms} - t_{Ps}} \right) + 1 \right]^2 + p^2 V_p^2 \right\}^{1/2}$$

From the RF (AMT_2009.245.07.55.01.eqr) find the Ps (t_{Ps}) and PpPms (t_{PpPms}) timings. Here ray-parameter $p=0.075$ s/km. Find *Vp/Vs* first for different values of Vp (6.3, 6.4 and 6.5 km/s) and then find *H* using above two formulae. Make a table as below

Vp (km/s)	t_{Ps} (s)	t_{PpPms} (s)	Vp/Vs	H (km)
6.3	??	??	??	??
6.4	??	??	??	??
6.5	??	??	??	??