Data and Codes backup for my cardinal Ph.D. projects

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\*\*\*Note: Naturally, this document does not outline all the work nor all the components of each research project (nor the entire backup I created after defending). Due to being part of a large research group exploiting data from large-N deployments with significant storage demand, some of the paths inside the codes might not be up to date, since I had to split between different PI-owned and temporary/vast CHPC storage. Please use the paths outlined in this document. Please understand that some codes cannot be compiled in thc future due to both hardware and software updates. Please use codes of un-published materials diligently. If any of the pleas above didn’t work, send me an email at gkogkaskonstantinos@gmail.com . In all conscience, you have been warned of potential issues.

1. Salt Lake City 2018 array (linear component)

Scientific targets: high resolution imaging of the East Bench Fault in Salt Lake City with unprecedented resolution, testing ambient noise double-beamforming tomography in an urban metropolis far from the ocean microseism.

Data

The raw data for this array (linear and 2-D component) can be found at:

Codes and processing files

All\* project files from this project files have been lost due to a massive RAID system failure. \*Local (i.e., USB) back-up exists and includes some of the codes used and the surface wave (Rayleigh and Love) measurements and 1-D Vs inversions (linear or Bayesian).

2. Southern California Regional Tomography with Radial Anisotropy constraints

Scientific targets: model parameter trade-offs between isotropic and anisotropic assumptions, obtain isotropic and anisotropic Vs model for Southern California at shallow depths.

All progress was lost due to a massive RAID system failure. Please contact me at gkogkaskonstantinos@gmail.com for inquiries (e.g., how to set the MCMC inversion to handle radial anisotropy as a free parameter.).

3. Ridgecrest Earthquake Imaging for Surface Wave measurement validation in SoCal

Scientific targets: exploit the wavefield excited by the recent Ridgecrest earthquakes and recorded by both permanent and triggered stations in SoCal (highest regional imaging resolution to date), compare earthquake and ambient-noise derived surface wave measurements.

Data

The waveforms can be found at: /uufs/chpc.utah.edu/common/home/flin-group5/kostas/Ridgecrest

Codes

Single beamforming

The single beamforming code can be found at :/uufs/chpc.utah.edu/common/home/u1249039/TT\_SB\_socal\_r6.m

Energy packet separation based on particle motion (many and different approaches, reach out to me for details)

We tried many things due to the complexity of the observed Rayleigh wave in the Los Angeles basin. The codes can be found at:

/uufs/chpc.utah.edu/common/home/u1249039/LAbasin\_scripts/

4. Alaska USArray imaging

Scientific targets: refinement of the Berg et al., 2020 model, shallow Vp/Vs imaging, density imaging with observed Bouguer anomaly gravity measurements, better understanding the regional Moho structure variation and impedance contrast between the lower crust/upper mantle.

Data

The ‘data’ (inversion measurements) can be found at each inversion directory.

Codes

Inversion

Vp/Vs as a free parameter (Rayleigh wave phase velocity, ellipticity and Receiver Function):

/uufs/chpc.utah.edu/common/home/u1249039/AlaskaTA\_scripts/MCMC\_CODES\_BASIC

Vp/Vs as perturbational parameter (Rayleigh wave phase velocity, ellipticity and Receiver Function):

/uufs/chpc.utah.edu/common/home/u1249039/AlaskaTA\_scripts/MCMC\_CODES\_VPVS\_SCALED

Vp/Vs including gravity measurements:

/uufs/chpc.utah.edu/common/home/u1249039/AlaskaTA\_scripts/MCMC\_CODES\_vpvs\_rho\_grav\_v2

Same as above, including density as a free parameter:

/uufs/chpc.utah.edu/common/home/u1249039/AlaskaTA\_scripts/MCMC\_CODES\_vpvs\_rho\_grav

Vp/Vs as a free parameter (Rayleigh wave phase velocity, ellipticity and refined Receiver Function Ps time):

/uufs/chpc.utah.edu/common/home/u1249039/AlaskaTA\_scripts/MCMC\_CODES\_Ps

Measurement correction

Receiver Function Moho Ps time and amplitude correction based on raw RF smoothing and correlation with Rayleigh wave phase velocity:

/uufs/chpc.utah.edu/common/home/u1249039/TA\_RF/histo\_RF\_A0\_PsA.m

5. Los Angeles 2022 (LAB2022) nodal array

Scientific targets (amongst many): high resolution 3-D imaging of the Los Angeles Basin with unprecedented resolution, higher mode Rayleigh wave ellipticity measurement, surface wave (Rayleigh and Love) fundamental mode phase velocity measurement, Rayleigh wave ellipticity measurement, azimuthal anisotropy of obtained measurements.

\*\*\*This is a long work in progress with some components of it currently drafted for publication. I first worked on linear arrays. and then combined the 2-D ‘shotgun’ array, the 2015 LASSIE array and permanent networks (2015 and 2022) of the regional SoCal array grid. ALLX below is the abbreviation for all arrays.

Data

2-D ‘shotgun’ (SG, deployed by Utah) array component:

/uufs/chpc.utah.edu/common/home/flin-group6/kostas/SAC\_SG

West Line (WL, deployed by Caltech) array component:

/uufs/chpc.utah.edu/common/home/flin-group6/kostas/CALdata

East Line (EL, deployed by UCRiverside) array component:

/uufs/chpc.utah.edu/common/home/flin-group6/kostas/UCR\_SAC

Regional SoCal stations miniseeds:

/uufs/chpc.utah.edu/common/home/flin-group6/kostas/SoCal\_2023/Jun

This array was augmented with the LASSIE 2014 (network codes XI, ZY) array. The data (regional and nodal array), can be found at: /uufs/chpc.utah.edu/common/home/flin-group7/kostas/LASSIE , while the cross-correlations can be found at: /uufs/chpc.utah.edu/common/home/flin-group7/kostas/LASSIE/PreProcessing/2014/Oct/COR\_ZEN

Data analysis and processing

Regional and nodal array cross-correlations (2022): /uufs/chpc.utah.edu/common/home/flin-group7/kostas/SoCal\_CCs/DATA

West Line cross-correlations:

/uufs/chpc.utah.edu/common/home/flin-group6/kostas/CC\_WL/stack\_all

East Line cross-correlations:

/uufs/chpc.utah.edu/common/home/flin-group6/kostas/CC\_EL/stack\_all

Love wave double beamforming for phase velocity measurement (WL and EL) code:

/uufs/chpc.utah.edu/common/home/u1249039/db\_WLxcut\_1\_TT.m

Rayleigh wave double beamforming for multi-mode phase velocity and ellipticity measurement (WL and EL) code:

/uufs/chpc.utah.edu/common/home/u1249039/db\_WLxcut\_2\_ZZ\_hmode\_no41\_boosted.m

Single beamforming for long-period Rayleigh wave ellipticity and phase velocity measurement (WL) code:

/uufs/chpc.utah.edu/common/home/u1249039/

4-component (\*new) single-beamforming for long-period Rayleigh wave ellipticity and phase velocity measurement (WL) code:

/uufs/chpc.utah.edu/common/home/u1249039/

Rayleigh wave ellipticity measurement (ALLX):

/uufs/chpc.utah.edu/common/home/u1249039/hv\_socal\_all\_upd2.m

Rayleigh wave ellipticity sorting/criteria (ALLX):

/uufs/chpc.utah.edu/common/home/u1249039/XMEAN\_sort\_newcc\_final\_append.m

/uufs/chpc.utah.edu/common/home/u1249039/XMEAN\_shotgun\_newcc\_boosted\_ultimate.m

Rayleigh wave ellipticity azimuthal anisotropy (ALLX):

/uufs/chpc.utah.edu/common/home/u1249039/Xangle\_hv\_FINAL\_PAPER\_lowhv.m

Off-great-circle propagation correction for Rayleigh wave ellipticity (ALLX) measurement code:

/uufs/chpc.utah.edu/common/home/u1249039/hv\_socal\_all\_rotation\_r14x\_v2.m

Eikonal tomography (ALLX) wavefield travel-time snapshot extraction:

/uufs/chpc.utah.edu/common/home/u1249039/eiko\_group.m

Eikonal tomography (ALLX) criteria and measurement:

/uufs/chpc.utah.edu/common/home/u1249039/eiko\_group\_long\_clean.m

Community Velocity Model predictions (use \*.lst for station lists):

/uufs/chpc.utah.edu/common/home/flin-group6/kostas/CVM/fwd\_vhalfspace

Community Velocity Model kernel calculations:

/uufs/chpc.utah.edu/common/home/flin-group6/kostas/CVM/kern

Community Velocity Model refinement inversions:

/uufs/chpc.utah.edu/common/home/flin-group6/kostas/CVM/MCMC