Earth Resources Laboratory

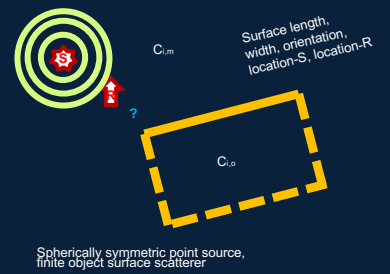
Student and Postdoc Introductions

Samiya A. Alkhairy

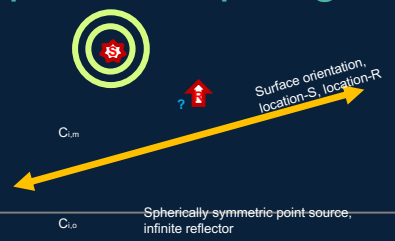
ExxonMobil Postdoctoral Fellow
Toksoz/Demanet; Ravela Groups
PhD MIT, 2017

DETERMINING & UTILIZING FREQUENCY-DEPENDENCE OF SCATTERED SEISMIC SIGNALS FOR FINITE OBJECTS

- Conventional scatterer theory has limitations
- Determine frequency and parameter conditions for conventional scatterer theory
- Develop *frequency-dependent* theory to account for conventional scatterers and also handle finite objects (less idealized)

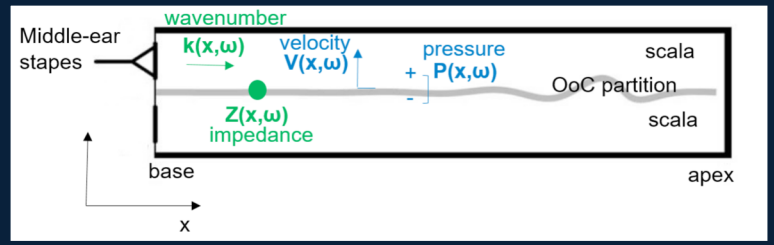


- Analytic modeling, numerical testing
- May be useful for object-centric modeling frameworks, determining depth and dip angle of layer

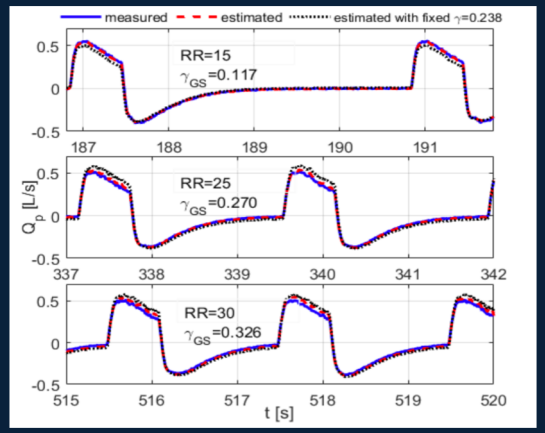


ANALYTIC MODELING AND MODEL-BASED ESTIMATION AND CHARACTERIZATION OF TRANSPORT SYSTEMS

- Analytic model of the cochlea and functional interpretations



- Model-based estimation of respiratory-ventilator parameters and latent variables

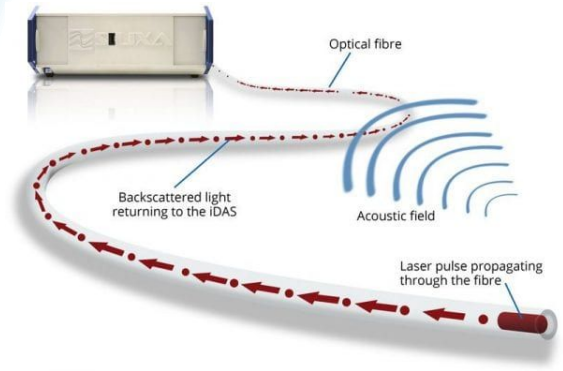


Hilary Chang

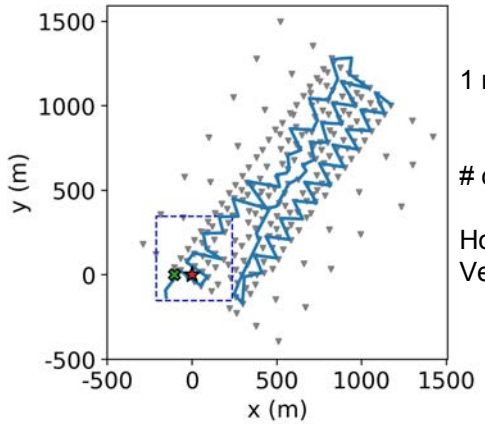
Graduate student working with Dr. Nori Nakata
BSc, Memorial University of Newfoundland, 2019

CURRENT RESEARCH INTERESTS

- **Monitoring temporal changes in structure using Distributed Acoustic Sensing (DAS)**
- **Analyzing Brady Geothermal Field, Nevada**
- **Comparing with temperature/pressure variations**



Silixa.com



1 m spacing

# of Recordings:

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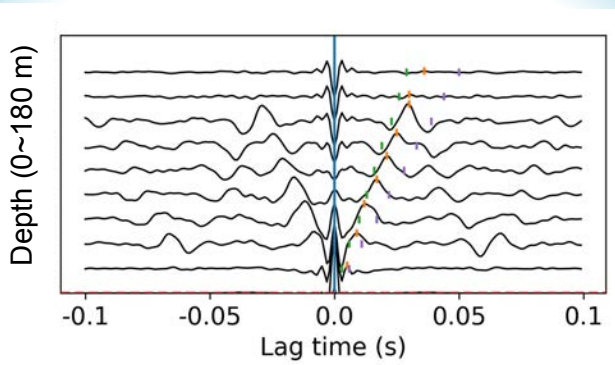
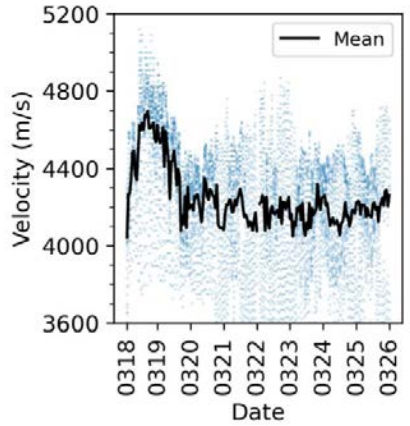
Vertical: 374





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Aarti Dwivedi

PhD Candidate working with Prof. Thomas Herring
Integrated M.Tech Geophysics, IIT Roorkee, 2016
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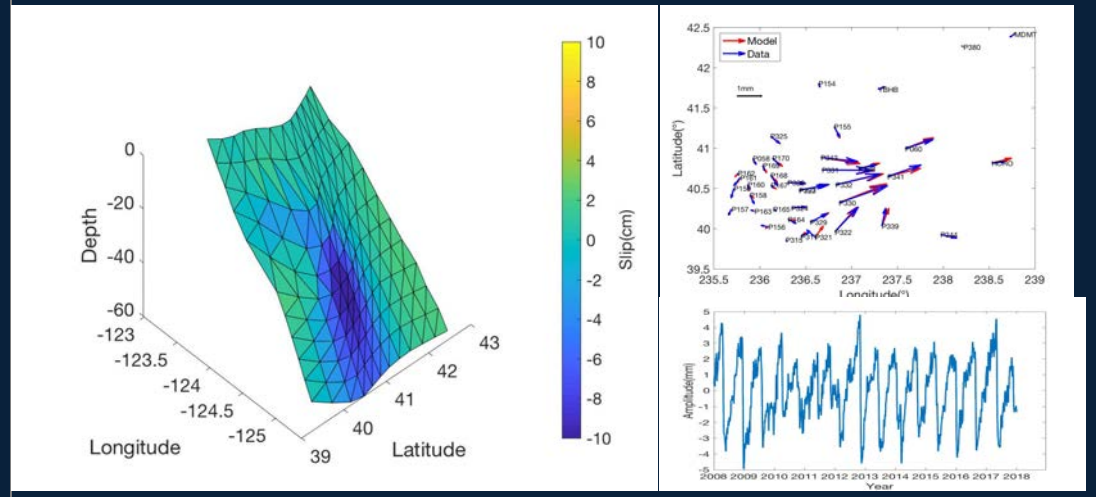
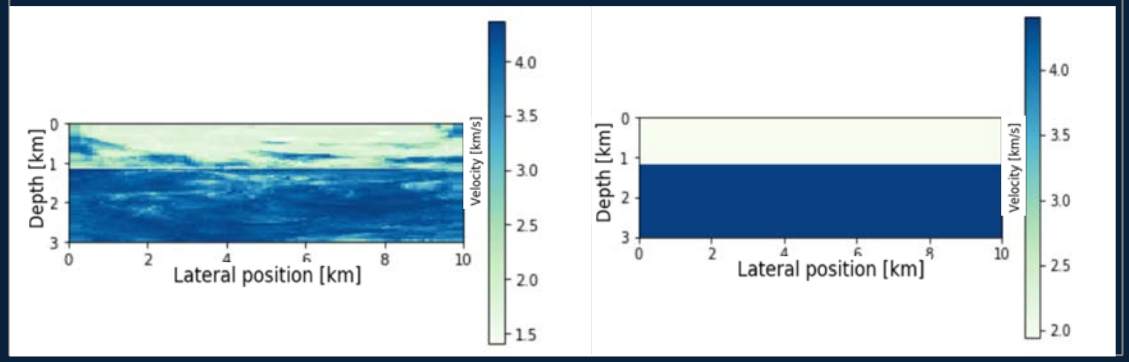
CURRENT RESEARCH INTERESTS

1. **SLOW-SLIP EVENTS IN NORTHERN CALIFORNIA**
2. **MACHINE LEARNING APPROACH TO BUILDING INITIAL VELOCITY MODEL FOR FULL WAVEFORM INVERSION (DR. SAI RAVELA)**



PAST RESEARCH INTERESTS

1. **CHARACTERIZATION OF TSUNAMIGENIC SOURCES USING REAL TIME WATER LEVEL INVERSION.**
2. **INVERSION OF EM DATA USING IMMERSED INTERFACE METHOD**
3. **CRUSTAL DEFORMATION OF ANTARCTICA**

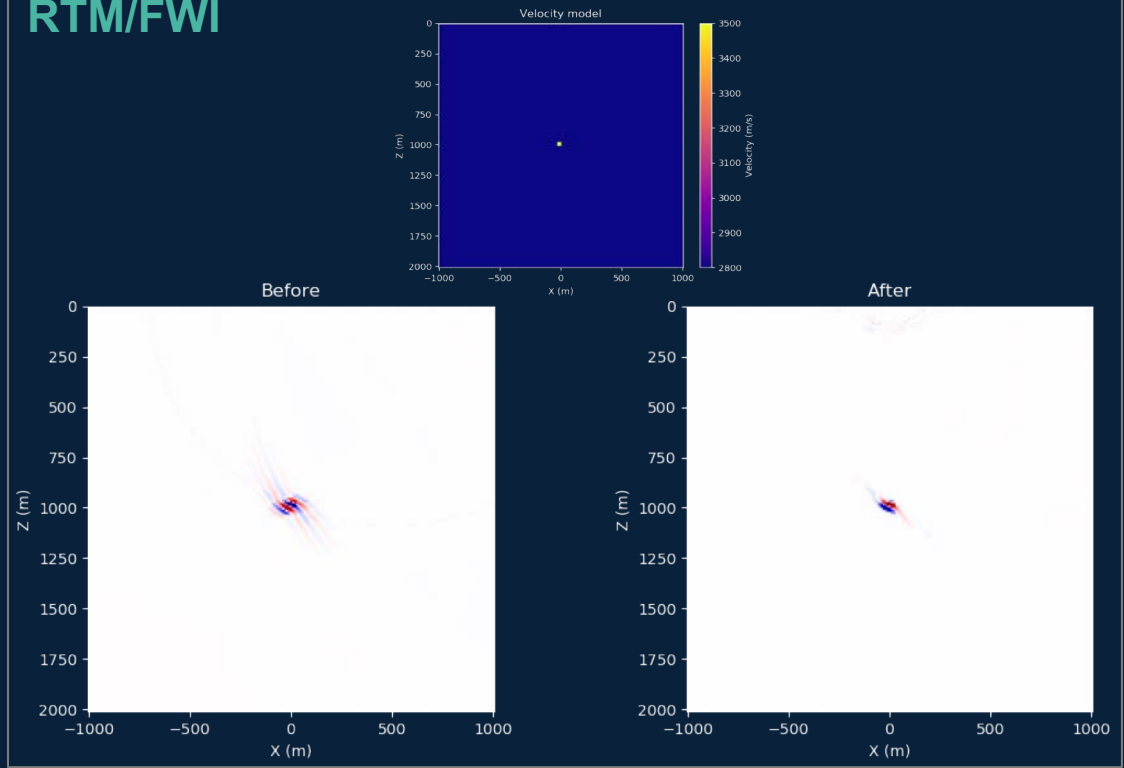


Sarah Greer

PhD Candidate working with Prof. Demanet
DOE Computational Science Graduate Fellow
B.S. Geophysics & B.S. Mathematics, UT Austin, 2018

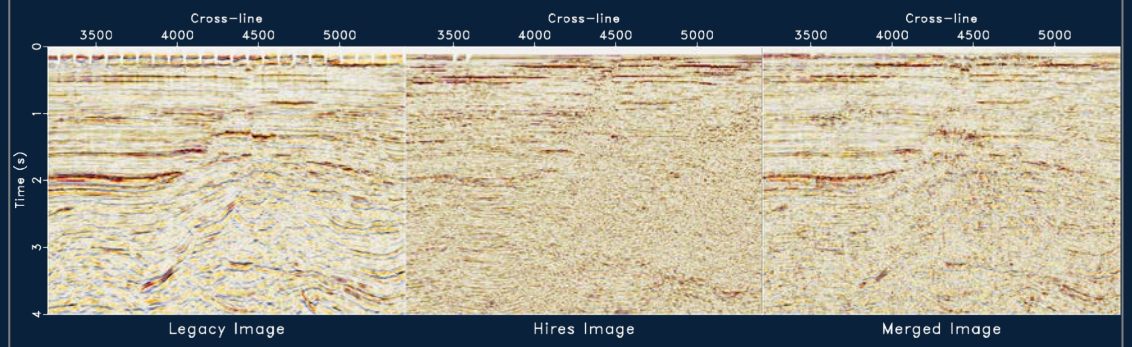
CURRENT RESEARCH INTERESTS

SUPERRESOLUTION IMAGING CONDITION FOR RTM/FWI



PAST RESEARCH INTERESTS

- **DATA MATCHING ALGORITHMS**
- **MATCHING AND MERGING SEISMIC DATA OF DIFFERENT RESOLUTIONS**
- **LEAST-SQUARES RTM PRECONDITIONING BY DATA MATCHING**
- **PRE-STACK ZERO-PHASE CORRECTIONS**



Jing Jian

Graduate student working with Prof. Rob van der Hilst
B.Sc, Colorado School of Mines, 2018

CURRENT RESEARCH INTERESTS

[SEISMIC IMAGING OF MTZ]

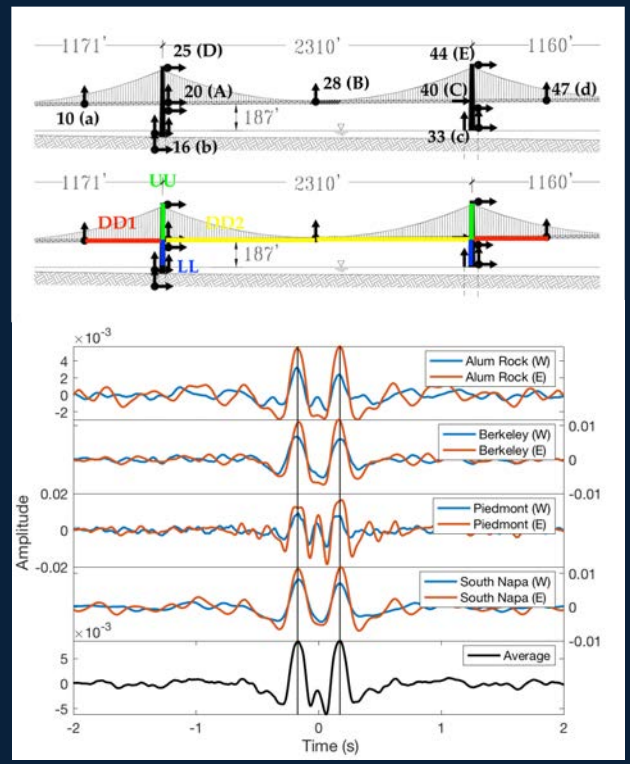
- Both S and P waves
- Different geological settings
- Mantle convection mechanisms

[SIGNAL PROCESSING]

- Sparsity
- Compressed sensing and quantization
- Non-linear approximation

PAST RESEARCH INTERESTS

[SEISMIC DECONVOLUTION INTERFEROMETRY]



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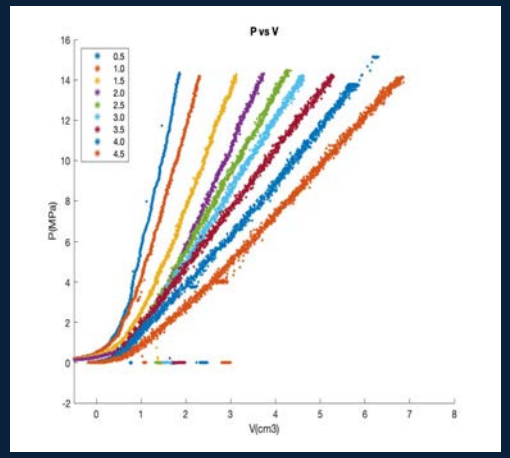
Magreth Kakoko

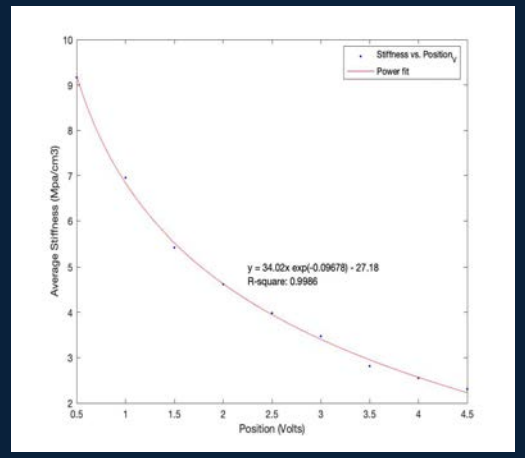
Undergraduate Student,
working with Prof. H. H Einstein

CURRENT RESEARCH INTERESTS

P-V CURVES FOR UNLOADED SYSTEM AT DIFFERENT PISTON POSITIONS



COMPLIANCE AT DIFFERENT POSITIONS

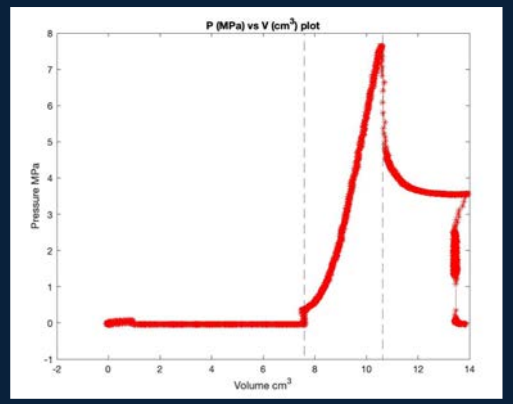


CURRENT RESEARCH INTERESTS

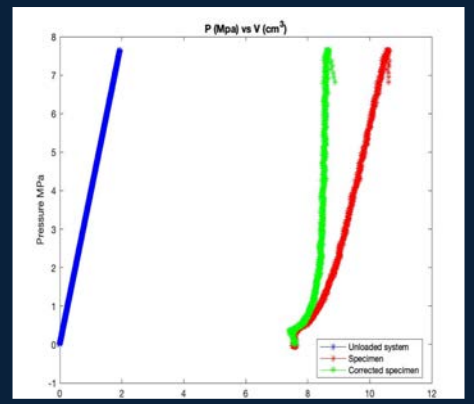
PROJECT OBJECTIVES

- Determine and isolate PVA system contribution to the measured compliance and work done of the specimen

PV CURVE FOR 1 RUN



CORRECTED PV CURVE

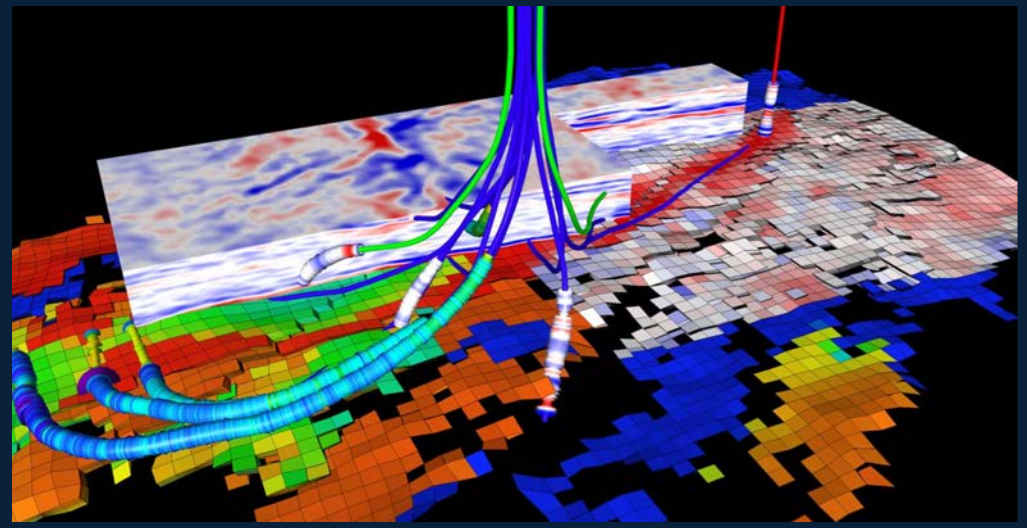


Brindha Kanniah

PhD Student working with Prof. Demanet
MSc., Earth and Planetary Sciences, MIT, 2019
BSc., Physics, MIT, 2019

CURRENT RESEARCH INTERESTS

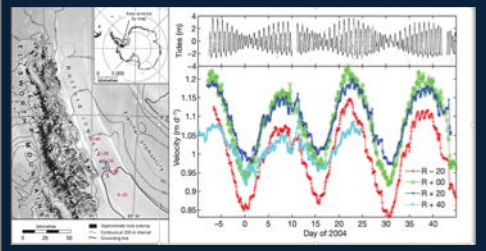
FULL WAVEFORM INVERSION AND DEEP LEARNING FOR 4D SEISMIC (TIME-LAPSE ANALYSIS)

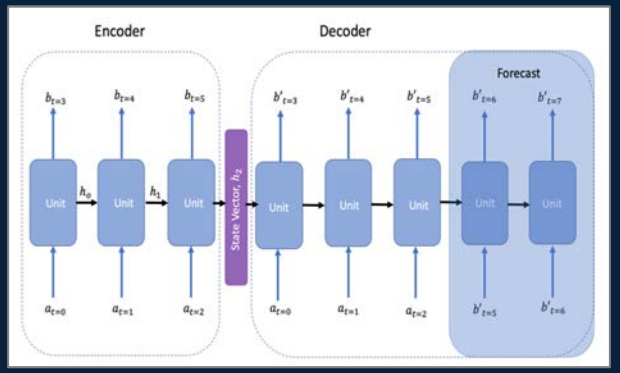


Dynamic Graphics, INC

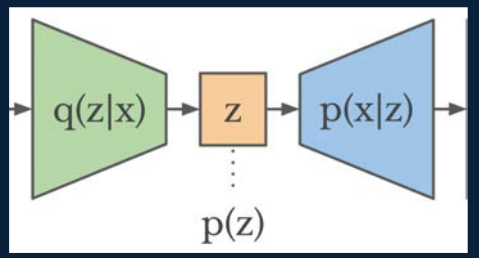
PAST RESEARCH INTERESTS

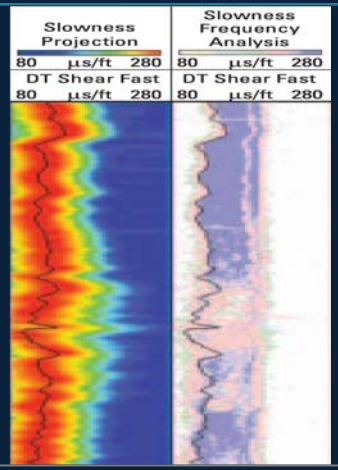
EAPS





Schlumberger





Paris Smalls

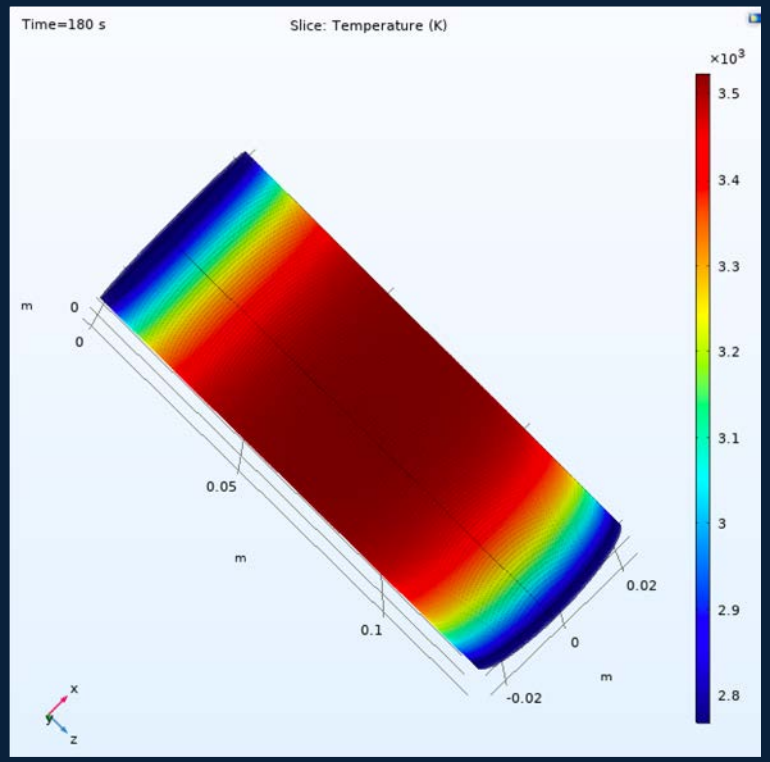
PhD Candidate working with Prof. Einstein
B SC.Geophysics, University of South Carolina, 2016

CURRENT RESEARCH: ELECTRIC ROCK FRACTURING

ELECTRIC ROCK FRACTURING

-ELECTRIC CURRENT/PULSED ELECTRIC SHOCKWAVES

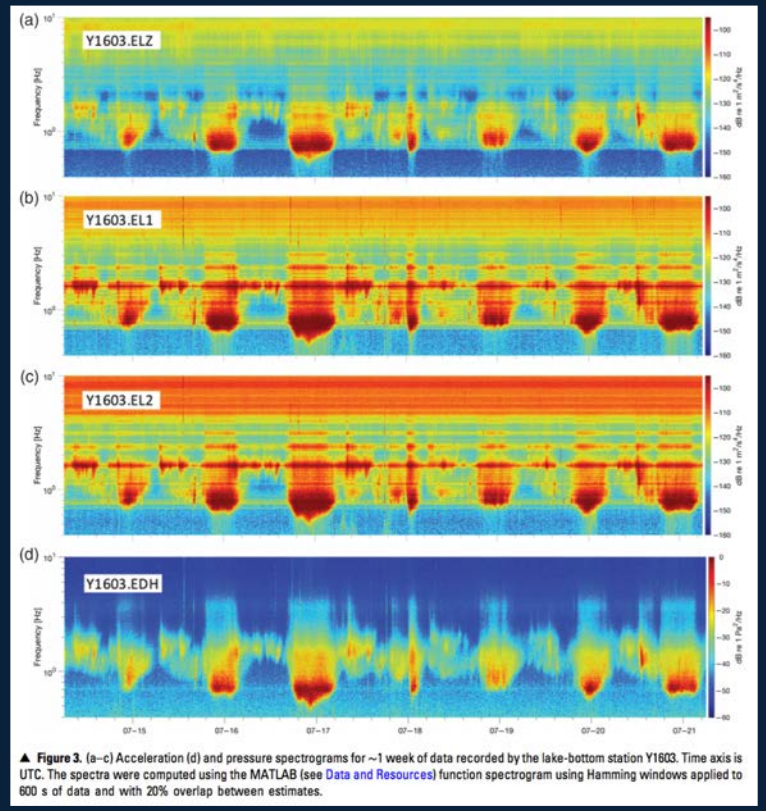
-JOULE HEATING/THERMAL STRESS MODELING



PREVIOUS RESEARCH: MICROSEISMIC ANALYSIS

LAKE BOTTOM SEISMIC DATA (YELLOWSTONE)

-ANALYED MICROSEISMICITY IN HYDROTHERMAL VENTS



▲ **Figure 3.** (a–c) Acceleration (d) and pressure spectrograms for ~1 week of data recorded by the lake-bottom station Y1603. Time axis is UTC. The spectra were computed using the MATLAB (see Data and Resources) function spectrogram using Hamming windows applied to 600 s of data and with 20% overlap between estimates.

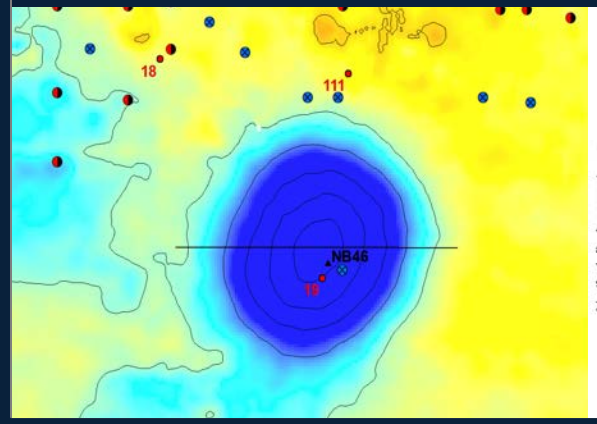
Anuar Togaibekov

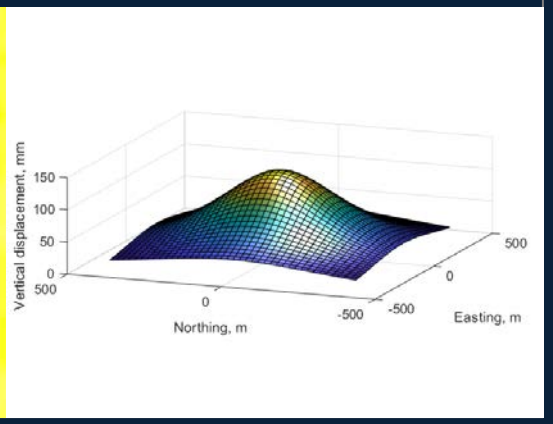
Masters Student working with Professor Thomas Herring
MS in Geodesy, Satbayev University, 2013
BS in Geodesy and Cartography, Satbayev University, 2011

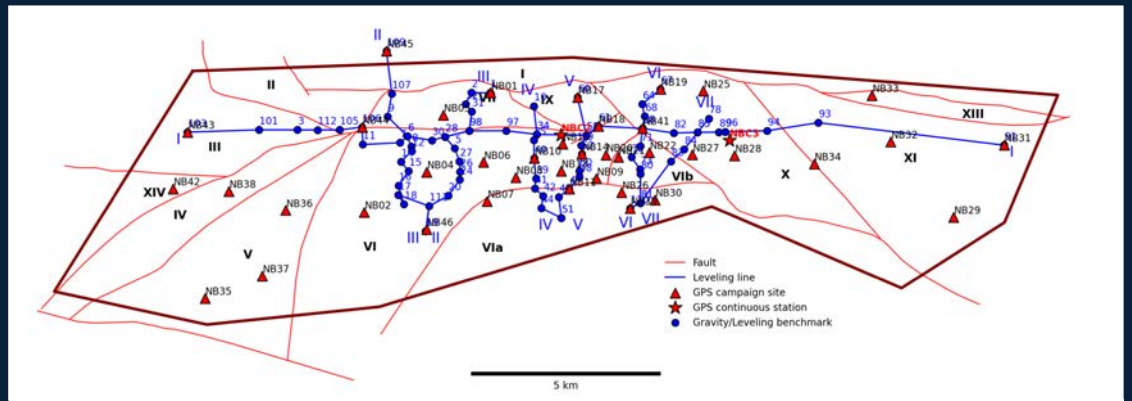
CURRENT RESEARCH INTEREST: GEODETIC MONITORING OF OIL-PRODUCTION-INDUCED SUBSIDENCE AND UPLIFT

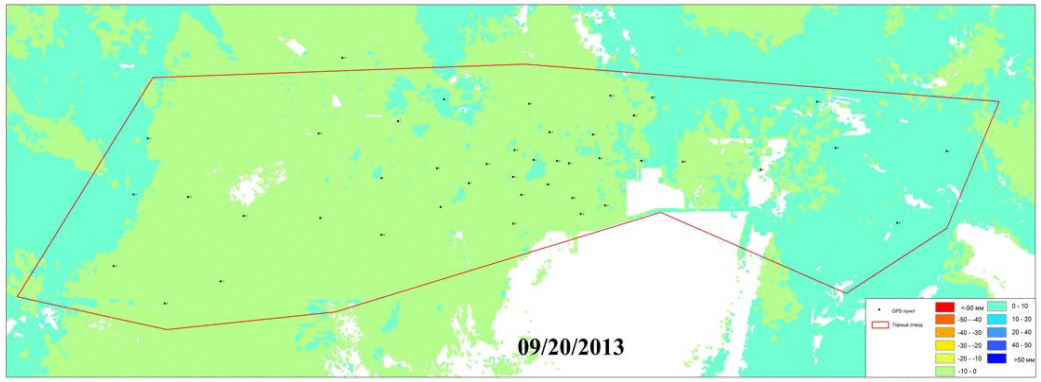
DATA SET:

- GPS (campaign and continuous)
- InSAR (Cosmos-SkyMed, ALOS PALSAR)
- Gravimetric measurements
- Precise levelling survey









Mohamad Zaarour

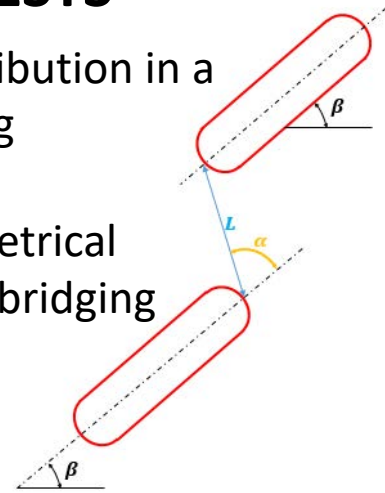
BIBLIOGRAPHY

- Master student in Civil Engineering at Ecole Polytechnique Fédérale de Lausanne (EPFL);
- Specialization: Geotechnical Engineering;
- Obtained my Bachelor of Engineering (BEng) in Civil and Environmental Engineering (CEE) from the American University of Beirut (AUB) [2018];
- Focus: Geotechnical Engineering;

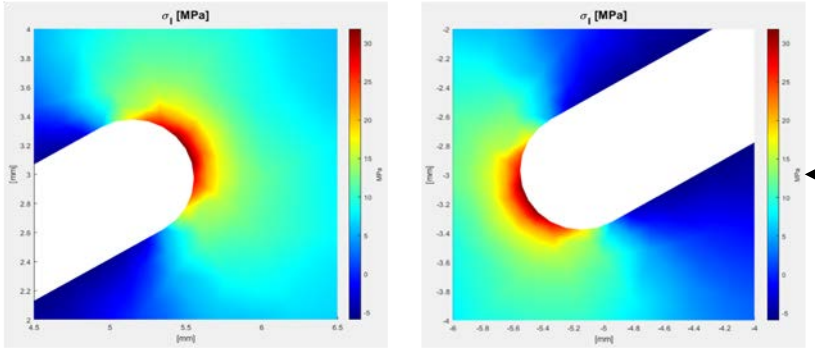
CURRENT WORK

- Conducting my Master thesis in exchange in the Laboratory of Rock Mechanics;
- Supervisor: Prof. Dr. Herbert Einstein;

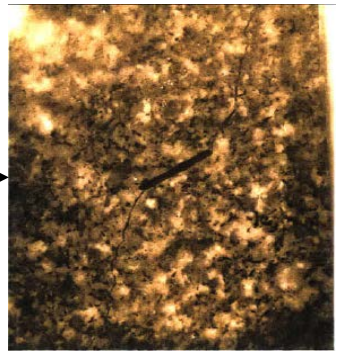
CURRENT RESEARCH INTERESTS

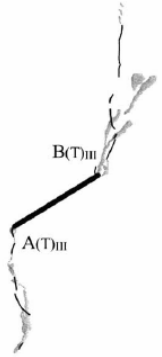


- Modeling numerically the stress distribution in a specimen subjected to various loading configurations;
- Examining the effect of various geometrical parameters (flaw inclination angle β, bridging angle between pre-existing flaws α, ligament length L, etc.) on the stress distribution in the medium;
- Predicting numerically the mode (tensile/shear) and the location of the fracture initiation;
- Comparing the numerical expectations with the visual experimental findings with regard to crack initiation, propagation and coalescence;



Numerical = *Experimental*





Chenguang Zhang

PDA working with Prof. Demanet
PhD from Louisiana State University, 2017
MS in Computer Sci. & Oceanography

CURRENT RESEARCH INTERESTS

Fast optimization of industrial operations

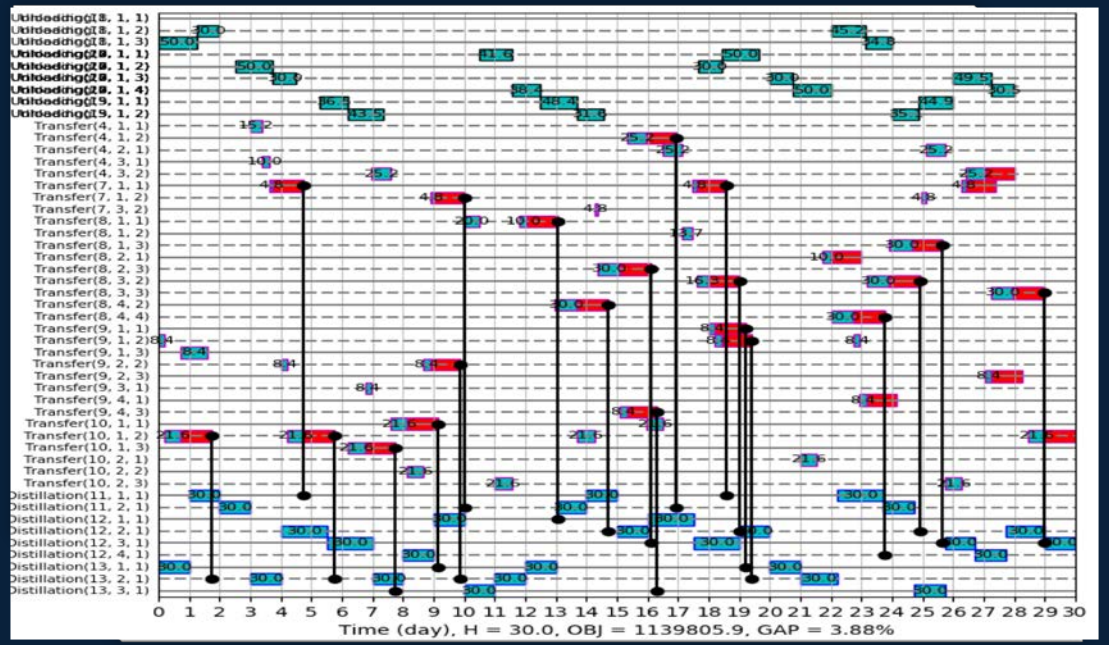
Operations research

E.g. schedule an oil refinery for one month (1.2×10^6 constrains, 1.2×10^5 unknowns, nonlinear)

Solution has high value ($10 millions/ year/ refinery), yet existing tools take far too long

Successive linear programming + reduced model + heuristics + …

Solve in 30 minutes



Potential applications

- **Oil & gas up/downstream**
- **Manufacturing**
- **Network/traffic optimization**