The Center for Wave Phenomena (CWP) is an interdisciplinary research and graduate education program, dedicated to the study of wave propagation in complex media, imaging and inversion. A primary focus of the program is on seismic modeling, imaging and inversion methods, as well as on improving the accuracy and efficiency of seismic processing algorithms, especially for application to regions of structural complexity.

Part of CWP is the Consortium Project on Seismic Inverse Methods for Complex Structures (“Consortium,”) an international group of industry sponsors. We are associated with the Department of Geophysics at the Colorado School of Mines (CSM), a public research university dedicated to engineering and applied sciences.

CWP faculty have a broad range of research interests and thrive on solving problems of practical interest to the exploration industry. CWP faculty are: Dave Hale, Paul Sava (CWP Director), Roel Snieder and Ilya Tsvankin. University Professors Emeriti and former CWP Directors Norm Bleistein and Ken Larner continue to work with CWP on a broad range of research interests. Over the years, CWP research directions have expanded to reflect the talents of our faculty and students, as well as to meet the needs and interests of our Consortium sponsors.

CWP is strongly committed to quality graduate education in geophysics. CWP students form an international group with a wide range of study and research interests. Their backgrounds are primarily in earth sciences, applied mathematics, computer science and physics. CWP graduates are recruited for employment by industry, government and academia following the completion of their degrees from CSM.

For additional information regarding CWP or the Consortium, visit our website at cwp.mines.edu or contact us at cwpinfo@mines.edu.
Dave HALE - Professor

Dave Hale received his B.S. in physics from Texas A&M University and his Ph.D. in geophysics from Stanford University. He has worked as a field seismologist and research geophysicist for Western Geophysical, as a senior research geophysicist for Chevron, as an associate professor at the Colorado School of Mines, as a chief geophysicist and software developer for Advance Geophysical, and as a senior research fellow for Landmark Graphics. Dave returned to the Colorado School of Mines in 2005 as the Charles Henry Green Professor of Exploration Geophysics. Dave received the Virgil Kauffman Gold Medal from the Society of Exploration Geophysicists (SEG) for his work on dip-moveout processing of seismic data. He also received the Society of Exploration Geophysicists awards for Best Paper in Geophysics in 1992 (imaging salt with seismic turning waves) and Best Paper Presented at the Annual Meeting in 2002 (atomic meshing of seismic images).

Paul SAVA - Associate Professor and CWP Director

Paul Sava is an Associate Professor of Geophysics and Director of the Center for Wave Phenomena at Colorado School of Mines. He holds an Engineering degree in Geophysics (1995) from the University of Bucharest, an M.Sc. (1998) and a Ph.D. (2004) in Geophysics from Stanford University where he was a member of the Stanford Exploration Project. His main research interests are in wavefield seismic imaging, stochastic imaging and inversion, computational methods for wave propagation, numeric optimization and high performance computing. He is a recipient of a Stanford Graduate Fellowship (1997-2000) from Stanford University and of a Jackson Young Scientist Fellowship (2006-2007) from the University of Texas (Austin). He is also a recipient of three Awards of Merit for best student presentations at the SEG conventions (1999, 2001 and 2004) and of a Honorable Mention in the category Best Paper in Geophysics (2003) for Angle-domain common-image gathers by wavefield continuation methods, co-authored by Sergey Fomel. The Society of Exploration Geophysicists recognized him in 2007 with the Reginald Fessenden Award for his work on wave-equation angle-domain imaging. He is a member of SEG, EAGE, and AGU, and currently serves as Education Officer on the EAGE Board.
Roel SNIEDER - Professor

Roel Snieder holds the W. M. Keck Foundation Distinguished Chair in Basic Exploration Science at the Colorado School of Mines. He received a Master's Degree in geophysical fluid dynamics from Princeton University in 1984 and a Ph.D. in seismology from Utrecht University in 1987. From 1997 to 2000, he was chairman of the Faculty of Earth Sciences at Utrecht University. In 2000, he was elected as a Fellow of the American Geophysical Union (AGU) for important contributions to geophysical inverse theory, seismic tomography, and the theory of surface waves. He has been a member of the Earth Sciences Council of the U.S. Department of Energy from 2003 to 2011. The second edition of his book, *A Guided Tour of Mathematical Methods for the Physical Sciences*, was published in September 2004. In 2008, Roel worked for the Global Climate and Energy Project at Stanford University on global energy outreach and education. Roel and Ken Larner are co-authors of *The Art of Being a Scientist*, which was published in August 2009. He serves on the Society of Exploration Geophysicists (SEG) committee, Geoscientists Without Borders, as well as on the Editorial Boards of the *Journal of the Acoustical Society of America* and the *European Journal of Physics*. Roel is a foreign member of the Royal Netherlands Academy of Arts and Sciences and he was elected as Honorary Member of the Society of Exploration Geophysicists in 2011. He served as CWP Director from June 2008 to May 2011. Prof. Snieder has also served as Chief of Genesee Fire and Rescue from July 2012 until July 2014.

Ilya TSVANKIN - Professor

Ilya Tsvankin is a Professor of Geophysics at the Colorado School of Mines, who served a four-year term as CWP Director from 2004-08. He received his Ph.D. in geophysics from Moscow State University in Russia. Before coming to CWP, Ilya worked as deputy head of the laboratory “Geophysics of Anisotropic Media” at the Institute of Physics of the Earth in Moscow and then as a consultant to Amoco Production Research in Tulsa, OK. His research interests are in seismic wave propagation, seismic processing, and fracture characterization, particularly in developing inversion and processing methods for anisotropic media. The third edition of Ilya's widely used monograph, *Seismic Signatures and Analysis of Reflection Data in Anisotropic Media*, came out in 2012 (SEG, Geophysical References Series). In 2011 SEG published his new book, *Seismology of Azimuthally Anisotropic Media and Seismic Fracture Characterization*, co-authored by Ilya's long-time collaborator Vladimir Grechka of Marathon Oil. Since 2002, Vladimir and Ilya have been teaching a short course on seismic anisotropy as part of the SEG Continuing Education Program. Ilya is the recipient of the SEG Virgil Kauffman Gold Medal for outstanding contribution to the advancement of the science of geophysical exploration (1996). He also received the Best Paper in *Geophysics* Award from SEG in 2009 for a paper on attenuation anisotropy co-authored with his former student Jyoti Behura. In May 2011, he was elected a Fellow of the Institute of Physics (IOP), a leading international physics society.
Norman BLEISTEIN

Norman Bleistein was a CWP research leader from its inception in 1984 until he retired in 1999, serving as CWP Director until 1996. After receiving his Ph.D. in 1965 from the Courant Institute of Mathematical Sciences at New York University, he spent three years as an assistant professor at the Massachusetts Institute of Technology and fourteen years at Denver University before moving to the Colorado School of Mines. After Norm’s retirement from the Department of Mathematical and Computer Sciences in September 1999, he has remained active with CWP as University Professor Emeritus and Research Professor in Geophysics. He continues research in asymptotic analysis of seismic modeling, migration and inversion; his textbook, *Mathematics of Multidimensional Imaging, Migration and Inversion*, co-authored by John Stockwell and Jack Cohen, was published in January 2001. This was his third book, the others being on asymptotic expansions of integrals and on the mathematics of wave phenomena. More recent research has focused on the application of Gaussian beams to modeling, migration and inversion. He visited the University of Karlsruhe as a Senior Alexander von Humboldt American Fellow. In 2005, Norm was awarded the lifetime achievement award of Honorary Membership by the SEG. His presentation at that meeting on modeling with one-way wave equations near caustics was designated as one of the top 25 papers. In 2006, a paper co-authored with Yu Zhang and Guan-quan Zhang received the Best Paper Award in *Geophysics* for 2005. His presentation at the 2008 SEG meeting was ranked among the top 30, the fourth consecutive year for that honor. In 2014, he received the prestigious Maurice Ewing Medal, the highest recognition awarded by SEG.

Ken LARNER

In 2004, University Professor Emeritus Ken Larner retired as the Charles Henry Green Professor of Exploration Geophysics at the Colorado School of Mines and as CWP Director; he remains actively involved with CWP. After receiving his Ph.D. in geophysics from the Massachusetts Institute of Technology in 1970, he joined Western Geophysical Company where he became vice president for geophysical research in 1979. The recipient of the 1988 Conrad Schlumberger Award of the EAGE, he was Spring 1988 SEG Distinguished Lecturer and SEG president for 1988-89. He received the President’s Award for CSM Outstanding Educator in 1992. In 1996, he received the SEG’s most prestigious honor, the Maurice Ewing Medal. He was the Society of Petroleum Engineers Distinguished Lecturer for 2000-2001. Ken was awarded the P.L. Kapitsa Gold Medal by the Russian Academy of Natural Sciences in 2003. In 2008, he co-authored the book *The art of being a scientist: A guide to graduate students and their mentors* with Roel Snieder. Since 2013, Ken has been teaching the five-week course, Professional Oral Communication, primarily for CSM geophysics graduate students.
Shingo Sean ISHIDA - Communications

Shingo manages CWP's communications, marketing and outreach efforts. He oversees the CWP website and he launched CWP's YouTube and Vimeo channels. Shingo joined CWP in 2011, after working in communications at the Colorado Department of Public Health and Environment. Before moving to Colorado, Shingo worked as a bilingual news producer for a Japanese TV network in Washington, D.C. He also lived in Tokyo for three years and worked for the Japanese government.

Outside of work, Shingo enjoys QT with his wife Catherine and his son Kento, playing softball in the Colorado State Employee Softball League, riding his motorbike, lighting up his BBQ grill, binge-watching on Netflix (Breaking Bad, The Walking Dead, House of Cards), supporting the Colorado Rockies despite the ludicrous prices of their ballpark hot dogs, as well as most outdoor activities except skyaking. Although he has never attended a Denver Broncos game in person, he secretly jumped on the bandwagon to support them when they made it to the 2014 Super Bowl (and subsequently got destroyed by the Seattle Seahawks). Shingo hails from Vancouver, in beautiful British Columbia. He recently celebrated another anniversary as a state employee with a cup of dark coffee and more work, because he is still making mortgage payments on his house somewhere in Denver's vast suburbia. Shingo likes dogs, but can't get himself to own one yet.

Pamela KRAUS - Program Assistant

Pamela manages the Center for Wave Phenomena office and provides administrative, technical and organizational support for the Center. She coordinates all logistics for the CWP Project Review Meeting and the CWP Semi-Annual Meeting, held in conjunction with the Society of Exploration Geophysicists (SEG) annual meeting, originates Consortium contracts and oversees all Center budget work. Pamela has worked for the State of Colorado since April 1982, where she began her career at Colorado State University in Fort Collins, Colorado.

Pamela is a fourth generation Colorado native, which she is proud of. In her spare time, she enjoys spending time with her husband David and her family, and became a grandma in November 2013 to granddaughter Teeghan. Pamela enjoys spending time at her dad’s summer home in Red Feather Lakes, Colorado and every March enjoys spending a week in Tucson, Arizona at his winter home where she plans to retire (in the winter months only).
John STOCKWELL - Research Associate

John is a research associate with CWP. He is the principal investigator of the Seismic Unix (SU) project, managing the popular CWP/SU open-source software package. SU is the world's first and most widely used open-source seismic research and processing environments. For his work with SU, John was co-recipient with Jack K. Cohen of the 1994 University to Industry Award from the Technology Transfer Society, and was co-recipient of a Special Commendation of Award from the Society of Exploration Geophysicists (SEG) with Einar Kjartannson, Shuki Ronen and Jack K. Cohen (posthumous). John uses SU as the basis of the Seismic Processing Lab course that he teaches each Fall semester at the Colorado School of Mines and he is presently developing a text book on seismic data processing with SU. John is the CWP Consortium contact regarding confidential software packages and manages the CWP computer system that includes several types of Linux systems. John is co-author of Mathematics of Multidimensional Seismic Imaging, Migration and Inversion, with Norm Bleistein and Jack Cohen. John teaches the graduate level course Mathematics of Seismic Imaging and Migration using this text. He expresses his ongoing passion for mathematics by teaching an informal seminar in Mathematics for Geophysicists. The notes collected from seven years of this provide the basis of a new textbook that John has just started compiling. John received a Distinguished Volunteer Award from the SEG Foundation in 2005 for his Timelines of Geoscience and Geophysics and of Exploration Geophysics and the Petroleum Industry. John is the Editor of the Bright Spots column in The Leading Edge, the Wiki Administrator of the new SEG Wiki (http://wiki.seg.org) and sits on several SEG Committees, including as the Chair of the SEG Wiki Committee and the Historic Preservation Committee. John received the SEG Presidential Award in 2014 for his work on the SEG Wiki and for his continuing work with SU, as well as the SEG Wiki Champion Award in 2014.

Diane WITTERS - Writing Consultant/Communication Coach

Diane teaches technical writing, coaches students on conference presentations, provides transition tools for efficient integration into the CWP community, and supports students as they develop into confident and effective writers, presenters, and collaborators within our diverse international group. In addition to her core work at CWP, Diane teaches a professional skills course to graduate students in different departments, offers various communication workshops through the CSM Writing Center, mentors a group of women scientists and engineers, and is developing an online resource and discussion board for students to dialog with each other about ethics in their degree programs and careers. She received a Bachelor of Arts degree in cultural anthropology from Principia College in Illinois and completed a graduate field study (organized through Northwestern University) on the Navajo Reservation in Arizona; this consisted of ethnographic research on bilingual/bicultural education within a Native American community. She also earned a Master of Arts in Language Teaching degree from the School for International Training, Vermont, with certification in English as a Second Language, Spanish and Multi-Cultural Education.

Diane has a passion for wild spaces and slips into the mountains and canyons for trail running, backpacking, canoeing, biking, and cross-country skiing.
Elias ARIAS

Degree Program: MS, Geophysics
Country: USA

Elias received his Bachelor of Science degree in geophysical engineering from the Colorado School of Mines while competing on the school's wrestling team. He held four internship positions, first at Landmark during the summer of 2012 where he worked as a Java developer implementing a wellbore analyzer plug-in for Landmark. This tool was presented at the 2012 SEG annual meeting in Las Vegas. Following his graduation from Mines, Elias worked in the Quantitative Interpretation (QI) group at BHP Billiton during his second internship, creating rock physics templates for seismic data evaluation. Elias joined CWP during the fall 2013 to work under the guidance of Prof. Dave Hale. After finishing his first year with CWP, Elias returned to BHP Billiton to work with the Eagle Ford production team on a Hawkville field study. During the Fall 2014 semester, he took a leave of absence from Mines for an internship with ExxonMobil to work with the geophysical applications group (GAPS) on an exploration project in the Gulf of Mexico. He returned to CWP for the Spring 2015 semester.

Elias's hobbies include: staying physically fit, being outdoors, and spending time with friends, family, and his dog.

Research
Elias is currently working on estimating seismic reflection slopes. The implications of this research include improving coherent noise reduction filters, automatic horizon extraction, and fault mapping. His research and work interests include: geophysical computing, image processing, seismic imaging, formation evaluation, well log analysis, petrophysics, rock physics.

Yogesh ARORA

Degree Program: PhD, Geophysics
Country: India

In 2013, Yogesh graduated from the Indian School of Mines in Dhanbad, with his Bachelor and Master of Science degrees in applied geophysics via a five-year program. He completed his Master’s thesis with the Gas Hydrate research group of National Institute of Oceanography, Goa. For his Master’s thesis, he estimated P-wave anisotropic parameters in orthotropic media containing two sets of mutually orthogonal fractures in isotropic background. This model aims to resemble the Gas Hydrate occurrences in the Krishna-Godavari (KG) basin located in southern India. His CWP advisor is Prof. Ilya Tsvankin. Yogesh's research interests are seismic anisotropy, seismic imaging and inversion.

Yogesh's hobbies include: hiking, playing tennis and trying exotic cuisine.

Research
Yogesh is currently working on diffraction processing for anisotropic models for imaging and inversion. His aim is to make diffractions part of the anisotropic parameter estimation. He uses ray-based methods like Kirchhoff migration for creating images from just diffractions and building angle domain common image gathers.
**Tong BAI**

Degree Program: PhD, Geophysics  
Country: China

Tong received his Bachelor of Engineering degree in geophysics from China University of Petroleum in Beijing. In graduate school, he switched his major to petroleum geology, focusing on the migration path of tight sand gas in China’s Western Sichuan province. His research interest also includes the distribution and attributes of fractures.

Tong joined CWP in August 2013, under the guidance of his advisor, Prof. Ilya Tsvankin. He enjoys sports, especially tennis, soccer, and badminton.

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**Esteban DÍAZ PANTIN**

Degree Program: PhD, Geophysics  
Country: Venezuela

Esteban is a geophysical engineer who graduated from Universidad Simón Bolívar (USB) in Caracas Venezuela, in 2008. After obtaining his Bachelor of Science degree, Esteban worked in seismic data processing, depth imaging, as well as research and development.

Esteban joined CWP in Fall 2011. During his time at CWP, he has worked on migration velocity analysis using two-way operators. He has completed two internships, one each with BP and Total. Both internships focused on full waveform inversion (FWI) projects.

Outside of geophysics, Esteban enjoys playing volleyball, tennis, soccer, skiing and exploring Colorado and neighboring States.

**Research**

Esteban’s main research interest is migration velocity analysis (MVA). At CWP, he studies the kinematic information contained in surface seismic data and seismic images. Esteban looks into different misfit errors measures, in both image and data domain, that improve the robustness of tomographic operators. His objective is to close the gap between high and low resolution tomographic methods.
Yuting DUAN

Degree Program: PhD, Geophysics  
Country: China

Yuting received her Bachelor of Science and Master of Science degrees in 2010 and 2012, respectively, from the School of Earth and Space Sciences at Peking University in Peking, China. Her Master's thesis was titled, "ADPI elastic wave forward modeling based on high performance computing." She is currently working with Prof. Paul Sava, her CWP advisor.

Yuting loves to take part in a variety of activities; her favorites being swimming and traveling.

Chris GRAZIANO

Degree Program: MS, Geophysics  
Country: USA

Chris graduated from the Colorado School of Mines with a Bachelor's degree in geophysics and a minor in geology. During this time, he interned with Transform Software and Services/DrillingInfo, where he worked with the support staff and programmed with the development team. He has also interned with Sigma Cubed, which gave him the opportunity to analyze and interpret a channel sands reservoir and propose new locations to drill. This past summer, Chris interned with ExxonMobil and worked with their 4D seismic group to evaluate a new method to increase the repeatability between all time-steps in a 4D seismic project.

Chris joined CWP in Fall 2013 to work with Prof. Dave Hale, his CWP advisor. During his free time, Chris carves wood caricatures by hand and loves to run.

Research

Chris is currently working with Dr. Hale on a method to warp a PS image to a PP image without distorting the wavelet in the PS image. This warping-with-wavelets method involves convolving the PS image with a filter before and after warping. Ideally, the estimated filters used in the warping-with-wavelets method are the PP wavelet and the inverse PS wavelet. Chris’s research and work interests are signal processing, formation evaluation, time lapse seismic, and geology.
**Oscar JARILLO MICHEL**

**Degree Program:** PhD, Geophysics  
**Country:** Mexico

Oscar graduated from Instituto Politécnico Nacional, México, in 2010 with a Bachelor of Science degree in geophysical engineering. Shortly after, in Fall 2011, he joined the Center for Wave Phenomena. In 2015, he obtained a Master of Science degree in geophysics from the Colorado School of Mines, after which he continued into his PhD program at CWP.

Oscar is currently working on FWI for VTI media to estimate source and anisotropy parameters from microseismic data. His CWP advisor is Prof. Ilya Tsvankin.

**Research**

Oscar uses full-waveform modeling for dislocation-type sources to simulate microseismic events and implements the adjoint-state method to calculate the gradient required by full-waveform inversion (FWI) to estimate source location, source mechanism and velocity parameters in VTI media.

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**Nishant KAMATH**

**Degree Program:** PhD, Geophysics  
**Country:** India

Nishant received his Bachelor's and Master of Science degrees in geophysics at the Indian Institute of Technology-Kharagpur in 2008. He worked as an On Board Processor for Schlumberger for two years before starting graduate studies at CSM with a minor in mathematics. He is currently working on FWI for 2D (elastic) VTI media to estimate vertical velocities and anisotropy parameters. Nishant interned with Shell International Exploration and Production, in Houston, Texas, in the summer of 2012. The work involved testing various parameters for serial- and joint-inversion (FWI) of acoustic (OBN) data and analysing the tradeoff between inversion parameters. In the summer of 2014, he interned with BP and worked on FWI testing for different model parameterizations on synthetic and real data. His advisor is Prof. Ilya Tsvankin.

Nishant's hobbies are hiking, reading, playing tennis and experimenting in the kitchen.

**Research**

Nishant is working on Full-waveform Inversion (FWI) to estimate Thomsen parameters (vertical P- and S-wave velocities, epsilon and delta) in 2D VTI media. He is currently working on a 2D synthetic model. One of the ways of understanding the trade-offs seen in the inversion results is by obtaining the 'radiation pattern' for a given parameterization. The insight gained from this will be used to choose an appropriate parameterization or explain obtained results when inverting for a more complex model.
Vladimir LI
Degree Program: PhD, Geophysics
Country: Russia

Vladimir received his Bachelor of Science and Master of Science degrees in geophysics from Lomonosov Moscow State University (LMSU). During his studies, he acquired and processed shallow seismic data in the Shallow Seismic Group at the Department of Seismics and Geoacoustics. As an undergraduate student at LMSU, he received the ConocoPhillips Excellence in Education Award for the 2007-08 academic year. Vladimir joined CWP in August 2012. His advisor is Prof. Ilya Tsvankin.

Vladimir enjoys reading classic literature, listening to music (mostly Russian rock), playing chess, Preferans, table tennis, football and billiards. He was the former Moscow State University student chess champion.

Sonali PATTNAIK
Degree Program: PhD, Geophysics
Country: India

Sonali received her Bachelor’s and Master of Science degrees in exploration geophysics at the Indian Institute of Technology, Kharagpur in 2014. Her Master’s thesis focused on various numerical techniques to model the acoustic wavefield in layered media. During her studies at IIT, Sonali interned at the National Institute of Oceanography in Goa, where she worked on 3D seismic data processing using ProMAX 2D/3D and adopted a specially designed processing sequence for gas hydrate studies. Sonali also interned at BG Exploration and Production India, where she developed an integrated interpretation of seismic, well log and gravity data to study the sub-basalt section. She independently developed a Petrel Plugin using Ocean SDK for quick evaluation of gravity data. Sonali’s CWP advisor is Prof. Ilya Tsvankin. Her research interests are seismic anisotropy, inversion and seismic imaging.

Sonali enjoys playing badminton, reading novels and travelling.
Daniel ROCHA, Jr.
Degree Program: MS, Geophysics
Country: Brazil

Daniel graduated in 2013 from the Universidade Federal da Bahia (UFBA) in Brazil. He spent a portion of 2012 on an exchange program at the Colorado School of Mines, where he took two semesters of classes and spent his summer at the Center for Rock Abuse in the Department of Geophysics. At UFBA, Daniel's research centered on deconvolution and ground-roll filtering techniques. Later on, Daniel studied linear and non-linear inversion using gradient methods, which became the main subject of his BS thesis, titled "Inversion of interval velocities". Following his graduation from UFBA, Daniel worked for a year at Petroleum Geo-Services, where he focused on seismic processing, including: noise filtering, multiple attenuation, data regularization, and time migration. Daniel's CWP advisor is Prof. Paul Sava.

Outside of geophysics, he enjoys the outdoors (soccer and snowboarding), playing the guitar and chess.

Research
During his first year at CWP, Daniel has worked on seismic wavefield imaging, waveform inversion using adjoint-state method, and elastic imaging. On wavefield imaging, in particular, he has been investigating on a new imaging condition to attenuate backscattering artifacts, which are common in reverse time migration.

Satyan SINGH
Degree Program: PhD, Geophysics
Country: Trinidad and Tobago

Satyan graduated from the University of West Indies in 2008, with a Bachelor of Science degree in petroleum geosciences. While an undergraduate, he had a summer internship with BP Trinidad and Tobago, which was followed by his employment as an exploration geophysicist at BG Group Trinidad and Tobago. After one year of employment in the oil and gas industry, he decided to pursue a Master of Science degree in geophysics at Texas A&M University. Satyan joined CWP in August 2011 and his advisor is Prof. Roel Snieder. His current interest is retrieving the Green's function and imaging.

Apart from academic research, Satyan enjoys playing table tennis, cricket and football.

Research
Satyan's current research is retrieving the Green's function in the presence of the free surface. Satyan presents a new scheme that focuses primaries and all multiples, i.e., internal multiples and free surface multiples. In other words, we retrieve the Green's function in the presence of the free surface. Our requirements are still the reflection response and an estimate of the first arrival at the surface from the virtual source. Significantly, the reflection response includes the free surface multiples, i.e., no free surface multiple removal is required.
Hui WANG

Degree Program: PhD, Geophysics
Country: China

Hui graduated from Zhejiang University with a Bachelor’s degree in earth science. Following his graduation, he studied at King Abdullah University of Science and Technology (KAUST) in Saudi Arabia, where he received his Master’s degree in geophysics. During his time at KAUST, Hui worked on depth migration, using the so-called prestack exploding reflector model to do two-way migration and modeling. His research also included exploring the efficiency gain for large-scale computations and he has experience working with some cutting-edge clusters and supercomputers. Hui joined CWP in August 2014 and is working with Prof. Paul Sava. His main research interests are seismic inverse problems and computational mathematics.

Apart from geophysics, Hui enjoys scientific reading, programming, and sports with friends and family.

Loralee WHEELER

Degree Program: MS, Geophysics
Country: USA

Loralee graduated from Colorado School of Mines with a Bachelor’s degree in geophysical engineering. She joined CWP in Fall 2013 to work with Prof. Dave Hale, her advisor. In Summer 2012, 2013, and 2014, Loralee interned with Chevron in Houston, Texas. In 2012, she worked in the Petrotechnical Data Management team transferring 2D/3D seismic data to Chevron’s new software package as well as providing software support for seismic data transfer issues. In 2013, she worked in the Amplitude and Custom Processing team testing the effects of post migration data conditioning on simultaneous inversion quality. She updated the PMDC processing flow to decrease processing time while maintaining maximum inversion quality. In 2014, she worked in the Seismic Imaging and Velocity Modeling R&D team developing a method for picking residual moveout on common-image-point gathers that uses dynamic image warping.

During her free time, Loralee enjoys photography, urban exploration, zumba, and upcycling.

Research

Loralee’s current research involves simultaneously correlating multiple well logs using dynamic warping. This method of log correlation reduces the inherent error within the logs themselves providing a more accurate geologic model. It can also be used to check the quality of time-depth conversions, pick horizons, and flatten seismic images.
Xinming WU

Degree Program: PhD, Geophysics  
Country: China

Xinming received a Bachelor of Engineering degree in 2009 in geophysics from Central South University, Changsha, China. He earned a Master of Science degree in 2012 in geophysics from Tongji University, Shanghai, China. Xinming joined CWP in August 2012 and is working with Prof. Dave Hale. He is currently working on seismic flattening or horizon volumes with constraints and 3D seismic image processing for unconformities. His research interests focus on numerical methods for seismic interpretation. He interned at Drillinginfo in Littleton, Colorado.

Xinming enjoys traveling, watching movies, reading and writing.

Research
Xinming is mainly interested in 3D image processing for seismic interpretation. He has worked on the automatic generation of a seismic Wheeler volume by using a RGT volume obtained from seismic phase unwrapping. He works on methods for extracting horizons one at a time and generating at once an entire horizon volume with control points. He also works on 3D seismic image processing for automatically detecting unconformities, accurately estimating seismic normal vectors at unconformities and correctly flattening a seismic image at unconformities. He is now working on image processing for faults, and simultaneously unfaulting and unfolding a seismic image.
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