

CONTENTS

Introduction.....	1
TOPICAL SUMMARIES	
Interdisciplinary Study of the Solid Earth, Oceans and Atmosphere	3
Near-Surface Environments – Hazards and Resources	6
Why Do Faults Slip?.....	8
The Global Stress Field: Constraints from Seismology and Geodesy.....	11
How Do Plates Evolve?	13
The Lithosphere-Asthenosphere Boundary	15
How are Earth’s Internal Boundaries Affected by Dynamics, Temperature, and Composition?.....	17
EDUCATION AND OUTREACH	
Towards a Global School Seismic Network	21
The Quake-Catcher Network: Bringing Seismology to Homes and Schools	22
On-Line Seismology Curriculum for Use with Educational Seismographs	23
Seismology in Schools (seismeolaíocht sa Scoil) Pilot Programme, Dublin Ireland	24
Teachers on the Leading Edge: Earth Science Teacher Professional Development Featuring Pacific Northwest Earthquake and Tsunami Hazards	25
The Earth Science Literacy Initiative	26
USArray Education and Outreach in Southwest Indian Country.....	27
Implementing Inquiry-Based Approaches in Geoscience Education and Research	28
From an IRIS Lecture Tour to a General Audience Book About Midwest Earthquakes.....	29
Active Earth Display Kiosk Education and Outreach Missouri Department of Natural Resources	30
Explorer Series	31
The IRIS Workshop as Outreach	32
Workshop "Earth System Science for Educators" at North Carolina A&t State University	33
IRIS Undergraduate Intern Research: Colorado Seismicity.....	34
The IRIS Internship Cycle: From Intern to Graduate Student to Intern Mentor	35
IRIS Membership and E&O Program Team up for Intern Orientation Week.....	36
Community-Outreach Efforts in Data Collection and Analysis for the 2008 Mogul Earthquake Sequence	37
USArray Student Siting Program Has a Big Impact in Oklahoma.....	38
Site Reconnaissance for Earthscope USArray: A Vehicle for Integrating Geophysics and GIS Education with Outreach to the Community While Saving Money.....	39
Educational and Outreach Experience from EarthScope/USArray 2010 Summer Siting Program	40
jAmaseis: Seismology Software Meeting the Needs of Educators	41
Visualizing the Ground Motions of Earthquakes: the USArray Ground Motion Visualization (GMV)	42
Near Real-Time Simulations of Global CMT Earthquakes	43
New DMC Data Product: Standardized Event Information Plots Generated in Near Real Time for All M>5.5 Earthquakes	44
FuncLab: A MATLAB Interactive Toolbox for Handling Receiver Function Datasets.....	45
SEIZMO: a Matlab and GNU Octave Seismology Toolbox	46
Five Years of Distributing the Seismic Analysis Code (SAC) Software.....	47
The NSF IRIS EarthScope USArray Array Network Facility (ANF): Metadata, Dataflow, Phase Picks, and State of Health Monitoring.....	48

IRIS DMS Data Products, Beyond Raw Data at the IRIS DMC	49
---	----

EARTHQUAKE SOURCE STUDIES

Seismicity and Faulting in the Southern Gulf of California	50
Local Earthquakes in the Dallas-Ft. Worth Region	51
Use of ANSS Strong-Motion Data to Analyze Small Local Earthquakes	52
Epicentral Location Based on Rayleigh Wave Empirical Green's Functions from Ambient Seismic Noise	53
Rupture Fault Determination of the 2008 Mt. Carmel, Illinois, Earthquake in Wabash Valley Seismic Zone	54
Analysis of Spatial and Temporal Seismicity Patterns within Arizona During the Deployment of the EarthScope USArray Transportable Array (March 2006 - April 2009)	55
Mozambique Earthquake Sequence of 2006: High-Angle Normal Faulting in Southern Africa	56
Exceptional Ground Motions from the April 26, 2008 Mogul Nevada Mw 5.0 Earthquake Recorded by PASSCAL Rapid Array Mobilization Program (RAMP) Stations.....	57
Detailing a Shallow Crustal Earthquake Swarm beneath the Mogul, Nevada with PASSCAL RAMP Instrumentation.....	58
The 2010 Mw7.2 El Mayor-Cucapah Earthquake Sequence, Baja California, Mexico and Southernmost California, USA: Active Seismotectonics along the Mexican Pacific Margin.....	59
Along-strike Variations in Shallow Earthquake Distribution and Source Parameters along the Kurile-Kamchatka Arc.....	60
Effects of Kinematic Constraints on Teleseismic Finite-Source Rupture Inversions: Great Peruvian Earthquakes of 23 June 2001 and 15 August 2007.....	61
The 2006-2007 Kuril Islands Great Earthquake Sequence	62
Imaging of the Source Properties of the February 27, 2010, Maule, Chile Earthquake Using Data from the Transportable Array	63
Using MEMS Sensors and Distributed Sensing For a Rapid Array Mobilization Program (RAMP) Following the M8.8 Maule, Chile Earthquake.....	64
Teleseismic Inversion for Rupture Process of the 27 February 2010 Chile (Mw 8.8) Earthquake.....	65
The 2009 Samoa-Tonga Great Earthquake Triggered Doublet.....	66
The Global Aftershocks of the 2004 Sumatra-Andaman Earthquake.....	67
Temporal Changes of Surface Wave Velocity Associated with Major Sumatra Earthquakes from Ambient Noise Correlation ...	68
The 17 July 2006 Java Tsunami Earthquake (Mw = 7.8)	69
Tsunami Early Warning Using Earthquake Rupture Duration and P-Wave Dominant-Period: The Importance of Length and Depth of Faulting.....	70
Seismic Cycles on Oceanic Transform Faults	71
Split Normal Modes and Beachfront Hotels.....	72
Migration of Early Aftershocks Following the Mw6.0 2004 Parkfield Earthquake	73
Mapping Subduction Zone Fault Slip with Teleseismic and Geodetic Data	74
Apparent Stress Variations at the Osa Peninsula, Costa Rica, Influenced by Subducted Bathymetric Features.....	75
Deep Earthquake Mechanics, Slab Deformation, and Subduction Forces	76
Automated Identification of Teleseismically Recorded Depth Phases with Application to Improving Subduction Zone Earthquake Locations	77
The Puzzle of the Bardarbunga, Iceland Earthquake: No Volumetric Component in the Source Mechanism.....	78
Evaluating Ground Motion Predictions of Usgs 3d Seismic Model of the San Francisco Bay Area with Broadband Seismograms.....	79
Physics-Based Shake Map Simulation for the 2008 Wells, Nevada Earthquake	80

EPISODIC TREMOR AND SLIP, TRIGGERED EARTHQUAKES

Tremor Monitoring	81
-------------------------	----

Non-Volcanic Tremor along the Oaxaca Segment of the Middle America Subduction Zone	82
Slow Slip and Tremor in the Northern Costa Rica Seismogenic Zone	83
An Earthquake-Like Magnitude-Frequency Distribution of Tectonic Tremor in Northern Cascadia	84
The Slumgullion Natural Laboratory.....	85
Distribution and Triggering Threshold of Non-Volcanic Tremor Near Anza, Southern California	86
Intimate Details of Tremor Observed by a Dense Seismic Array.....	87
Tidal Triggering of LFEs Near Parkfield, CA	88
Global Search of Triggered Tremor and Low-Frequency Earthquakes	89
Cascadia Transition Zone: Tremor as a Fault Strength Indicator.....	90
Slab Morphology in the Cascadia Fore Arc and Its Relation to Episodic Tremor and Slip.....	91

NON-EARTHQUAKE SOURCES

Regional Moment Tensor Solutions for Source-Type Identification: The Crandall Canyon Mine Collapse	92
Source Analysis of the Memorial Day Explosion, Kimchaek, North Korea	93
Studying Earth's Wave Climate Using the Global Microseism	94
Iceberg Tremor and Ocean Signals Observed with Floating Seismographs.....	95
Observations of Seismic and Acoustic Signals Produced by Calving, Bering Glacier, Alaska	96
Elucidating the Stick-Slip Nature of the Whillans Ice Plain	97
Infrasonic Imaging with the USArray	98
Probing the Atmosphere and Atmospheric Sources with the USArray.....	99
Harmonic Tremor on Active Volcanoes: Seismo-Acoustic Wavefields	100
Volcanic Plume Height Measured by Seismic Waves Based on a Mechanical Model	101
Anomalous Earthquakes Generated by Collapse of Magma Chambers	102
Eruption Dynamics at Mount St. Helens Imaged from Broadband Seismic Waveforms: Interaction of the Shallow Magmatic and Hydrothermal Systems	103
The Seismic Story of the Nile Valley Landslide - Foreshocks, Mainshock and Aftershocks	104
A Search for the Lunar Core Using Array Seismology.....	105

FAULT STRUCTURE

Shallow Low-Velocity Zone of the San Jacinto Fault from Local Earthquake Waveform Modeling	106
Seismic Imaging of the Mt. Rose Fault, Reno, Nevada: A Landslide Block Cut by Faulting.....	107
Faulting Processes During Early-Stage Rifting: RAMP Response to the 2009-2010 Northern Malawi Earthquake Sequence ...	108
Structure of the California Coast Ranges and San Andreas Fault at Safod from Seismic Waveform Inversion and Reflection Imaging.....	109
Characterizing the Calico Fault Damage Zone Using Seismic and Geodetic Data	110
Temporal Variations in Crustal Scattering Structure Near Parkfield, California, Using Receiver Functions	111
Preseismic Velocity Changes Observed from Active Source Monitoring at the Parkfield SAFOD Drill Site.....	112
High-Resolution Locations of Triggered Earthquakes and Tomographic Imaging of Kilauea Volcano's South Flank	113

CRUSTAL STRUCTURE

Crustal Seismic Anisotropy in Southern California	114
Adjoint Tomography of the Southern California Crust	115
Nature of Crustal Terranes and the Moho in Northern Costa Rica from Receiver Function Analysis.....	116
Crustal Structure of the High Lava Plains of Oregon: A Large Controlled-Source Experiment	117
Shear Velocity Images of the Cascadia ETS Source Region.....	118

Controlled Source Seismic Experiments in Northern China.....	119
Radial Anisotropy in the Deep Crust beneath the Western US Caused by Extension	120
Structural Interpretations Based on a 3D Seismic Survey in Hawthorne, Nevada	121
Assembling a Nevada 3D Velocity Model: Earthquake-Wave Propagation in the Basin & Range, and Seismic Shaking Predictions for Las Vegas	122
Optimized Velocities and Prestack Depth Migration in the Reno-Area Basin	123
Shallow Shear-Velocity Measurements and Prediction of Earthquake Shaking in the Wellington Metropolitan Area, New Zealand.....	124
Crustal Structure beneath the High Lava Plains of Eastern Oregon and Surrounding Regions from Receiver Function Analysis.....	125
Imaging Radially Anisotropic Crustal Velocity Structure in NW Canada	126
Controlled-Source Seismic Investigation of the Generation and Collapse of a Batholith Complex, Coast Mountains, Western Canada	127
SIMA/PICASSO: Seismic Investigations of the Moroccan Atlas/program to Investigate Convective Alboran Sea System Overturn	128
Northward Thinning of Tibetan Crust Revealed by Virtual Seismic Profiles.....	129
Quantification of Landscape Evolution Processes with Seismic Refraction Imaging, Boulder Creek Watershed, Colorado	130
An Integrated Analysis of an Ancient Plate Boundary in the Rocky Mountains	131
Full-Wave Ambient Noise Tomography of Northern Cascadia.....	132
Crustal Velocity Structure of Turkey from Ambient Noise Tomography	133
Seismic Noise Tomography in the Chile Ridge Subduction Region.....	134
Ambient Noise Tomography of the Pampean Flat Slab Region.....	135
Pacific Northwest Crust and Lithosphere Structure Imaged with Ambient Noise Tomography	136
Ambient Noise Monitoring of Seismic Speed	137
Vp Structure of Mount St. Helens Imaged with Local Earthquake Tomography.....	138
Mushy Magma beneath Yellowstone.....	139
Structure of the Chesapeake Bay Impact Crater from Wide-Angle Seismic Waveform Tomography	140
Imaging the Seattle Basin to Improve Seismic Hazard Assessments.....	141
Earthquake Hazard Class Mapping by Parcel in Las Vegas Valley.....	142
Developing a Database of ENA Ground Motions for NGA East.....	143
Seismic Wave Gradiometry Using Multiwavelets: Documented Surface Wave Reflections.....	144

LITHOSPHERE, LITHOSPHERE/ASTHENOSPHERE BOUNDARY

Lithospheric Layering in the North American Craton.....	145
Survival and Demise of Thick Continental Lithosphere under Highly Extended Crust	146
The Lithospheric Structure of the Mendocino Triple Junction from Receiver Function Analysis.....	147
Lithospheric Structure beneath the Western US Using USArray Data	148
The Lithosphere-Asthenosphere Boundary beneath North America and Australia.....	149
Receiver Function Imaging of the Lithosphere-Asthenosphere Boundary	150
S-Velocity Structure of Cratons, from Broad-Band Surface-Wave Dispersion.....	151
First Multi-Scale, Finite-Frequency Tomography Illuminates 3-D Anatomy of the Tibetan Plateau	152
Seismic Structure of the Crust and the Upper Mantle beneath the Himalayas.....	153
Evolution of Caribbean – South American Plate Boundary from Surface Wave Tomography	154
Subducted Oceanic Asthenosphere and Upper Mantle Flow beneath the Juan de Fuca Slab.....	155
Subduction of the Chile Ridge: Upper Mantle Structure and Flow.....	156

Detecting the Limit of Slab Break-off in Central Turkey: New High-resolution Pn Tomography Results.....	157
Imaging the Flat Slab Beneath the Sierras Pampeanas, Argentina, Using Receiver Functions: Evidence for Overthickened and Broken Subducted Oceanic Crust	158
Pn Tomography of the Western United States using USArray	159
Geophysical Detection of Relict Metasomatism from an Archean (~3.5 Ga) Subduction Zone.....	160
3-D Isotropic Shear Velocity Model from Ambient Noise and Earthquake Tomography	161
Shear-Wave Birefringence and Current Configuration of Converging Lithosphere under Tibet.....	162
Seismic Anisotropy Associated with Continental Lithosphere Accretion beneath the CANOE Array.....	163
Stratified Seismic Anisotropy beneath the East Central United States	164
Anisotropy in the Great Basin from Rayleigh Wave Phase Velocity Maps	165
Source-Side Shear Wave Splitting and Upper Mantle Flow in the Romanian Carpathians and Surroundings.....	166
Source-Side Shear Wave Splitting and Upper Mantle Flow in the Chile Ridge Subduction Region	167
An Earthscope Magnetotelluric Transect of the Southern Cascadia Subduction System, Washington	168
UPPER MANTLE STRUCTURE AND DYNAMICS	
S-Velocity Structure of the Upper Mantle.....	169
P and S Body-Wave Tomography of the Western US Upper Mantle.....	170
Velocity Structure of the Western US from Surface Wave Phase Velocity Measurements.....	171
Imaging and Interpreting the Pacific Northwest.....	172
Segmented African Lithosphere beneath Anatolia Imaged by Teleseismic P-wave Tomography.....	173
High-resolution Images of Mantle-wedge Structure along the Western Hellenic Subduction Zone Using Scattered Teleseismic Waves.....	174
Imaging the Mantle Wedge in the Central America Subduction Zone: The TUCAN Broadband Seismic Experiment.....	175
Systematic Variation in Anisotropy beneath the Mantle Wedge in the Java-Sumatra Subduction System from Shear-Wave Splitting	176
A Slab Remnant beneath the Gulf of California	177
Three-Dimensional Geometry of the Juan de Fuca/farallon Slab.....	178
Imaging the Southern Alaska Subduction Zone	179
S-Velocity Mantle Structure at the Subducting Chile Ridge.....	180
Opposing Slabs under Northern South America.....	181
Arc-Parallel Flow beneath the TUCAN Broadband Seismic Experiment in Central America	182
Effect of Prior Petrological Constraints on Global Upper Mantle Models of Radial Anisotropy	183
Shear Wave Splits, Plate Motions and the Mérida Andes, Western Venezuela	184
Global Azimuthal Seismic Anisotropy and the Unique Plate-Motion Deformation of Australia	185
Depth Dependent Azimuthal Anisotropy in the Western US Upper Mantle.....	186
The Stratification of Seismic Azimuthal Anisotropy in the Western US.....	187
Rayleigh Wave Phase Velocities, Small-Scale Convection and Azimuthal Anisotropy beneath Southern California.....	188
Upper Mantle Anisotropy beneath the High Lava Plains, Oregon, USA: Linking Mantle Dynamics to Surface Tectonomagmatism	189
Mantle Flow in Subduction Systems from the Global Pattern of Shear Wave Splitting above and below Subducting Slabs	190
The Teleseismic Signature of Fossil Subduction: Northwestern Canada.....	191
Seismic Anisotropy beneath Cascadia and the Mendocino Triple Junction: Interaction of the Subducting Slab with Mantle Flow	192
Seismic Anisotropy under Central Alaska from SKS Splitting Observations	193
Attenuation and Anisotropy in the Northern Apennines, Italy.....	194

Stress-Induced Upper Crustal Anisotropy in Southern California	195
USArray Observations of Quasi-Love Surface-Wave Scattering: Orienting Anisotropy in the Cascadia Plate Boundary.....	196
Tau-p Depropagation of Five Regional Earthquakes Recorded by the Earthscope Usarray to Constrain the 410-km Discontinuity Velocity Gradient.....	197
Steep Reflections from the Earth's Core Reveal Small-Scale Heterogeneity in the Upper Mantle.....	198
Mapping the Upper Mantle with the Spectral Element Method.....	199
Adjoint Tomography for the Middle East	200
Upper Mantle Structure of Southern Africa from Rayleigh Wave Tomography with 2-D Sensitivity Kernels.....	201
A Low Velocity Zone Atop the Transition Zone in Northwestern Canada	202
The Africa-Europe Plate Boundary in Central Italy, Marked by the Seismic Structure of the Crust and Upper Mantle.....	203
Imaging Lithospheric Foundering beneath the Central Sierra Nevada with Receiver Functions, Teleseismic Surface Waves, and Earthquake Locations	204
The Isabella Anomaly Imaged by Earthquake and Ambient Noise Rayleigh Wave Dispersion Data: A Composite Anomaly of Sierra Nevada Batholith Root Foundering and Pacific Plate Slab-Flap Translation?	205
Detection of a Lithospheric Drip beneath the Great Basin.....	206
Tomographic Image of the Crust and Upper Mantle Beneath the Western Tien Shan from the MANAS Broadband Deployment: Possible Evidence for Lithospheric Delamination.....	207
Global Variations of Temperature and Water Content in the Mantle Transition Zone from Higher Mode Surface Waves	208
Small-Scale Mantle Heterogeneity and Dynamics beneath the Colorado Rocky Mountains Revealed by CREST	209
The Effect of S-Velocity Heterogeneity in the North American Crust and Mantle on Waveforms of Regional Surface Waves from the February 2008 Nevada Earthquake.....	210
Mantle Heterogeneity West and East of the Rocky Mountains	211
Receiver Function Imaging of Upper Mantle Complexity beneath the Pacific Northwest, United States	212
New Geophysical Insight into the Origin of the Denali Volcanic Gap.....	213
Anomalous Seismic Structure beneath the Klyuchevskoy Group, Kamchatka, as Indicated by Receiver Function Analysis	214
The Plume-slab Interaction beneath Yellowstone Revealed by Multiple-frequency Tomography.....	215
Yellowstone Hotspot: Insights from Magnetotelluric Data.....	216
Imaging the Shear Wave Velocity "Plumbing" beneath the Northwestern United States with Rayleigh Wave Tomography: The High Lava Plains vs Yellowstone.....	217
Temperature of the Yellowstone Hotspot.....	218
Slab Fragmentation and Edge Flow: Implications for the Origin of the Yellowstone Hotspot Track.....	219
Plume-Slab Interaction beneath Western US	220
Mantle Shear-Wave Velocity Structure beneath the Hawaiian Hotspot	221
Rayleigh Waves Observed During the Hawaiian Plume Deployment Trace Anomalously Low Shear Velocities in the Lithosphere and Asthenosphere	222
Discordant Contrasts of P- and S-Wave Speeds Across the 660-km Discontinuity beneath Tibet: A Case for Hydrous Remnant of Sub-Continental Lithosphere.....	223
Deep Mantle Plumes and Convective Upwelling beneath the Pacific Ocean.....	224
Upper Mantle Discontinuity Topography from Thermal and Chemical Heterogeneity.....	225
Mantle Dynamics beneath North Central Anatolia.....	226
Edge-Driven Convection beneath the Rio Grande Rift.....	227
The Mantle Flow Field beneath Western North America.....	228
Imaging Attenuation in the Upper Mantle with the GSN.....	229
S-Wave Velocity Structure beneath the High Lava Plains, Oregon, from Rayleigh-Wave Dispersion Inversion	230
Three-Dimensional Electrical Conductivity Structure of the Pacific Northwest	231

LOWER MANTLE, CORE-MANTLE BOUNDARY

Observation of a Mid-Mantle Discontinuity beneath Northeast China from S to P Converted Waves Recorded by the USArray Stations.....	232
Core-Mantle Boundary Heat Flow	233
Localized Seismic Scatterers Near the Core-Mantle Boundary beneath the Caribbean Sea: Evidence from PKP Precursors ...	234
Constraints on Lowermost Mantle Anisotropy beneath the Eastern Pacific from SKS-SKKS Splitting Discrepancies	235
Constraints on Lowermost Mantle Mineralogy and Fabric beneath Siberia from Seismic Anisotropy	236
Localized Double-Array Stacking Analysis of PcP: D" and ULVZ Structure beneath the Cocos Plate, Mexico, Central Pacific, and North Pacific.....	237
Anti-Correlated Seismic Velocity Anomalies from Post-Perovskite in the Lowermost Mantle.....	238
Waveform Modeling of D" Discontinuity Structure	239
A Narrow, Mid-Mantle Plume below Southern Africa.....	240
Absence of Ultra-Low Velocity Zones at the CMB	241

WHOLE MANTLE STRUCTURE

Chemical Heterogeneity in the Mantle: Inferences from Seismology, Mineral Physics and Geodynamics.....	242
Moving Seismic Tomography Beyond Fast and Slow to Thermo-Chemical/Mineralogical Modeling	243
Mantle Heterogeneity and Flow from Seismic and Geodynamic Constraints	244
A Three-Dimensional Radially Anisotropic Model of Shear Velocity in the Whole Mantle	245
Global Mantle Anisotropy and the Coupling of Free Oscillations	246
The Importance of Crustal Corrections in the Development of a New Global Model of Radial Anisotropy.....	247
Analysis of the Mantle's Small Scale-Length Heterogeneity	248
Slabs Do Not Go Gentle	249

OUTER AND INNER CORE STRUCTURE

A Glassy Lowermost Outer Core.....	250
Localized Temporal Change of the Earth's Inner Core Surface.....	251
On the Inner-Outer Core Density Contrast from PKiKP/PcP Amplitude Ratios and Uncertainties Caused by Seismic Noise....	252
Core Structure Reexamined Using New Teleseismic Data Recorded in Antarctica: Evidence For, at Most, Weak Cylindrical Seismic Anisotropy in the Inner Core	253
On Iris Contribution to Deep Earth Studies	254
Large Variations in Travel Times of Mantle-Sensitive Seismic Waves from the South Sandwich Islands: Is the Earth's Inner Core a Conglomerate of Anisotropic Domains?	255
Three-Dimensional Anisotropic Structure of the Earth's Inner Core.....	256
Observations of Antipodal PKiKP Waves: Seismic Evidence for a Distinctly Anisotropic Innermost Inner Core.....	257
Inner-Core Shear-Wave Anisotropy and Texture from an Observation of PKJKP.....	258
Regional Variation of Inner Core Anisotropy from Seismic Normal Mode Observations	259
Inner Core Rotation and Its Variability from Non-Parametric Modeling.....	260
Wide-Scale Detection of Earthquake Doublets and Further Evidence for Inner Core Super-Rotation	261