

ROSLYNN KING

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EDUCATION

San Diego State University and University of California, San Diego, California September 2022

Joint Doctor of Philosophy in Geophysics

Dissertation: Controlled-Source Electromagnetic Studies of the Southern California Continental Shelf

Colorado School of Mines, Golden, Colorado

May 2014

B.S. Geological Engineering- Exploration with Honors

RELEVANT EMPLOYMENT

Postdoctoral Scholar

October 2022 - Present

Institute of Geophysics and Planetary Physics, University of California San Diego, California

- Primary role: to collect, process, and interpret marine controlled source electromagnetic, seismic, and magnetotelluric data for offshore groundwater, archaeological, and volcanic hazard studies.

Supervisors: Dr. Steven Constable, 8800 Biological Grade, La Jolla CA 92093. Phone: 858-534-2409

Teaching Assistant

September 2018 – June 2021

San Diego State University, San Diego, California

- Prepare presentation materials, instruct, and organize three-hour laboratory sessions weekly or bi-weekly for students either in person or virtually.
- Maintain course website, organize office hours, write exam materials, grade and report assignments.
- Additional responsibilities: exam proctoring, laboratory maintenance, and offering review sessions.

Supervisor: Dr. Jillian Maloney, 5500 Campanile Drive, San Diego CA 92182. Phone: 619-594-5200

Staff Geologist

April 2016 – April 2017

G3SoilWorks, Costa Mesa, California

- Provide clients with in-depth hazard and soil analysis to ensure safe building practices, environmental remediation, and compliancy through drilling, sampling, and site-investigations.
- Determine the physical and chemical properties of soil through geochemical and laboratory testing.

Supervisor: Larry Fanning, 350 Fischer Ave. Suite Front Costa Mesa, CA 92626. Phone: 714-668-5600

Exploration Geologist

July 2014 – February 2016

Nyrstar, Gordonsville, Tennessee

- Primary role: coordinate and plan exploration efforts through diamond hole drilling and geophysical methods (induced polarization and gravity) for four mines located in Middle Tennessee.
- Operational responsibilities included: budgeting, interaction with corporate, directing drilling and geophysical crews, and maintaining positive relationships with land owners.
- Analytical responsibilities involved: core logging, sampling, and building geologic and mineralization models to define ore blocks for engineers to advance mining and estimate reserves.

Supervisor: Dominic Ahiapur. 120 Zinc Mine Circle, Gordonsville, TN 38563. Phone: 615-683-6411

Physical Scientist

April 2012 – June 2014

United States Geological Survey, Golden, Colorado

- Investigated paleoseismicity of the Wasatch fault zone in Springville and North Creek, Utah. Collected radiocarbon and luminescence samples. Studied and documented structural geology of trench walls and surrounding area. Surveyed field area with total station to create georeferenced models.
- Used Optically Stimulated Luminescence method to date samples and prepared radiocarbon samples.
- Created study area maps, trench cross-sections, updated USGS hazard maps and fault databases, and combined core data using Arc GIS, Photoshop and Adobe illustrator.

Supervisor: Dr. Ryan Gold, 1711 Illinois St, Golden, CO 80401. Phone: 303-273-8633

RESEARCH INTERESTS

I am interested in the design, fabrication, and use of electromagnetic instruments to study the hazards and potential resources that have direct implications for human life located on the continental shelf and onshore. More specifically, I specialize in identifying and analyzing hydrocarbon seeps, fluid pathways, freshwater resources, and archeological sites so as to reduce ambiguity in current climate models, manage groundwater resources, and aid in our understanding of human migration pathways. Recently, my research has transitioned to also include onshore/offshore characterization of volcanoes, white ribbon studies of coastal aquifers, sediment/mineral conductivity, and airborne electromagnetic studies of surf zones. Additionally, I value and actively work to involve students and tribal representatives in this research. I do this by inviting students, community members, and tribal representatives to surveys, planning meetings, and in the interpretation process as I believe that these partnerships result in a more holistic understanding of drowned, sensitive, and/or coastal landscapes.

HONORS & AWARDS

- Hydrogeology Journal Editor's Choice article for the 2022 publication year
- Invited speaker with travel support for Fall 2022 AGU session: Effective Earth and Space Science Informatics: Building the Future of Science
- Invited speaker for Transboundary Groundwater Resiliency Research Bi-Monthly Meeting
- Invited keynote speaker for EarthCube Annual Meeting (2022)
- Invited speaker for International Workshop on Offshore Freshened Groundwater Research (2022)
- UC Ship Funds Recipient and chief scientist for 8 science days at sea (2021-2023, awarded \$375,000)
- ARCS Scholarship (2021-2022) – San Diego Chapter of ARCS (awarded \$10,000)
- Invited speaker for the meeting of COOPERATE EM (2021)
- Invited speaker for the Marine Seismology Symposium (2021)
- Invited panelist for the R/V Bob and Betty Beyster Celebration (2020)
- ARCS Scholarship (2020 - 2021) – San Diego Chapter of ARCS (awarded \$10,000)
- Award of Student Support (2020-2022) - NOAA Office of Ocean Exploration and Research
- Invited speaker for the Meeting of the Science Advisory Panel of the Coastal Plain of San Diego Groundwater Sustainability Plan (2020)
- SCEC Travel Grant Award (2019)
- Award of Student Support (2019-2020) - National Park Service Preservation Technology & Training Grant

LAB, FIELD, & SEA EXPERIENCE

USGS Wasatch Fault Study, 2012-2013, Goals: to study paleoseismicity of the Wasatch fault zone using trenching and sampling techniques. Mentors: Dr. Ryan Gold (USGS Head of Intermountain West Team), Dr. Chris DuRoss (Utah Geological Survey Researcher), and Dr. Anthony Crone (USGS Researcher)

USGS OSL dating laboratory work, 2012 -2014, Goals: to use optically stimulated luminescence dating methods to determine the time of burial for various sediments and man-made objects. Mentor: Shannon Mahan (Head of OSL Laboratory and USGS Researcher)

Mississippi River Delta Front Research Cruise, 2017, Goals: to determine the rate of sediment accumulation and timing of mass wasting events on the Mississippi Delta Front using various in-situ sampling techniques (e.g. multi-core, piston core, gravity core, and thermal measurements). Mentors: Dr. Jillian Maloney (SDSU Assistant Professor) and Dr. Sam Bentley (Louisiana State University Professor and Associate Dean of Research)

Northern Channel Islands (NCI) Research Cruise, 2017, Goals: to vibrocore and acoustically image paleochannels and estuaries offshore NCI to improve paleoclimate models. Mentor: Dr. Jillian Maloney (SDSU Assistant Professor)

Controlled-Source Electromagnetic (CSEM) Survey Offshore Santa Barbara and NCI, 2019, Goals: a feasibility study of the use of surface-towed controlled-source electromagnetic (CSEM) to detect and characterize paleochannels, paleoestuaries, and hydrocarbon seeps for later archeological and hydrocarbon studies. PI: Roslynn King (SDSU/UCSD Joint Doctoral student)

- Sampling Cruise of the Marine Scattering Layer offshore San Nicholas**, 2019, Goals: to use marine acoustic receivers to study the behavior of deep diving whales and sample the marine scattering layer with MOCNESS tows. PI: Ashlyn Giddings (UCSD PhD Candidate)
- Land Magnetotelluric (MT) Data Collection in the Coachella Valley**, 2019, Goals: feasibility study to test the use of MT systems to map and characterize the damage zone and, by proxy, the seismicity of the San Andreas fault system. PIs: Dr. Pieter-Ewald Share (UCSD Post-Doctorate Researcher) and Dr. Jared Peacock (USGS Researcher)
- CSEM Survey Offshore San Diego to Identify Submarine Groundwater**, 2019, Goals: to identify possible submarine groundwater and offshore pathways for saltwater encroachment into the San Diego Aquifer using surface-towed CSEM. PI: Roslynn King (SDSU/UCSD Joint Doctoral student)
- Acoustic Survey Cruise of the San Clemente Fault System**, 2020, Goals: to use CHIRP and subbottom profiler systems to identify the extent and seismicity of the San Clemente fault system offshore San Clemente and Catalina Islands. PI: Bo Derosier (UCSD PhD candidate)
- DARPA EM Cruise**, 2020, Goals: to use long-range deep-towed CSEM to study the transition between the lithosphere and the uppermost asthenosphere. Mentor: Dr. Steve Constable (UCSD Professor and Head of SIO Marine EM Lab)
- Test Cruise of Novel Bottom-Towed CSEM Array**, 2020, Goals: to test the functionality of a novel bottom-towed CSEM instrument offshore Imperial Beach to fulfill National Parks Technology Grant. PI: Roslynn King (SDSU/UCSD Joint Doctoral candidate)
- CSEM Survey Offshore Imperial Beach to Identify Submarine Groundwater**, 2020, Goals: to map the bounds and better understand the geology and structure of a previously identified (2019) submarine groundwater lens related to the the San Diego Aquifer using surface-towed CSEM. PI: Roslynn King (SDSU/UCSD Joint Doctoral candidate)
- CSEM and Seismic Survey Targeting Gas Hydrate Systems Offshore New Zealand**, 2020, Goals: to study the distribution of and better understand the gas hydrate systems of the southern Hikurangi subduction margin using a deep-towed CSEM system. PI: Dr. Peter Kannberg (UCSD Postdoctoral Researcher)
- NCPPT CSEM Survey Offshore the Northern Channel Islands and Santa Barbara**, 2021, Goals: to study the use of CSEM systems, surface-towed and/or novel bottom-towed, toward identifying and characterizing cultural resources and paleolandscapes in a drowned region with evidence of past human occupation. PIs: Roslynn King (SDSU/UCSD Joint Doctoral candidate) and Dr. Amy Gusick (LA Natural History Museum Researcher and Curator)
- NOAA CSEM Survey Offshore Northern Channel Islands and Pt. Conception**, 2021, Goals: to study the use of CSEM systems, surface-towed and/or novel bottom-towed, toward identifying and characterizing marine hydrocarbon seeps that have the potential to have been subaerially exposed during the last glacial maximum for later sampling. PIs: Roslynn King (SDSU/UCSD Joint Doctoral candidate), Dr. Amy Gusick (LA Natural History Museum Researcher and Curator), and Dr. Jillian Maloney (SDSU Associate Professor)
- Navsea Experiment Testing the Capabilities of EM Instrumentation Offshore Port Everglades, Florida**, 2021 Goals: to create a baseline resistivity map of testing facility offshore Port Everglades as well as to study the sensitivity, range, and use of various CSEM systems toward detecting ship activity as well as testing novel instrumentation and array geometries. PIs: Dr. Brian Glover (Naval Researcher), Mathew Young (Engineering Lead at Naval Surface Warfare Center), and Dr. Steven Constable (UCSD Professor and Head of SIO Marine EM Lab)
- CSEM and Seismic Survey Targeting Paleochannels Offshore San Dieguito, California**, 2022, Goals: to collect CSEM and acoustic reflection data for use in parametrized inversions to map porosity changes within and surrounding the paleochannels. PIs: Roslynn King (SDSU/UCSD Joint Doctoral candidate) and Margaret Morris (UCSD Doctoral candidate)
- Marine MT Survey Offshore White Island Part 1, New Zealand**, 2022, Goals: To deploy 40 MT instruments around White Island, an active andesitic-to-dacitic stratovolcano, to image the underlying magma chambers. PI: Dr. Ted Bertrand (GNS Science Senior MT Scientist) and Dr. Steven Constable (UCSD Professor and Head of SIO Marine EM Lab)
- ROV, Seismic, and Coring Cruise to Reconstruct the Paleolandscape of Southern California Bight**, 2023, Goals: to ground truth anomalous signatures in seismic and CSEM data collected from 2019-2023 using ROV imaging and sampling; to image and core paleochannels to better understand the lower dryas transition and compare porosity data from in-situ measurements and EM data; to create a sound map of

the Santa Barbara Channel to better model marine mammal and anthropogenic noise propagation in the marine environment; to train students on a variety of oceanographic and geophysical methods to map and study the Southern California Bight both on a research vessel and in the classroom. PI: Dr. Roslynn King (UCSD Postdoctoral Researcher)

Marine MT Survey Offshore White Island Part 2, New Zealand, 2023, Goals: To collect and redeploy 40 MT instruments (for a final array of 80 sites) around White Island, an active andesitic-to-dacitic stratovolcano, to model the underlying magma chambers. PI: Dr. Ted Bertrand (GNS Science Senior MT Scientist) and Dr. Steven Constable (UCSD Professor and Head of SIO Marine EM Lab)

Marine Active Seismic and CSEM Survey of Goban Spur, United Kingdom, 2023, Goals: to survey a sediment starved region of the seafloor with both active and passive seismic and EM methods to better understand the initiation of continent formation and the development of magmatism and serpentinization. PI: Dr. Tim Minshull (University of Southampton).

Marine MT Survey and Gravity Core Collection Offshore Mayor Island, New Zealand, 2023, Goals: To collect data from 40 MT instruments around Mayor Island, a dormant shield volcano, to model the underlying magma chambers and map the distribution of ash layers. PI: Dr. Ted Bertrand (GNS Science Senior MT Scientist).

Semiaquatic CSEM survey of Pearl Harbor, Hawaii, 2023. Goals: To image the extent and pathways of pollutants within the aquifer underlying Honolulu and Pearl Harbor using both marine and onshore CSEM receivers and to test the feasibility of seamlessly collecting EM data across the shoreline. PI: Dr Peter Kannberg (University of Hawaii Researcher).

PUBLICATIONS

King, R. B., Constable, S., Maloney, J. M., Gusick, A. E. (2024). CUESI: A near seafloor controlled-source electromagnetic system for shallow seabed characterization. (awaiting coauthor approval for submission).

King, R. B. & Constable, S. (2023). How low can you go: An investigation of depth sensitivity and resolution using towed marine controlled-source electromagnetic systems. *Geophysical Prospecting*. <https://doi.org/10.1111/1365-2478.13345>

King, R. B. (2022). Controlled-Source Electromagnetic Studies of the Southern California Continental Shelf. *UC San Diego*. ProQuest ID: King_ucsd_0033D_21764. Merritt ID: ark:/13030/m5r574gh. Retrieved from <https://escholarship.org/uc/item/5j24w1ww>

King, R. B., Constable, S., Maloney, J. M. (2022). A case study in controlled source electromagnetism: Near seabed hydrocarbon seep systems of Coal Oil Point, California, USA. *Marine and Petroleum Geology*. <https://doi.org/10.1016/j.marpetgeo.2022.105636>

King, R. B., Danskin, W. R., Constable, S., & Maloney, J. M. (2022). Identification of fresh submarine groundwater off the coast of San Diego, USA, using electromagnetic methods. *Hydrogeology Journal*. <https://doi.org/10.1007/s10040-022-02463-y>

Gusick, A. E., Maloney, J., **King, R. B.**, & Braje, T. J. (2019, June). Emerging Technologies in the Search for the Submerged Cultural Landscapes of the Pacific Continental Shelf. In *Offshore Technology Conference*. Offshore Technology Conference.

Duross, C., Hylland, M. D., Hiscock, A., Personius, S., Briggs, R., Gold, R. D., Beukelman, G. S., McDonald, G.N., Erickson, B.A., McLean, A. P., Angster, S. J., **King, R. B.**, Crone, A. J., Mahan, S. A. (2017). *Holocene surface-faulting earthquakes at the Spring Lake and North Creek Sites on the Wasatch Fault Zone: Evidence for complex rupture of the Nephi Segment* (Vol. 28, pp. 1-119). Utah Geological Survey.

DuRoss, C. B., Hylland, M. D., Hiscock, A., Beukelman, G., McDonald, G. N., Erickson, B., McKean, A., Personius, S. F., Briggs, R., Gold, R., Angster, S., **King, R.**, Crone, A. J., Mahan, S. A. (2014). Paleoseismic investigation to determine the mid-Holocene chronology of surface-faulting earthquakes on the Nephi segment of the Wasatch fault zone, Utah and Juab Counties, Utah. *US Geological Survey, NEHRP final technical report.*

SELECT PROFESSIONAL PRESENTATIONS

King, R. (2023, December). High-resolution CSEM system for offshore technical assessment. Invited presentation for *USGS Geology, Geophysics, and Geochemistry Science Center.*

King, R. (2022, December). Reconstructing the Southern California Bight with Tribal and Scientific Knowledge. Invited speaker for AGU session: Effective Earth and Space Science Informatics: Building the Future of Science. In *AGU Fall Meeting Abstracts.*

King, R. Gusick, A., Constable, S., & Maloney, J. (2022, September). Comparing results from a new bottom-towed CSEM system against seismic and core data. In *25th Annual International EM Induction Workshop Abstracts.*

King, R. (2022, August). Freshwater under the Ocean Floor and How to Find it. Invited speaker for *Transboundary Groundwater Resiliency Research Bi-Monthly Meeting.*

King, R. and Gustafson, C. (2022, June). Freshwater under the Ocean Floor and How to Find it. Keynote speakers for *EarthCube Annual Meeting.*

King, R. (2021, July). CSEM Exploration for SD Submarine Groundwater. Invited speaker for *COOPERATE EM.*

King, R. (2021, March). CSEM exploration for submarine groundwater: Paths for encroachment or exploitation? Invited Speaker for the Frontiers in Marine Electromagnetics Special Interest Group Session in the *Marine Seismology Symposium.*

King, R. (2020, January). Controlled-Source Electromagnetic Methods (CSEM) to Detect and Characterize Fresh-Water Resources on the Continental Shelf. Invited presentation for the Science Advisory Panel of the Coastal Plain of San Diego Groundwater Sustainability Plan.

King, R., Maloney, J. M., Constable, S. (2019, December). Controlled-Source Electromagnetic Methods (CSEM) to Detect and Characterize Resources and Hazards on the Continental Shelf. In *AGU Fall Meeting Abstracts.*

King, R., Maloney, J. M., Constable, S., Gusick, A. E., Braje, T., & Ball, D. (2018, December). Feasibility of Detecting Submerged Landforms and Archaeological Resources Using Controlled Source Electromagnetic Methods. In *AGU Fall Meeting Abstracts.*

PROFESSIONAL MEMBERSHIPS

OFF-SOURCE WG2 Electromagnetic Subcommittee, European Union, 2022-Present

COOPERATE EM, San Diego, California, 2020-Present

Southern California Earthquake Center, Los Angeles, California, 2018-Present

San Diego Association of Geologists, San Diego, California, 2016-Present

American Geophysical Union, San Diego, California, 2017-Present

Seafloor Electromagnetics Consortium, San Diego, California, 2017-Present

Society of Exploration Geophysics, San Diego, California, 2020 – Present

Mississippi River Delta Front Team, San Diego, California, 2017-2020

Association of Env. and Eng. Geologists (AEG) Technological advisor, Colorado School of Mines, 2011-2014

American Association of Petroleum Geologists, Colorado School of Mines, 2012-2015

Society for Mining, Metallurgy, and Exploration, Colorado School of Mines, 2013-2016

Society of Women Engineers, Colorado School of Mines, 2012-2020