

STEVEN CONSTABLE

EMPLOYER: Scripps Institution of Oceanography
University of California San Diego
La Jolla, California, USA

POSITIONS HELD: 2016– Distinguished Professor, UCSD
1998–2016 Professor, UCSD
1985–1998 Research Geophysicist (Assistant through Full), UCSD
1983–1985 Postdoctoral Research Oceanographer, UCSD

EDUCATION: 1983 Ph.D., Geophysics, Australian National University
1979 B.Sc., Geology (Honors), University of Western Australia

RESEARCH NARRATIVE:

My PhD research, advised by Mike McElhinny, involved deep resistivity studies of the Australian crust. Having stumbled into electrical methods, on graduation I took up a postdoc with Chip Cox to study the oceanic lithosphere using controlled-source EM methods. An experimentalist by nature, I enjoyed the challenges associated with collecting marine EM data, but when it came to interpreting the data I discovered that (a) the inversion methods available at the time were lacking, and (b) the conductivity–temperature relationships of mantle minerals were poorly understood. I addressed the first problem through a collaboration with Bob Parker and Cathy Constable, and we developed, and distributed, the Occam’s inversion code, which is quite possibly the first application of regularized inversion to nonlinear geophysical problems. For the second problem a collaboration with Al Duba and Tom Shankland was productive, and we have a number of publications on the electrical properties of olivine.

Marine EM remained my primary interest, and through a strong relationship with industry I have developed and built an instrument pool that is second only in size to that of the remaining marine EM contractor, and which has become a de-facto facility for the academic community in the US and elsewhere. I have used my instruments and methods to study oceanic lithosphere/asthenosphere boundary, mid-ocean ridges, subduction zones, offshore gas hydrate, submarine groundwater, mineral deposits, hydrothermal prospects, gas and oil seeps, and permafrost. I continued my interest in mantle conductivity through magnetic satellite and observatory studies, and have dabbled in global lightning observations. Through collaborations with USGS and LLNL, I recently concluded a series of papers on laboratory measurements of methane and carbon dioxide hydrate.

PUBLICATIONS:

King, R.B., W.R. Danskin, S. Constable, and J.M. Maloney, 2022. Identification of fresh groundwater off the coast of San Diego, USA, using electromagnetic methods. *Hydrogeology Journal*, **30**, 956–973.

Stern, L.A., S. Constable, R. Lu, W.L. Du Frane, J.J. Roberts, 2021. Electrical properties of carbon dioxide hydrate: Implications for monitoring CO₂ in the gas hydrate stability zone. *Geophysical Research Letters*, **48**, e2021GL093475.

Attias, E., D. Thomas, D. Sherman, K. Ismail, and S. Constable, 2020. Marine electrical imaging reveals novel freshwater transport mechanism in Hawai’i. *Science Advances*, **6**, eabd-4866.

Wang, S., S. Constable, C.A. Rychert, and N. Harmon, 2020. A lithosphere-asthenosphere boundary and partial melt resolved using marine magnetotelluric data. *Geochemistry Geophysics Geosystems*, **21**, e2020GC009177.

- Constable, S., R. Lu, L.A. Stern, W.L. Du Frane, and J.J. Roberts, 2020. Laboratory electrical conductivity of marine gas hydrate. *Geophysical Research Letters*, **47**, e2020GL087645.
- Constable, S., 2020. Perspectives on marine electromagnetic methods. *Perspectives of Earth and Space Scientists*, **2**, e2019CN000123.
- Kannberg, P.K., and S. Constable, 2020. Characterization and quantification of gas hydrates in the California Borderlands. *Geophysical Research Letters*, **47**, e2019GL084703.
- Sherman, D., and S.C. Constable, 2018. Permafrost extent on the Alaskan Beaufort Shelf from surface towed controlled-source electromagnetic surveys. *Journal of Geophysical Research*, **123**, 1–13.
- Constable, S., P. Kowalczyk, and S. Bloomer, 2018. Measuring marine self-potential using an autonomous underwater vehicle. *Geophysical Journal International*, **215**, 49–60.
- Key, K., S. Constable, L. Liu, and A. Pommier, 2013. Electrical image of passive mantle upwelling beneath the northern East Pacific Rise. *Nature*, **495**, 499–502.
- Naif, S., K. Key, S. Constable, and R.L. Evans, 2013. Melt-rich channel observed at the lithosphere-asthenosphere boundary. *Nature*, **495**, 356–359.
- Constable, S., 2010. Ten years of marine CSEM for hydrocarbon exploration. *Geophysics*, **75**, 75A67–75A81.
- Orange, A., K. Key, and S. Constable, 2009. The feasibility of reservoir monitoring using time-lapse marine CSEM. *Geophysics*, **74**, F21–F29.
- Constable, S., 2006. SEO3: A new model of olivine electrical conductivity. *Geophys. J. Int.*, **166**, 435–437.
- Constable, S., and C. Constable, 2004. Observing geomagnetic induction in magnetic satellite measurements and associated implications for mantle conductivity. *Geochem. Geophys. Geosys.*, **5**, Q01006.
- Füllekrug, M. and S. Constable, 2000. Global triangulation of intense lightning discharges. *Geophys. Res. Lett.*, **27**, 333–336.
- Constable, S.C. and Duba, A., 1990. The electrical conductivity of olivine, a dunite, and the mantle. *J. Geophys. Res.*, **95**, 6967–6978.
- Constable, S.C., Parker, R.L., and Constable, C.G., 1987. Occam's Inversion: a practical algorithm for generating smooth models from EM sounding data. *Geophysics*, **52**, 289–300.
- Cox, C.S., S.C. Constable, A.D. Chave, and S.C. Webb, 1986. Controlled source electromagnetic sounding of the oceanic lithosphere. *Nature*, **320**, 52–54.

AWARDS, PRIZES:

1979	Rex T. Prider Medal
2003	G.W. Hohmann Award
2007	SEG Distinguished Achievement Award (for Scripps)
2010	R&D 100 Award (with Quasar Geophysical Technologies)
2015	Bullard Lecturer (AGU section lecture for GPE)
2016	SEG/AAPG Distinguished Lecturer
2016	SEG Reginald Fessenden Award
2016	AGU Fellowship

MEMBERSHIPS:

- American Geophysical Union (supporting life member)
- Royal Astronomical Society
- Society of Exploration Geophysicists (lifetime member)
- European Association of Geoscientists and Engineers