

# Fall 2016 SEG/AAPG Distinguished Lecturer

Steven Constable

Scripps Institution of Oceanography

## **Abstract: Mapping Gas Hydrate using Electromagnetic Methods**

Gas hydrate is found globally on the continental shelves and is important as an unconventional hydrocarbon source, a hazard to drilling and seafloor infrastructure, a potential source of potent greenhouse gas, and a confounding resistor in the interpretation of conventional marine EM data. Yet, estimates of global hydrate volume vary by three orders of magnitude and identified recoverable reserves are rare, the reason being that it is difficult to image hydrate using seismic methods alone. However, gas hydrate is highly resistive and presents a good EM target at high saturations. Conventional controlled-source EM (CSEM) methods can be used to image hydrate, but is inefficient because seafloor receivers need to be closely spaced to achieve the appropriate resolution in the upper hundreds of meters of the seafloor. Several groups, including Scripps Institution of Oceanography, have developed towed CSEM systems designed to map hydrate in deep water, and such equipment is now being used commercially to image hydrate with a potential for methane production. In this lecture I will describe marine gas hydrate, laboratory studies of its electrical properties, and the equipment that we use to image it, with case studies from offshore California and the Gulf of Mexico.

## **Biography**



Steven Constable studied geology at the University of Western Australia, graduating with first class honors in 1979. In 1983 he received a Ph.D. in geophysics from the Australian National University for a thesis titled "Deep Resistivity Studies of the Australian Crust" and later that year took a postdoc position at the Scripps Institution of Oceanography, University of California San Diego, where he is currently Professor of Geophysics. Steven is interested in all aspects of electrical conductivity, and has made contributions to inverse theory, electrical properties of rocks, mantle conductivity, magnetic satellite induction studies, global lightning, and instrumentation. However, his main focus is marine electromagnetism; he played a significant role in the commercialization of marine EM for hydrocarbon exploration, work that was recognized by the G.W. Hohmann Award in 2003, the 2007 SEG Distinguished Achievement Award, and now the SEG 2016 Reginald Fessenden Award. He also received the R&D 100 Award in 2010, the AGU Bullard Lecture in 2015, followed in 2016 by being named Fellow of the AGU. More recent efforts have involved the development of equipment to map gas hydrate and permafrost. Steven has served as an associate editor for the journal *Geophysics*, as a section secretary and corresponding editor for the American Geophysical Union, and on the MARELEC steering committee.