EGI Energy & Geoscience Institute
AT THE UNIVERSITY OF UTAH

Since 1972

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Research Interests

- EM Modeling and Inversion
- Geothermal Systems and Ore Deposits
- Orogenic and Earthquake Processes

Phil holds a Ph.D in Electromagnetic Geophysics from the University of Utah and a B.Sc. in Engineering Geology from Queen's University at Kingston, Canada. He has been active in basic and applied geophysical research for 30 years and joined EGI in 1995 through its merger with UURI. He has lead international teams of investigators in large research projects in U.S. Cascadia, Basin and Range, Southern Appalachia, New Zealand, and Antarctica.

Dr. Wannamaker is an active member of the AGU, GRC, GSA, SEG, and ASEG. In 2011 he was elected a Fellow of the Geological Society of America. He is Trustee and Treasurer for the Gerald W. Hohmann Memorial Trust for Teaching and Research in Applied Electrical Methods. Phil has published 50+ papers and has advised 23 graduate student theses. He has served as associate editor for several journals and as co-editor of a book on EM modeling and inversion.

EM Modeling & Inversion:

Dr. Wannamaker heads development of leading algorithms in integral equations and finite elements for 2D and 3D modeling and inversion of EM data, especially magnetotellurics (MT). Source codes commonly have been shared with the broader community although technological niches in handling complex environments including topography are retained. Source and scale characteristics have been tailored to exploration needs in geothermal, oil and gas, and mining.

Geothermal Systems & Ore Deposits:

EM methods are primary in exploration for geothermal and mineral resources. Dr. Wannamaker's research is in discriminating high-enthalpy systems using MT, structural geology, and isotope geochemistry. Large projects have cost-shared research with several geothermal companies having fields in the western U.S. and Indonesia. For mining, electrical structure can be a direct indicator of ore minerals, or used to map alteration stratigraphy to define ore zone geometry.

Orogenic & Earthquake Processes:

Larger scale research has uncovered sources and pathways of subduction fluids in triggering large earthquake events in the New Zealand and Cascadia subduction systems. Transect surveying across the U.S. Basin and Range revealed zones of active magmatic underplating and crustal scale fluid pathways linked to geothermal systems. Pioneering work in Antarctica demonstrated MT feasibility over thick ice sheets, showed that sedimentary sections could be revealed beneath ice and seawater columns, and established the thermal state of the rift-platform transition of the central Transantarctic Mountains.

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