

## Foundations of Portable Seismology: The Program for Array Seismic Studies of the Continental Lithosphere (IRIS-PASSCAL).

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The creation and development of PASSCAL (Program for Array Seismic Studies of the Continental Lithosphere) revolutionized portable seismology. The vision for a mobile array of seismographs was articulated in the original IRIS proposal in 1984, and the first PASSCAL experiments were conducted in 1986. Prior to PASSCAL, field experiments required either purchase of the few commercial systems on the market, a long-term investment in instrument research and design, or negotiations with institutions owning equipment. Most recordings were analog; emerging digital systems had varying formats and capabilities. Field recordings were not usually shared. With the creation of PASSCAL, the barriers to field seismology were greatly reduced. Maintained equipment was available to any scientist with funding, and training at the instrument centers (Lamont and Stanford, and later New Mexico Tech) and technical help in the field was provided. Equipment loan came with the requirement that the user provide a copy of the data to the IRIS DMC. As PASSCAL emerged as a viable partner for seismologists, greater support emerged, beginning with software to organize and process seismic data and later assistance with archival at the DMC. With the integration of field data into observatory data, seismologists could take advantage of data from PASSCAL deployments in global studies as well as targeted regional studies. Early PASSCAL experiments honed in on crustal structure of the Basin and Range, the origin of the Ouachita Mountains, and aftershock studies of the Loma Prieta earthquake. Other early studies examined the profoundly different western ("tectonically active") and eastern ("stable") parts of North America. In the Himalaya, geologic speculations on the geometry of the India-Asia plate boundary could finally be put to multiple tests. A sampling of recent publications (2017-2018) acknowledging PASSCAL includes papers on structural seismology as well as contributions in relatively new directions such as induced seismicity, temporal variations in seismic properties, and glacial seismicity.

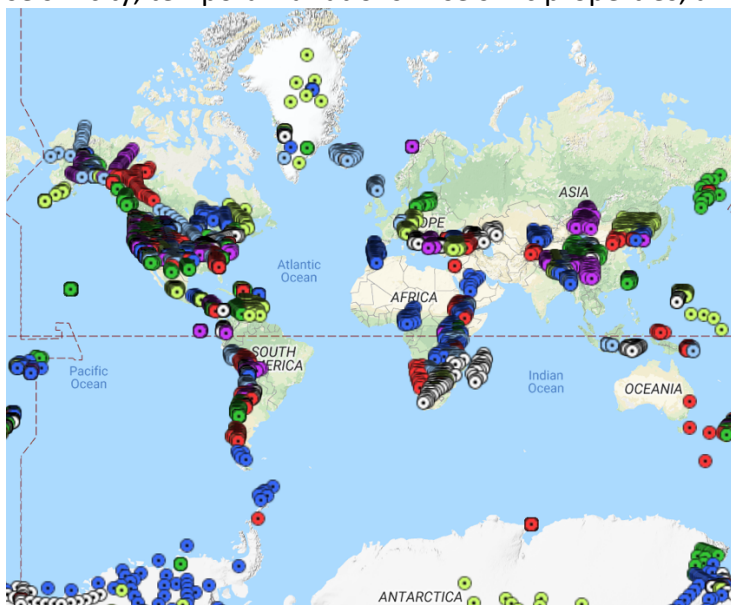


Figure 1. Global map of PASSCAL deployments with data archived at the IRIS Data Management Center, 1990-2017. Over 17,000 stations.