

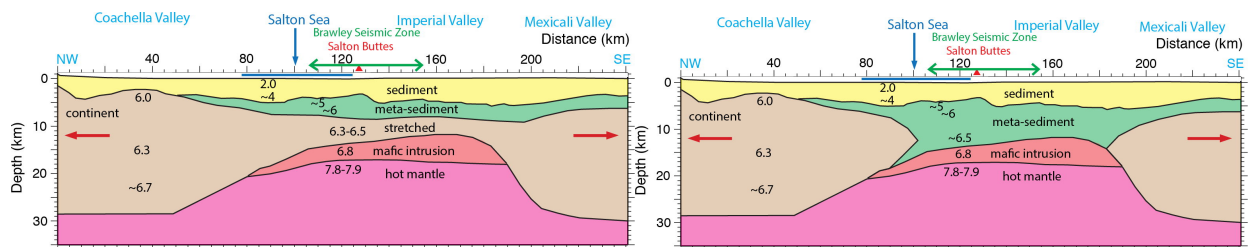
Active continental rifting in the Salton Trough, southern California, illuminated by the Salton Seismic Imaging Project (SSIP)

L. Han¹, J. A. Hole¹, G. S. Fuis², J. M. Stock³, N. W. Driscoll⁴, G. M. Kent⁵, A. M. Kell⁵,
M. J. Rymer², A. Gonzalez-Fernandez⁶, and O. Lazaro-Mancilla⁷

(1) Virginia Tech; (2) U. S. Geological Survey, Menlo Park; (3) Caltech;
(4) Scripps Institution of Oceanography; (5) University of Nevada, Reno;
(6) CICESE, Mexico; (7) Universidad Autonoma de Baja California, Mexico

SSIP acquired seismic refraction and reflection data in and across the Salton Trough to investigate active rifting processes at the northern end of the Gulf of California extensional province and earthquake hazards at the southern end of the San Andreas Fault system. Seven lines of refraction and low-fold reflection data were acquired onshore, and two lines and a grid of airgun and OBS data were acquired in the Salton Sea. Onshore-offshore data and 2-D arrays were also recorded. More than 120 volunteers participated in the fieldwork, most of whom were students.

The central Salton Trough contains 2-5 km of Colorado River sediment. The top of crystalline rock is not sharp and has a seismic velocity of 5-6 km/s. This crystalline crust is interpreted to be Colorado River sediment that has been metamorphosed by the very high heat flow. At most, 4 km of higher velocities in the middle crust might represent pre-existing continental crust, but this layer can alternatively be interpreted as higher-grade meta-sediment. Beneath ~13 km depth, seismic velocity of ~6.8 km/s is interpreted to be mafic rocks underplated by rift magmatism. The Moho is at ~18 km depth. This thin, relatively uniform crust is ~100 km wide in the direction of plate motion, along the Salton Trough. A velocity of ~7.8 km/s in the upper mantle indicates partial melting. The SSIP data show that the North American lithosphere rifted apart in the past few Myr and is being replaced by new crust created by rift magmatism from below, sedimentation from above, and metamorphism of the sediment. Other continental margins may include similar crust created by rifting in a river-delta setting.



Seismic velocity (km/s) and two alternate interpretations of crustal structure in the Salton Trough.