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PN VELOCITY BENEATH WESTERN NEW MEXICO AND EASTERN ARIZONA; Lawrence H. Jaksha, U.S. Geological Survey and New Mexico Institute of Mining and Technology, Socorro, New Mexico

Crustal thinning has usually been associated with a wide-spread heat source in the upper mantle. The low compressional wave (Pn) velocities (≈7.6 km/s) reported beneath extended terrains contrast strongly with normal (≈8.0 km/s) Pn velocities found beneath cratons.

The U.S. Geological Survey began a study of the association between thinned crust and low Pn velocity in 1984. The study area is in the transition zone between the Colorado Plateau and the Basin and Range provinces and lies along the New Mexico-Arizona border at approximately 34.5°N latitude. The study area contains a segment of the Jemez lineament (1), an extensive, late Cenozoic alignment of basaltic volcanism that extends from east-central Arizona to northeastern New Mexico (Figure 1).

Our experiment involves observing Pn arrivals on an areal array of 7 seismic stations located in the transition zone and along the Jemez lineament. We are using explosions from coal and copper mines in New Mexico and Arizona as well as military detonations at White Sands Missile Range, New Mexico, Yuma, Arizona, and the Nevada Test Site as energy sources. Mining explosions at Morenci, Arizona and Gallup, New Mexico will be used later in the study to deduce the velocity structure of the crust above the Pn refractor.

Very preliminary results suggest a Pn velocity of 7.94 km/s (with a fairly large uncertainty) beneath the study area. The Pn delay times, which can be converted to estimates of crustal thickness given knowledge of the velocity structure of the crust increase both to the north and east of Springerville, Arizona. As a constraint on the velocity of Pn we analyzed the reversed refraction line GNOME-HARDHAT which passes through Springerville oriented NW-SE. This analysis resulted in a Pn velocity of 7.9-8.0 km/s for

the transition zone.

These preliminary results along with those reported earlier (2,3) suggest that a normal Pn velocity might persist even though the crust thins (from north to south) by 15 km along the length of the Arizona-New Mexico border. If the upper mantle is currently hot anywhere in western New Mexico or eastern Arizona then the dimensions of the heat source (or sources) might be small compared to the intra-station distances of the seismic arrays used to estimate the velocity of Pn.

References Cited

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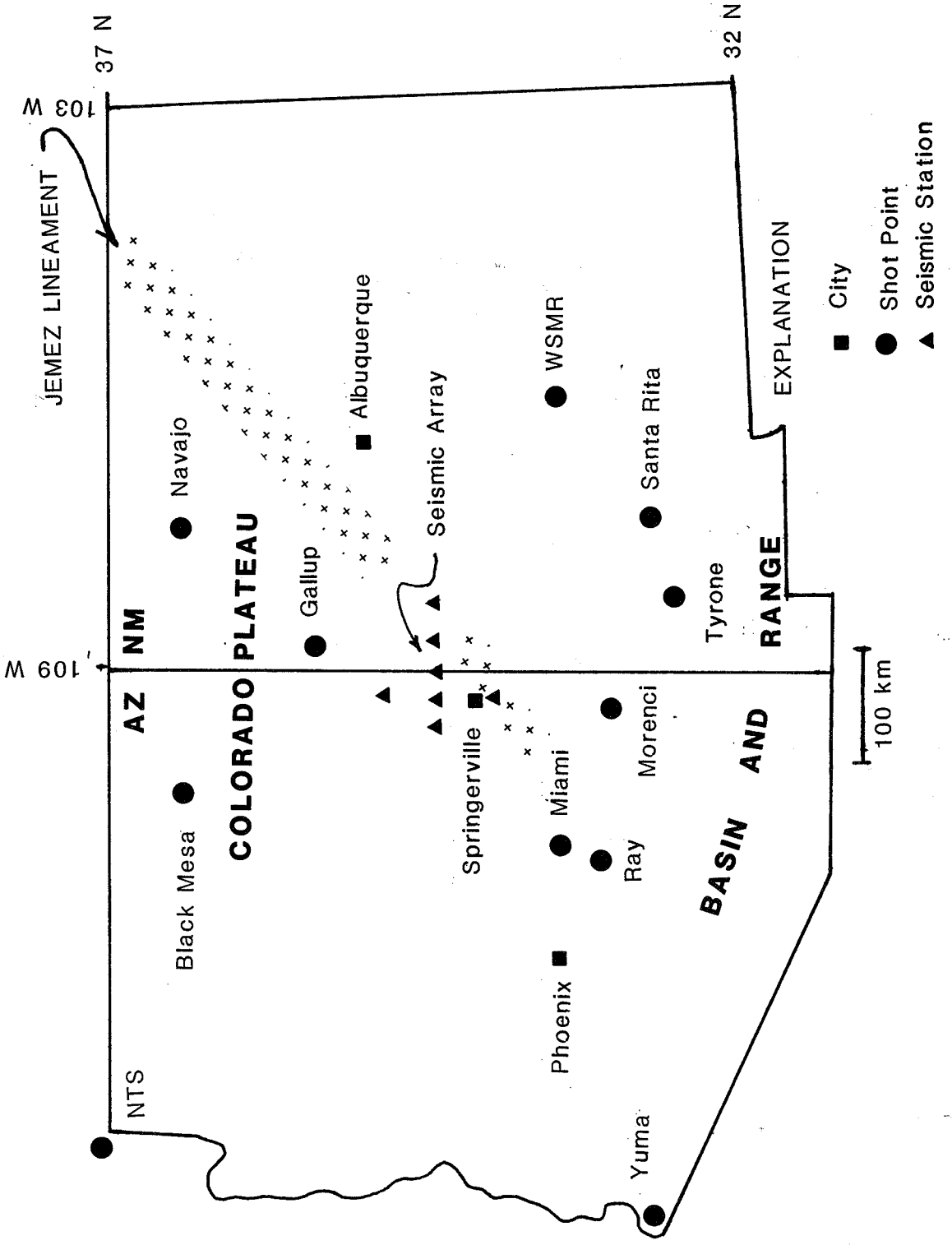

Figure 1