

SEISMICITY AND CRUSTAL STRUCTURE OF NORTH-CENTRAL ARIZONA

by

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ABSTRACT

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The seismicity of northern Arizona is concentrated in a band that extends from the northwestern corner of the state to Chino Valley in west-central Arizona. Near the Colorado River (at approximately 36°N latitude, 112°W longitude), the trend of this seismic band changes from southeasterly to south-southwesterly. This band of seismicity, termed the northern Arizona seismic belt (NASB), is bound on either side by relatively aseismic areas. Many events within this band have had Modified Mercalli Intensities greater than or equal to V, and one event of Intensity VII occurred near Flagstaff, Arizona, near the southeastern margin of the NASB. Epicenters from microseismic studies in and around the San Francisco volcanic field (SFVf) of north-central Arizona follow the same trend as that defined by the historic epicenters. The NASB may be a southern extension of the Intermountain Seismic Belt that trends from southwestern Utah to northwestern Montana.

Microseismic studies in and near the SFVf (1976-1985) have documented a lower level of seismicity than is found in the NASB to the north and south. This seismicity consists of microseismic swarms and single events. The majority of the events are relatively shallow (<6 km), and are therefore probably not directly related to a magma body that has been hypothesized to lie at depths of 9-34 km beneath San

Francisco Mountain. Much of the seismicity recorded during these surveys was located in northwest-trending fault systems.

Several crustal models used in seismic studies of northern Arizona were examined and compared. Each of these models were quite similar, but one model, with uppermost crustal P-wave velocities of 4.7 and 6.2 km/sec corresponding to layer thicknesses of 1.5 and 28.5 km respectively, did prove to be better than the others. This model was then used for hypocenter locations during this investigation.

Several tectonic elements (i.e. structural style and stress orientations) suggest that Basin and Range-type tectonics are encroaching onto the southwestern edge of the Colorado Plateau. Isochrons of magmatism show the same arcuate pattern as the NASB, suggesting that the NASB may define the neotectonic boundary between the southwestern Colorado Plateau and Basin and Range.

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