

## SAN JUAN, ARGENTINA EARTHQUAKE OF NOVEMBER 23, 1977

Based on preliminary data, the hypocenter of the destructive San Juan, Argentina earthquake of November 23, 1977 was located approximately 80 km (hypocentral distance) east-northeast of the city of San Juan at a depth of about 50 km (oral commun., S. T. Algermissen, 12/19/77). The main shock, about magnitude 7.0, was followed by a large aftershock sequence including at least one event of magnitude 6. The main shock was felt throughout much of Argentina, including Buenos Aires 960 km to the east, and caused extensive damage in the province of San Juan, particularly in the town of Caucete, 28 km southeast of the city of San Juan. The most notable effects of the earthquake were vast areas of liquifaction (hundreds of square kilometers), complete or partial collapse of hundreds of adobe dwellings, and damage to numerous metal cylindrical wine storage tanks. Approximately 65 persons were killed, 284 injured and 20,000 to 40,000 left homeless (oral commun., J. S. Castano, 12/1/77).

The province of San Juan is situated along the Chile-Argentina border and includes the eastern slopes of the Andes as well as flat lands to the east. The climate is semi-arid and there is extensive irrigation throughout much of the province. Wine production is the major industry. Most of the cities seriously affected by the earthquake--Caucete, San Juan, Las Casuarinas, Media Agua--are situated on the San Juan River flood plain between the foothills of the Andes on the west and a small mountain range, "Sierra Pie de Palo" on the northeast. Liquifaction occurred at various locations within this region, particularly in Caucete and to the south beyond Las Casuarinas, but it was most prevalent (spectacular) on the north side of "Sierra Pie de Palo" between the range's north face and the town of Punta del Agua, 90 km to the north (oral commun., G. E. Brogan, 12/15/77).

The towns of Caucete and Bermejo sustained the greatest concentration of damage, primarily in the form of fallen adobe dwellings. The city of San Juan, on the other hand, the province capital city that was virtually destroyed by an earthquake in 1944 that killed 5,000, injured 13,000 and left 70,000 to 80,000 homeless, sustained little damage. A few multi-story buildings (this reporter observed two) sustained significant structural damage and several dozen adobe dwellings partially or completely collapsed.

Three strong-motion accelerograph records and at least 14 seismoscope records were generated by the main shock. Two of the strong-motion records were obtained in the city of San Juan, and the third is from the city of Mendoza, approximately 175 km south of the epicentral area. Eleven of the seismoscope records are from the greater San Juan (city) region, two are from Caucete, and one from Media Agua. A preliminary visual analysis of the accelerograph record from INPRES (Instituto Nacional de Prevencion Sismica, San Juan) indicates that maximum accelerations for the north-south, vertical, and east-west components were 0.19g, 0.12g, and 0.19g, respectively. Predominant frequencies for the same components were 2.5-3.0 Hz, 1.5 Hz, and 2.5-3.0 Hz, respectively. The duration of motion greater than 0.10g was approximately 22 seconds and the duration of motion greater than 0.05g was approximately 48 seconds. The seismoscope records indicate that the intensity of shaking, at least at the natural frequency of the seismoscopes, was greatest in Caucete.

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