REPORTS AND COMMENT

The San Salvador earthquake of 10th October 1986

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THE SEISMICITY OF EL SALVADOR

The republic of El Salvador lies on the Pacific Coast of the isthmus of Central America, bordered by Honduras and Guatemala, forming part of the so-called "ring of fire," the zones of earthquake and volcano activity that encircle the Pacific Ocean. El Salvador is adjacent to the mid-America trench, a subduction zone where the Caribbean Plate overrides the Cocos Plate. Four distinct bands of seismicity have been identified that affect El Salvador; three of these are located in the Cocos Plate situated 20—30, 60 and 120 km offshore. The first of these is the source of 90% of the earthquakes that are felt in El Salvador. The fourth zone of seismic activity, and the one that produces the most damaging earthquakes, is located onshore running parallel with the chain of young volcanoes that passes through El Salvador and Nicaragua. The earthquakes that occur in this zone tend to be of intermediate magnitude and of shallow focal depth. This seismic zone also gave rise to the earthquake that destroyed Managua, Nicaragua in December 1972.

San Salvador became the capital of El Salvador in 1538—1539, after the original capital founded by the Spanish, Bermuda, was itself destroyed by an earthquake. The city lies on an erosion surface in an area known locally as the "Valley of the Hammocks." The erosion surface lies at an elevation of between 650 and 750 m above sea level overlooked by the San Salvador Volcano, known as El Boqueron, which stands at 1,967 m above sea level, to the west of the city. To the north are the subdued Cerros de Mariona and to the south the coastal cordillera and the extinct volcano, Cerro de San Jacinto. The erosion surface slopes out to the east to Lake Ilopango which lies at 438 m above sea level (Fig. 1).

Almost the entire area of the capital is overlain by "tierra blanca," a white-yellow volcanic ash which is thought to have its origin in the volcano that is now submerged in Lake Ilopango. This volcano was last active in 1880 when its eruption followed a seismic "swarm" beginning in the previous year. Near the lake the tierra blanca has been found to extend to depths of 100 m, thinning out westwards where it gives way to the slopes of El Boqueron. In the metropolitan area the deposits of volcanic ash vary between 5 and 20 m in depth. Largely as a result of pumping for the city's supply, the groundwater is now located at depths greater than 80 m, although near Lake Ilopango the level rises almost to the ground surface.

San Salvador has been destroyed by earthquake a number of times in its history. There are historical records of destruction in 1576, 1659, 1798, 1839, 1854, 1873, 1917, 1919 and 1965, and it is possible that very heavy damage also occurred in 1594, 1707, 1719, 1806 and 1815. The earthquakes of 1659 and 1917 were both accompanied by eruptions of El Boqueron. After the earthquake of 1854 an attempt was made to relocate the capital a few kilometres westward at Nueva San Salvador, which exists today as Santa Tecla (Lomnitz and Schulz, 1966).

THE EARTHQUAKE OF 3rd MAY 1965

The earthquake of 3rd May 1965 occurred at 4 a.m. local time, with magnitude $M_S = 6.2$ and with its epicentre located a few kilometres south-east of the city (Fig. 2). The focal depth was of the order of 10—20 km. The earthquake caused significant damage within a radius of about 15 km, resulting in 120 casualties and up to 30,000 people being made homeless. The earthquake was investigated by a UNESCO reconnaisance mission which included E. Rosenblueth of the National University of Mexico (UNAM). Amongst the observations were reports of liquefaction of the soil near Lake Ilopango. There were no accelerographs in San Salvador at the time, but Rosenblueth reported that there was no evidence of significant vertical ground accelerations and subjective reports on the nature of the earthquake made no reference to vertical motion. Based on

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