

FORCASTING THE END OF A GAP : THE LARGE ANTOFAGASTA (NORTHERN CHILE) EARTHQUAKE OF JULY 30, 1995

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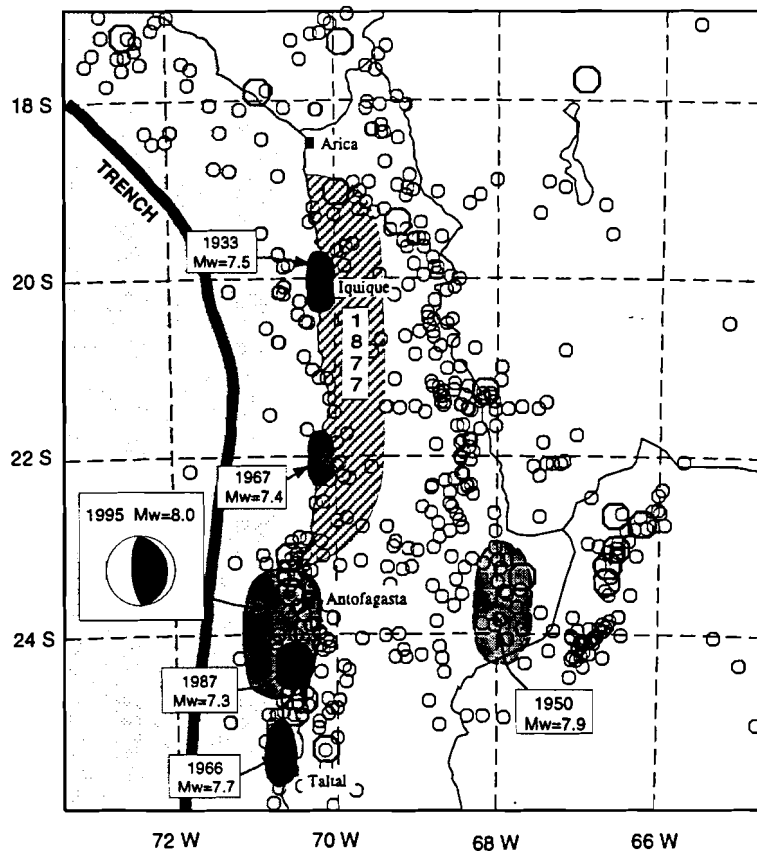
The July 30, 1995 Antofagasta earthquake ($M_w = 8$), and its aftershock sequence, were precisely monitored by a local network previously installed in the region in order to study the seismic evolution of the large 1877 gap in Northern Chile. One strong foreshock ($M_w = 6.2$) six months before the main event, and several smaller ones are described. The main rupture started under the Antofagasta airport region and propagated southwards with a velocity of 2.8 km/sec, in a N200° direction, over an area of 185*80 km², the total seismic moment being $1.2 * 10^{28}$ dyne-cm. Very little destruction resulted from this earthquake in spite of its size. Waveform modelling of body waves gives insight on some details of the rupture process, in particular its start as a double event, and its end near the trench in normal faulting. Accelerations in Antofagasta reached 30% of gravity. The Atacama fault showed coseismic centimetric surface ruptures next to Sierra Remiendos, among other places. A tsunami wave, 2 m high, was observed along the coast from Mejillones to Taltal. The aftershock distribution delineates a very well defined rupture surface along the subduction interface. The epicenters during the first 24 hours of activity are limited by a sharp northern boundary across the Mejillones peninsula. Aftershocks during the following two weeks indicate growth of the initial rupture zone both north and south. The mechanisms of the strongest aftershocks are consistent with the thrust along the subduction interface. The Mejillones peninsula acts like a barrier for the propagation of the rupture to the north into the region of the 1877 gap. Nevertheless, compressional stresses under the northern half of the peninsula increased after the main shock along a direction transverse to the trench. Thus, the chances for the activation of the 1877 gap are greater now.

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THE 1995 ANTOFAGASTA EARTHQUAKE AND ITS CONNEXION TO THE 1877 SEISMIC GAP



Present day situation in Northern Chile. Epicenters are from NEIC and cover the period 1980-1995. The extend of the rupture area of the large 1877 earthquake is inferred from the isoseismal VIII and is indicated by the long striped zone. Rupture zones associated with known strong events this century are represented by the gray shaded zones. Seismicity forms a doughnut shape around the likely next rupture of the 1877 seismic gap.

○ 5.0 < M < 6.0
 ○ 6.0 < M < 7.0