

QUANTIFICATION OF THE 1995 ANTOFAGASTA EARTHQUAKE FROM GEODETIC MEASUREMENTS AND MODELLING

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The July 30, 1995, Antofagasta earthquake is the largest for this century in the coastal region of North Chile where the historical record of seismicity includes only a sequence of two great subduction earthquakes (8.5-9) in 1868 and 1877. The latest of these two earthquakes extended roughly from latitude 18.5°S to 23°S, which is considered as a locked area. The location of the main shock is for the present time only determined from teleseismic records (23.36° S, 70.36° W, $h = 36$ USGS data bank). The centroid moment tensor determined from the global seismic network by various institutions gives a first estimation of the size of the earthquake (Moment : $1.7 \cdot 10^{21}$ N-m, $M_w = 8.1$) and of the focal mechanism (inverse faulting dipping 19° towards E direction).

On an other hand the distribution of the aftershock defines approximately the size of the rupture zone 180 x 70 km, that roughly corresponds with the seismic moment. The partial remeasurement in August 1995 of a large geodetic GPS network installed in 1992 permitted the quantification of the coseismic displacements associated with this earthquake.

Preliminary results indicate horizontal movements of the order of 1 m of the coastal bench marks towards the west with a small component to the south. Bench marks located inland subsided several tens of cm. One bench mark located in Mejillones Peninsula was uplifted more than 15 cm.

A first interpretation of the displacement field, in which the main fault is considered as a dislocation with uniform slip reveals that the northern extreme of the fault is constrained to be roughly at the level of the Mejillones Peninsula at latitude 23.2° S; the southern extreme of the fault is constrained only by the extension of the aftershock area up to latitude 25.0° S. Assuming a dip angle of 19°, the most probable fault plane extends between 15 and 37 km depth. The slip vector is of the order of 5 m.

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