CRUSTAL MICROSEISMICITY IN CENTRAL CHILE: EVIDENCE OF ACTIVE FAULTING?

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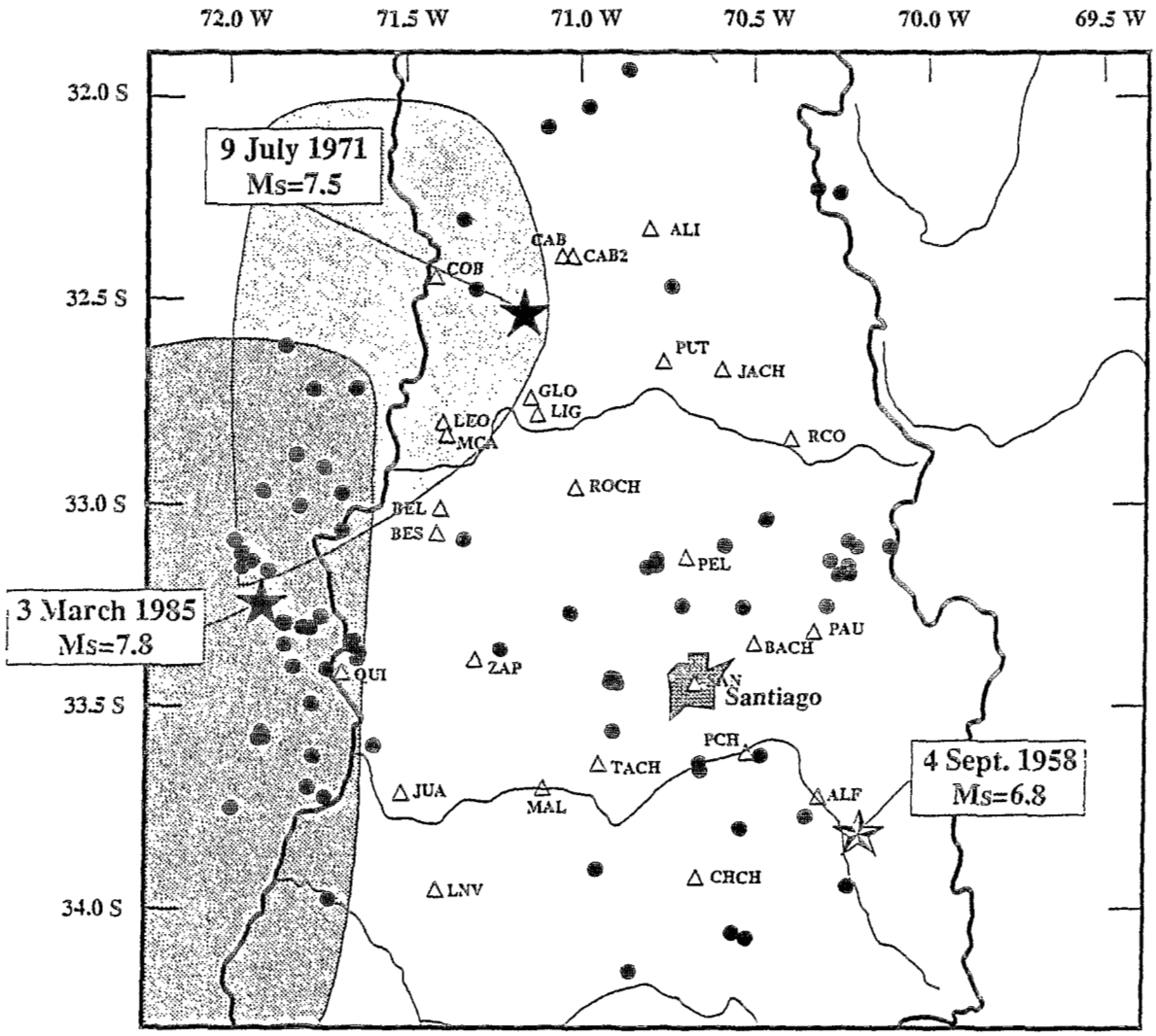
Abstract

Crustal seismicity in Central Chile (32°-34.5°S) has not been studied in detail up to now because it is blurred by the "high noise level" generated by the seismic activity of the subduction. The most important events recorded in the region are directly related to the subduction process, that is they are interplate events. Since these subduction events are the most destructive and strongest ones, seismologists have paid little attention to the crustal seismic activity that reflects the actual deformation to which the overriding border of the South American Plate is being submitted. For example in September 1958 an important but not well known shallow crustal earthquake (m_S=6.8) with epicenter located, in Las Melosas, 50 km to the south-west of Santiago shook the region, causing damages in some nearby villages and being strongly felt in Santiago and Valparaiso. This event was accompanied by surface faulting on the high mountains.

In 1986 a field experiment to record aftershocks of the 1985 Valparaiso earthquake and the microseismicity of the region was carried out from the 20th September to the 5th November, to study in detail the geometry of subduction (Fuenzalida et al, 1992). A group of 14 portable stations was deployed, expanding the permanent network of 10 telemetred stations, mantained by the Seismological Service of the University of Chile. During this time an important number crustal events that evidences active seismic crustal deformation were recorded.

Several clusters were observed in the crust, one 30 km to the west of Santiago and two others toward the Andean cordillera. The activity in the Central valley was rather sparse. Focal mechanism, local tomography and stress analysis are performed to determine the mechanical characteristics of crustal deformation.



Crustal seismicity (filled circles) for October 1986, all events have depth < 30 km. Triangles represent the network used. The location of the 1958 "Las Melosas" crustal earthquake is shown south-east of Santiago.
The epicenters and aftershock areas of the Valparaiso earthquakes of 1971 and 1985 are also shown.