SEISMOGENIC SOURCES AND REGIONAL TECTONIC STRESSES IN THE SUBANDEAN ZONE OF MAJOR SEISMIC HAZARD OF ARGENTINA.

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RESUMEN: Se analizan las fuentes sismogénicas y su relación con los esfuerzos tectónicos regionales en la zona centro-oeste de la Argentina, desde los 66º W hasta el límite con Chile y desde los 28º S hasta los 33º S, que corresponde al área de mayor peligro sísmico de este país. Es ésta una de las zonas andinas donde la Placa de Nazca subduce en forma horizontal debajo de la Placa Sudamericana. En dicha zona se grafican los mecanismos focales de buena resolución, correspondientes a sismos superficiales modelados con ondas internas, observándose que todos son de tipo compresivo. Tambíen se muestran las fallas activas, predominantemente inversas, así como los principales terremotos históricos asociados a ellas.
Los ejes de presión de los eventos considerados varían su orientación azimutal, entre 65º y 115º, lo que corresponde a un esfuerzo tectónico regional promedio de este-oeste, coincidente con la orientación general del fallamiento.

KEY WORDS: Seismogenic sources, tectonic stresses, focal mechanisms.

INTRODUCTION

The central west part of Argentina is the region with major seismic hazard of this country. Evidences of such hazard are given by historical destructive earthquakes and active faulting. Four historical earthquakes arises over the rest, due to their particular characteristics: (a) the March 20, 1861 earthquake which destroyed the old city of Mendoza, killing 6,000 people over a population of 18,000; (b) the October 27, 1894 earthquake with estimated magnitude Ms $\geq$ 7.5, was felt in an area of more tham three million square kilometers and produced extensive liquefaction; (c) the January 15, 1944 earthquake which produced heavy damage to the city of San Juan, killing 10,000 people over a population of 90,000, and (d) the November 23, 1977 earthquake (Ms = 7,4) that killed 65 people in the small city of Caucete and,as it happen with the 1894 earthquake, produced extensive liquefaction in the same area.

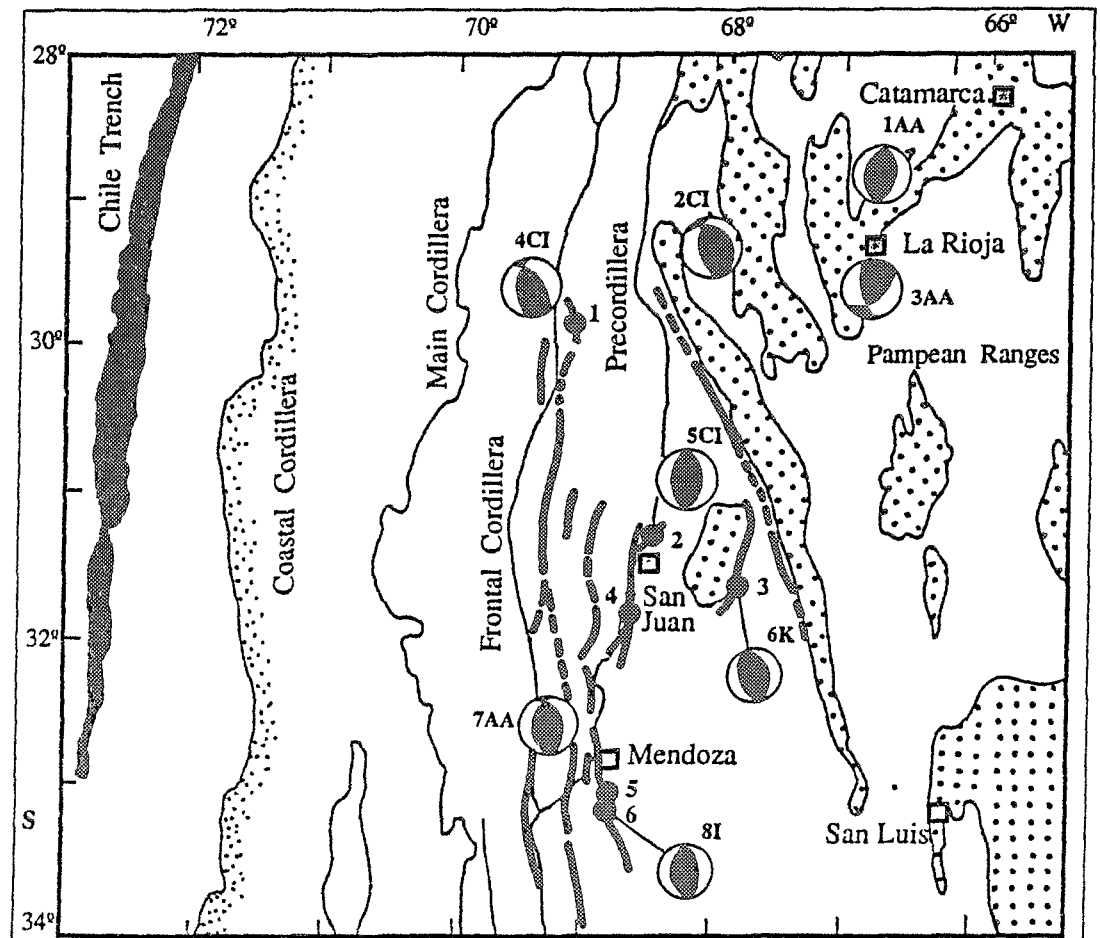
In this region, the main populated centers at risk are the cities of Mendoza and San Juan, with 700,000 and 350,000 inhabitants respectively, and also the cultivated areas and the basic infraestructure, mainly irrigation channels and roads.

Active faults, with observed surface displacements during Holocene time, are present all over the region, some of them bordering or even crossing through the populated areas.

REGIONAL SEISMOTECTONIC SETTING

The region under study is located in a tectonic setting resulting from the ongoing subduction of the Nazca plate eastward beneath the South American plate. This process has created such major structural features as the complex of faulted, folded and uplifted basement rocks called the

Andes and the linear zone of volcanoes occurring within much of the Andes. These features continue to the east with the Precordillera and, finally, the Pampean Ranges .



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EARTHQUAKES WITH FOCAL MECHANISM

Number N(i)		Date	Origen Time, UT
1	AA	04-02-83	05 58
2	CI	11-13-65	17 59
3	AA	12-24-79	00 13
4	CI	05-18-63	05 53
5	CI	09-26-72	21 05
6	K	11-23-77	09 26
7	AA	04-25-67	10 36
8	I	01-26-85	03 07

AA : Assumpcào, Araujo; 1993
CI : Chinn, Isacks; 1983
K : Kadinsky-Cade; 1985
I : INPRES, 1985

HISTORICAL EARTHQUAKES

Number N	Date	Magitud Ms
1	10-27-1894	7.5
2	01-15-1944	7.4
3	11-23-1977	7.4
4	06-11-1952	7.0
5	03-20-1861	7.0
6	01-26-1985	6.0

Active Fault

Figure 2: Active faults, historical earthquakes and focal mechanisms.

general orientation of fault movement, with localized deformations from this average in certain areas, due to concentrated local stresses.

CONCLUSIONS

The main characteristics of the clear evidences of active faulting observed in the subandean zone of major seismic hazard of Argentina, agree with the results obtained from the analysis of focal mechanisms of important earthquakes which occurred in the region.

This is in accordance with the tectonic setting of this particular portion of the Andes, where the ongoing subduction of the Nazca plate eastward beneath the South American plate, with near horizontal orientation, gives place to an east-west compression frame, where important intraplate earthquakes occur and where no volcanic activity is present.

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