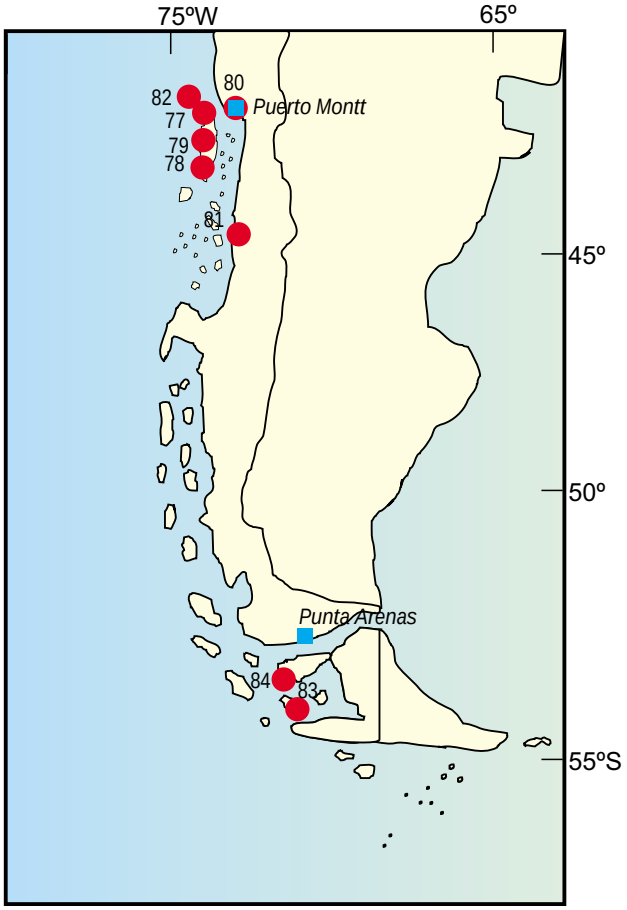
5.2.5 SOUTH CHILE (41ºS - 60ºS)

This zone can be divided in three different seismic regions as seen in the next diagram.

a) Region from 41ºS - 45ºS: The coastline of South America changes dramatically at 41ºS latitude. From this point south, the coastline becomes irregular and has numerous islands, bays, and inlets. This indicates that the collision between the Pacific and South American Plates is not as pronounced in this area, and perhaps that the two plates are not being forced past one another as is occurring along the coast to the north. In the northern part of this region (near 41ºS latitude), earthquakes generated damaging tsunamis in 1633 and 1837. A damaging tsunami occurred at 44.6º S latitude in 1929.



Earthquake's location in South Chile.

b) Region from 45ºS-53ºS: South of the triple junction between the Peru-Chile trench and the Chile Ridge at 46ºS latitude, the oceanic part of the Antarctic Plate is being subducted beneath the South American Plate at a rate of about 2 cm/year.

Magnetic anomalies in the Southeast Pacific indicate that segments of the Chile Ridge collided with the southern part of the South American Continent 26 million years ago. Since that time, there has been a great decrease of volcanic activity on the continent and a cessation of folding in the sedimentary basins.

c) Region from 53º S-60º S: Seismic records are incomplete because of the recent settlements of the South American Continent near 53º S latitude. Records that do exist, however, indicate that the seismicity is low. The earliest record of earthquake activity is the Magellan Strait earthquake of 1878. Two large earthquakes occurred within a 10-hour period in 1949.

SEISMIC HISTORY OF SOUTH CHILE (41ºS - 60ºS)

Event Nr.	Date Year	Mo	Day	Lat. ºS	Long. ºW	Magnitud	Effects
77	1633	05	14	41,8	74,0		Small Tsunami
78	1737	12	24	43,0	74,0	7,5 - 8	
79	1837	11	07	42,5	74,0	8,5	Large Tsunami
80	1871	12	28	41,5	73,0		
81	1927	11	21	44,6	73,0	7,1	Tsunami
82	1940	10	11	41,5	74,5	7,0	
83	1949	12	17	54,0	71,0	7,7	Local Tsunami
84	1950	01	30	53,5	71,5	7,0	

A) REPORT

REPORT FROM THE PAST

On December 16, 1575 there was a severe earthquake in the South of the country whose characteristics were very similar to the one which occurred several centuries later in the same region (May 22, 1960). Due to this similarity is important to keep a record of the effects of that particular event.

The Indian territories south of the Bio-Bio River contained five frontier outpost: Imperial, Valdivia, Villarrica, Osorno and Castro. All five were destroyed by the areas earthquake of 1575. According to reports by the Commander of Valdivia and the Governor of Chile there were more than twenty deaths in Valdivia, a large number considering the nature and size of the settlement. Cracks and fissures opened in the ground during the main shock and during some of the larger aftershocks. The tsunami reached Valdivia, located on a river of the same name about 25 km upstream from its mouth, shortly after the earthquake, " while the earth still shook", i.e. during the initial aftershocks. The water came rushing upstream, reversing the natural flow of the river. The rising water knocked over houses, poles and uprooted trees. Two galleons, riding at anchor in this port were sunk. After the ebb, the inhabitants had time to flee to higher ground.

The tremors continued for a period of forty days. Sizable cracks appeared in the ground and landslides were also recorded, a river flowing from lake Riñihue became blocked in its upper reaches. The dam lasted until April of the following year, when after prolonged rains the water level in the lake rose considerably, causing the dam to burst and resulting in much devastation farther downstream; more than 1200 indians perished and many cattle were lost as well; but the population of Valdivia was saved due to the foresight of its Commander, who had all low-lying houses evacuated well in advance.

The tsunami was highly destructive along the entire coast of southern Chile, up to Concepción where the amplitudes were too low to cause damage. Nearly 100 Indians were drowned along the coast of La Imperial, north of Valdivia, where Indian settlements exist to this day.

The description and extent of damage due to earthquake and the tsunami match closely the effects of May 22, 1960.

B) CHAPTER SUMMARY

- Spatial distribution of hypocenters is characterized by the lack of intermediate depth seismic activity between depths of 320 and 525 kilometers.

- Shallow earthquakes are distributed along or close to the coastline everywhere in the country.

- Most intermediate depth earthquakes (between 100 and 130 kilometers deep) occur in Chile from latitude 17ºS to latitude 24ºS near the bend in the coastline between Chile and Peru.

- Major differences in seismicity exist along the coastline of Chile.

- In the Transverse Valleys Region (27ºS-33ºS latitude) there is a lack of Neogene volcanism.

- Several seismic events have occurred in different regions of the country which have produced destructive tsunamis.

- No seismicity is recorded presently in South Chile between latitude 45ºS and latitude 53ºS.

C) QUESTIONS/PROBLEMS

1. What is the characteristic of intermediate depth earthquakes in Chile?

2. List three characteristics of the seismicity of South Chile.

3. What are the largest magnitude events occurred in Chile?

4. In which region have most of the important seismic events occurred?

5. Using books in the library, draw the location of volcanoes over the maps of seismicity for the different regions of the country.

D) CHAPTER TEST

A. Multiple Choice. Choose the letter that best completes the statement or answers the question.

1 . Between the Andes and the Peru-Chile trench there is a very active

a) fault
b) volcano
c) seismic belt
d) tsunami

2. The northern part of North Chile is characterized by

a) the lack of volcanism
b) big tsunamis
c) deep earthquakes
d) shallow earthquakes

3. The region where the potential for future earthquakes is highest is

a) South Chile
b) Central Chile
c) North Central Chile
d) North Chile