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The avalanche catasthophe of El Teniente-Chile: August 8 of 1944.

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Abstract: The avalanche of El Teniente-Chile (~34°S) August 8 of 1944, was the most serious avalanche accident in Chile of the last 100 years. On the night of August 8, 1944, a major avalanche impacted a The Sewell, a worked village of the Copper Mine of El Teniente, there were 102 fatalities, 8 building, one school and one bridged destroyed. Due to a storm over the central part of Chile where intense precipitation fall over the Andes mountains during nine days. Historical precipitation records near to Sewell shows that total rainfall during the storms was 299mm (La Rufina) and 349mm (Bullileo), and the day before of avalanche the 24 hours rain intensity was 93mm. The Weilbull statistical analysis of monthly snowfall (water equivalent) record in Sewell from 1912-2001 show that the total August 1944 snowfall (621mm) was the larger of the all historical records and the return period is close one events in 180 years, and the annual snowfall during 1944 was 1140mm and return periods was 3.8 years.

Keywords: Chile, Avalanches, Andes Mountains, Avalanche Disaster, Historical Snow Records.

1. Introduction

Figure 1: Location map of the study area on the Central Part of Chile.

The Andes mountains, the longest chain of mountains in the south hemisphere, shows a strong and complex variations in the snow and meteorological conditions as one move from east to west, because the Andes is the narrows and longest mountains in the world. The annual mean snowfall in the Andes central part Chile is close to 6 meters, with a strong interannual variability from 1.4 meters on la Niña year of 1998 to 9.0 meters on the el Niño years of 1997 (Vergara, 2000), and the snow may fall in the any time on the winter from April to September with a maximum in June/July (Figures 3). On the Andes at 3000m above msl. during the winters the means minimum temperatures is close to –10°C and the maximum mean temperature is close 12°C (Vergara, 2000). The high temperatures on the mountains usually take place immediately following the storms associate to anticyclone subsidence, them the maximum avalanches formation are maximum in June-July. But the ratio of the number of avalanches to the total snowfall of the storm increase during the second part of the winter and spring time because the temperature increase dramatically and them melting (Vergara and Leon, 2000).

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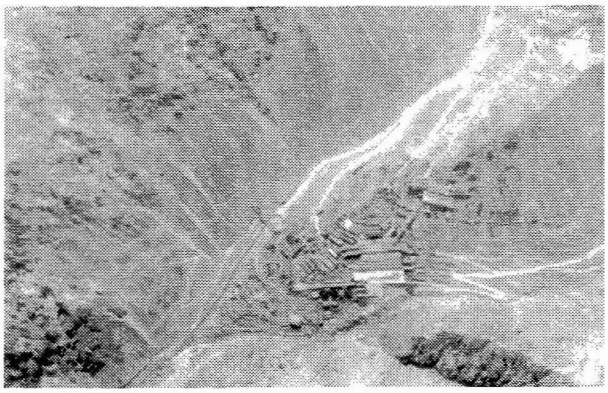

Figure 2: View of Sewell-El Teniente a worker village. The damage area is in the middle of the photograph along of Rio Coya Valley.

El Teniente located in center part of Chile within the Cachapoal Basin in the Andes mountains at aproximate 3000 m. above sea level. One of the most importans features of the zone is the presence of large glacial cirques and U-shaped basins (Figure 2).

Historical data of avalanches occurrences in Chile Andes Mountains vary in quality, in our cases the interpretation of then avalanche of 1994 use historical research methods. The sources includes mines historical records, newspaper, internal reports, personal letters and pictures.

A retrospective feedback has been carried out to try to draw conclusions for the future as regards prevention.

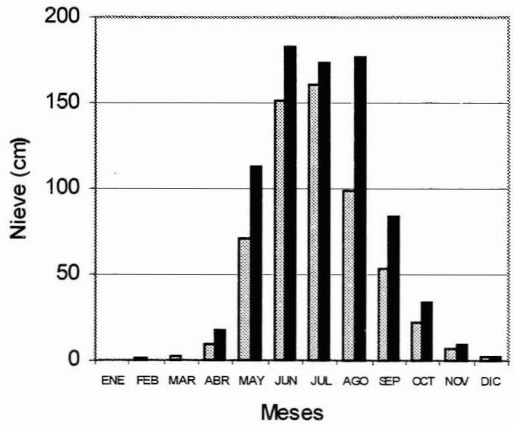

Figure 3: Annual cycle of snow (cm) precipitación in Swell station, during El Niño year (black) and La Niña year (grey).

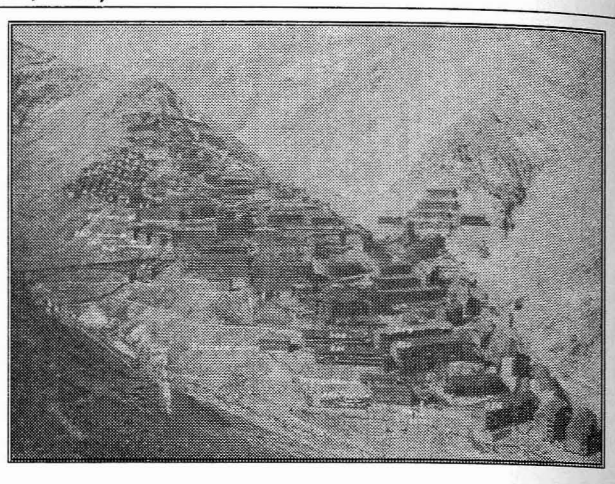

Figure 4: View of Sewell-El Teniente before of avalanche, marks on the picture show the building destroyed by the avalanche of August of 1944 (Baros, 1996).

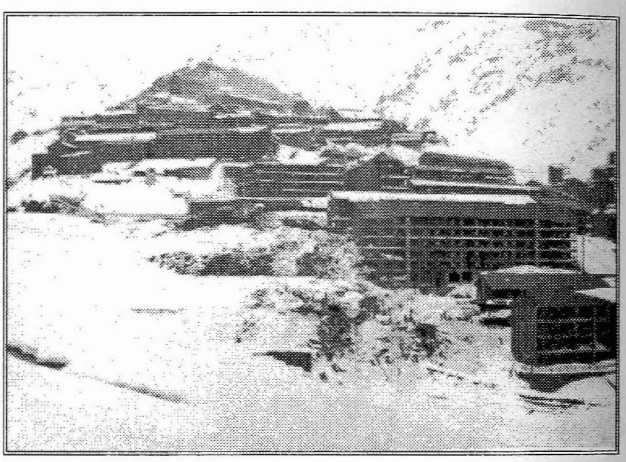

Foto 5: View of two building destroyed, photo of 1944 (Baros, 1996).

2. Results

Winter 1944, especially the month of August, was particulary snowy and devastating avalanches occurred on the Central part of Chile Andes Mountains (Figure 1). On the night of August 8, 1944, a major avalanche impacted a The Sewell, a worked village of the Copper Mine of El Teniente, there were 102 fatalities, 8 building, one school and one bridged destroyed (Fig. 4 and 5). Due to a storm over the central part of Chile where intense precipitation fall over the Andes mountains during nine days. Historical precipitation records near to Sewell shows that total rainfall during the storms was 299mm (La Rufina) and 349mm (Bullileo), and the day before of avalanche the

24 hours rain intensity was 93mm. The Weilbull statistical analysis of monthly snowfall (water equivalent) record in Sewell from 1912-2001 show that the total August 1944 snowfall (621mm) was the larger of the all historical records and the return period is close one events in 180 years (Fig. 6), and the annual snowfall during 1944 was 1140mm and return periods was 3.8 years.

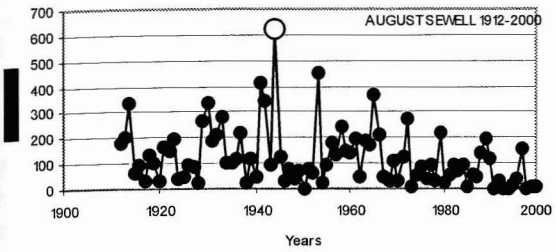

Figure 6: August total snow precipitation (water equivalent) from 1912 to 2000.

3 Conclusions

The El Teniente have been habited for mine worker for 100 years, and instrumeltal snow and meteorological record are kept. The snow and meteorological conditions in Andes are complex and require continuous monitoring of snow, hidrological and meteorological parameters. Studies of exceptionnal accidents due to avalanches are imports in order to accurately predict avalanches for the Andes conditions and developed forescats models.

4 Acknowledgements

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5 References

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