

## LITHOSCOPE EXPERIMENT IN NORTHERN ECUADOR : PRELIMINARY RESULTS

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### INTRODUCTION

From December 1994 to May 1995, 54 short period seismic stations from the French Lithoscope network, (19 stations 3C, 35 stations 1C) have been operating in the Northern part of the Ecuadorian Andes ( $0^{\circ}$  to  $1^{\circ}30'S$ ,  $77^{\circ}20'W$  to  $79^{\circ}20'W$ ), along five profiles : 3 North-South profiles at  $77^{\circ}40'W$ ,  $78^{\circ}30'W$ ,  $79^{\circ}20'W$  and 2 East-West profiles at  $0^{\circ}15'S$  and  $1^{\circ}15'S$ . Data of the national network (27 1C stations) of the Instituto Geofísico of the Escuela Politecnica Nacional of Quito have been incorporated to the Lithoscope data.

### DATA PROCESSING

The hypocenters have been located using HYPOINVERSE (Klein, 1978) with a crustal velocity structure represented by flat homogeneous layers based on an inversion model from local data (Prévot et al., 1996). Travel time is corrected for the elevation of the stations. From December 1994 to March 1995, 1011 local and regional events with more than 6 arrival times have been detected,

which represent a total set of 21166 arrivals times (12394 P-waves arrivals and 8772 S-waves arrivals). From the initial set of 1011 local events, a final set of 552 events (figure 1) were selected with the following criteria : a root mean square residual (RMS) less than 1.0 s and a condition number less than 100. Out of these 552 events, 146 are recorded in 20 stations or more. The location have been performed using a  $V_p/V_s$  ratio of 1.737 obtained with a (S-S) versus (P-P) diagram (Chatelain, 1978).

## PRELIMINARY RESULTS

At the moment, only the first step of the data analysis has been completed : all arrival times have been read, the events located and selected, and the preliminary spatial distribution analysis of the earthquakes performed.

- 1.- About 50% of the earthquakes are shallow events concentrated in the Pisayambo nest centered on  $1^{\circ}20'S$ ,  $78^{\circ}30'W$  (Figure 1) ;
- 2.- Under the cordillera only shallow events (0 -30 km) are present (Figure 1), i.e. no earthquakes occur on the subducting Nazca plate beneath the Andes cordillera. This can be clearly seen on the cross-section (Figure 2) where it appears that the seismic nest of Pisayambo in the upper plate is right above the gap of intermediate seismicity in the downgoing plate ;
- 3.- The shallower intermediate-depth earthquakes (60 to 100 km) are located to the west of the Cordillera, while the deeper events (100 to 200 km) are present to the East of the Cordillera South of  $1^{\circ}S$  only (Figure 1)
- 4.- A lack of shallow seismicity (0 - 20 km) is clearly marked South of  $0^{\circ}$  between the coast and the western Cordillera (between 100 and 200 km on the horizontal scale on figure 2). This absence of seismicity is not an artifact of the location, as stations were installed above this zone.

## CONCLUSION

Preliminary results of the Lithoscope Ecuador experiment have allowed us to precise the spatial distribution of the seismicity beneath Ecuador, revealing at least four interesting features. More detailed study, including about 50 focal mechanisms, currently undergoing in order to relate these features with the tectonics of the area will also be presented.

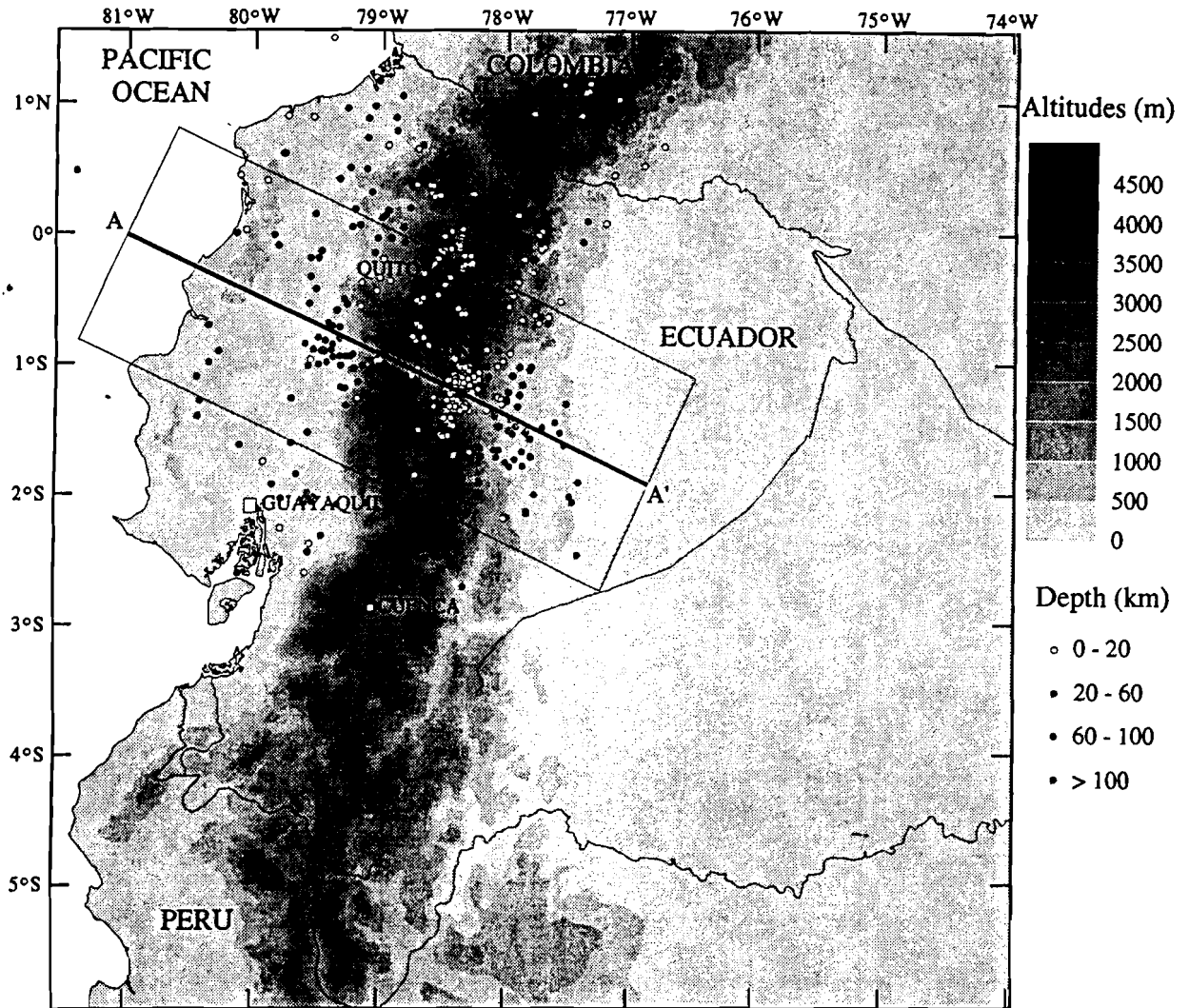


Figure 1 : Location of the selected earthquakes recorded from december 1994 to march 1995, during the Lithoscope experiment. The black line represents the location of the cross-section shown in figure 2. PN : Pisayambo nest.

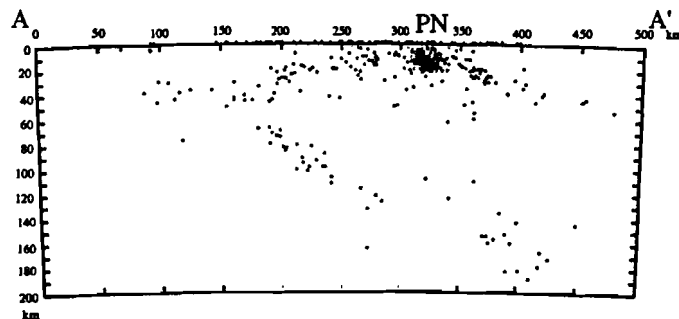


Figure 2 : Depth distribution of the selected earthquakes (open circles) recorded from december 1994 to march 1995, during the Lithoscope experiment, along a NW-SE cross-section. The filled triangles represent the location of the stations. Note the location of the shallow seismicity nest in the upper plate above the seismicity gap in the down-going plate. PN : Pisayambo nest.

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