THE EL PILAR FAULT ACTIVE TRACE (NORTHEASTERN VENEZUELA): NEOTECTONIC EVIDENCES AND PALEOSEISMIC DATA.

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INTRODUCTION

The El Pilar Fault, considered by many authors as the southern boundary between the Caribbean and Southamerican Plates, has generated a big controversy, even recently, because differents workers haven't agreed yet about its kinematics and its cartographic trace.

Even though this fault is the most important tectonic element in northern Venezuela (350 Km long.), only 80 Km can be followed on- shore, between Muelle de Cariaco (west) and Caño Ajies (east). Both extremities can be followed off-shore and are connected to the San Sebastian (west) and Los Bajos-El Soldado faults system (east).

RESULTS

Neotectonics evaluation of the on-shore section (including trenching and trial pits) allowed to confirm the right lateral movement. Four segments can be differentiated along the El Pilar Fault active trace:

A.- An off-shore segment located western of Cumana), where this fault is connected to the San Sebastian fault, and generating thus two pull-apart basins (Cariaco through). This connection occurs, south of the La Tortuga Island, along two "en échelon" segments, producing a transtension zone of 30 Km long and 160 Km wide, where two deep depressions ("graben-like") can be easily identified. The pull-apart here defined is narrower than the one mentioned by SCHUBERT (1982).

B.-An 80 Km long segment, located even on shore and off-shore (Cariaco Golf), between Cumana and Casanay. A sinistral "échelon" step, produce a transpressive zone, where the Caigüire hills, have been elevated since the Pleistocene. Boths flanks of these hills, present evidences of right lateral displacement, with an important reverse component (conic folds, knee folds and high angle reverse faults), which have been mentioned by ASCANIO (1972) and MACSOTAY & VIVAS (1988).

Also, shutter ridges, obturated drainages, fault trench and a offsetted creek along a secundary fault, have been identified.

A surface rupture generated during the1929-17-01 earthquake (PAIGE, 1930), indicates a right lateral displacement (Caigüire hills). Toward the east, between Cariaco and Casanay towns (Fig.1), offseted creeks, sag ponds, shutter ridges and a Holocene scarplet, suggest also a right lateral movement.

C.- Between Casanay and El Pilar (30 Km long), numerous geomorphologic evidences of recent right lateral activity have been mapped (Fig.2). This segment shows a complex anastomosed geometry, and it's located between the Cariaco and Paria gulfs.

Between Casanay and Rio Casanay towns, the main active trace offset a middle Pleistocene colluvion deposit, and the Tunapuy limestone unit; 375 m of dextral offset can be measured along a middle Pleistocene shutter ridge, generated in the fault zone. A trench excavated in 1994, allowed to expose a 20m gouge zone associated to a flower structure geometry, with fault planes oriented E-W and containing horizontal slickensides (less than 10° pitch). Using C^{14} method, we have interpreted four paleoseismic events : 7.080 ± 1.460; 5.985 ± 735 ; 5.595 ± 275 and 4.805 ± 1.050 years BP.

Along the most southern active branch, sag ponds, an Holocene scarplet (50 cm high), a Pleistocene scarp (6 m), as well as an extruded serpentinite body mentioned by METZ (1968), have been mapped.

Between Rio Casanay and El Pilar towns, two active traces can be recognized, following a E-W direction; along these two segments, numerous evidences of recent activity (sag-ponds, scarps, shutter-ridges), as well as, an intense hydrothermal activity have been reported. A 10 m high scarp affects a Pleistocene detritic ramp, near Nueva Colombia, between Casanay and El Pilar.

D). several "en échelon" steps can be followed along this most eastern segment (Fig.2) ; some controlled drainages,and also, a horst-graben geometry feature can be mapped along the Holocene marsh deposits. Toward the east , in the gulf of Paria, the El Pilar fault is connected to the Los Bajos-El Soldado system, instead of continuing to the Northern Range of Trinidad (SOULAS, 1986; BELTRAN & GIRALDO, 1989 y BELTRAN, 1993 and 1994).

CONCLUSIONS

Diagnostic evidences of active faulting along the EL Pilar fault system on-shore segments indicate a predominantly right-lateral displacement during the Quaternary. These evidences have been confirmed, by studying the coseismic structures well exposed on a trench excavated , as well as , on trial- pits, along the active trace of this fault.

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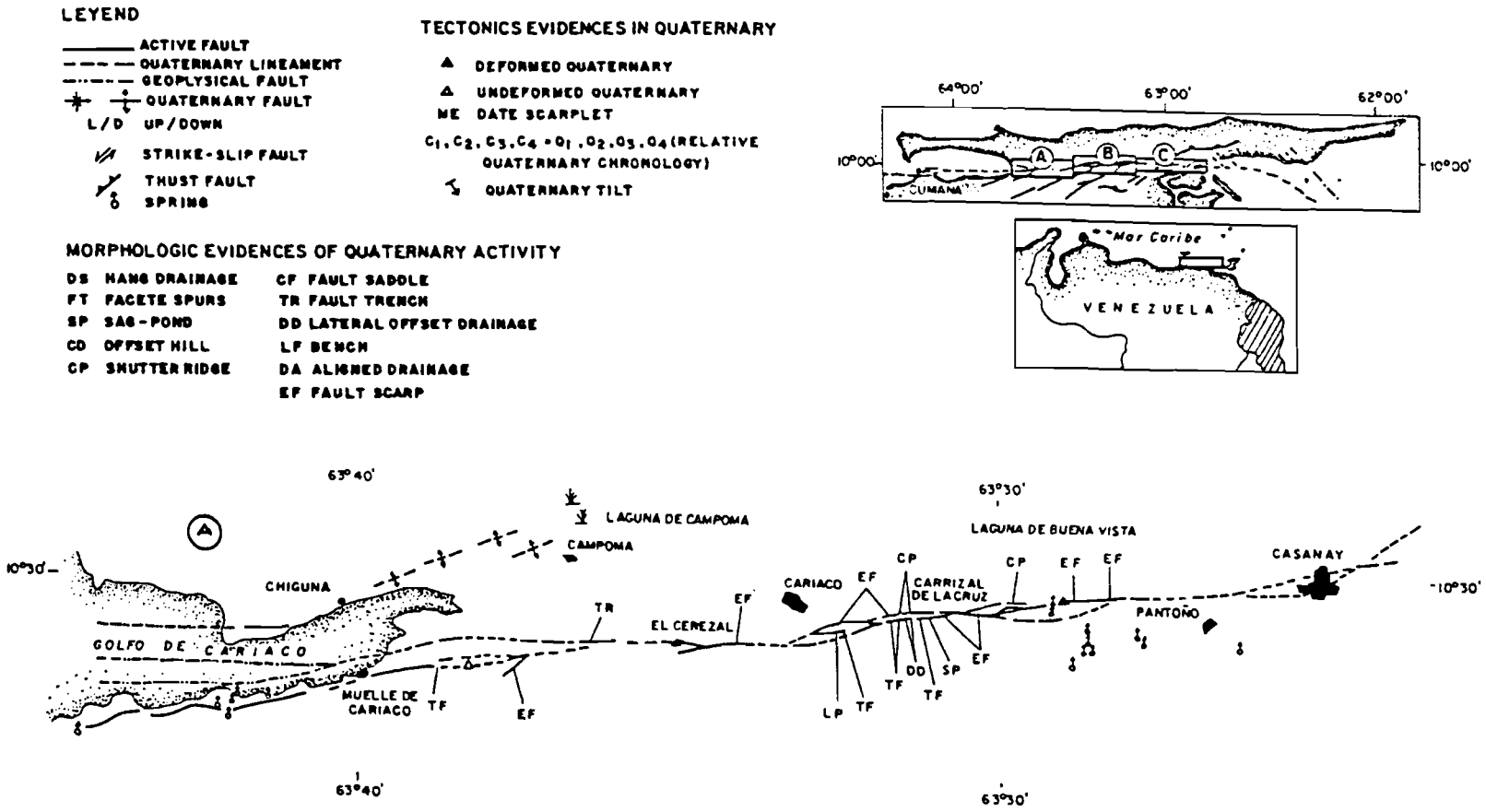

Fig.1 Geomorphic evidences of recent tectonic activity along the El Pilar active fault trace.

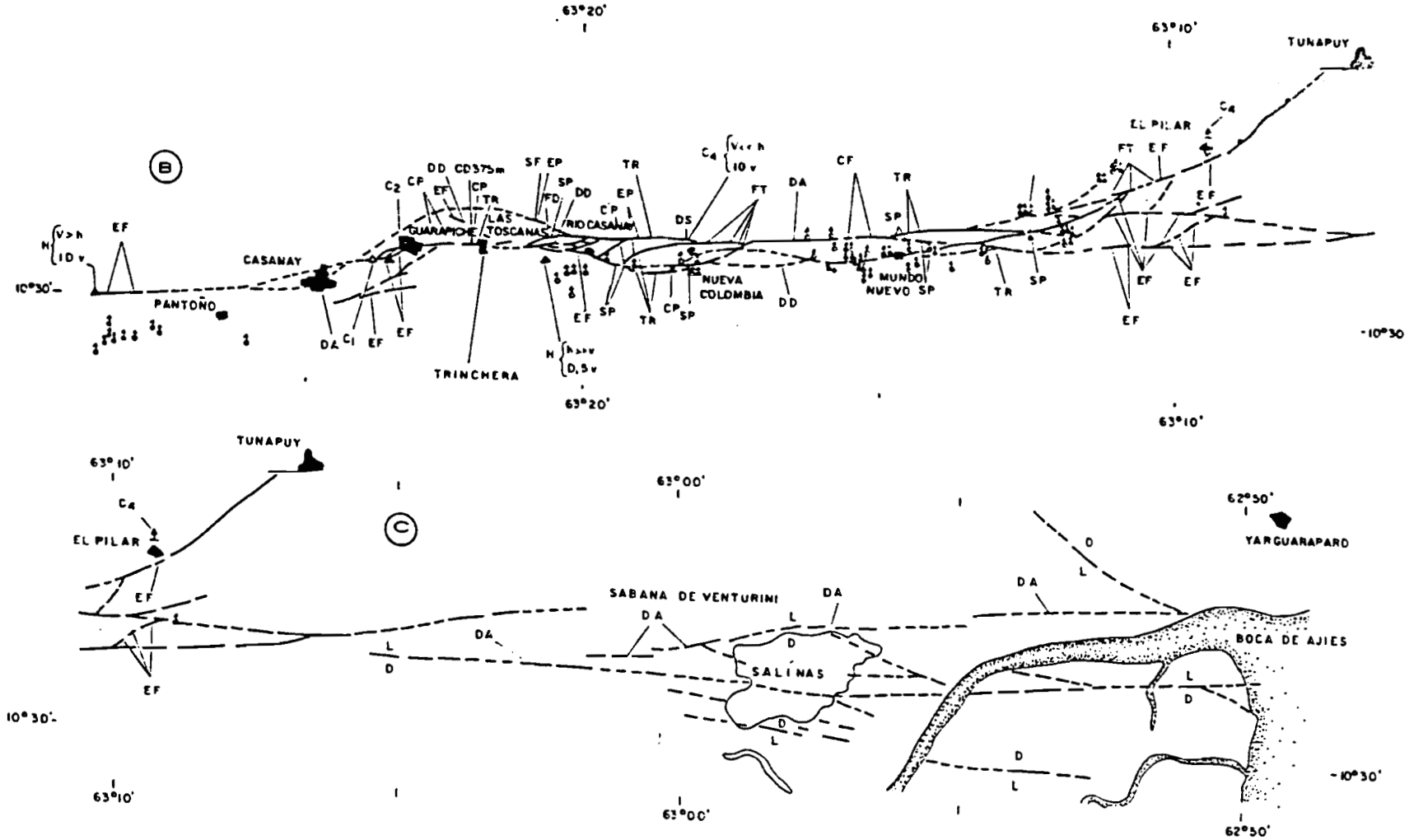

Fig.2 Geomorphic evidences of recent tectonic activity along the El Pilar active fault trace (Continuation).