ACTIVE TECTONIC DEFORMATION AND RESPONSE OF SAN JUAN RIVER CHANNEL PATTERN IN TULUM VALLEY. SAN JUAN, ARGENTINA.

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INTRODUCTION

The lower de Los Patos river-San Juan river basin (Lam. 1a) is placed in the middle-west of Argentina, in the Central Andes area, in relation to the flat subduction between the Nazca and South American plates (Isack, 1988). This basin is part of the Desaguadero-Colorado fluvial system flowing to the Atlantic Ocean. Its drainage system, in the geological areas of the Andes Range, Precordillera and Pampean Ranges, has a predictive normal pattern similar to the other fluvial systems, follows the Horton laws and shows an alometric growth (Ruzycki, 1993).

The lower de Los Patos-San Juan colector river is 320 Km long, grows in the Andes Range (1950 masl), flows to into the Lagunas de Guanacache (515 masl) and shows a double transversal - longitudinal desing in relations to the regional structures (Ruzycki, 1993), (Lam. 1a). Both longitudinal profile (Lam. 1b) and the design of its first order channel show the existence of intrinsic and extrinsic factors interfering with its environmental adjustement (Ruzycki, 1992-1993; Ruzycki and Paredes, 1996).

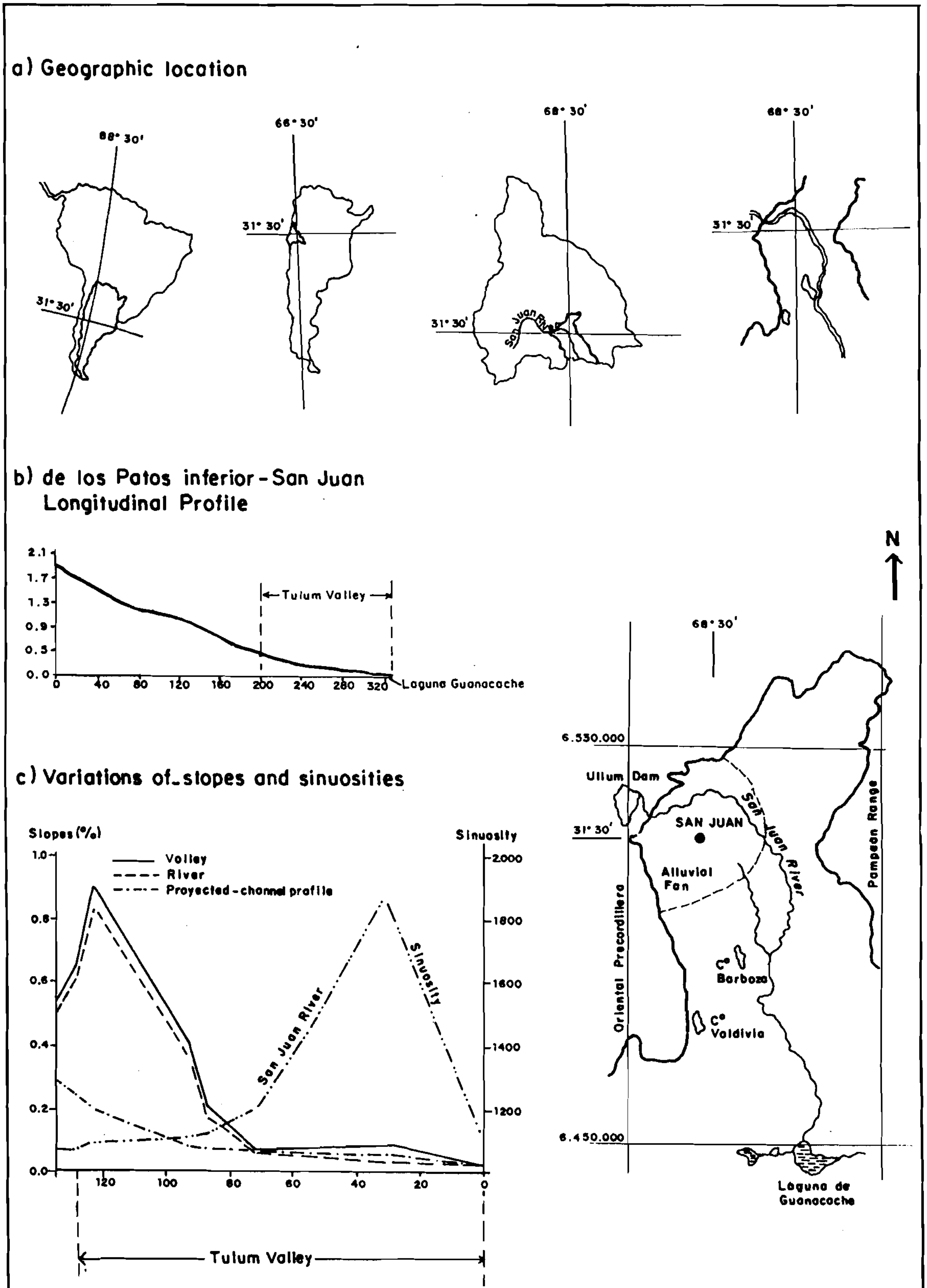
In general, the colector river changes in pattern from its origin to the mouth, presenting the form of the multichannel with a low sinuosity (braided) at the beginning, then with a meandering shape, after forming an aluvial fan, and finally, keeping straight (Ruzycki, 1992).

This study considers the control that neotectonics has over the river pattern morphology when crossing Tulum Valley.

Tulum Valley is an active broken-foreland basin placed in the pedemountain of the Oriental Precordillera (fault-thrust belt), mainly in the geological area of the Pampean Ranges and it is characterized by a series of crystalline basament blocks of Precambrian - Early Paleozoic Age. This basement was partially covered by a series of continental deposits consisting of the late Paleozoic Paganzo Group and terciary - cuaternary (Miocene to present) synorogenic deposits of alluvial and fluvial facies associated with the development of broken-foreland basin related to the broken-foreland Precordilllera and Pampean Ranges uplift (González Bonorino, 1950; Jordan et al, 1983). The main valley structure ("Tulum Fault") is composed of several high angle reverse faults, almost all with NNW-SSE strike, and normal faults almost with ENE-WSW strike, originating differencial uplifts in the basament blocks, turned according to their axis, and downfalls to the SSE (Zambrano and Suvires, 1978).

In ordre to know the precuaternary basament relief (mainly the Terciary) in the valley, a diagram block (Lam. 2) was drawn using drill data and geophisical methods (Vertical Electric Sounding) carried out by CRAS since 1965 till present.

In this valley, wiht a neotectonic activity (Zambrano and Suvires, 1987; Bastías et al, 1990), the river presents a topographic unlevelling of 200 metres with a mean gradient of 0.0016 m/m (Ruzycki,


a) Geographic location
68° 30'
31° 30'
San Juan River
b) de los Patos inferior - San Juan Longitudinal Profile
2.1
1.7
1.3
0.9
0.5
0.0
0
40
80
120
160
200
240
280
320
Tulum Valley
Laguna Guanacache
c) Variations of slopes and sinuosities
Slopes (%)
Sinuosity
Valley
River
Proyected - channel profile
1.0
0.8
0.6
0.4
0.2
0.0
2.000
1800
1600
1400
1200
120
100
80
60
40
20
0
San Juan River
Sinuosity
Tulum Valley
N
68° 30'
6.550.000
6.450.000
Ullum Dam
31° 30'
SAN JUAN
San Juan River
Alluvial Fan
Oriental Precordillera
Pampean Range
C° Barboza
C° Valdivia
Laguna de Guanacache

Lam. 1

1992) and a several of the flowing sections coincide with traces of satellite alignment or underground faults (Zambrano and Suvires, 1978).

DISCUSION

In general, Lam. 1c shows that both valley and river slopes are almost paralell and present two principal main slopes: one taking place in the fluvial plain of San Juan river (between the mouth to Km 70 the fluvial stream), and the other in the aluvial fan of San Juan river (between Km 70 and 129).

In particular it can be established that, in the fluvial sections (measured from the mouth) between Km 0 and 50 (fluvial plain) and Km 93 and 123 (apical and mid-superior sections of the aluvial fan) there is a loss of parallelims between the river and the valley slopes, being always the valley slope the steepest.

The approximate sinuosity (Lam. 1c) of the fluvial stream is 1.115 between the mouth and Km 30, 1.885 between Km 30 and 50, 1.515 between Km 50 and 70, 1.21 between Km 70 and 87, 1.115 between Km 93 and 123 and 1.095 between Km 123 and 129.

The channel pattern is a low sinuosity river with suspended-mixed load between the mouth and Km 30, a highly sinous meandering river whit mixed-suspended load between Km 30 and 50, a meandering river with mixed-suspended load and presence of bank erosion and flooding cutoff between Km 50 and 70, a low sinuosity river with bed load between Km 70 and 87, and a very low sinuosity river with bed load between Km 87 and 129.

CONCLUSIONS

Changes in channel morphology go with the evidences in the valley neotectonic activity:

I- Firstly, the neotectonic activity originate local steppings in the valley slope: **1-** an abrupt reduction between km 87 and 70 which shows the underground existence of reverse fault dippening to the East approximately at Km 87 and infering the underground existence of a normal fault with a lip falling down to the north approximately at Km 70, and **2-** an increase a) an abrupt slope between Km 129-123 as a consequence of the existence of a sinclinal approximately at Km 123, b) a moderate slope between Km 30-50 showing the underground existence of faults with a lip falling down to the South at Km 50 and at Km 30.

II- In the second place, the neotectonic activity originate a bigger sedimentary agrading in **1-** between Km 123-93 due to the sinclinal existence and in **2-**between Km 50 and the mouth due to the subsidencies originated by the underground faults at Km 50 and 30.

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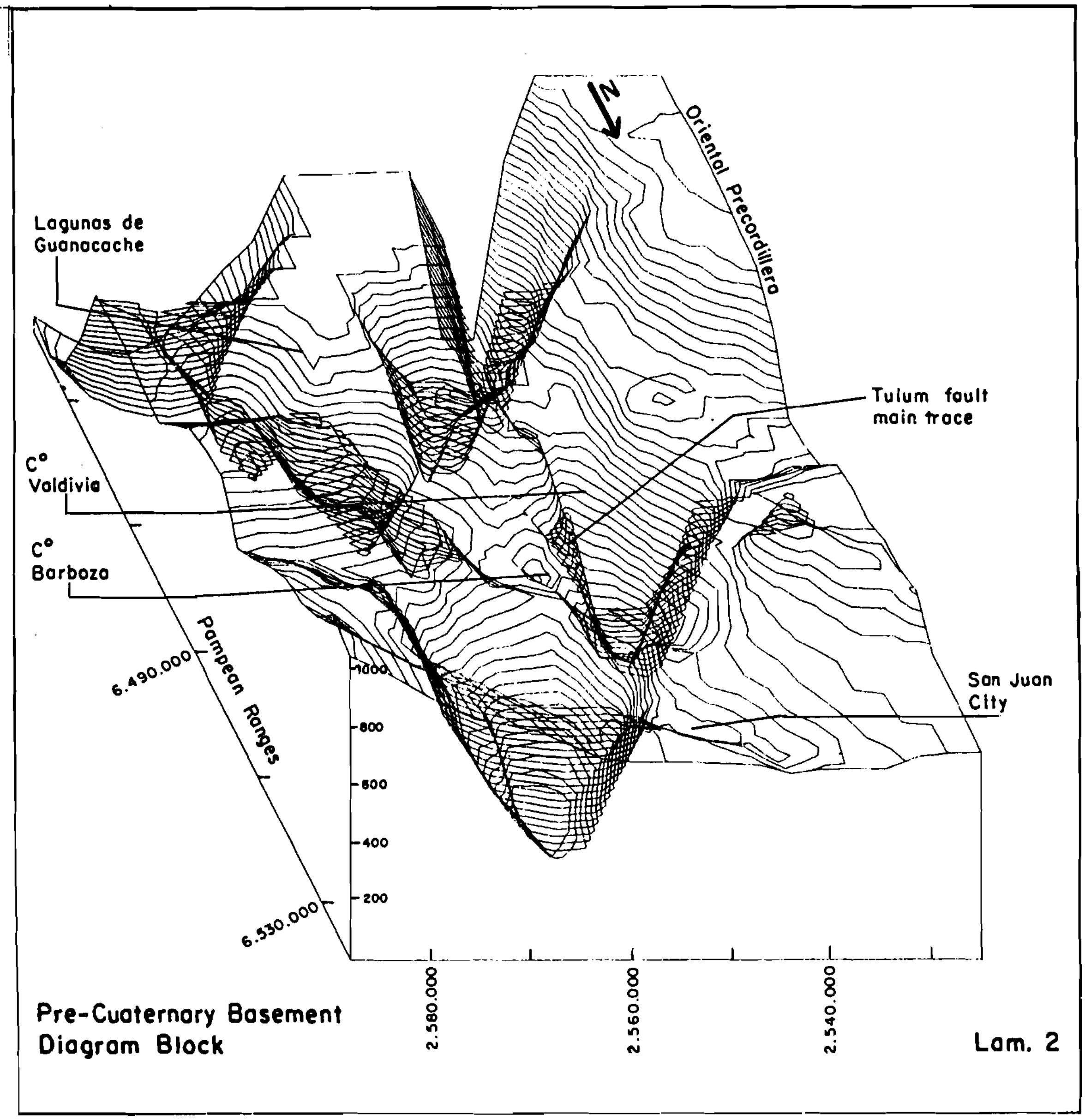

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