RIVER PIRACY CONTROLLING CHANGES IN THE DRAINAGE PATTERN AND RIVER SLOPE

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GEOLOGICAL SETTING

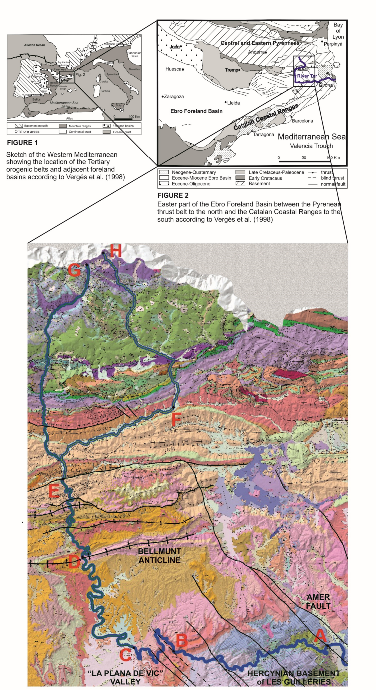

FIGURE 3

The Ter River flows between the Eastern Pyrenees and the Mediterranean Sea through the Hercynian basement and the Ebro Foreland Basin (Fig. 2). A family of basement faults of NW-SE direction, which continue in the Paleogene cover, affects the study area. This area is a half graben system structured by normal faults. One of the main, with important activity during the Neogene, is the Amer Fault (Fig. 3).This fault developed an escarpment over which were incised anti-dip streams. The primitive River Ter used the gradient created by the fault activating a process of river capture on the footwall block. This process took advantage of the monocline sequence of the Paleogene cover, which is a succession of lithologies with different degrees of resistance (Fig. 4).

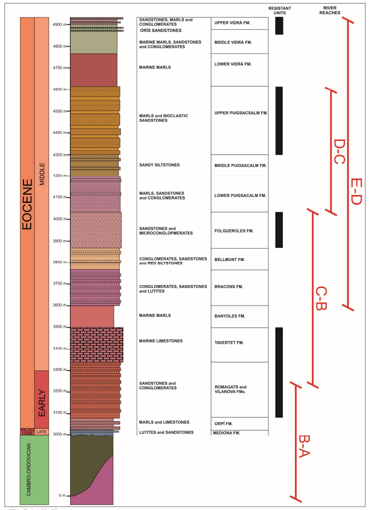

FIGURE 4

HOMOCLINAL SHIFT

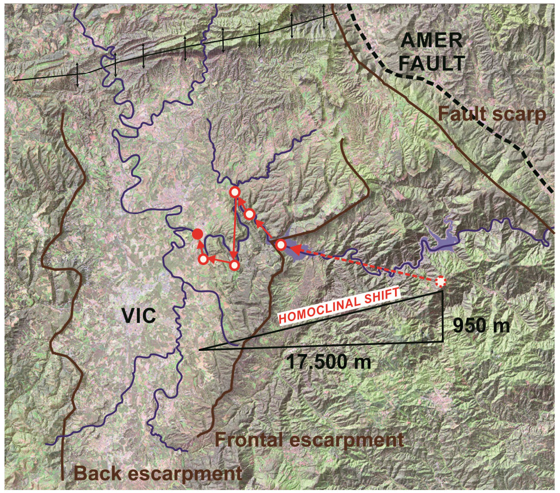

FIGURE 5

BACKWATER EFFECT

The key point to explain meandering pattern on the cover is C (Fig. 3). This point is a basin drain, which concentrates all the radial drainage from upstream. It is affected by the backwater effect developing a couple of **incised** meanders which are the result of hydraulic head losses by the effect of a channel constriction in the resistant layer.

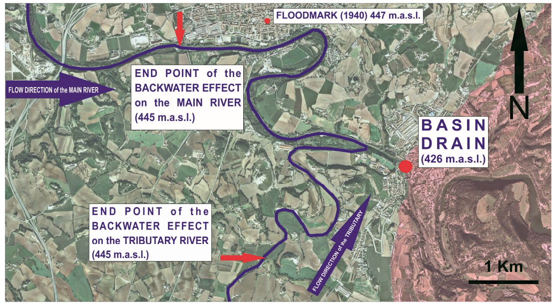

FIGURE 6

DRAINAGE PATTERNS

The main strike valley created by the Ter River capture is "la Plana de Vic" (Fig. 5). The dip slope is formed by a resistant bed of sandstones (Folgueroles Fm.). The valley has undergone homoclinal shift over the resistant dip slope. The center of the valley has migrated about 17.5 Km from east to west, and the river has incised into the cover and the basement around 950 m. To achieve the shift and incision the stream had to cut the resistant bed making use of the fractures affecting the basement and the cover.

The Hercynian basement has been exhumed by incision of the Ter River showing a rectangular drainage pattern between B-A (Fig. 3) which is product of the family of basement faults. Over this drainage pattern is superimposed the meandering pattern of the Ter River which is product of the homoclinal shift and incision of the river across the succession of different lithologies of the cover.

Between C-B the river flows into three subparallel reaches that provide a form of inverted Z, which can be described as structural pseudo-meanders. The river used an area of fractured rock to came into the strike valley.

Between E-C the drainage pattern is clearly meandering. It corresponds to the flow of the river on the cover where alternating lithology and structure are the controlling factors.

Upstream E stream course is nearly straight. It is part of an older stablished drainage network captured by the Ter River.

RESULT OF BACKWATER EFFECT ON THE FORMATION OF MEANDERS

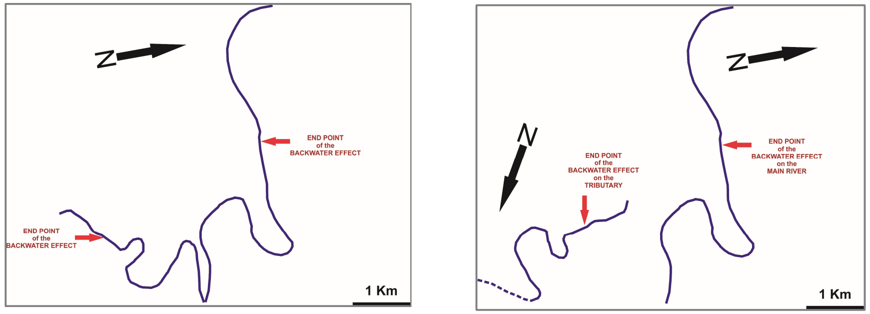

FIGURE 7

REACH	$h_{initial}$	h_{final}	$h_{difference}$	L	D	Sinuosity	$slope\_L_{100}$	$slope\_D_{100}$
H-F	2475	842	1.633,0	27.451	21.507	1,28	5,95	7,59
F-E	842	659,3	182,7	21.502,6	16.692	1,29	0,85	1,09
G-E	2508,5	659,3	1.849,2	34.455	27.177	1,27	5,37	6,80
E-D	659,3	535	124,3	19.946	11.148	1,79	0,62	1,11
D-C	535	426,3	108,7	28.667	12.517	2,29	0,38	0,87
C-B	426,3	375	51,3	16.017	5.113	3,13	0,32	1,00
B-A	365	162	203	30.555	19.705	1,55	0,66	1,03

REFERENCES

Vergés et al., (1998). In: Cenozoic Foreland Basins of Western Europe. Geological Society. Special Publication, 134, 107-134,

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