EROSION OF THE UPPER TAQUARI BASIN ANO THE SEOIMENT ACCUMULATION IN THE PANTANAL MATOGROSSENSE.

ECrepani
Senior Researcher
A.R. dos Santos
Senior Researcher
National Institute for Space Research - Brazil

Comission VII, Working Group 6

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ABSTRACT:

The Upper Taquari basin is eroded by an obsequent drainage system, which captures a consequent drainage system.This process occurs in a plateau which is formed by sedimentary rocks of the Paraná Sedimentary Basin.The basin consist of psamitic rocks which are easily eroded and transported after alteration, and deposited in the Pantanal Matogrossense plain.
The erosion and transportation by the rivers of the Upper Taquari basin are extremely facilited by the conversion of savannah into pasture land and increased cattle- raisinq activities.Actually the anual loss of soil per hectare increased one hundred times at present
Landsat imagery allows to identify the deposition sites of the Pantanal Matogrossense plain , the monitoring of land use conversion and the identification of sites of erosion and transportation in the Upper Taquari plateau.

1. INTROOUCTION

This paper presents some ideas about the erosion of the Upper Taquari basin and the accumulation of sediments in the Pantanal Matogrossense . Those ideas are based on the interpretation of TM Landsat images at the scale of 1:100,000 (colar composites bands TM3, TM4 and TM5 with the Blue, Green and Red colors respectively) . Black and white bands TM 3 and TM 4 were also examined. The final interpretation was complemented with ground observations and bibliographic information .

2. GEOLOGICAL SETTING

A period of relative tectonic stabillty in the end of the Wealdenian Reactivation (Almeida, 1966) permitted the developrnent of huge erosion surfaces in the Brazilian Platform, which later was lifted up to 1000 meters in relation to the sea levei.

Locally the epeir oqenic liftlng which occurred during the Pliocene and Pleistocene was suspended by gravity faults tha! shaped the lectonic basins within the Brazilian Platform. This is the origin of the Pantanal basin with nearly 500 meters of quaternary sediments, and located in the west border of the Paraná Sedimentary Basin.

3. EVOLUTION OF THE EROSIVE ANO OEPOSITION PROCESSES

Nowadays the Tertiary surface keeps an altitude of nearly 900 meters at the Municipality of Taquan (MT), where the watershed of Tocantins River Basin and Prata Rlver Basin is located. The Taquari nver headwater is located near Taquari (figure 1) and is the largest river crossing the Pantanal Matogrossense

If the present altitude of the Tertiary surface cutting the plateau of the Paraná Sedimentary Basin and the thickness of the quaternary sediments fillinq the Pantanal are taken into account, it is possible to hypothesize the Tertiary landscape and the geomorphologic processes that took place then to shape the present landscape. The ancient landscape was characterized by a tectonic basin at the border of the Paraná Sedimentary Basin with a fault cliff 1400 m high. (figure 2A).

The ancient landscape was then developed into a consequent drainage network(Davis, 1909) running eastward , heading to Paraná Sedimentary Basin axis. The drainage network was characterized by gentle longitudinal profile and long rivers as a consequence of the low dip of the sedimentary stratum . Another drainage network , also consequent running westward aver the fault scarp (front of cuesta) was characterized by steep longitudinal profile and short nvers (figure 2 B).

This short and steep rivers, with a high erosive and transportation power, transposed the watershed and begun a quick process of capture named as " piracy stream" (Shumm, 1977), Figure 2 C.

The evolution of this process started with the capture of the consequent rivers running eastward . Nowadays the old consequent rivers transformed into obsequent rivers running westward in the plateau of the Paraná Sedimentary Basin. The sedimentary rocks are psammites with a low resistance to erosion. It helps the expansion of the Upper Taquari Basin by the

constant capture of the consequent network, with increase erosion and transportation(figure 2 D).

The most important river of the obsequent drainage network is the Taquari river which has it headwaters at 900 m and flows westward 300 km reaching the altitude of 200 m. Within the Taquari alluvial plain the river crosses 500 km before reaching the Paraguay river at the altitude of 80 m. (figure 3).

Trus outstanding decrease in the river Taquari channel slope (10 times within the alluvial piain) causes a "decantation effect" and sediment load is settled into an alluvial fan of 50.000 km^2. This settling can be observed in the color composites of TM/Landsat (3B4R5G) which shows the Taquari river water color chanqrnq from bluish to black as the river flows towards the Paraguay river. This fact was also confirmed through ground observation sailing from Paraguay river towards the Upper Taquari river: the water changes from high transparency (c1ear water type according Sioli, 1964, classification) to muddy water (white water type according Sioli, 1964).

Those ftnds were also confirmed by the preliminary results of a study to determine the transportation rates of the Taquari river. The authors (Souza and Hamilton, 1993) showed that lhe amount of sediment entennq the Pantanal is 38 mllllon of tons per year, with insrqruficant output of sediment to the Paraguay river (Tables 1 and 2)

The natural erosron and transportation processes of the Upper Taquari basin has been accelerated in the last 20 years by the conversion of savannah veqetation to pasture land for cattle-raising. Actually this activity tncreased one hundred times the annual loss of soil per hectare (Gilluly, in Leinz and Amaral, 1969).

4. CONCLUSION

The present set found in the Taquari river basin is warning. The natural landscape shows a framework characterized by an active drainage network in a region with very hlgh precipitation, outstanding erosive capacity acting in a plateau supported by psamitic sedimentary rocks with low resistance to erosion. This natural set has been threatened by deforestation. It brings about a huge amount of material which enters into the plain but never comes out.

As a result of this situation, the region is facing economical and environmental problems. Pasture land and roads are being destroyed by gully erosion in the plateau of Upper Taquari basin. Pantanal plain is being filled up contributing to the instability of the Taquari river channel which turned to an unstable anastomosed channel (braided pattem).

These changes in the fluvial morphology of the Taquari river is changing the Ilooding pattem of the region, increasing the area periodically inundated, and therefore reducing the areas for cattle- raising during the wet season.
Among the environmental changes, it is clear that the rates of erosion, transportation and deposition had increased affecting the wild life in the Pantanal Matogrossense by disrupting important links in the food-chain.

5. BIBLIOGRAPHY

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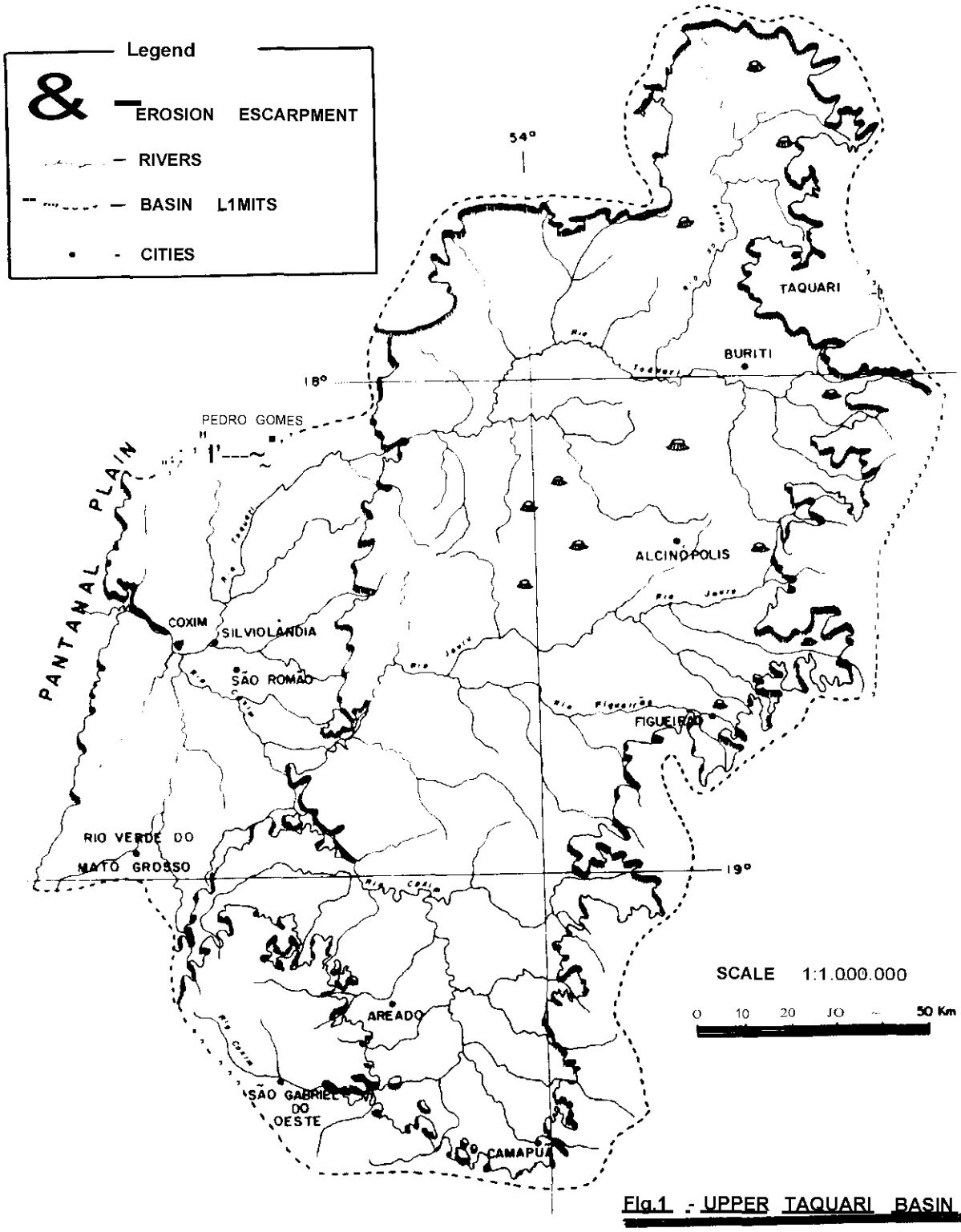
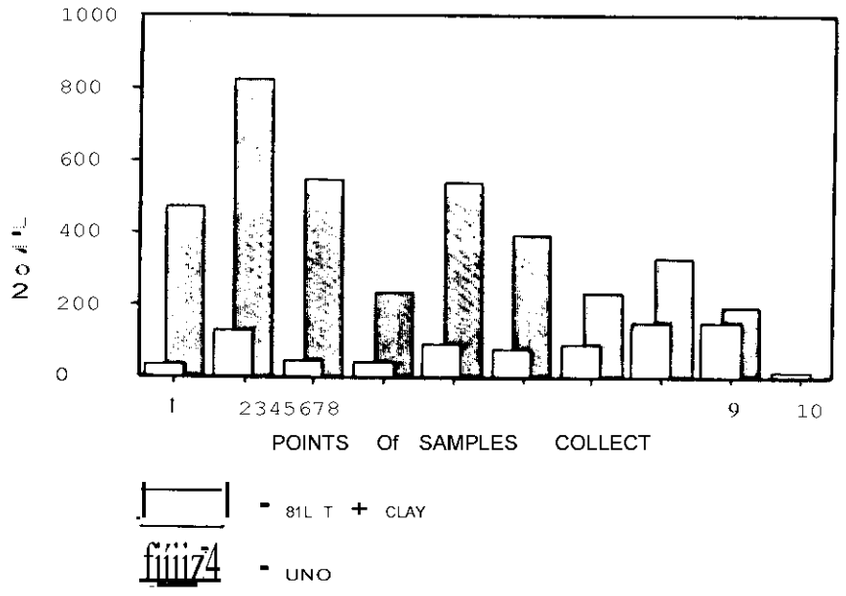


Fig.1 - UPPER TAQUARI BASIN



LOCATION OF POINTS OF SAMPLES COLLECT IN THE PLATEAU

1- COXIM RIVER IN THE BRIOtE OF BR-142
2- COXIM RIVER ,IN THE CONFLUENCE WITH JAURU RIVER
3- JAURU RIV ER. IN T HE CONFLUENCE WITH COXIM RIVER
4- TAQUARI RIVER • IN THE CONnUENCE WITH COXIM RIVER
,- COXIM RIVER • IN THE CONFLUENCE WITH rAQUARIRIVER

IN THE PLAIN

8- rAQUARI RIVER. IN THE BARRANQUEIIU
7- TAQUARI RIVER. IN THE FltUEIRAL FARM
8- TAQUARI RIVER , IN THE S!⊥ ISABEL FARN
8- UQUARI RIVER ,IN THE PAUIEIRINHA"ARRO •+ ADO'
10- TAQUARI RIVER ,IN THE MOUTH AT PARAGUAI RIVER

TABLE 2 - AMOUNT Of SEDIMENTS IN THE RIVERS Of TAQUARI BASIN (IN: SOUZA a HAMILTON,1993)