

The use of TM Landsat 5 images satellites (compositions 357, 457 and 375 with histogram equalization stretching enhancements) prove to be a very useful tool for examine the spatial distribution pattern of incipient meandering fluvial rivers.

Among them, two courses, the Pilcomayo and the Bermejo rivers, run about to the "Chaco-Pampeana" plain as typical "meandering" river model. This is a reflection about the flat relief and topography of the region and is related with the weather conditions (a very wet climate).

The sedimentary deposits of these rivers (the Pilcomayo river, the Bermejo river, tributary stream and minor courses) have not a great significance. In fact, these are almost non-existent and mainly they are re-worked sediments of the Upper Tertiary arenaceous sediments. So, they have very little erosional potential.

The deposits of these little rivers are mainly arenaceous lithofacies of fine to very fine sand grains. Grouped planar crossbeds, trough crossbeds stratification is frequent at the beds, in which sometimes, bipolar cross stratification appears. Solitary and grouped channels are common. The downstream accreted mesoform and macroform deposits aren't present and not recognized by now.

It is proposed here that the origin of these low volume courses of meandering design reorganization drainage are quite synchronous with the base sea level change occurred on the 3,000 and/or 6,000 years BP periods according with HAQ et al. eustatic curves (1998). The climatic change, varying from more dry toward more wet conditions at northeastern Argentina in the period mentioned above (TORRA 1998).

These age were accuracy tested upon ^{14}C dating over widely mollusks biofacies related with restricted recent marine transgression whose deposits are present at the entrance of the Río de la Plata estuary and adjoining areas as the coast-line of the Buenos Aires Province (CORTELEZZI & LERMANN 1969).

These brief reflections have the aims to bring forward some ideas about a theme absolutely obscured and never studied in the Chaco-Pampeana region with modern architectural and remote sensing techniques.

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Recent architectural studies over the sandy lithofacies, show a typical assemblage of internal structures that are diagnostics of a tide-dominated depositional environment.

Hummocky cross stratification, herringbone cross stratification, first and second order reactivation surfaces, tidal rhythmic beddings, flaser beddings, bipolar cross stratification, sigmoidal stratification and tidal bundles-beddings are present in all the outcrops (TORRA 2000a).

Typically, an erosion unconformity was proposed between the heterolithic succession and the mudrocks that overlies itself (HERBST 1971).

The trace elements study led to the interpretation that the mud beds that structurally cover in quite conformable arrange the heterolithic succession, has the same geochemical anomalies -or signatures- (TORRA 1999b, 2000b).

The overlying unit was generally interpreted as in erosion discordance (HERBST 1971) in despite of to not accept a simple lithofacies change.

Geochemical trace elements data analysis shows the same anomalies ('signatures') in the muddy lithofacies interleaving with very fine sands. All the mud beds analyzed had the same geochemistry anomalies. As a result, we interpreted them as formed under similar sedimentologic and environmental conditions.

Trace element proves to be a suitable tool in order to help to solve stratigraphic problems always together with architectural analysis at least in the case of the marine Miocene sequence of the Northeastern region of Argentina (TORRA 2000b).

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Can geochemistry help in stratigraphic problems? The case of the Ituzaingó Formation (Middle Miocene), Northeastern Argentina

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The Ituzaingó Formation sands are a very typical heterolithic succession of sandy-muddy beds that cover all the northeastern of Argentina and the southwest of the Paraguay Republic. The outcrops are of about 117,000 km² (TORRA 1999a, b).

However, recent study of texture in hidrologic drill-holes in the vast area, reveals that these sediments are quite common in the major portions of the 'Chaco-Paraná intracratonic basin'. The extension confirmed until the moment sound of somewhat 450,000 km² (TORRA 1999a).

The sandy lithofacies are characterized for a well sort, very fine grain, very well rounded and gray to white in shades. When reddish, they are ferricretized (epigenetic oxidation of magnetite and ilmenite).

Geochemical properties and origin of rich-iron manganese concretions in the Ituzaingó Formation (Middle Miocene), Northeastern Argentina

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In the upper beds of the Ituzaingó Formation sands are present outstanding rich-iron manganese concretions previously studied by CORTELEZZI et al. (1997). The Ituzaingó Formation is largely defined by a heterolithic succession composed for interleaved sandy-muddy lithofacies. The upper levels are characterized for a typical thin mudrock bed, 2-4 meters in thickness. In these beds, horizontally disposed, breccial rich-iron manganese concretions appear. They are about 10-40 cm in size (average). Predominant shape is coarser botryoidal or irregular. The main elongation axis is markedly in the sense of the stratification. That is horizontally arranged.

Two selected samples of the Empedrado village and the Arroyo El Sombrero river, were picked up from very well exposed outcrops. The selected samples were analyzed by the technique of

fluorescence X-ray spectrometry (FRX). The element boron was analyzed using an inductively emission coupled plasma spectrometry (ICP-AES).

The analyzed major elements were: CO_3Ca , P_2O_5 , Fe_2O_3 , TiO_2 , SiO_2 , Al_2O_3 , CaO , K_2O , MnO . These molecules were measured in percentage. Trace elements analyzed were: Rb, Cs, Ga, Zr, Ta, Nb, Sr, Ba, Cr, Ni, Zn, Pb, Cu, V and boron.

CORTELEZZI et al. (1997) believe that concretions are of continental origin on the basis of geological setting and some trace elements relationships.

TORRA (1998, 1999, 2000) interpreted the hosted mudrocks as belonging to littoral shallow marine origin (tempestites facies). The high concentration in barium (9,500 ppm in average), vanadium (546 ppm in average) and lead (355 ppm in average) mark a geochemical anomaly. No significant values in gallium and cesium were found in the context of regional geochemical background although cesium values are slightly greater (RANKAMA & SAHAMA 1954). TUCKER (1991) said "the deep-ocean floors are usually well-oxygenated. The reason for this is that cold, dense oxygen-rich waters are produced in the polar region, and these descend and flow to lower latitudes, thus keeping the ocean floor ventilated. These deep-sea currents are locally responsible for erosion of the sea floor, so that skeletal lags and oriented fossils may form in these areas, and Fe-Mn oxides may be precipitated there".

PROTHERO & SCHWAB (1997) explained these concretions, in a general way, as belonging to supratidal facies in a peritidal environment.

Preliminary geochemical conclusions are that shallow marine origin might be a more satisfactory explanation for rich-iron manganese concretions of the Ituzaingó Formation.

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Chaco-Paraná Intracratonic Basin (Argentina): Exploration Oil Possibilities

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The Chaco Paraná intracratonic basin is one of the most large sedimentary basin situated at South America of about 550,000 km² (CHEBLI et al. 1989, RUSSO et al. 1979).

Few exploration tasks were carried out in recent years. However, one of the most outstanding productive oil drill-hole -the Palmar Largo oil hole-, is just located in the northwestern edge of the Chaco-Paraná intracratonic basin at the northwestern foreland-folded trend basin.

It is assumed that the 'contact' between Chaco-Paraná intracratonic basin and the high productive 'Cuenca del Noroeste' (northwestern foreland-folded trend basin, Argentina-Bolivia), is a significant and very potential place for exploration in order to began the surveying for oil and fuel gas. Almost never was tested by the drill.

The extensive effusive flow-beds of the so called 'tholeiitic basalt flows', aged Lower Cretaceous-Upper Jurassic, situated at a depth of 600 meters, covers an immense sector of this basin. These seismic-reflective basalt-beds constitute a significant problem for the 2D seismography. The new 3D exploration tasks performed under these depths may bring out invaluable results.

The continental (Permian and Carboniferous) and the marine (Cambrian to Devonian) Paleozoic sequence are present. They are covered by at least by 600 meters of Cenozoic littoral shallow marine sediments join to the above mentioned tholeiitic-basalt beds, ranging 0 to 1,500 m in thickness, commonly interstratified with colian supermature sandstones. The Paleozoic sequence constituted an extraordinary potential focus for exploration.

We think, that it is necessary to stake on pilot exploration areas near the productive northwestern foreland-folded trend basin in order to examine with more detail (3D sismography) sedimentology and structures at depths and subsequent oil possibilities at the giant Chaco-Paraná intracratonic basin. On the other hand, it is imperious to perform a detailed sedimentological and structural study at the adjoining areas.

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Geochemical characterization of loessial sediments of the Chaco Province, Northeastern Argentina

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Eight selected samples were picked out from loessial sediments and studied geochemically. They were cited at the Tres Isletas, Laguna Blanca and Colonia Benitez villages (Chaco Province). The studied material belongs to the loessial Middle Holocene country rocks. After civil engineering works, the samples were obtained from the outcrop rocks in the site; the depths of the samples varying from 1 to 4 meters in depths.

The samples were analyzed by means of X-ray fluorescence spectrometry (FRX). The major elements analyzed were: CO_3Ca , P_2O_5 , Fe_2O_3 , TiO_2 , SiO_2 , Al_2O_3 , CaO , K_2O , MnO . The trace elements analyzed were: Rb, Cs, Ga, Zr, Ta, Nb, Sr, Ba, Cr, Ni, Zn, Pb, Cu and vanadium.

Three types of "test-set" were made out on the samples.

The T-set 1 embraces the sample particle ranging between 100/44 microns. These samples are constituted for a mixture of alloctonous unaltered minerals. Also, it is present the frequent product of pedogenetic weathering including clay minerals.

The T-set 2 embrace all the grains ranging minor than 44 microns but cleaned by means of CHH 0.5 N.

The T-set 3 embrace the particles ranging minor than 44 microns without clean. This is the alloctonous material plus weathering products, clay minerals, silicofites, pollen, pollen grain, etc.

Using the T-set 1, for example, we found it a significant relative concentration (movement) in the major and trace elements in the alloctonous material with the weathering products and clay minerals