

structural relation between them is conformable, and none autoctonous fossil or microfossil remains were founded before 1999 into the Toropí and Yupofí tempestites Formations.

The Toropí and Yupofí Formations were interpreted as continental (fluvial) in origin long time ago (HERBST 1971, HERBST & SANTA CRUZ 1985). They argued the presence of vertebrate fossil fauna remains of Pleistocene to Holocene age (HERBST & SANTA CRUZ 1985). The Toropí and Yupofí Formations have a maximum thickness of about eight meters averaging four meters (TORRA 1998b, 1999a, b).

Recent studies proposed that those vertebrate fossil fauna remains are alloctonous (TORRA 1998a, b). The interpretation was that the fossil remains are always in surface layers and that they were swamped into mud beds on Holocene times (11,500 BP, TORRA 1998c).

The sandy-muddy Ituzaingó Formation is a typical heterolithic succession beneath these horizontal mixed silty-very fine sandy beds of flat-lenticular forms. The fact is that marine heterolithic succession (Ituzaingó Formation) and the supposed continental Toropí and Yupofí Formations layers are in a quite concordance (TORRA 1999b).

The origin proposed for Toropí and Yupofí Formation is non-tidal offshore sand bodies deposits (formerly very fine sandy-silty mud bodies) deposited under the action of marine storm currents (i.e. tempestites or marine storm deposits).

The geochemical signatures of eight mayor molecules and fifteen trace elements carried out on Ituzaingó, Toropí and Yupofí Formations, confirmed that the sequence is in a fully agree with previous sedimentological thesis (TORRA 2000a, b).

HERBST, R & SANTA CRUZ, J.N. (1985): Mapa Litoestratigráfico de la Provincia de Corrientes. - D'Orbignyana, **2**: 1-51.

TORRA, R. (1998a): A Brief Stratigraphy and Paleogeography of the Miocene Sea at the Mesopotamia Region, Northeastern Argentina, South America. - Geocongress '98 Geological Society of South Africa, 79-81, Pretoria.

TORRA, R. (1998b): A New Age (Miocene) and a New Environment Depositional System for Pelitic Toropí and Yupofí Formations, Corrientes Province, Argentina, South America. - 15th International Sedimentological Congress, 767, Alicante.

TORRA, R. (1998c): El Estudio de los Sedimentos del Cuaternario de la Provincia del Chaco y Regiones Aledañas. - III Reunión de Comunicaciones Científicas y Tecnológicas. Universidad Nacional del Nordeste. - Actas, **4**: 197-200, Resistencia.

TORRA, R. (1999a): Avances en el conocimiento del Terciario Superior de la Llanura Chaco-Pampeana. IV Reunión de Comunicaciones Científicas y Tecnológicas. - Universidad Nacional del Nordeste, Actas, **VI**: 93-96, Corrientes.

TORRA, R. (1999b): Ituzaingó Formation. A Key for the Interpretation of the Upper Tertiary Stratigraphy, Mesopotamia-Chaco Paraná Basin, Argentina. - Revista Ciência e Natura, Universidade Federal de Santa Maria, Santa Maria, (in press).

TORRA, R. (2000a): Reinterpretación Sedimentológica y Edad de las Formaciones Paraná, Ituzaingó, Toropí, Yupofí y Puelches (Mioceno Medio), Mesopotamia de Argentina. - Revista Brasileira de Geociencias, Brasília, (in press).

TORRA, R. (2000b): Geochemistry of a Tidal Transgressive Heterolithic Succession: The Ituzaingó Formation (Middle Miocene), Argentina. - Chinese Journal of Geochemistry, **19** (1): 1-7.

Petrographical characterization of the Ituzaingó Formation Sands (Middle Miocene), Northeastern Argentina

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The Ituzaingó Formation is a wide succession of sand and mud beds. They appear in the left margin of the natural slopes, ravines and gullies of the left margin of the Paraná and Paraguay rivers at

the Mesopotamia region.

The outcrops of the northern beds are extremely characterized by a predominance of a very fine, well sorted, white sands. They have several internal structures such as tidal bundles, reactivation surfaces, herringbone cross-stratification, rhythmic tidal beddings, flaser beddings and bipolar cross-stratification. The sequence has a very simple arrangement of sigmoidal pattern (TORRA 1998, 1999).

Twenty-nine selected samples were picked up from the Corrientes province outcrops' (northeastern Argentine). In this way, twenty-nine thin-polished sections were made out. They were studied using standard polarizing microscope methods.

The results show a great predominance of well rounded to rounded quartz grains in form, generally uniform in size and spherical appearance (0.15-0.06 mm in average). The percentage is over 95 % quartz. About 85 % are monocrystalline quartz grains with few visible fluid inclusions and not undulose extinction. The other 15 % were polycrystalline grain-sutured quartz grains (metamorphic grains?). Packing is largely cubic and highly porous. Neither cement nor matrix material is present into unaltered sand beds. Both, the very well sorting and rounded grains point out a 'superature' texture sand very frequent in beach environments. There are no significant quantities of feldspars and lithics grains. Very scarce microcline is present, generally characterized by cross-hatch twinning. The main translucent resistates minerals are tourmaline, muscovite, rutile, zircon, kyanite, staurolite, chalcedony and garnets.

Opaque minerals are mainly rounded magnetite grains, which is always present. Sometimes magnetite grains appear in quantities of about more than 3-5 in percentage. The significant ferritization processes are present in some of upper beds of the Ituzaingó Formation derived from magnetite oxidation. This phenomenon stamped typical reddish to yellowish tones into the sand layers. It is possible that forces of oxidation caused break out of pure quartz grains, which are fully cemented by ferric oxides. Ilmenite and titanomagnetite are inferred to be present based on significant geochemical anomalous values in titanium (TORRA 2000).

In accord with the classification of DOTT (1964), the arenaceous lithofacies of the Ituzaingó Formation may be classified as a 'quartz arenite'.

DOTT, R.H. (1964): Wacke, graywacke and matrix-what approach to immature sandstone classification? - Journal of Sedimentary Petrology, **34**: 625-632.

TORRA, R. (1998): Estructuras sedimentarias marinas diagnósticas en las arcas de la Formación Ituzaingó (Mioceno Medio), entre Itatí y Empedrado, Provincia de Corrientes, Mesopotamia de Argentina. - Revista del Instituto de Geología y Minería, **12** (1): 75-86.

TORRA, R. (1999): Reinterpretación sedimentológica y edad de las Formaciones Paraná, Ituzaingó, Toropí, Yupofí y Puelches (Mioceno Medio), Mesopotamia de Argentina. - Revista Brasileira de Geociencias, 'in press'

TORRA, R. (2000): Geochemistry of a Tidal Transgressive Heterolithic Succession: The Ituzaingó Formation (Middle Miocene), Argentina. - Chinese Journal of Geochemistry, **19** (1): 1-7.

Holocene fluvial reorganizing drainage pattern at the right margin of the Paraná-Paraguay rivers, Northeastern Argentina

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The right margin of the Paraná-Paraguay fluvial valley is frequently run around for a most number of young, low volumes, incision rivers at the Chaco-Pampeana region.