Massive diamictites interbedded with sandstones constitute the upper part of the Permo-Carboniferous Rio do Sul Formation (Itararé Group). These diamictites consist of dispersed centimeter to meter size clasts in a muddy to muddy-sandy matrix deposited in a subaqueous "rain-out" glaciogenic environment. They frequently have transitional contacts with crudely stratified diamictites. These facies probably formed as a result of downslope resedimentation in areas of the basin receiving fine-grained sediments from suspension and sandy turbidites. The fabric patterns of diamictites from Rio do Sul Formation have been studied through anisotropy of magnetic susceptibility. A subhorizontal to weakly imbricate magnetic planar fabric, corresponding to bedding plane, appears in whole samples. The magnetic lineation occurs dispersed on the bedding or has a faint alignment generally to NW or SE directions. This fabric pattern is attributed to settling of sediments into a weak current on basin floor. Five stations have a well defined N- to NW-trending magnetic lineation, suggestive of a post-depositional alignement process. These rocks have weak susceptibility magnitudes ($k < 0.2 \times 10^{-3}$ SI) and anisotropy degree. A strong paramagnetic contribution characterizes the hysteresis loop and no lattice transitions due to ferromagnetic fraction are observed in the susceptibility versus temperature variation diagrams. MEV investigations detected the presence of chlorite blades coating detrital grains or partially infilling the pore spaces. If these paramagnetic phyllosilicates controll the anisotropy of susceptibility, the magnetic fabric pattern of the diamictites has an important diagenetic contribution. — (*December 10, 1999*) .

LATE PALEOZOIC GLACIAL BOULDER PAVEMENTS FROM JUMIRIM, SP (ITARARÉ SUBGROUP): NEW EVIDENCE ON ORIGIN*

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Mapping and facies analysis of diamictites containing boulder pavements and associated rocks from the upper part of the Itararé Subgroup in Jumirim, SP, furnished additional evidence on the glacial paleoenvironmental context and origin of the clast concentrations.

Five facies associations have been mapped and interpreted in terms of their paleoenvironment. *Associations I and II* were formed mainly by the settling of muds from suspended sediments plumes derived from subglacial meltwater plus a variable contribution of debris from floating ice. Evidence of reworking of glaciogenic debris by bottom traction currents is also present; *Association III* represents a subaqueous clastic fan fed by meltwater currents; *Association IV* is a fluvio-deltaic subaqueous (or partly subaerial) outwash wedge that passes distally to a submarine fan associated with flows of glaciogenic debris; *Association V* includes a lower subglacial diamictite (lodgement tillite) resting on a glaciotectonized substratum, overlain by a possible meltout diamictite (meltout tillite).

Boulder pavements A and B occur respectively in the lower and upper diamictites of Association V. Environment of deposition of the lower diamictite implies in the formation of the boulder pavement during deposition of a subglacial till. Formation of the pavement may thus have been through processes related to lodgement. Interpretation of the upper diamictite as a subglacial meltout tillite and origin of boulder pavement B in this context are less clear. It is preliminary interpreted as a structure inherited from the basal transport zone of ice.

Rocks studied record the permanence of glacial influence during deposition of the uppermost beds of the Itararé Subgroup in northern Paraná Basin. The general environmental setting is interpreted as a subaqueous (possibly marine) basin marginally affected by a late advance and retreat of the Kaokoveld glacial lobe. — (*December 10, 1999*) .

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OCCURRENCES OF EVAPORITES IN THE IRATI SUBGROUP (LATE PERMIAN, PARANÁ BASIN)

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Evaporite deposits in the Paraná Basin are unusual and of limited occurrence. The Morro do Alto (lower) and Ipeúna (upper) members of the Assistência Formation (Irati Subgroup) include the most expressive evidence for Late Permian evaporitic sedimentation in this syneclise.

During the regressive event after sedimentation of the Taquaral Formation, the area north of the Ponta Grossa Arc (in São Paulo State) became a hypersaline residual sea, leading to calcium sulfate precipitation in a restricted

stagnant paleoenvironment and dry climate.

The Taquaral-Assistência boundary is distinguished by the transition from non-bituminous shale to organic-rich bituminous shale. At this contact are evaporitic breccias that deform the basal beds of the overlying Assistência Formation.

In the upper part of the Bairrinho bed (Ipeúna Member, Assistência Formation), northeastern São Paulo, evaporite was deposited in another short transgressive-regressive cycle. Later this bed was deformed by salt mini-domes which were later replaced by chalcedony.

In the northern portion of the Paraná Basin (southern Goiás State), between the Assistência and Corumbataí formations, there are partially silicified strata with mesosaurid bones. This contact is marked by silicified mini-domes, horizons with radial-fibrous crystals and breccias like those found in the evaporitic deposits of São Paulo State. These silicified rocks occur above the last bituminous shale, thus denoting a third evaporitic acumulation at the top of the Irati Subgroup. — (*December 10, 1999*) .

DIAMICTITE FACIES OF THE ITARARÉ SUBGROUP (LATE PALEOZOIC), IN THE SOUTHERN PARANÁ BASIN, BRAZIL*

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Diagnostic features of glacigenic deposits, both in the continental and marine environments, have been extensively discussed in the last decades.

A special facies classification of these rocks similar to that used by Canuto (1993) with some improvements, is here proposed, with practical approaches to field applications, based on lithology, texture, structure, clast orientation, color, geometry, lateral extension and, in some cases, presence of ichnofossils, microfossils and palinologic content.

Compact massive diamictite facies. This facies is composed by compacted massive diamictite, with shearing at the base. It occurs in the form of discontinuous bodies plastered in irregularities of the substratum, whose surface is flat, polished and estriated, with eventual "crescentic marks". The substratum, close to the contact, also reveals to have been sheared. It corresponds to the lodgement tillite. *Non-compact, massive diamictite facies.* It is a massive tillite, formed from the slow melting of stagnated ice masses. *Tabular diamictite facies.* It is composed of tabular, massive diamictite, formed by cohesive debris flows, having folded and faulted sandstone layers, which may be sheared, and disrupted, sometimes forming "sandstone balls", with clasts generaly without orientation. The lower contact is sharp, and the upper can be transitional to fine clastics. *Lenticular diamictite facies.* This facies is formed by channelized massive diamictite, deposited by cohesive debris flows. Its characteristics are similar to those of the tabular diamictite facies, differing by its geometry amalgamated and stacked channels, associated with the movement of lenticular channelized lobes tens of meters thick as a whole. The lower contact is sharp, and the upper can be transitional to fine clastics. Clasts may be oriented parallel to the bedding. *Deformed interbedded sandstone and diamictite facies.* It occurs as extensive tabular bodies, with metric thickness, of intercalated deformed diamictite and sandstone, with beds showing slump folds and faults, sometimes forming a chaotic mixture. It is interpreted as formed by gravitational flows of glaciogenic sediments, deposited at the margins of a water body, perhaps marine, and covered by shoreface sandstones. *Laminated clast rich diamictite facies.* Laminae are piled up with obscure contacts, or with suspension deposits. Bodies are up to tens of meters thick and were deposited by dense flows, intermediate between debris flows and turbidites. This facies differs from the debris flows by being turbulent flows which erode the substrate. *Laminated diamictite with lenses of massive diamictite facies.* Lamination is given by subparallels discontinuities or joints, without associated textural variation, eventually showing clast orientation. Lamination is undulate and includes lenticular, elongated bodies of massive diamictite. The diamictite is interpreted as formed by gravitational sedimentary flows. — (*December 10, 1999*) .

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THE INVERSION OF THE SÃO JOSÉ DO ITABORAÍ PALEOCENE BASIN (RJ) IN A STRIKE-SLIP REGIME*

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