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SALENTO MIOCENE: A PRELIMINARY PALEOENVIRONMENTAL RECONSTRUCTION

Summary

The Miocene Series of the Salento Peninsula is formed by six lithological facies. These lithological facies are made up by calcirudites, calcarenites and calcilutites composed of intrabasinal carbonate grainsand, subordinately, of non-carbonate intrabasinal grains and non-carbonate extrabasinal clasts. The facies show abrupt lateral thickness changes and a variety of contacts corresponding to different stratigraphic relations (heterotopy, paraconformity, disconformity and angular unconformity). The chronostratigraphic setting, based on biostratigraphic data from literature, allows to establish space-time relations between the lithological facies.
Altogether, the stratigraphic features of the Salento Peninsula Miocene Series is indicative of an open marine platform environment characterised by a “undulating” topography which fragemented the studied area in different “depositional domains”. The main factors of these differences in the depositional history within the basin have been due to both exogenous (subaerial erosion and eustatic changes) and endogenous (tectonic fracturing and/or diapire raising) phenomena.

Riassunto

Nella Penisola Salentina, varie unità stratigrafiche di età miocenica ricoprono, con contatti trasgressivi e discordanti, unità del Cretaceo e del Paleogene. Il Miocene salentino è caratterizzato da sedimentazione prevalentemente carbonatica ed è distinto in due formazioni: Pietra Leccese (GIOVENE, 1810) e Calcareniti di Andrano (MARTINIS, 1967). Il contatto tra di esse è interpretato come un limite stratigrafico privo di significative discontinuità (ROSSI, 1969a; 1969b; BOSSIO *et al.*, 1988b; 1991), come un limite eteropico (LARGAIOLLI *et al.*, 1969; ROSSI, 1969a; 1969b;) ovvero come trasgressivo e discordante (BOSSIO *et al.*, 1988a). Al Miocene sono, inoltre, attribuite più di una decina di unità stratigrafiche informali (vedi tabella 1). La stratigrafia del Miocene salentino risulta, pertanto, mancante di un quadro unitario di riferimento.

Di conseguenza, anche gli aspetti sedimentologici delle unità mioceniche del Salento, già difficilmente interpretabili a causa delle modificazioni post-deposizionali (bioturbazioni, diagenesi, alterazioni esogene) sono poco noti. Quindi la ricostruzione dell'evoluzione paleoambientale di questo settore della Piattaforma Carbonatica pugliese, che già prima del Miocene assumeva il ruolo di avampaese rispetto agli orogeni appenninico e dinarico, è carente di molti aspetti fondamentali.
Nel presente articolo si è fatto uso, quale strumento di lavoro, di unità stratigrafiche informali ("*facies* litologiche"). Esse permettono di delineare una preliminare ricostruzione della stratigrafia del Miocene salentino, attraverso l'uso critico delle fonti della letteratura scientifica di merito (specie per i riferimenti cronostratigrafici) e di originali osservazioni geologiche di terreno.
Con tali premesse, la Serie miocenica salentina è descrivibile attraverso sei distinte *facies* litologiche (vedi tabella 1). Esse sono formate da calciruditi, calcareniti e calcilutiti composte da granuli carbonatici di origine intrabacinale e, subordinatamente, da granuli non carbonatici intrabacinali e da clasti non carbonatici extrabacinali. Le facies litologiche sono state applicate in undici sezioni stratigrafiche (Punta Ristola; N di Santa Maria di Leuca; Ciolo; Poggiardo; Cursi-Melpignano; Cannole; Castro-S. Cesarea Terme; Palmariggi-Minervino; S di Lecce; N di Lecce ed W di Capo d'Otranto; vedi Figg. 1, 3 e 4).
Si è così evidenziata l'ampiezza delle variazioni laterali di spessore delle *facies*; inoltre si sono ricostruiti contatti corrispondenti a rapporti stratigrafici di vario tipo (eterotopia, paraconformità, disconformità e discordanza angolare). E ancora, l'inquadramento cronostratigrafico, ottenuto mediante dati biostratigrafici di letteratura, ha permesso di stabilire relazioni spazio-temporali tra le *facies.*
L'insieme delle caratteristiche delle *facies* mioceniche della Penisola Salentina indica un ambiente deposizionale di piattaforma di mare aperto alimentato da rari apporti terrigeni, e consente di delineare una preliminare ricostruzione paleoambientale. La trasgressione del Burdigaliano superiore, ricoprì un territorio modellato da azioni endogene ed esogene attive dal Cretacico. I sedimenti si accumularono così principalmente nelle zone più depresse (depocentri di Leuca, Cursi e Lecce; vedi Figg. 5 e 7).
Dalla fine del Langhiano, o dal Serravalliano, e sino al Messiniano iniziale, il settore sudoccidentale del Salento (depocentro di Leuca) fu in condizioni subaeree.
Durante il Serravalliano non vi furono condizioni favorevoli alla sedimentazione su quasi tutta la Penisola Salentina; probabilmente le biocenosi bentoniche migrarono verso E e verso W, quale conseguenza dell'abbassamento del livello medio del mare. Nel Tortoniano il depocentro di Cursi presentava batimetrie minori rispetto al depocentro di Lecce. Dopo un probabile breve periodo di emersione, nel Messiniano pre-evaporitico il Salento fu caratterizzato da una omogenea sedimentazione carbonatica riferibile a mare poco profondo. Infine, durante la fase evaporitica che interessò l'intero Mediterraneo, probabilmente l’intera penisola salentina si trovò in condizioni subaeree.

Introduction

In the Salento Peninsula a discrete Miocene sequence overlies either Cretaceous or Paleogene units depending on the paleogeographic evolution of different parts of the basin. The contacts between the Miocene and both the overlying and underlying units are transgressive and disconformable, as well as the contacts between Miocene and the overlying Pliocene and Pleistocene units (Fig. 1).
During the Miocene, the Salento Peninsula which corresponds to the southeastern sector of the Apulia Platform (Auct.), has been characterised by prevailing carbonatic sedimentation. The relative deposits have been subdivided into two formations called Pietra Leccese (Giovene, 1810) and Calcareniti di Andrano (Martinis, 1967). The stratigraphic boundary between these formations has been interpretated either as stratigraphically continuos (Rossi, 1969a; 1969b; Bossio *et al.*, 1988b, 1991), or heterotopic (Largaiolli *et al.*, 1969; Rossi, 1969a; 1969b) or transgressive and disconformable (Bossio *et al.*, 1988a).
Different points of view have evolved also concerning the thickness of Miocene. The reported thickness usually varies from a few centimetres to, approximately, one

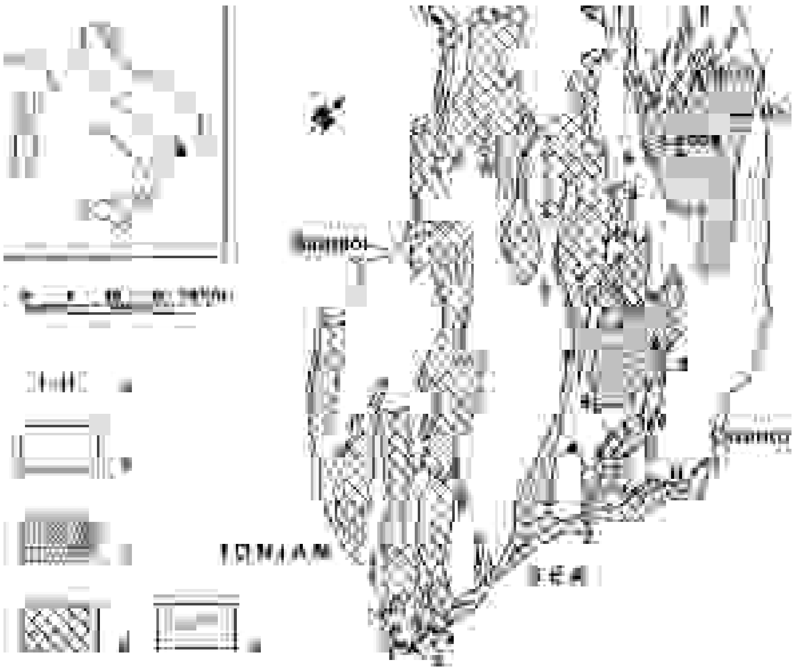

Fig. 1 - Simplified geological map of the Salento Peninsula. a, stratigraphic section: 1, Punta Ristola, 2, north of S. Maria di Leuca, 3, Ciolo, 4, Poggiardo, 5, Cursi-Melpignano, 6, Cannole, 7, Castro-S. Cesarea Terme, 8 Palmariggi-Minervino, 9, south of Lecce, 10, north of Lecce, 11, west of Capo d'Otranto; b, Pleistocene and Pliocene deposits; c, Miocene deposits; d, Paleogene and Cretaceous deposits; e, transgressive and disconformable contact; A Cappella d’Aurio quarry (see fig. 2).

hundred metres; nevertheless a thickness of some hundreds of metres, recontructed on the base of well-data, has been suggested by CIARANFI *et al.* (1988). Furthermore, in spite of the fact that the the Salento Miocene Series is lithologically fairly well constrained, its sedimentological features are not known. As a consequence, the Miocene environment evolution of this sector has not yet been interpreted in detail. This paper focuses on the study of the Salento Peninsula deposits using not conventional units (lithological facies). These lithological facies have been defined mainly on the base of their lithological and paleontological features and they will reveal themselves as useful tools for the reconstruction of the Miocene Serie and for a preliminary environmental interpretation.

Geological setting

The structural style is the main factor of shaping the landscape in the Salento Peninsula. Here the reliefs are mainly formed by both Cretaceous and Paleogene units, while Miocene, Pliocene and Pleistocene units mainly crop out in the level lands. This is interpreted as due to the structural setting, with the riliefs which had to be blocks structurally uplifted, while the level lands should had to be lowered blocks (LARGAIOLLI, 1970; MARTINIS, 1970; BOSSIO *et al.*, 1988a; 1988b; 1991; CIARANFI *et al.*, 1988).

In any case, owing to the scarcity of the exposures there are not sufficient factors to recognize the importance and the roles of folds and faults. As a consequence we have not many elements to reconstruct in detail the tectonic style. The few exposed folds show wavelenght of some tens of metres. More frequently, the cropping out layers are not folded (Cretaceous and Paleogene usually dip from 30° to 5°; Miocene dip from 20° to few degrees; Pliocene and Pleistocene dip generally from 15° to about 0°). The dip directions are prevalently towards the NE and the SW (structural axis strike about NW-SE).

Nevertheless along the southeastern coast (between Otranto and Leuca villages) the dip of the layers are mainly towards the SE and, subordinately, towards the NW (structural axis strike about NE-SW). NE-SW oriented structures have been recognized also in the southern Salento Peninsula (FUNICIELLO *et al.*, 1991). Faults can be directly observed expecially in the central-southern Salento (ROSSI, 1969a; LARGAIOLLI *et al.*, 1969).

These structures show high dip, strike NW-SE and they affect Cretaceous to the early Pleistocene units. The throws have been estimated on the base of drilling-data, and ranges from some metres to more than 300 m (CIARANFI *et al.*, 1988). Generally these structures have been interpreted as extensional faults. In any case, faults showing reverse slip are also present in the Salento (as an example, see fig. 2), but their meaning have not yet been interpreted.

As a whole, the Salento is considered as a wide asymmetric horst, dipping the east (MARTINIS, 1970; CIARANFI *et al.*, 1988; RICCHETTI *et al.*, 1988).

According to this interpretation it should have been involded into extensional tectonic fracturing. Nevertheless, some folds can be interpreted as contractional structures; in the northern sector of the Apulia Platform the folds have been explained as a consequence of propagation of blind thrust, according to the reconstruction carried out by CELLO *et al.* (1987)

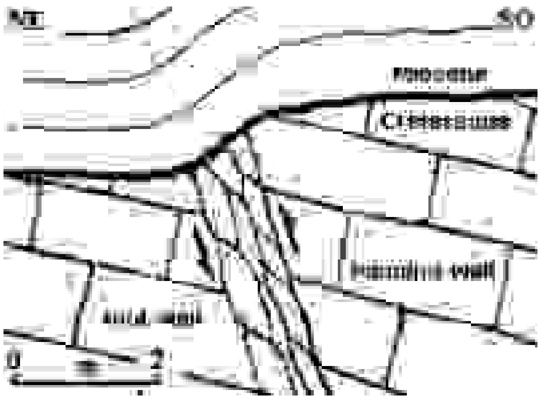

Fig. 2 - Sketch of the succession outcrops in Cappella d'Aurio quarry (3 kms north of Lecce); fault shears Cretaceous limestones; Miocene is folded and overlies Cretaceous. Note the fault gouge fabric which indicate sense of slip.

Stratigraphy of the Miocene Serie

Due to the general absence of topography, Miocene deposits show a restricted area of exposure which is mainly limited to the central-eastern part of the Salento Peninsula. In other areas, the Miocene units are usually covered by Pliocene-Pleistocene deposits and are well exposed, though partly, nearly exclusively within quarries. Some important sequence of Lower Miocene deposits can be observed exclusively by bore-holes. A stratigraphhic reconstruction of the whole Miocene series has, therefore, to be based on the correlation of several sections. With this aim, eleven suitable sections have been litho- and biostratigraphically correlated on the basis of both literature data and new observations. The recognition of the sedimentology structures, as well as the simple description of the Miocene deposits stratigraphic features in the Salento Peninsula, are complicated by two factors: bioturbation and diagenesis. Structures of bioturbation (mainly burrows) are well recognisable mainly in exposures subject to the weathering at lenght where they are in rilief in respect to the undisturbed sediments. Owing to the same reason the bioturbations are not well identified in the samples coming from drilling. Hence, the Miocene deposits could have been also strongly reworked by bioturbations.
The diagenesis can strongly affect the lithostratigraphic features. This problem is particularly important for the samples coming from the drilling sites. For istance, in the subsoil, owing to the underground diagenesis, detrital carbonate deposits can resemble homogeneous limestones, also with partially dolomitization.

Further problems are connected about the determination of the Miocene deposits primary colour. The more frequent colours observable in the exposures are white, yellow and grey; red, green, brown, ochre and orange are also present, but is not everywhere possible to recognize the roles of the various causes of the sediment painting (e. g. original colour of both granular and interstitial components; changes during the diagenesis; changes due to weathering; painting due to clay minerals coming from soils). Keeping on mind the above mentioned problems, the lithological facies reported in Table 1 have been used for the description of the Miocene deposits.

Table 1 - lithological facies: main feature and literature age	***Literature names***	***References***
LITHOLOGICAL FACIES F (Early Pre-evaporitic Messinian): limestones, calcarenites and calcirudites, fossil-rich calcarenites, less frequently marly-limestones and marls; calcareous-marly stringers are also interbedded; macrofossils are mostly abundant (in particular Anellidas and Gastropods) and pellets can occur as well. Somewhere algal and coral bioherms are present; level rich in Anellidas, Gastropds and Bivalves (qoquina-like) are subordinately interbedded; bedding is nearly everywhere well recognizable or, subordinately, moderately defined. In some places (e. g. Santa Maria di Leuca area) a very thin discontinuous conglomerate and fossil-rich phosphatized level, forms the base of this facies.	calcari ad Anellidi e Gasteropodi Calcareniti di Andrano calcilutiti e calcareniti scogliera a Porites Novaglie Fm	GIANNELLI *et al.* (1965; 1966) MARTINIS (1967) AA. VV. (1968); LARGAIOLLI *et al.* (1969); BOSSIO *et al.* (1988a,b) GUERRICCHIO and ZEZZA (1972) BOSELLINI (1993) BOSSELLINI *et al* (1999)
LITHOLOGICAL FACIES E (Early Pre-evaporitic Messinian): calcarenites with frequent glauconite grains and frequent phosphate grains, the latter in particular at the bottom; this interval forms a discontinuous lenticular body.	biomicriti glauconitiche (Pietra Leccese)	BOSSIO *et al.* (1991)

LITHOLOGICAL FACIES D (Tortonian): calcilutites, calcarenites and calcirudites, somewhere, espexially at the base, with frequent macrofossil-casts (e. g. Cursi and Palmariggi areas) and shells (mostly bentonic foraminifers and bivalves). Bedding is not well defined but usually is more and more recognizable towards the uppermost portion (especially around Lecce area); in the uppermost levels cross-bedding is also present.	Pietra Leccese; Calcareniti di Andrano Pietra Leccese calcareniti del Miocene	AA.VV. (1968) BOSSIO *et al.* (1988a,b,e) DELL'ANNA and LAVIANO(1988)
LITHOLOGICAL FACIES C (Serravallian-Tortonian): calcarenites (less frequent calcilutites and calcirudite) with abundant glauconite grains and frequent phosphate grains; usually very frequent are the macrofossils, especially Bivalves and Gastropods that somewhere form very rich intercalations. Usually the contact with the underlying lithological facies is sharp and characterized by burrows filled by glauconite-rich sediments; carbonate pebbles can occur mostly at the base (e. g. Otranto area); bedding is not well recognizable.	piromafo livello a *Pygnodonta* calcarenite glauconitico-fosfatica biomicriti glauconitiche	MARTELLI (1931); DELL'ANNA and LAVIANO (1988) GIANNELLI *et al*. (1965) MELIDORO and ZEZZA (1968) BOSSIO *et al*. (1988b,e)
LITHOLOGICAL FACIES B (Langhian-Burdigalian -Aquitanian(?) in Lecce area): generally massive calcarenites and calcilutites; somewhere the bedding is poorly marked evident or moderately defined. Mainly in the lower portion, frequent phosphate grains and subordinate glauconite grains are present. Especially in the lower-middle portion clayey interstitial material can be present; generally in the uppermost portion the grain size is more sorted and coarser and this deposit is less and less clayey towards the	Pietra Leccese	DELL'ANNA (1966); AA.VV (1968); MELIDORO and ZEZZA (1968); BOSSIO *et al*. (1988b,e) DELL'ANNA and LAVIANO (1988)

top; rare lignite and carbonaceous material stringers are interbedded; some beds are strongly bioturbated; rare are the macrofossils.	Formazione di Lecce	BOSSIO *et al*. (1999)
LITHOLOGICAL FACIES A (Serravallian(?) Langhian-Burdigalian): calcirudites with phosphatized carbonate clasts (derived from the oldest unit) and less frequent fecal pellets; calcarenitic grains filled the interstials. The carbonate cement containing high amount of macrofossils (also phosphatized) and variable amount (somewhere abundant) of glauconite grains. Somewhere both the interstitial and the granular component are strongly phosphatized; at the base, frequent infiltrations of calcarenites into joints and hollows of the bottom units are present; this lithological facies forms a discontinuous lenticular body.	formazione calcarea a fosforiti conglomerati fosfatici livello ad Aturia concentrazioni fosfatiche rudite fosfatica	CAPELLINI (1869) MERLA(1945) GIANNELLI *et al*. (1965) DELL'ANNA and LAVIANO (1988) MELIDORO and ZEZZA (1968) GUERRICCHIO and ZEZZA (1972)

1 Punta Ristola Section

This section (Figs. 1, 3 and 4) has been measured along the cliff of the Punta Ristola promontory, where a well exposed succession outcrops. Here the pre-Miocene sequence is formed by bioclastic limestones and macrofossil-rich calcarenites. Upwards the lithological facies A and, successively, the lithological facies F (see fig. 3) follow in the section. The lithological facies A is very rich in phosphatised carbonate calsts (derived from the underlaying unit); its upper and lower boundaries are constituted by erosional and disconformable contacts. The top of the section is represented by calcarenites and calcirudites with well defined bedding and calcilutite stringers (about 10-m-thick); they cover the Miocene through erosional and disconformable contacts.

Fig. 3 - Main features of the Punta Ristola, Ciolo, south of Lecce and Capo d'Otranto sections.
1, post-Miocene deposits; 2, fossils (Bivalves, Anellids, Gastropods); 3, phosphatised carbonate clasts; 4, lignite and carbonaceous material; 5, calcirudites, calcarenites and calcilutites with rare glauconite grains; 6, calcirudites, calcarenites and calcilutites more or less rich in glauconite grains; 7, Miocene lithological facies; 8, Cretaceous deposits.

A comparison of the paleontological and lithological features allows a litho- and biostratigrafic correltion of the basal unit with the Paleocene-Oligocene units of LUPERTO (1962) and ROSSI (1969b). The lithological facies A corresponds to the phosphate marker-bed of CAPELLINI (1869), DE GIORGI (1922), MERLA (1945) and to the "rudite fosfatica" of MELIDORO and ZEZZA (1968a) (see table 1). As reported by DAINELLI (1901) this interval contains corals, brachiopods, gastropods, bivalves, cephalopods, echinoderms, crustaceans and vertebrates. According to BOSSIO *et al.* (1988a) the lithological facies A is upper Burdigalian-upper Langhian in age. Finally, the lithological facies F and the upper deposits can be correlated to the deposits of the second (early pre-evaporitic Messinian) and fifth cycles (Quaternary) of BOSSIO *et al.* (1988a), respectively.

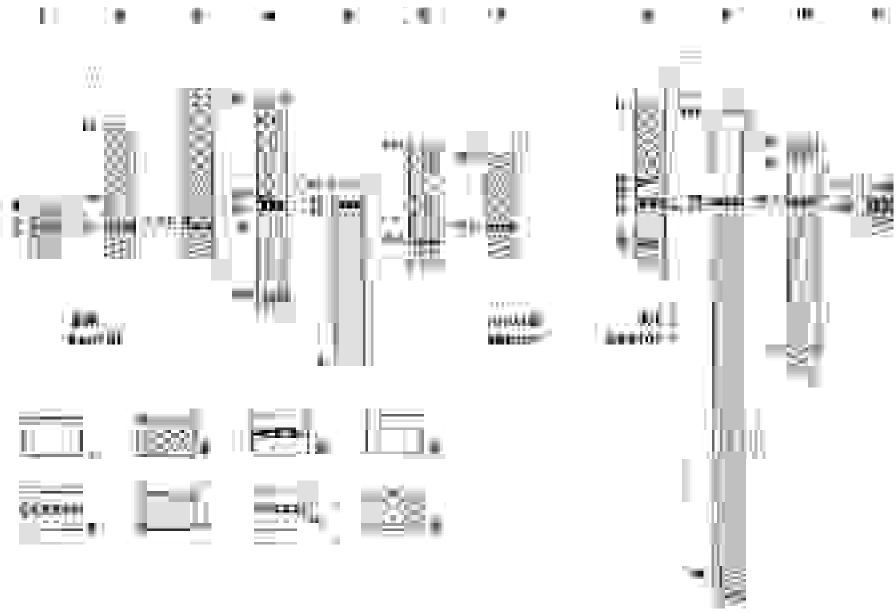

Fig. 4 - Correlations of the studied stratigraphic sections (thickness is in metres). The correlations has been made according to biostratigraphic data from different literature sources (see Tab. 1). 1, post-Miocene deposits; 2, litological facies F; 3, litological facies E; 4, litological facies D; 5, litological facies C; 6, litological facies B; 7, litological facies A; 8, pre-Miocene deposits.

2 North of Santa Maria Di Leuca composite Section

This section is composed of partial sections measured north of Santa Maria di Leuca. Bore-hole data have allowed a further control on litho- biostratigraphic correlations (Fig. 4). The basal unit is formed by, sometimes fossil-rich, limestones, reported to be Cretaceous in age (ROSSI, 1969b). In this area, the lithological facies Acovers the limestones by an erosional and disconformable contact, somewhere showing intercalations of bauxite pisolite-bearing clay. The lithological facies Aforms a thin, discontinuous body containing a high amount of phosphate grains.
This oldest Miocene deposits are covered by sediments attributable to the lithological facies B; the relative boundary seems to be gradual. The uppermost Miocene deposits are represented by the lithological facies F; around the Santa Maria di Leuca area the lithological facies F is very rich in pellets and macrofossils (BOSELLINI, 1993). Deposits of the lithofacies F covers the oldest sedimentary sequence by an erosional and disconformable contact; somewhere this contact is characterised by intercalations of clays containing pisolites. In agreement with BOSSIO *et al.* (1998a) the lithological facies A could be referred to the upper

Burdigalian, the lithological facies B to the late Langhian and the lithological facies F to the early pre-evaporitic Messinian. The lithological facies A is also found to be in contact with Paleocene-Oligocene deposits, particularly in the eastern sector of the studied area. Moreover, well-data allowed to identify lithological features which are restricted to limited areas (e.g. thin lignite beds have been recognised by MARTINIS, 1970 in some wells at the boundary between the lithological facies B and F).

3 Ciolo Section

The Ciolo section has been measured along the homonymous canyon. It has an overall thickness of about 60 m (Figs. 3 and 4). The basal portion of this section is formed by limestones and bioclastic limestones with abundant rudistids of the Cretaceous and by bioclastic limestones, breccias and conglomerates referred to the Chattian by GUERRICCHIO and ZEZZA (1972). Deposits referrable to the lithological facies A overly the basal unit by an erosional and disconformable contact.
The latter contains abundant glauconite grains; both the interstitial and granular components are strongly phosphatised.
The lithological facies F, mostly characterized by Porites colonies (BOSELLINI *et al.*, 1999), is found at the top of the Ciolo section; the contact between the two Miocene lithological facies (Fig. 3) is sharp though conformable.
Currently available biostratigraphic data (GUERICCHIO and ZEZZA, 1972; BOSSIO *et al.*, 1988a; 1988b; 1988d; 1991) would suggest that the Miocene sedimentary sequence started to deposit by late Burdigalian time in the Ciolo area. The presence of Orbulina suturalis Brönnimann detected by GUERICCHIO and ZEZZA (1972) in some clastic elements of the facies A (reported by these Authors as "rudite fosfatica"), is indicative of a Serravallian or younger age. The lithological facies F was assigned to the Tortonian-Messinian by GUERICCHIO and ZEZZA (1972) and to the early pre-evaporitic Messinian by BOSSIO *et al.* (1988a) and BOSELLINI *et al.* (1999).

4 Poggiardo Composite Section

This composite section has been reconstructed on the base of partial stratigraphic sections and well-data from the area of Poggiardo (Fig. 4). The basal unit, which is formed by limestones, dolostones and bioclastic limestones, is overlayed by the lithological facies A. The contact between the two units is erosional and disconformable and shows frequent filling of calcarenites from the lithological facies A into joints and hollows of the basal unit. The lowest Miocene deposits form a discontinuous sedimentary body covered by calcarenites and calcilutites belonging to the lithological facies B.
Upwards the lithological facies C also occurs. The boundary between unit B and C is abrupt, probably erosional and characterised by burrows filled by glauconitic calcarenites. The overlaying lithological facies E forms a lenticular body. In the surrounding of Poggiardo, the lithological facies F covers both the lithological

facies C and E by an erosional and disconformable contact. Sandy-conglomerates grading upwards to clayey deposits overlay the Miocene Serie. Following the stratigraphic notes of the Foglio 214 "Gallipoli"(AA VV, 1968) the basal unit can be dated to the Cretaceous. According to BOSSIO *et al.* (1988b) the lithological facies A and B are late Burdigalian-Langhian(?) in age while the lithological facies C can be dated to the Serravallian-early Tortonian, while both the lithological facies E and F are assigned to the early pre-evaporitic Messinian; the upper unit has an early Pliocene age. The lithological facies C of the Poggiardo composite section represents an important element for the correlation with the other sections (Fig. 4).

5 Cursi-Melpignano Section

This section has been measured in the quarries located along the Cursi-Melpignano way (Fig. 4). The maximum recontructed thickness is about 50 m, all referred to the Miocene. The lithological facies B forms the lowermost deposits underlaying the lithological facies C which contains abundant macrofossils. The latter is a well known regional marker level which corresponds to the "calcarenite glauconitico-fosfatica" of MELIDORO and ZEZZA (1968a). Below it MARTELLI (1931) recognised about 0,5 m of coquina deposit in the surrounding of Cursi. The uppermost deposits of this section belong to the lithological facies D (about 5 m thick) which contains frequent macrofossil-casts and, subordinately, shells. In a preliminary study, GIANNELLI *et al*. (1966) reported that both the lithological facies C and D can be dated to the Tortonian. As far as lithological facies B is concerned no biostratigraphic data are available thus, this interval is here reported as generic early-middle Miocene in age.

6 Cannole Section

The Cannole section has been measured along the country roads located near the railway station of Cannole (Fig. 4). Below the base of the Miocene Serie, partly dolomitic bioclastic limestones occur. According to LARGAIOLLI *et al.* (1969) this unit has a Cretaceous age. Lithological facies A, representing the beginning of the Miocene sedimentation, is followed by the lithological facies B without a clear sedimentary boundary. Upwards, the lithological facies F covers the previous deposits by an erosional and disconformable contact. Heteromorphous carbonate pebbles and macrofossils in the calcarenitic cement and, less frequently, in the clayey-calcilutitic cement (about 10 m thick), overlay the Miocene deposits by an erosional and disconformable contact. The lithological facies F and the uppermost unit of this section are referred to the early pre-evaporitic Messinian and to the early Pliocene, respectively (BOSSIO *et al.*, 1991). Uncertain is the age of both lithological facies A and B; according to BOSSIO *et al.*. (1991) the calcarenites and calcilutites cropping out to the south-east of Cannole (sample 621, 674 and 675 of these Authors) could be referred to as late Burdigalian, although the top level of the lithological facies B might also belong to a younger age. In any case it is proved that, in the Cannole area, the late Burdigalian-early Messinian is represented by few metres of succession. LARGAIOLLI *et al.* (1969) reported lignite and clay deposits below the base of the Calcareniti of Andrano (corresponding to the lithological facies F, see table 1).

7 Castro-Santa Cesarea Terme Section

In the Castro-Santa Cesarea Terme area a thin conglomeratic level (0,1-0,3 m thick), with abundant macrofossils and diffused phosphatisations is present (lithological facies A). This deposit contain large amount of glauconitic-grains. Its bottom contact is erosional and, generally, disconformable on Cretaceous and Paleogene units.

Somewhere the conglomerates fill joints and hollows of the lower intervals. The scarce microfossils allow to assign this level to the late Burdigalian-early Messinian (BOSSIO *et al.*, 1988c, d). The conglomeratic level, is covered by limestones and calcarenites with subordinate marls (lithological facies F); this interval is dated to the early pre-evaporitic Messinian (BOSSIO *et al.*, 1988d); the contact between the latter units is erosional, generally disconformable, somewhere conformable. In the Castro-Santa Cesarea Terme area, various Pliocene and Pleistocene units (LARGAIOLLI *et al.*, 1969; BOSSIO *et al.*, 1988c, d) show transgressive contacts at their top. A schematic stratigraphic section only partially representative for the abrupt variations of the geological features in this area is shown in Fig. 4.

8 Palmariggi-Minervino Composite Section

This section has been reconstructed by lithostratigraphically correlating two local stratigraphic sections measured east of Palmariggi and west of Minervino, respectively (Figs. 1 and 4). The pre-Miocene substratum is formed by limestones with rudistids, clays containing bauxite pisolites and well bedded fossil-rich calcirudites and calcarenites of Cretaceous-Oligocene age
(LARGAIOLLI *et al.*, 1969; BOSSIO *et al.*, 1991). The Miocene deposits begin with the lithological facies A and the lithological facies B (maximum observed thickness about 10 m). The boundary between these two lithological facies is gradual. On the contrary, the boundary between the lithological facies B and the overlaying lithological facies C is abrupt and marked by a well defined surface. The lithological facies D overlyies the above mentioned deposits; it displays frequent macrofossils, the greater part of which is represented by casts. Somewhere (especially in the surrounding of Palmariggi), calcarenites with abundant glauconitic-grains and frequent phosphatic-grains likely deriving from the lithological facies E are interbedded between the lithological facies D and the lithological facies F. The latter covers the older deposits by an erosional and, generally, disconformable contact.

According to BOSSIO *et al.* (1991) the lithological facies A is late Burdigalian in age, while the lithological facies B can be dated to the late Burdigalian-late Langhian. Both the lithological facies C and D are referred to the Tortonian (GIANNELLI *et al.*, 1966), while the lithological facies E and F are referred to the early pre-evaporitic Messinian (BOSSIO *et al.*, 1991). Sharp variations of thickness and contacts geometry are observed in the Palmariggi-Minervino area. As an example, both the lithological facies C and D cover the older deposits and the relative contacts can be both conformable and disconformable. In this area the Miocene Serie is followed by Pliocene deposits (LARGAIOLLI *et al.*, 1969).

9 South of Lecce Composite Section

A composite section has been reconstructed in the area south of Lecce on the base of both outcrop- and well-data (Figg. 3 and 4). The pre-Miocene substratum is formed by an alternation of limestones rich in Bivalves and Gastropods, and by clays and marls (drilled thickness about 50 m). Upwards, the lithological facies B displays a drilled thickness of 90-100 m. It is interesting to notice that, about 70 m above the base of the latter unit, a 1-m-thick interval of interbedded calcarenites and carbonaceous stringers are present.
The lithological facies C generally covers the lithological facies B by an abrupt contact. In correspondence of this contact, burrows in lithological facies B are filled by sediments of the lithological facies C. The Miocene Serie is topped by the lithological facies D which shows cross-bedding in the uppermost levels. The basal unit can be referred to the Oligocene (MARGIOTTA, 1992; BOSSIO *et al.*, 1999). According to BOSSIO *et al.* (1988e), the lithological facies B could be referred to late Burdigalian-late Langhian. However, recently (BOSSIO *et al.*, 1999) dated to Aquitanian deposists correlatable to the litholigical facies B. This suggests an older age for the lower part of the unit, but more analyses need to solve this problem.
Following BOSSIO *et al*. (1988e), the lithological facies C and D can be referred to the early Tortonian.
It is noteworthy that the lithological facies C occuring in the south of Lecce composite section corresponds to a key-bed named "Piromafo" (see e. g. MARTELLI,1931).

10 North of Lecce Composite Section

Also this composite section has been reconstructed on the base of both local stratigraphic sections and well-data. The maximum recontructed thickness is about 70 m, the greater part of which being referred to the Miocene (Fig. 4). The pre-Miocene is formed by limestones and dolostones with subordinate marly stringers (few metres in bore holes). The lithological facies B, showing a well defined bedding especially in its uppermost portion, covers the previous unit by an erosional and disconformable contact. Upwards, the lithological facies C and the lithological facies D follow in the succession.
The uppermost Miocene deposits belong to the lithological facies F and cover the lithological facies D by a, generally, erosional and disconformable contact.
Underlaying deposits are referred to the Cretaceous (ROSSI, 1969a). The lithological

facies B can be referred to late Burdigalian-late Langhian (BOSSIO *et al*, 1988e). The lithological facies C and D can be referred to the early Tortonian (BOSSIO *et al.*, 1988e). According to BOSSIO *et al.*, 1999, Lithological facies F is dated to the early Messinian. East of this section Miocene shows abrupt thickness change. TADOLINI *et al.* (1971) reconstructed, on the base of well-data, a southwest-northeast variations from about 30 to more than 60 m. Where the contact between the Cretaceous and the Miocene crops out, only few metres of the latter can be observed, (i.e. between Lecce and Surbo). Along the erosional and disconformable contact Miocene calcarenites fill, somewhere, joints and karst landforms of the Cretaceous. In other cases discontinuous lens of clays and bauxite-carbonaceous clayey-marls are interbedded between the Cretaceous and the Miocene deposits. Finally, where Miocene deposits show a thickness reduced to only 1-3 m, diffused phosphatized carbonate and phosphate grains can be observed.

11 West of Capo D'otranto Section

This section has been measured about 3 km to the west of Capo d'Otranto (Figg. 1, 3 and 4). The basal unit, formed by bioclastic limestones and calcarenites, is covered by the lithological facies A. The latter is characterised by abundant conglomerates, macrofossils and glauconite grains. The contact between the pre-miocene deposits and the lithological facies A is erosional and, generally, disconformable. Upwards the lithological facies C is present; it is mostly rich in macrofossils and its basal boundary is sharp although conformable.
The youngest Miocene deposits are represented by the lithological facies F that shows frequent Anellids- and Gastropods-rich levels. About 10 m of early Pliocene conglomerates and breccias (GIANNELLI *et al*., 1966) top the section.
The pre-Miocene substratum has been referred to the late Oligocene (LUPERTO, 1962; MARTINIS, 1967). The lithological facies A and C correspond to the "conglomerato ad Aturia", "calcareniti a Pycnodonta" of GIANNELLI *et al.* (1965) and to the "rudite fosfatica","calcarenite glauconitico-fosfatica" of MELIDORO and ZEZZA (1968a), respectively. Following GIANNELLI *et al.* (1965; 1966) the lithological facies A can be referred to the Serravallian, and the lithological facies C to the Tortonian. However the lithological facies A could represent a condensed sequence of deposits formed during the late Burdigalian-early Serravallian. The lithological facies F is referred to the Tortonian-early (pre-evaporitic) Messinian (GIANNELLI *et al.*, 1965; 1966).

Main characteristics of the Salento Peninsula Miocene Serie

Fig. 5 depicts a scheme of stratigraphic relations between the six Miocene lithological facies. To show a more detailed reconstruction, three published sections of contiguous areas have been also reported.

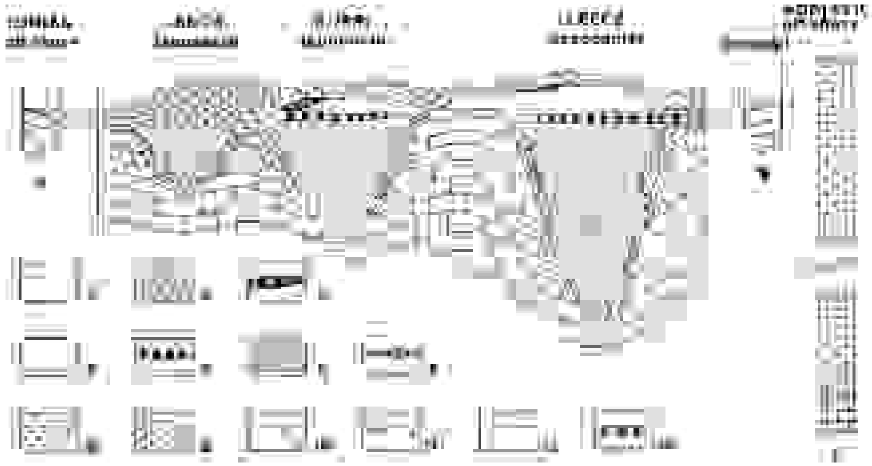

Fig. 5 - Salento Miocene lithological facies stratigraphic relations. 1, post-Miocene deposits; 2, litological facies F; 3, litological facies E; 4, litological facies D; 5, litological facies C; 6, litological facies B; 7, litological facies A; 8, marly limestones and marls (Miocene); 9, pre-Miocene deposits; 10, heterotopic boundary; 11, disconformity and angular unconformity; 12, paraconformity; 13, published stratigraphic sections (A: AGIP, 1977; B: CHERUBINI et al., 1987; C: DE DOMINICIS and MAZZOLDI, 1987).

The reconstructed Miocene Serie shows the following main features:

1) abrupt lateral changes of thickness from more than 125 m (e. g. to the south of Lecce section) to a few metres (e. g. Capo d'Otranto section). Miocene deposits about 500 m thick (Fig. 5), have been drilled in the Adriatic Sea, 50 Km towards the north of the Salento Peninsula. Lateral changes of thickness are mainly present along the SW-NE strike and, subordinately, along the NW-SE strike. The Miocene is mainly lacking in the southwestern sector of the Salento Peninsula (also including part of the Ionian off shore, see Fig. 5), as well as in part of the adjacent northern sector (e. g. Brindisi subsoil, see Fig. 5);

2) lithological changes are also present (Fig. 4). The thickest successions are the most omogeneous in terms of lithology: being mainly made of massive calcilutites and calcarenites. The thinest successions several different lithologies: conglomerates, fossil-rich calcarenites and calcirudites, calcarenites and calcirudites with a high amount of glauconite- and phosphate-grains. The stratigraphic features of the various section have been described by six lithological facies. The latter are correlatable to the units of the previous Authores (see Table 1); anyway, within facies lithological changes can be present (i. e. the lithological facies

D is thinner - but coarser in grain size - in the central Salento, if compared to the easternmost Salento);

3) except for the boundary between the lithological facies Aand B which is, generally, gradual, the contacts between the others lithological facies can be lumped into three groups characterised by: (a) no erosional plane surface interposed between conformable beds; (b) erosional plane surface interposed between conformable beds; (c) erosional plane surface interposed between disconformable beds. Between the lithological facies B and the lithological facies F, more or less wide hiatus are present (see e. g. BOSSIO *et al*., 1988a, 1988b; 1988c; 1988d; 1988e; 1991). As a consequence, the three types of contact surfaces could be respectively called: (a) paraconformity; (b) disconformity; (c) angular unconformity (Fig. 5);

4) on the base of the above reported considerations, it is possible to distinguish relatively complete, condensed, and reduced successions. The South of Lecce and Cursi-Melpignano sections are the two of the most complete succession of the whole Salento Peninsula (although Messinian deposits are not present in these areas). Nevertheless, according to well-data from the surroinding off shore, the succession of the "Rosaria Mare 1" (DE DOMINICIS and MAZZOLDI, 1987) seems to be the most complete, at least with regards to the Lower-Middle Miocene interval. The Poggiardo section represents an example of condensed and reduced succession. The other sections here considered represent various examples of reduced successions;

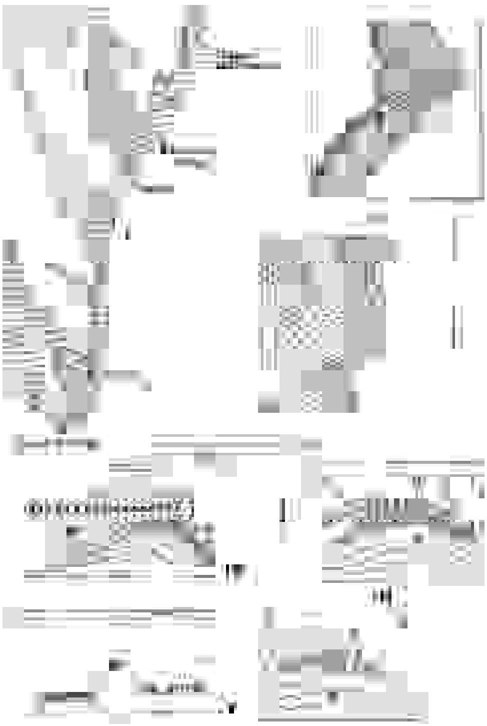

Fig. 6 - Main features of the Capo d'Otranto-S. Maria di Leuca morphologic-structural high.
I, general geological map (pre-Miocene units and Miocene lithological facies are undifferentiated); II, detailed geological maps; III, geological sections; IV, stratigraphic relations; V, probably tectonic settings. 1, undifferentiated post-Miocene units; G, lithological facies G D, lithological facies D, B, lithological facies B, A, lithological facies A, (Miocene); 2, late Oligocene(?) unit; 3, Paleocene-early Oligocene(?) unit; 4, Cretaceous unit.

5) at the base of the Miocene Serie, it is generally present the lithological facies A, whose maximum thickness is about 1 m. It is characterised by high amount of phosphatic grains and by fairly high amount of glauconitic grains. Along the coast between Capo Otranto and S. Maria di Leuca (Fig. 6) the lithological

facies Ashows discrete lithological changes (see also MERLA, 1945; GIANNELLI *et al.*, 1965; MELIDORO and ZEZZA, 1968a; DELL'ANNA and LAVIANO, 1988) but is nearly everywhere present. The lithological facies A is time transgressive and forms the most reduced and condensed succession deposited from the upper Burdigalian to the middle Serravallian;

6) the lithological facies C is present in several sections (e. g. Poggiardo, South Lecce, Capo d'Otranto). This unit which shows laterally continous lithological features and age being referred to the Tortonian (GIANNELLI *et al.,* 1965; 1966; BOSSIO *et al.*, 1988b; 1988e), can be considered a regional marker bed (Figg. 4 and 5).

The environmental and tectonic conditions during the Miocene

To understand the Miocene sedimentation of the Salento Peninsula it is necessary to consider all the available data on the environmental and tectonic conditions.

(1) Based on fossil content BOSSIO *et al.* (1988a; 1988b; 1988e) indicate paleoldepths ranging from the boundary of the internal neritic zone to the external neritic zone for deposits referrable to the lithological facies B, C and D (see table 1). Micropaleontological data from MOSNA (MELIDORO and ZEZZA, 1968a), suggest that the lithological facies A is characterised by a shallower paleodepositional depth and might have, therefore, deposited on a morphological high. According to LARGAIOLLI *et al.* (1969) and BOSSIO *et al.* (1988a; 1988b;) the micro and macro thanatocoenosis from lithofacies F suggest a depht of deposition falling in the internal neritic zone. Moreover, the lithological facies F forms a “classic” Messinian reef tract along the southen portion of the Capo d'Otranto-S. Maria di Leuca rock cliff (BOSELLINI *et al.,* 1999).

(2) Besides fossil evidences a petrographic characterisation of sedimentary grains can give further indications on the depositional environment of the different lithofacies. Carbonates, inthe form of both grains and interstitial material, are the main component (from 68 to 99 %) in all Miocene deposits. The carbonate grains are mainly made of planktonic foraminiferal fragments and, subordinately, other bioclasts. However, in some levels of the lithological facies F Bivalve and Anellid fragments are the most frequent. The interstitial material is formed by micrite (MELIDORO and ZEZZA 1968a; BOSSIO *et al.*, 1988 a; 1988b). At least in the stratigraphic levels referrable to lithological facies B and D, shells are usually broken and taxa of various inferred depth of life are mixed. Minimum values of carbonate contents are present in both the lithological facies A and C, due to the relatively high amount of phosphates and glauconites, respectively (DELL'ANNA, 1966; DELL'ANNA and LAVIANO, 1988). The former is characterised by phosphates occuring in the form of both granular and interstitial amorphous components, whereas the latter seems to contain only grains (MELIDORO and ZEZZA, 1968a). The phospate granular components of both are rounded to subrounded authigenic grains (grain-size from pebbles to silt) and shells, showing different degrees of phosphatisation; collophane pellets have also been found. The features of the phosphatic grains and shells is indicative of an intrabasinal, sin-depositional origin

although they might have been later affected by a mechanism of intrabasinal reworking. According to MELIDORO and ZEZZA (1968a), also the glauconitic grains of the lithological facies C have an intrabasinal origin. Moreover, phosphatic and glauconitic grains can fill shell material (MELIDORO and ZEZZA, 1968a; BOSSIO *et al.*, 1988 a; 1988b) also in the lithological facies B and D (see table 1 for stratigraphic comparisons). A moderate amount of extrabasinal grains (maximum 3 %) is also present. In the form of clay minerals, chert, glauconites and phosphates and, less frequently, quartz, feldspars, micas, pyroxenes, garnets, Fe-oxides and hydroxides (DELL'ANNA and LAVIANO, 1988). In the lithological facies A and C tourmaline, rutile and zircon have also been recognised (DELL'ANNA, 1966). The compositional and textural features of the extrabasinal grains is indicative of a very far silicatic source rocks (DELL'ANNA and LAVIANO, 1988). The petrographic features indicate conditions of an open marine (shallow water) platform environment. The gneiss fragment found by MELIDORO and ZEZZA (1968b) in deposits referrable to the lithological facies B, does not contradict this interpretation because we can suppose, for istance, a tree trunk to drift as the carriage vector.

(3) Some lateral lithological variations can be interpreted as a consequence of local tectonic arrangements. This is mainly suggested by the the presence of more abrupt changes in correspondence to some alignments parallel to regional structural axis. The following situations constitute two examples. The reduced and condesed successions of the Cannole and Poggiardo sections are located in a sector (fig. 1) where the Cretaceous and Paleogene units crop out or are covered by few metres of younger deposits. On the contrary, in both the northeastern and southwestern adjacent sectors, where more complete successions occur (e. g. Cursi-Melpignano and south of Lecce sections), the Cretaceous and Paleogene units lie 100-200 m below the topographic surface. The above three sectors have NW-SE strike, parallel to the regional structural axis, and they have been interpreted either as a horst and graben structure (AA.VV., 1968; CIARANFI *et al.*, 1988) or as anticlines and synclines (BOSSIO *et al.*, 1991). In any case, the presence of reduced and condensed successions on uplifted blocks and of more complete successions on structurally lowered blocks, suggests that the onset of the structure build-up started before the deposition of Miocene deposits. A second example of a possible tectonically controlled sedimentation can be observed along the Capo Otranto-Santa Maria di Leuca coast (fig. 1). Here, reduced and condensed Miocene successions (i. e. Ciolo, Castro-Santa Cesarea Terme, Capo d'Otranto sections) top Cretaceous and Paleogene units. The contact is located on a structurally uplifted block. Accordinlgy the uplift of this block is interpreted as having started before the sedimentation of the Miocene deposits (i. e. upper Oligocene-early Burdigalian).

(4) Considering the stratigraphic features of the Miocene Serie in neighbouring areas (Ionian Sea; Bradanic Foredeep; Adriatic Sea) it is possible to make a more general recostruction. To the west of Salento Peninsula the well "Lieta 1" (Ionian off shore, Fig. 5) is characterised by the lack of any Miocene deposits, the early Pliocene being in contact with the Crataceous (AGIP, 1977). In any case the Miocene Series seems to be present in other sectors of the Ionian Sea (ROSSI and BORSETTI, 1977; ROSSI *et al.*, 1983). In the subsoil of the Bradanic Foredeep, middle-late Miocene deposits are overlying Eocene-Oligocene units and covered by early Pliocene deposits (RICCHETTI, 1980). In the lower and middle portion of the

succession, the Miocene is formed by bioclastic calcarenites probably heterotopic with marly calcarenites (whose maximum thickness is 400 m), while in the upper portion they are contain gypsum, anhydrites and dolostones (whose maximum thickness is 200 m). Also to the north and east of the Salento Peninsula the Miocene Series displays sharp variations of thickness and lithologies as osberved by comparing the "Rosaria Mare 1" (DE DOMINICIS and MAZZOLDI, 1987), "Grazia 1", "Jolly 1" and "Gondola 1 bis" (COLANTONI *et al.*, 1990) wells drilled in the Adriatic Sea. In the "Rosaria Mare 1" drillhole (Adriatic off shore, Fig. 5) a Chattian-Tortonian succession about 500 m-thick has been drilled; it is formed by an alternation of marly limestones and marls covered by Pleistocenic deposits. Northwards, Miocene deposits are present in the "Grazia 1" well (950 m of marls) and in the "Jolly 1" core (30 m of alternations of marly limestones and marls) whereas they do not occur in the "Gondola 1 bis" drillhole where the Pliocene directly covers Crataceous deposits. Also in the subsoil of the Brindisi area (Fig. 5) the Miocene Series is lacking; here the Cretaceous is covered by Pleistocene deposits (CHERUBINI *et al.*, 1987). In conclusion in the eastern and western sector of the Miocene platform, carbonates are interbebbed with deposits referrable to a deeper environment. This confirms the conditions of an open carbonate platform.

Preliminary interpretation

If we consider the presence the “swelling” topography of the basin as the main cause in determining the observed lateral changes, the differences in lithology and thickness can be attributed to: previous subaerial erosion; tectonic fracturing; fracturing due to diapire raising. However, other factors (e. g. uneven intrabasinal transportation by bottom currents) could have contributed to determine the observed lateral changes. Furthermore, at least some of the observed vertical variations (e. g. the boundaries between the lithological facies D and F) might indicate changes of depositional paleodepth due to either eustatic changes and/or regional tectonics determined by the evolution of the Apennines and Dinarides foredeeps, and/or local tectonics. Subaerial exposure can be observed from, at least, the upper Chattian to the upper Burdigalian. The reconstructions of the top of the pre-Miocene substratum (TADOLINI *et al.*, 1971; MARGIOTTA and TADOLINI, 1988; DELLE ROSE and MARGIOTTA, 1992) suggest strong erosional subaerial phenomena. Continental conditions were also present during part of the early pre-evaporitic Messinian (depositional stop between the lithological facies D and the lithological facies E-F) at least in some areas of the Salento Peninsula.
As far as the tectonic fracturing is concerned various types of stress can be considered. These must take into account the different reconstructions proposed by several authors (MARTINIS, 1970; CIARANFI *et al.*, 1988; RICCHETTI *et al.*, 1988; BOSSIO *et al.*, 1988a; 1988b; 1991). The presence of diapire fracturing well fits with the evidence of tectonic activity until the quaternary as proposed by DE DOMINICIS and MAZZOLDI (1987) for some structures present in the Adriatic Sea (off Brindisi). On the other hand, a possible influence of eustatic variations has to be considered since some of the vertical changes pointed out in this paper can be correlated to sea level changes evidenced in the HAQ *et al.*’s (1987) chart; in particular, Serravallian

was a period of probably nearly lack of geological rekord (just in the Palmariggi-Minervino section, Serravallian deposits - referred in this paper to the lithological facies C - have been recognized). The pre-Miocene tectono-sedimentary evolution of the Salento Peninsula differes from that of the others Apulia Platform sectors (Murge, Gargano), when the whole Apulia Platform became the foreland of both the Apennines and Dinarides foredeeps. This is mainly suggested by stratigraphical features (e. g. the Paleocene-Oligocene units are lacking in the Murge). Moreover, paleomagnetic data indicate that, beginning by the Eocene-Oligocene time, the Salento Peninsula underwent a clockwise rotation of about 25° with respect to the European and African plates (TOZZI *et al*., 1988). During the Oligocene the tectonic activity mainly interested the southeastern Salento Peninsula (ROSSI, 1969b). This activity probably determined the build up of a structure uplifted along a NE-SW strike. In the late Paleogene-early Miocene the Salento region might have been affected by subaerial conditions. It is likely that the the development of the NW-SE structures started in this time interval. The Aquitanian has been only recently recognized in Lecce area (BOSSIO *et al.*, 1999); moreover an Aquitanian age cannot be excluded for (the top?) of the Galatone Formation (BOSSIO *et al.*, 1998). As a consequence the early Miocene of the Salento is nearly unknown. In any case, the transgressive upper Burdigalian deposited on a “undulating” topography.

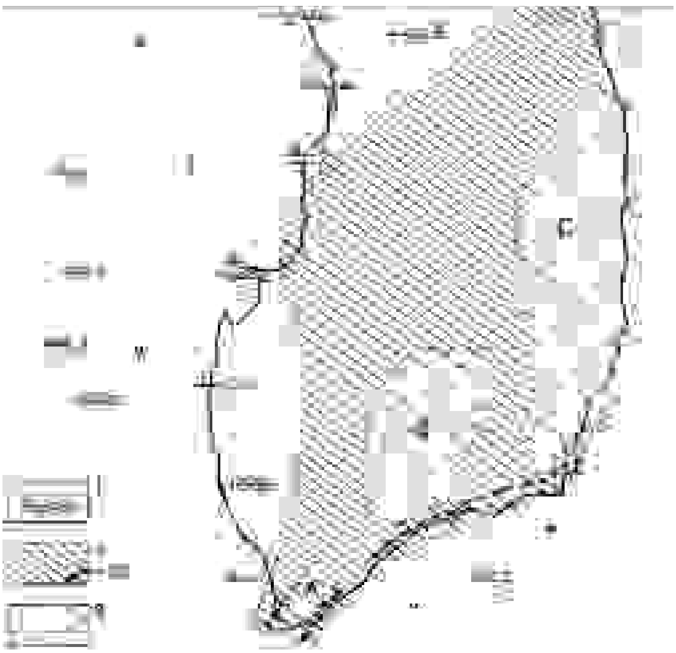

Fig. 7 - Environmental reconstruction of the Salento during Middle Miocene. 1, emerged lands; 2, platform environment (shallow water); 2b, very shallow water; 3, platform environment (deep water).

The Salento was an open carbonate platform occasionally supplied by rare fine terrigenous grains at least until Middle-Late Miocene. During the Langhian deposition occurred mainly in the deepest zones (i. e. Leuca, Cursi and Lecce, Fig. 7). Afterwards, until at least the early Messinian the southwestern sector of the Salento was likely emerged.
It is interesting to note that CESTARI and SIRNA (1987) suggested that a differentiations between the southwestern sector and the remainder of the Salento area occurred also during the Maastrichtian.
By the Serravallian, unfavourable depositional conditions related to a sea-level low occurred. As a consequence, the geological record for this time interval is quite fragmenteed or lacking. The serravallian regression led to a migration of shallow water taxa benthic organisms to the eastern and western sector of the Salento platform. During the early Tortonian sedimentation rate probably decreased as evidenced by the presence of glauconite; successively (middle Tortonian ?) the central sector could have been shallower than the northeastern sector. At the beginning of the Messinian there possibly were suitable conditions for the geologic record. After a brief time of emersion that probably interested the whole Salento, during the early pre-evaporitic Messinian, the sedimentation became more homogeneous in the various sectors and most likely characterised by shallower environmental conditions, behind a reefal margin (BOSELLINI, 1993).
During the Messianian evaporitic phase the whole Salento Peninsula was emerged. According to this reconstruction, three main sectors of the Salento Peninsula (southwestern, central and northeastern) can be distinguished. On the base of the stratigraphic features, the meaning of depocenters must be given to these sectors; they are called here, from southwest to northeast, Leuca, Cursi and Lecce depocenters (figg. 5 and 7). In the Leuca depocenter, lithological facies C and D are not recognised. The Cursi depocenter mainly differs from the Lecce depocenter in the characters of lithological facies B and D. In particular in the Cursi depocenter glauconite grains are more frequent (e. g. Poggiardo section) and deposits are coarser compared to the Lecce depocenter. This is particularly evident for the lithological facies D.

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