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marsh deposits (silt) alluvial/avalanche)

_____ synsedimentary fault/inferred or buried ----- main thrust/inferred or buried minor thrust/inferred or buried

_____ normal fault/inferred or buried

UNITS REFERABLE TO THE TIBER AND ANIENE RIVERS BASIN

subsintema dei Monti Simbruini (Simbruini Mts. subsynthem) (SFT-)
Glacial and periglacial deposits related to the Aniene River basin deposited during the last glacial phase. Disorganized till composed of highly heterometric carbonate and siliciclastic clasts (size ranging from clay to megablocks), referable to moraine systems (SFT_{1,1}), which can reach thicknesses up to 30-40 metres. Locally, matrix-free accumulations of erratic boulders of plurimetric dimensions are observed, linked to glacial transport (SFT_{1,2}). Locally
¹ backwards of the moraine deposits flat morphologies are observed, characterised by marsh deposits, related to sedimentation in small moraine-barrage basins (SFT_{1,es}). SFT- also includes ancient cemented breccias with angular carbonate clasts, occurring in scattered outcross along the mountain slopes, subsequently incised during the Holocene ensure processor.

subsintema di Pezze della Macchia (Pezze della Macchia subsynthem) (VGR₂) Polygenic breccias mainly composed of calcareous clasts outcropping along the Val Granara. Differently from VGR₃, clasts of PTY occur, possibly sourced from the Serra S. Antonio and Fonte della Moscosa outcrops. The breccias are organised in tabular to lenticular layers, with a thickness ranging between 25 centimetres and more than 1 meter. The size of clasts ranges from few millimeters to more than 1 metre; they are generally well sorted within the single layers and are sub-rounded to rounded. Clasts can be imbricated and associated with a sand-silt matrix. The deposits are cemented by carbonate cement and are affected by karstification. These deposits can be referred to an alluvial system comparable with the present one. The thickness exceeds 50 m.

Calcareous breccias with clasts coming from the dismantling of the pre-orogenic carbonate substrate of the left slopes of Val Granara, ranging in size from millimetres to decimetres, with scarce to abundant sandy-silty matrix. The clasts are sometimes imbricated, generally angular or sub-angular, often showing sharp edges. The deposit is faintly graded and is referable to alluvial fans characterised by debris-flow or grain-flow processes. VGR₁ form hanging terraces and somewhere show counter slope bedding. Maximum thickness > 100 m.

UNITS REFERABLE TO THE LIRI AND SACCO RIVERS BASIN Deposits ascribed to the Sacco and Liri basins deposited during the last glacial phase. Mixed deposits consisting of heterometric (also plurimetric boulders) angular carbonate clasts, with brown sandy-silty matrix, disorganised, mainly linked to the reworking of glacial deposits through debris-flow processes, alluvial transport, and avalanches (ISL₁). ISL also includes ancient cemented breccias with angular carbonate clasts, occurring into scattered outcrops along the mountain slopes and incised during the Holocene erosive phase (ISL_{1s3}). The maximum thickness reaches a few tens

Polygenic breccias and conglomerates, locally very well cemented, made up of heterometric clasts produced by the erosion of the local the Meso-Cenocoic stratigraphic succession. Clasts are sub-rounded to rounded, but locally are sharp-edged. The matrix is sandy and sandy-silty and has a characteristic yellowish color. The clastic bodies have tabular and lenticular geometries, with common erosive surfaces at the base, and local sedimentary structures. Maximum thickness a few tens of metres.

Heterometric breccias composed of angular carbonate clasts belonging to the Meso-Cenozoic local succession. The breccias are generally well cemented, organized in metric massive beds, with subordinate alaminated arenites. The arenitic matrix is scarce and made up of calcareous lithoclasts, bioclasts and subordinate silicidastic material. The breccias are produced by the dismantling of pre-orgenic fault escarpments, with depositional mechanisms ranging from rock-fall (massive breccias) to grain flow (breccias and laminated arenites). Minimum thickness 30 m. MESO-CENOZOIC CARBONATE SUCCESSION

Coarse bioclastic white calcarenites and subordinate bryozoan floatstones, often organized in massive beds. Bioclasts are mainly bryozoans, benthic foraminifiera (*Amphistegina* sp., *Elphidium* sp., *Heterostegina* sp., *Operculina* sp., *Cibicides* sp., *Neorotalia* sp., *Miogysina globulina)*, fragmented bivalves (pectinids and ostreids), echinoderms and red algae. CBZ directly rest on the Upper Cretaceous carbonate units, and, locally, few centimetres of polygenic conglomerates are preserved at the base of the unit, bearing clasts exotic to the local successions, associated with dm-thick ostreid buildups. The depositional environment is a carbonate ramp. Thickness cannot be determined but exceeds 50 m.

The lowermost 30-40 metres are characterized by vellowish micritic facies bearing scarce fossils, arranged into The lowermost 30-40 metres are characterized by yellowish micritic facies bearing scarce fossils, arranged into peritidal cycles (30-60 cm thick), and horizons with cryptoalgal laminations, fenestrae and paleokarst, dolonitized horizons are also common. Upwards, the unit is typically made up of calcarenites and calcirudites rich in fragments of bivalves, especially rudists, and gastropods. Locally rudist shells form bouquets and clairudites rich in fragments of bivalves, especially rudists, and gastropods. Locally rudist shells form bouquets and clusters showing in-life position. These lithotypes are associated with hazel colour calcilutite layers, with abundant benthic microfauna. Macrofossil content essentially consists of fragments or whole individuals of rudists (*Radiolites spp., Biradiolites spp., Gorjanovicia* spp., *Durania* spp., *Sauvagesia* spp., hippuritids), gastropods (nerineids and acteonellids), echinoids and hydrozoans; the very abundant micropaleontological assemblage is characterised by benthic foraminifera (*Moncharmontia apenninica*, *Accordiella* conica, *Reticulinella* kaeveri, *Pseudocyclammina* sphaeroidea, *Nummoloculina* cf. *irregularis*, *Rotalispira* scarsellai, Rotalispira maxima, Rotorbinella lepina, Spiroplectammina multicamerata, Aeolisaccus kotori, *Dirvelina* schlumbergeri scandonega sampitica. *Scandonea* mediterranea

Bioclastic limestones, sometimes dolomitic, interbedded with wackestones and peloidal packstones. Red levels and Bioclastic limestones, sometimes dolomitic, interbedded with wackestones and peloidal packstones. Red levels and oxidised breccias are frequent, marking subaerial exposure conditions; reddish or greenish clay horizons and polygenic conglomerates with black pebbles also occur. Locally, discontinuous pockets of bauxite occur. The top of the unit is characterised by mounds composed of caprinid rudists along with *Cisalveolina fraasi* horizons. Locally, at the top of the unit, ostreid (*Chondrodonta joannae*) floatstones occur. The passage to the overlying RDT is marked by a characteristic up to 2m-thick polygenic conglomerate with greenish marly matrix. The micropaleontological assemblage consists of *Sellialveolina viallii, Chrysalidina gradata, Nezzazata simplex, Nezzazata isabellae, Trocholina sp., Biconcava bentori, Sigmomassilina ottadunensis, Cisalveolina lehneri, Ovalveolina maccagnoe, Cuneolina sp., Merlingina cretacica, Cisalveolina fraasi, Pseudorhapydionina dubia, Rotorbinella mesogeensis;* among macrofossils, the rudists are abundant (caprinids, requieniids, radiolitids) along with ostreids (*Chondrodonta joannae*). The depositional environment is interpreted as an inner carbonate platform characterised by subtidal and supratidal conditions. The maximum thickness is about 200 m.

CALCARI CICLOTEMICI A REQUIENIE (cyclotemic limestone with requienids) (CIR) White to hazel wackestones and packstones with abundant benthic foraminifera, interbedded with subordinate floatstones rich in requieniid rudists shells. The lowermost portion of the unit is characterized by peritidal cycles, with frequent fenestrae and microbial facies, paleosols and oxidized patinas. The upper part of the unit is thinly bedded (5-15 cm) and characterised by dolomitised intervals. The micropaleontological assemblage is composed of *Dictyoconus algerianus, Cribellopsis arnaudae, Orbitolina (Mesorbitolina)* cf. *texana, Archaealveolina reicheli, Salpingoporella* sp., *Praechrysalidina infracretacea*; macrofossils are essentially rudists (requientids) and gastropods. The upper boundary with IBX is marked by a bauxitic horizon or by well-developed paleosols. The depositional environment can be referred to a carbonate platform controlled by frequent relative sea-level fluctuations. The thickness ranges between 200 and 250 m. CALCARI E MARNE A SALPINGOPORELLA DINARICA E CAROPHYTA (Salpingoporella dinarica

Palorbitolina lenticularis, carophytae and dasycladacean algae (Salpingoorella dinarica). The passage to the overlying CIR is located at the disappearance of marly-clayey horizons as well as at the appearance of coarse calcareous facies with abundant *Archeoalveolina* reicheli. The depositional environment is referable to a carbonate platform characterised by terrigenous inputs and affected by synsedimentary tectonics. The thickness ranges from 10 to 40 m.

White to hazel micritic limestones and calcarenites with abundant benthic foraminifera, algae and ostracods, interbedded with subordinate floatstones with abundant gastropods, rare oolitic horizons, and laminated microbial limestones with birdseyes and fenestrae. Metric to decametric greyish dolomitic intervals occur throughout the entire unit. The basal portion of the unit is made up of massive grey saccharoidal dolostones (CCG). The topmost portion of the unit is characterized by typical ostreid and rudist floatstones (*Chondrodonta glabra* and requienids). The passage to the unit dological and the strength of the strength unit is characterized by typical ostretid and rubit industories (*chorarobotha giabra* and requenting). The passage to the overlying CMS is marked by the sudden appearance of greenish marks and conglomerates. The paleontological content consists of gastropods, calcareous algae (*Heteroporella lemmensis, Salpingoporella annulata, Salpingoporella biokovensis, Salpingoporella polygonalis, Piriferella spinosa, Permocalculus sp., Clypeina sp.)*, benthic foraminifera (*Campanellula capuensis, Praechrysalidina infracretacea, Cuneolina* sp., miliolidae and textularidae), crustaceous coprolites (*Favreina salevensis*) and *Rivularia* sp. The depositional environment is referable to a carbonate platform characterised by frequent emersive phases. Thickness can range between 250 and 600 m.

CALLARI LOW CLADUCOKOPSIS E CLYPEINA (Cladocoropsis and Clypeina limestone) Whitish to grey limestones and dolostones, organised in thick beds, characterised by floatstone texture with abundant Cladocoropsis mirabilis and subordinate wackestones with Clypeina jurassica. In the lowermost portion of the unit laminated arenitic horizons with quartz granules occur. The fossil assemblage is composed of Cladocoropsis mirabilis, Clypeina jurassica, Apinella sp., Campbelliella striata, Salpingoporella annulata, Salpingoporella grudii, Farinacciella ramalhoi, Favreina salevensis, Conicokurnubia cf. orbitanminiformis, Kurnubia palastiniensis, Redmondoides lugeoni, Pfenderella arabica, Pseudocyclammina sp., Trocholina sp., valvulinidae and miliolidae; macrofossils are represented by scarce bivalves and gastropods. The boundary with the overlying CCG is marked by the disappearance of Campbelliella striata and by a thick stack of saccharoidal dolostones. The depositional environment is referable to an inner carbonate platform, dominated by tidal flat and lagoon facies. The maximum thickness is about 650 m.

UNITÀ CALCAREO-DOLOMITICA (calcareous-dolomitic unit) (UCD) Whitish to grey wackestones, oolitic packstones and intraclastic calcarenites, interbedded with grey dolostones. Locally, oncolithic horizons with pluricentimetric oncoids, and red/green emersive facies occur, associated with ferrigenous crusts. The unit is generally well-bedded with thick beds corresponding to peritidal cycles. Dolostones often show a brecciated feature with calcareous relics, including loose specimens of calcareous algae. In the topmost portion of the unit decametric dolostone intervals occur. Fossiliferous content consists of cyanobacteria aggregations and dasycladacean algae (*Cayeuxia* sp., "*Rivularia" piae*, Salpingoporella annulata, Selliporella donzellii, *O Cylindroporella arabica*, Salpingoporella sellii), benthic foraminifera (*Everticyclammina* sp., *Redmondoides lugeoni*, *Praekurnubia crusei*, Paravalvulina sp., Paleopfenderina salernitana, Paleopfenderina trochoidea, Protopeneroplis striata, Kilianina blanchetiformis, Kurnubia palastiniensis, Siphovalvulina beydouni, Siphovalvulina variabilis, miliolids), gastronods, brachinoods and trae biyalves. The upper boundary is marked by the disanpearance of dolostones and bu gastropods, brachiopods and rare bivalves. The upper boundary is marked by the disappearance of dolostones and by the first occurrence of *Cladocoropsis mirabilis* and *Clypeina jurassica*. The depositional environment is referable to an inner platform characterized by lagoons and tidal flats. The observed thickness ranges between 600 and 700 m.

Whitish-grey limestones and marly limestones, characterised by wackestone to floatstone-rudstone textures, with subordinate oolitic and bioclastic packstone, in beds 30-40 cm-thick. The main feature that characterises this unit is the presence of typical nodular green, red or violet spots, along with ferruginous crusts and nodules (paleosols). Fossiliferous content consists of rare benthic foraminifera (*Siphovalvulina* e *Trochammina*), *Cayeuxia* sp., *Gutnicella* sp., gastropods and ostracods. The passage to the overlying UCD is marked by the disappearance of paleosols and the appearance of typical whitish cyclothemic facies. The depositional environment is referable to a low-energy lagoon affected by frequent subporting upmorume.

SLOPE - PELAGIC BASIN SUCCESSION Oolitic packstone/grainstones organised in dm- to m-thick beds, with interbedded float/rudstones with echinoderm

the overlying CLT is marked by the appearance of paleosols and ferruginous crusts. The sedi referable to a slope prograding within a deeper pelagic basin. Thickness up to 80 m. TOARCIAN p.p. - AALENIAN p.p.

environment is a pelagic basin with input of neritic material sourced by shallow-water carbonate settings. Thickness is

SYMBOLS OF THE QUATERNARY CONTINENTAL DEPOSITS

CARBONATE PLATFORM SUCCESSION

Dicyclina schlumbergeri, Scandonea samnitica, Scandonea mediterranea, Murgeina apula, Keramosphaerina tergestina, Nezzaztinella picardi) and algae (Heteroporella lepina, Sgrossoella parthenopeia, Thaumatoporella parvovesiculifera). The upper boundary is represented by a sharp passage to CBZ, by means of an unconformity that truncates the unit at different stratigraphic levels. The deposition-al environment is an inner carbonate platform and tidal flat. The thickness is variable, and can reach 700 m. TURONIAN – CAMPANIAN p.p.

and carophyta limestone and maris (LNIS) Green and yellowish marls and clayey marls, with intercalations of marly limestones and hazel fine-grained limestones. Heterometric conglomerate horizons also occur, with clasts referable to the underlying units, and associated black pebbles, deposited through debris-flow processes and associated with slumpings. Locally, the marly lithotypes are laterally heteropic to calcareous lithotypes, which are often characterised by the presence of abundant calcareous algae (Salpingoporella dinarica) and conical agglutinated orbitolinid foraminifera. The micropaleontological content mainly consists of benthic foraminifera (Praechrysalidina infracertacea, Orbitolina (Mesorbitolina) parva, Paleobiting Lorbitugic prophytics and devided opena leas (Salpingoporella direction) are bene used to the outpeting