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lower Pleistocene - Holocene

CONTINENTAL DEPOSITS

UNITS UNRELATED TO DRAINAGE BASINS

Sandy and silty gravel, sand, silt and sandy silt, silty clay (*alluvial deposits*, b; *terraced alluvial deposits*, b_n). Silt, sandy silt and clayey silt (*lacustrine/palustrine deposits*, e; *palustrine deposits*, e_3), mainly fine-grained sediments of ephemeral swamp (*palustrine deposits: present and recent swamp*, e_5). Sediments with angular clasts in a wealthy silty or silty-sandy matrix (*slope deposits*, a). Clayey-marly diamicton with heterometric up to boulder-sized clasts (*landslide deposits*, a_1). Poorly-sorted calcareous or arenaceous sediments, with sandy-gravelly up to sandy-silty matrix (*scree deposits*, a_3). Massive, reddish-brown, gravelly sand or clayey silt, with scattered clasts and ceramics and bricks fragments (*colluvial deposits*, b_7). Poorly-sorted, clast- to matrix-supported, carbonate diamicton with angular clasts up to multimeter-sized boulders, and rich sandy-silty matrix. In the Capitignano area mainly fine-grained diamicton with scattered sandstone clasts (mud-flow deposits), interlayered with poorly rounded gravel in pale sandy-silty or clayey-silty matrix and silty/clayey-silty (overbank deposits) (*mixed origin deposits: debris flow and/or torrential and/or avalanche deposits*, i). Road and canalised-river embankments, tunnel and quarry wastes (*anthropic deposits*, h; *landfill*, h_1). ***HOLOCENE***

b_2 Colluvial deposits and eluvial covers consisting of generally massive, rarely clast supported, clayey-silty materials with scattered cherty/carbonate/arenaceous clasts in moderately sorted layers; the matrix usually consists of soil sediments or eluvial products. They refer to several sedimentation and weathering phases; somewhere they may still be evolving (*eluvial-colluvial covers*, b_2). ***PLEISTOCENE-HOLOCENE***

VELINO RIVER BASIN AND LEONESSA INTERMONTANE BASIN UBIQUITARY UNITS

SINTEMA DI RIETI
SRI Deposits made of angular-shaped clasts with rich silty or sandy-silty matrix (*slope deposits*, a). Silty-clayey diamicton with sparse heterometric pebble- to boulder-sized clasts (*landslide deposits*, a_1). Sediments with angular calcareous or arenaceous clasts in gravelly-sandy to sandy-silty matrix (*scree deposits*, a_3). Poorly sorted, clast-supported, chaotic deposits made up of angular clasts surrounded by a silty-sandy matrix laterally passing to moderately organized deposits made of subangular to subrounded clasts (*mixed origin deposits: debris flow and/or torrential and/or avalanche deposits*, i). Gravel, sandy gravel and silty gravel, with silty and clayey-silty layers, sedimented in floodplain and alluvial fan environments (*alluvial and fluvio-glacial deposits*, b). Pisolitic calcareous tufa (Santa Giusta) arranged in terraced-slope pools; alternations of compact, laminated, oolitic or phytoclastic calcareous tufa (Borgovelino) (*calcareous tufa*, f_1). Variable thickness, up to several tens of meters for landslide deposits. ***UPPER PLEISTOCENE***

In the area of the M. Terminillo, at the top of the unit the *subsintema di M. Terminillo* (SRI_1) has been recognized.

SUBSINTEMA DI MONTE TERMINILLO
SRI_1 Heterometric, occasionally with large boulders, generally loose, mainly calcareous sediments; sandy- or silty-gravelly matrix (*scree deposits*, a_3). Chaotic, poorly sorted, clast supported diamicton made of heterometric subangular clasts in a sandy-silty matrix and moderately sorted deposits consisting of sub-angular to sub-rounded clasts (*mixed origin deposits: debris flow and/or torrential and/or avalanche deposits*, i). Moderately sorted gravel, with sandy-silty matrix, of alluvial fan environment, and well sorted, rounded gravels (*alluvial and fluvio-glacial deposits*, b). Chaotic, somewhere matrix-supported deposits consisting of heterometric from pebble- to boulder-sized limestone clasts in silty-clayey matrix (*undifferentiated till*, c_1). Finely laminated silt and clay (*lacustrine deposits*, e_2).
UPPER PLEISTOCENE p.p.

VELINO RIVER BASIN UNITS

SUPERSINTEMA DELLA CONCA DI RIETI
CR Along the slopes of the Valle di Corno, heterometric, clast-supported, clinostratified breccias in silty-sandy matrix (*scree deposits*, a_3) (cf. *sintema di Colle Cantaro-Cave* of the 358 Pescorocchiano Sheet). At the eastern foothill of M. Valloni (Micigliano), immature or chaotic, clast-supported, lithified breccias, with angular heterometric up to pluridecametric boulder-sized clasts, referred to the Scaglia Rossa formation; in the Marmorale-Fiorenzano area (Antrodoco) chaotic breccias and clusters of calcareous decametric boulders traceable to the formations cropping out on Monte Giano; deposits are ascribable to rock avalanche phenomena (*deposits of ancient landslide*, a_1). The thickness varies between a few meters and 70-100 m for the ancient landslides. ***EARLY PLEISTOCENE p.p. - MIDDLE PLEISTOCENE***

In the Velino River Valley the unit is partly divided into three sub-units with embedding relations with respect to each other: *sintema di Cittaducale*, *sintema di Casale Giannantoni* and *unità di Antrodoco*.

UNITÀ DI ANTRODOCO
ATD Gravel with sub-rounded limestone clasts in silty sandy matrix and interlayered whitish silty layers of limestone clasts, sand and pedogenized silts (*alluvial deposits*, b). Poorly sorted, clast-supported layers of angular, weakly cemented, calcareous gravel in an ochraceous sandy-silty matrix (*scree deposits*, a_3). Outcropping alluvial deposits are some tens of meters thick. ***MIDDLE PLEISTOCENE p.p.***

SINTEMA DI CASALE GIANNANTONI
GNT Gravel and conglomerates with sub-angular to sub-rounded, centimeter- and sub-centimeter-sized, embricated pebbles; well-sorted, cross-stratified horizons and layers of rounded, decimetric cobbles in a sandy-silty matrix of alluvial fan (Valle di Corno) and alluvial plain (Bacugno) depositional environments; heteropic relationship with silty and clayey overbank deposits (*alluvial deposits*, b). Poorly sorted conglomerate, consisting of sub-angular clasts and scarce ochraceous sandy-silty matrix (Gole di Antrodoco); diamicton with heterometric, angular and sub-angular, limestone gravel and cobbles and up to multimeter-sized boulders (Valle Scura); pale silty matrix, lenses and layers of pedogenized, moderately sorted and poorly cemented silt (Mozza) (*deposits of mixed origin: debris flow and/or torrents*, i). Poorly sorted, clinostratified, from scarce to well cemented gravel and breccias, with angular and sub-angular mainly centimetric and pluricentimetric clasts (*scree deposits*, a_3). Locally the unit is strongly weathered. Thickness up to 100 m (Gole di Antrodoco). ***MIDDLE PLEISTOCENE p.p.***

SINTEMA DI CITTADUCALE
UCT At the rock sanctuary of Madonna delle Grotte (Antrodoco), clast-supported, poorly organized, roughly stratified, lithified breccias (*alluvial deposits*, b); outcropping thickness of about 20 m. In the Mozza area, alternations of orange, spongy, calcareous tufa, sandy silt and rounded gravel, covered with a fersiallitic soil of metric thickness (*calcareous tufa*, f_1). ***MIDDLE PLEISTOCENE p.p.***

GRUPPO DELLA PALEOVALLE DEL FIUME VELINO
GV This unit includes deposits of uncertain chronological attribution, referable to independent sedimentary events and to paleogeographical contexts different from the current one. They are not separately mapped.
Brecce di Persico (western slope of M. Giano): well cemented, coarse to very fine, sub-horizontal breccias, with pale sandy matrix; cross-beds suggest from W to E tractive currents (*alluvial deposits*, b). Maximum thickness 70-80 m.
Brecce di M. Giano: mainly coarse, clast-supported, heterometric breccias with metric blocks, referable to ancient scree deposits developed on the western slope of Monte Giano (*scree deposits*, a_3). Thickness up to several tens of meters.
Brecce di Santi Vatillo (Cimata di Castello): chaotic or poorly organized, massive to stratified calcareous breccias, with very thick beds and up to pluridecametric boulders, characterized by deeply weathered and karst erosion morphologies (cavities, towers, pinnacles). The unit is referable to ancient rock avalanches from the eastern slopes of the Reatini Mts., along the Olevano - Antrodoco - M.ti Sibillini front (*deposits of ancient landslide*, a_1). Thickness exceeds 150 m. ***EARLY PLEISTOCENE p. p.***

LEONESSA INTERMOUNTAIN BASIN UNITS

SINTEMA DI FONTE VETICA
FON Mainly gravelly and gravelly-sandy, slightly cemented deposits of alluvial fan facies, and sandy silt with interlayered fine gravel of alluvial plain facies (*alluvial deposits*, b); deposits include several volcanoclastic horizons. Poorly sorted, clinostratified, moderately to well cemented and locally strongly weathered breccias (*scree deposits*, a_3). ***MIDDLE PLEISTOCENE p.p.***

SINTEMA DI LEONESSA
LEO Clayey silt and siltstones, subordinately sandy silt and siltstones, from compacted to lithified, usually grey or brown (*lacustrine deposits*, e_2). Deeply weathered conglomerate, gravel and sandy gravel with rounded, sometimes angular, carbonate clasts (*alluvial deposits*, b); the unit includes very thick beds of sandy silt containing weathered re-sedimented volcanic products and thin layers of primary volcanoclastic sediments referable to several volcanic events; two of these have returned $^{40}Ar/^{39}Ar$ ages of 551±4 ka (Sala) and 535±1 ka (Vallimpuni). In the Colleverde area summit horizons consist of primary or moderately reworked, up to 5 m thick, grey, lithoid tuffs (*volcanoclastic deposits*, l). The outcropping thickness of the *sintema di Leonessa* locally exceeds 50 m. The top surface has a multi-meter-thick eluvial cover made of reddened silt and sandy-clay (*eluvial products, alterites*, b_6). ***LOWER PLEISTOCENE p.p. - MIDDLE PLEISTOCENE p.p.***

CONGLOMERATI DI CUMULATA
CCU Polygenic, poorly organized, calcareous conglomerate made of rounded and sub-rounded, centimeter- to decimeter-sized gravel, with pluridecimetric boulders, in a gravelly-sandy matrix (*alluvial deposits*, b). The maximum thickness of deposits is about 50 m. ***LOWER PLEISTOCENE p.p.***

TRONTO RIVER BASIN UBIQUITARY UNITS

SINTEMA DI MATELICA
MTI Gravel made of sandstone clasts and sands, with a silty matrix, laterally passing to fine, sandy-silty deposits, with layers of sub-rounded sandstone clasts and marshy peat, AMS age 27,548-26,783 years BC (Poggio Cancelli) (*alluvial and fluvioglacial deposits*, b). Debris with angular sandstone clasts in a sandy-silty matrix (*scree deposits*, a_3). ***UPPER PLEISTOCENE***

SINTEMA DI RETROSI-TORRITA
RTS Interlayered sand, silt and clay with laminated layers and sporadic lenses of rounded pebbles. The deposits, grey-blue in color, are characterized by deep weathering and rubefaction for thicknesses of 10-12 m (*lacustrine/palustrine deposits*, e). The outcropping thickness exceeds 25 m.
MIDDLE PLEISTOCENE p.p.

UBIQUITARY UNITS OF ATERNO AND VOMANO RIVER BASINS

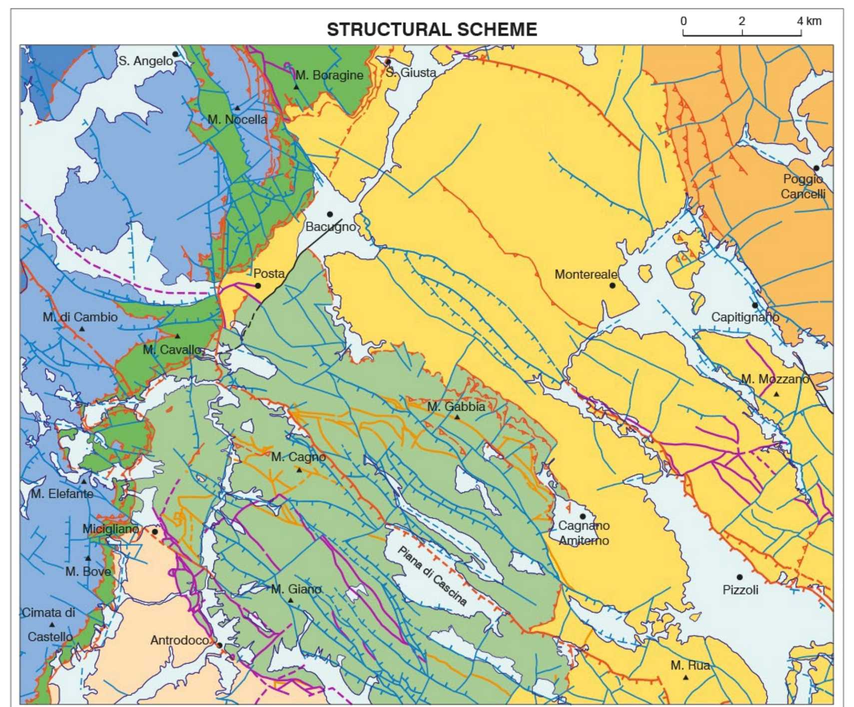
SINTEMA DI VALLE MAJELAMA
AVM Debris made of angular arenaceous or calcareous clasts, from clast- to matrix-supported, massive or crudely stratified, loose to cemented; silty-sandy matrix (*scree deposits*, a_3). Alternating layers of silt, silt with very fine angular gravel, and pedogenized silt of alluvial plain environment, AMS ages between 33 and 14 ka BC (San Giovanni di Montereale); mainly gravelly sediments, with metric boulders and silty-sandy matrix of alluvial fan environment (*alluvial deposits*, b). Heterometric chaotic, locally matrix-supported diamicton made of sandstone clasts in silty-clay matrix and related to debris flow phenomena, alternating with torrential deposits consisting of poorly sorted gravel with silty-sandy to silty-clayey matrix and interchannel silt and clayey-silt; AMS ages from 16.984-16.342 BC (Capitignano) to 25.249-24.167 BC (Sivignano) (*mixed origin deposits: debris flow and/or torrential and/or avalanche deposits*, i). Laminated, rich in organic matter silt and silty-clay with peaty layers, AMS age 41,278-40,075 years BC (Cagnano Amiterno) (*palustrine deposits*, e_3). Chaotic accumulation of sandstone boulders in a clayey-silty matrix (*landslide deposits*, a_1). ***UPPER PLEISTOCENE***

SUBSINTEMA DI SCENTELLA
AVM_9 Clast-supported, sandy gravel, with centimeter- to multi-centimeter-sized, rounded, predominantly calcareous clasts and silty-sandy matrix, alternating with sand, silt, gray and brown clay rich in organic matter, referable to alluvial plain environments. Locally channel-fill deposits made of up to decimeter-sized cobbles. Sandy gravel of alluvial fan environment, made of sub-angular to rounded, sub-centimetric to centimeter-sized pebbles and rare decimetric cobbles, alternating with laminated sand, silt and clay of alluvial plain environment, with abundant shell fragments (*alluvial deposits*, b). A paleosoil in the Scentella area (Pizzoli) provided an AMS age of 17,981-17,226 years BC. Massive silty clay and clayey-silt, locally with scattered gravel, frequently consisting of compacted brown-reddish soil sediments (*eluvial-colluvial covers*, b_2). ***UPPER PLEISTOCENE p.p.***

SUBSINTEMA DI CONELLA
AVM_8 Heterometric gravel and sandy gravel, with angular/sub-angular to sub-rounded carbonate clasts, alternations of fine- and coarse-grained mainly clast supported horizons, beige- to orange-colored sandy-silty matrix, from slightly dense to weakly cemented; sediments include alternations of sand and fine silty-sand with frequent reworked volcanic layers, silty horizons, gravel lenses and brown paleosoils. These deposits are referred to a distal (between Barete and Pizzoli) or proximal (between Pizzoli and Colle) alluvial fan environment. In the latter locations the deposits are affected by numerous faults. Dating of soils in the fault zone have provided AMS ages between about 40 and 29 ka BC (*alluvial deposits*, b; *mixed origin (torrential) deposits*, i). ***UPPER PLEISTOCENE p.p.***

SINTEMA DI CATIGNANO
ACT In the area of Poggio Cancelli, laminated and compacted sandy silt and silty sand, with clayey horizons and layers of embricated and clast supported sandy gravel; deposits are strongly weathered and reddened; centimetric rounded or discoid sandstone clasts are surrounded by a thick cortex (*alluvial deposits*, b); in the Pizzoli basin deposits of alluvial fan environment consisting of clast- to matrix-supported, mainly carbonate gravel, with sub-rounded to rounded clasts, interlayered with sand and silt, characterized by the abundance of primary or reworked and altered volcanic deposits (*alluvial deposits*, b). Colluvial deposits and eluvial covers consisting of i) on terrigenous siliciclastic bedrock, mainly silty-sandy materials, with deeply weathered sandstone clasts; ii) on carbonate bedrock, mainly fine-grained, massive, reddish-brown-coloured, silty-clayey materials, somewhere very consistent and deeply weathered (*eluvial-colluvial covers*, b_2). Deposits made of heterometric angular clasts affected by weathering and rubefaction (*scree deposits*, a_3). ***MIDDLE PLEISTOCENE p.p.***

STRUCTURAL SCHEME



- Quaternary deposits
- UMBRIA-MARCHE-SABINA DOMAIN
  - Palloroso-Tolentino Unit
  - Terminillo-Nocella Unit
  - Cavallo-Boragine Unit
- LATIUM-ABRUZZI DOMAIN
  - M. Nuria-M. S. Rocco Unit
  - M.ti Giano-Gabbia-Calvo Unit
- GRAN SASSO DOMAIN
  - M. Mozzano-Cittareale-La Torretta Unit
- LAGA DOMAIN
  - Acquasanta Unit
- main thrust, inferred or buried
- secondary thrust, inferred or buried
- fault and strike-slip fault, inferred or buried
- quaternary normal fault or with uncertain age, inferred or buried
- transpressive fault (reverse strike-slip), inferred or buried
- paleofault with prevalent Cretaceous-Paleogene movement, inferred or buried
- paleofault with prevalent miocene movement, inferred or buried
- paleofault with quaternary re-activation, inferred or buried

lower Pleistocene - middle Pleistocene

MONTEREALE INTERMOUNTAIN BASIN UNITS

UNITÀ DI PATERNO
ERN Mainly clast-supported gravel and diamicton with sandstone clasts in a reddened sandy-silty matrix, referable to torrential fan environments and debris flow phenomena; they are associated with ochraceous gravelly and sandy silt and silty clay sedimented in interchannel and distal fan environments (*mixed origin deposits: debris flow and/or torrential and/or avalanche deposits*, i). **PLEISTOCENE MEDIO p.p.**

SUPERSINTEMA DI AIELLI-PESCINA

CONGLOMERATI DI CASTELLO DI MONTEREALE
CCM Diamicton made of coarse calcareous clasts in a silty-sandy matrix passing upwards to moderately to well-sorted, cross-stratified calcareous gravel and conglomerates arranged in moderately- to well-cemented multidecimetric layers and metric banks, referable to a torrential fan environment (*mixed origin deposits: debris flow and/or torrential deposits*, i). Reverse magnetic polarity. They can be correlated to deposits drilled in the southern part of the Montereale basin, passing upwards to overbank silt with normal magnetic polarity. Maximum thickness 50-60 m.
CALABRIAN p.p. - MIDDLE PLEISTOCENE p.p.

CASCINA INTERMOUNTAIN BASIN UNITS

SUPERSINTEMA DI AIELLI-PESCINA

SINTEMA DI CASCINA
NSC Sub- and centimetric, sub-angular to sub-rounded calcareous gravel, with gravelly-sandy matrix, of alluvial fan facies (*alluvial deposits*, b); silty clay, and clayey silt with ochraceous sandy layers containing altered volcanic minerals and primary volcanic horizons of tephriphonolytic composition (*lacustrine/palustrine deposits*, e). Dating of a volcanic deposit at a depth of 24,30 m from the ground floor has returned an $^{40}Ar/^{39}Ar$ age of 604,9±3,4 ka. Massive and compacted ochraceous silty clays (*eluvial products, alterites*, b_6). Erosive, somewhere in tectonic contact with the limestone bedrock. Erosional, locally depositional upper boundary. ***MIDDLE PLEISTOCENE p.p.***

CONGLOMERATI DEL CASTELLO DI CASCINA
NSA Well-cementated, moderately sorted conglomerate with mainly fine-grained angular clasts and rare decimetric sub-rounded clasts, coarse-grained horizons, pinkish matrix; clast supported heterometric limestone breccia, in metric banks, chaotic to poorly sorted, with gravelly-sandy matrix or open work, metric blocks, of alluvial fan facies (*alluvial deposits*, b). Erosional upper boundary, erosional on carbonate bedrock lower boundary. Thickness greater than 20 m. The deposit has reverse magnetic polarity and is ascribable to the Matuyama chron.
GELASIAN? p.p. - CALABRIAN p.p.

PIZZOLI INTERMOUNTAIN BASIN UNITS

SINTEMA DI CERMONE
RMO Heterometric, generally clast supported gravels, made of mainly sub-centimetric to centimetric up to decimetric, sub-rounded to rounded clasts, in silty-sandy matrix, alternating with sand and silt (*alluvial deposits*, b). The succession is characterized by both primary and reworked volcanic horizons. Tephra dating has provided an indirect age of 457 ka (Cermone) and an $^{40}Ar/^{39}Ar$ age of 316.9±3.6 ka (Colle). Poorly cropping out yellowish silt and sandy silt (*alluvial deposits*, b), covered by a discontinuous *volcanoclastic deposits* (l) have been doubtfully attributed to the *sintema di Cermone*; dating of a tephra west of Madonna delle Fornaci provided an $^{40}Ar/^{39}Ar$ age of 347.7±3.8 ka. ***MIDDLE PLEISTOCENE p.p.***

SUPERSINTEMA DI AIELLI-PESCINA
AP Well cemented breccia cropping out between Marana and S. Pelino, consisting of calcareous diamicton in sandy-silty matrix (*mixed origin deposits: debris flow and/or torrential deposits*, i) and well cemented sandy gravel with mainly sub-angular clasts, silty horizons and lenses of well-rounded boulders, in sandy-silty matrix, (*alluvial deposits*, b; *scree deposits*, a_3) and strongly weathered sandy silt with gravel, sometimes preserved at the top of the breccia (*eluvial-colluvial covers*, b_2). Erosional upper surface, at places with a rubefacted paleosoil. Erosional lower surface cropping out on the substrate along the valley slopes. ***GELASIAN? - MIDDLE PLEISTOCENE p.p.***

The supersynthem includes the *Teora unit* (TEO), and the *Cona della Croce* (CND) and the *Barete* (BAE) *synthemes*.

SINTEMA DI BARETE
BAE Whitish silt and clayey silt, rich in volcanic minerals, referable to alluvial environments and partly to marshy environments inside a river system (*alluvial deposits*, b); heterometric gravel, with mainly subcentimetric to centimetric clasts, of alluvial fan environment (*alluvial deposits*, b). Well cemented breccias consisting of calcareous diamicton in sandy-silty matrix (*mixed origin deposits: debris flow and/or torrential deposits*, i) and gravelly-sandy deposits with mostly sub-angular clasts (*alluvial deposits*, b) cropping out along the Aterno Valley upstream the Pizzoli Basin. The unit includes primary volcanic horizons. Yellowish to reddish sand and clayey silt, resulting from the weathering of deposits with significant volcanoclastic component (*eluvial-colluvial covers*, b_2). Erosional basal surface, partly erosional summit surface or corresponding to a decarbonated, strongly evolved soil. ***MIDDLE PLEISTOCENE p.p.***

SINTEMA DI CONA DELLA CROCE
CND Polygenic, mainly heterometric, chaotic to well organized, medium- and coarse-grained, clast- to matrix-supported, sub-angular to sub-rounded and rounded gravel and sandy gravel; hazelnut- to pinkish-colored matrix; deposits are dense to well cemented. Alternations of fine-grained conglomerates, yellow arenites, silty sands, generally characterized by the presence of abundant pisolites of iron and manganese, massive to pseudo-stratified clayey silt containing shells of planorbid (*alluvial deposits*, b). Chaotic and heterometric breccias consisting of angular/sub-angular clasts, from pluricentimeter- to decameter-sized, in usually pinkish-coloured sandy-silty matrix, moderately to strongly cemented (*scree deposits*, a_3). Rubefacted soils and soil sediments (*eluvial-colluvial covers*, b_2). ***LOWER PLEISTOCENE p.p. (Calabrian)***

UNITÀ DI TEORA
TEO Extremely light, from massive to subtly laminated, white- to pale-yellow-coloured and almost exclusively siliceous siltstones; in the subsoil these deposits are interlayered with angular and sub-angular gravel of alluvial fan environment and paleosoils (*lacustrine deposits*, e_2). The lower boundary does not crop out; along the basin margins the unit lies on carbonate bedrock. Erosional upper boundary. ***GELASIAN?***

upper Miocene p.p.

OLIGO-MIOCENE SUCCESSION

FORMAZIONE DELLA LAGA (LAG)
For this formation only the "membro del Lago di Campotosto" (LAG_4) is outcropping, it is subdivided into four lithofacies alternated each other with the LAG_{4c} especially in the lower part.

membro del Lago di Campotosto (LAG_4)

LAG_{4e} **associazione pelitico - arenacea** (LAG_{4e}): greyish arenaceous-pelitic horizons are predominant, with thinned and tabular beds and sandstone/pelite ratio<1. Thinned-to-medium-arenaceous-pelitic beds intercalations occurred within the successions. Facies D1 and D2 are dominant, subordinated facies C.

LAG_{4b} **associazione arenaceo - pelitica II** (LAG_{4b}): alternations of arenaceous-pelitic and pelitic-arenaceous horizons, thin-to-medium beds, thick beds are subordinated. Sandstone/pelite ratio ranging between 1 and 3. Complete Bouma's sequences are common. Current erosion scours are frequent. The pelitic-arenaceous and arenaceous-pelitic beds showed facies C, D1 and D2, while the arenaceous beds only B1 and C1 facies.

LAG_{4d} **associazione arenaceo - pelitica I** (LAG_{4d}): alternations of massive arenaceous and arenaceous-pelitic horizons, with thin to thick beds. Sandstone/pelite ratio ranging between 3 and 10. Current erosion scours, groove casts and impact scours are common. Ta-e Bouma'sequences and the upper laminated one are present. Dominant facies are C1, C2; B1, B2 always present.

LAG_{4c} **associazione arenacea** (LAG_{4c}): yellowish, quartz-felspar-rich sandstones, with micaceous and femic minerals, medium-to-coarse grain size. Sandstone/pelite ratio more than 1 or undefined. Medium-to-very thick and amalgamated beds are present. At the top of the beds thinned-laminated cm-thick clayey horizons occur. Plane parallel lamination is present, sometimes evolving upwards into wavy and/or convolute lamination. Facies B1 and B2 are dominant, A1 and A2 recurrent, and C1 and C2 intercalations are less frequent.
Foredeep environment.
Max thickness in the outcrop is 1200 m. ***LOWER MESSINIAN p.p.***

UNITÀ ARENACEO-PELITICA (UAP) *(cfr. Upper Miocene latium-abruzzi torbiditic complex of sheet 358 Pescorocchiano)*

Only the arenaceous lithofacies crops out

UAP_a ol **associazione arenacea** (UAP_a): quartz-feldspar turbiditic sandstones from yellowish to reddish in color, with thick or massive beds, usually homogeneous or locally with planar lamination and convolutes. Sandstone/pelite ratio more than 1. Subordinately (area near Micigliano), at the bottom arenaceous-pelitic intercalations occur displaying complete Bouma' sequence. Locally, in the basal part of the unit, clasts and olistoliths (max hundreds of m³: ol) of Miocene calcarenites and marls belonging to the Mt. Nuria sedimentary succession (CBZ_2 and UAM formations) occur.
Confined foredeep environment. Max thickness in outcrop 400-500 m. ***LOWER MESSINIAN p.p.***

Oligocene p.p. - upper Miocene p.p.

UNITÀ ARGILLOSO-MARNOSA (UAM)
The unit is divided into three members, the lower one occurred only in the extreme SO sector of the sheet (above the CBZ_2), only the third is always mapped. Even if all the three members are present, but the thickness is too small to be mapped, the formation has been mapped as generic UAM.

UAM_3 **membro delle argille ad *Orbulina*** (UAM_3): clayey marls and grey-brown to greenish clays rich in planktonic foraminifera (*Orbulina* sp.). At the bottom and the top cm-laminated-calciturbiditic horizons occur. *Globigerinoides extremus* and *Globorotalia conomiozea p.p* biozone. Hemipelagic environment. Thickness ranges from 10 to 40 m. ***TORTONIAN p.p. - LOWER MESSINIAN p.p.***

UAM UAM_2 **membro delle marne a *Cylindrites*** (UAM_2): alternations of marls and grey calcareous marls, thin-to-medium beds, highly bioturbated. Orbulinids and sponge spicules (in the basal part) are present. Medium-to-upper part of the *Neogloboquadrina acostaensis* biozone. Hemipelagic environment. Thickness ranges from few to several tens of meters. ***TORTONIAN p.p.***

UAM_1 **membro delle marne calcaree** (UAM_1): coarse glauconitic calcarenites, subordinately bioclastic, with clay content increasing towards the top, dark grey to ocher (for alteration) in color, massive or with thick beds at the base (with *losangae*) and more thin-bedded or nodular upwards. From *Globigerinoides obliquus* biozone to part of the *Neogloboquadrina acostaensis* biozone. Distal-outer carbonate ramp environment. Thickness ranges from few to 30 meters. ***SERRAVALLIAN p.p. - TORTONIAN p.p.***
Age of the entire formation: ***SERRAVALLIAN p.p. - LOWER MESSINIAN p.p.***

MARNE CON CERROGNA (CRR)
CRR Grey to whitish marly limestones and calcareous marls (wackestones) and subordinated marls/clayey marls, with planktonic foraminifera. Tabular-dm-to-m-thick beds. Bioclastic turbiditic rudstone-grainstone intercalations with massive and thick beds, more frequent in the medium part. Spicules are rare, above all in the basal part. The clayey/marly fraction increases upward (locally heteropic with UAM_2). From the *Praeorbulina* sp. biozone to part of the *Neogloboquadrina acostaensis* biozone. Distal-outer ramp environment. Thickness up to 250 m. ***UPPER BURDIGALIAN p.p. - TORTONIAN p.p.***

UNITÀ SPONGOLITICA (SPT)
SPT SPT_b SPT_a Laminated packstones to grainstones, Fe-rich, sponges spicules, glauconite and phosphates decreasing upwards. Marls and calcareous marl intercalations more frequent upward and towards the distal part of the carbonate ramp (N-NE sectors). Locally a lag-deposit, with fish tooth remains and thin levels of dark cherts, is recognizable (NE sector of Mt. Lato-Basanello) (**litofacies selcifera** SPT_b). Beds are generally amalgamated and massive, with *losangae* in the basal part and fining upward. The basal part (Chattian *p.p.*) is often characterized by a "**litofacies a micriti avana e macroforaminiferi**" (SPT_a), characterized by well-bedded and few tens of meter thick wackestones to packstones, whitish to light-brown coloured with Fe-oxides, glauconite, planktonic foraminifera and sponge spicules, and rudstones to grainstones with larger foraminifera mainly reworked and resedimented together with glauconite and phosphates. Dark chert is present. At the top of the unit a 1-to-4-m-thicked fine packstones with planktonic foraminifera, thin bedded and laminated horizon is present with dark chert levels. From the *Miogypsinoides* biozone (SBZ 23) to a large part of the *Miogypsina globulina* biozone (SBZ 25 *p.p.*). Middle to distal-outer ramp environment. Max thickness 250 m.
CHATTIAN p.p. - UPPER BURDIGALIAN p.p.

lower Jurassic p.p. - upper Oligocene p.p.

MONTI REATINI SUCCESSION

SCAGLIA CINEREA DETRITICA (CDZ)
CDZ In the basal part mainly rudstones, subordinated grainstones and packstones with larger foraminifera; beds are massive and generally amalgamated; marls, marly limestones and greyish-greenish wackestones/mudstones with planktonic, often a tight cleavage is present. Dark chert occurs. At the base, a debris-flow and breccia-bearing deposit (clasts of cretaceous carbonate platform) is present. In the upper part are frequent greyish-greenish marls with bioclastic larger foraminifera-rich intercalations. From the SBZ13 p.p. to SBZ22B biozones. Middle to outer ramp. Variable thickness, ca. 150 m.
LUTETIAN p.p. - CHATTIAN p.p.

SCAGLIA VARIEGATA (VAS)
VAS Mudstones and marls (increasing upward), from pink to reddish/greenish, with planktonic foraminifera and thin-to-medium beds. Larger benthic foraminifera rich-calcarenites are subordinated; purple to black/brown chert occurs. From *Globigerapsis kugleri* to *Turborotalia cunialensis* biozones. Distal slope/basin environment. Max thickness 30 m.
LUTETIAN p.p. - PRIABONIAN p.p.

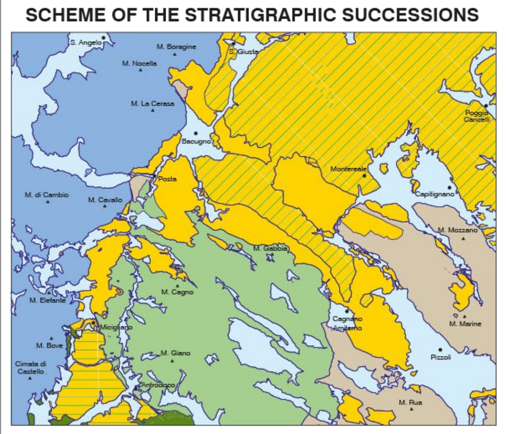
SCAGLIA DETRITICA (SCZ)
Only the cenozoic member crops out.
SCZ_2 **membro calcarenitico-calciruditico** (SCZ_2): bioclastic grainstones, rudstones and floatstones with larger foraminifera, mud clasts, planktonic foraminifera. Bioclastic laminated wackestones with planktonic foraminifera are subordinated. Beds are often amalgamated and with erosional-type base. In the basal part reworked clasts and bioclasts (Cretaceous in age) are present as well as chaotic accumulations, slumping phenomena, debris-flow and /or submarine slides related deposits and crudely bedded horizons made of cretaceous pelagic succession.
From SBZ2/3 to SBZ13 biozones. Distal slope/proximal basin. Total thickness from 75-to-250 m. ***UPPER SELANDIAN-LUTETIAN p.p.***

SCAGLIA ROSSA (SAA)
Two different members, arranged in stratigraphic order, and two lithofacies are recognized within the formation.
SAA_6 SAA_{6a} **membro calcilutitico-calcarenitico di S. Giusta** (SAA_6): well-bedded mudstones and marly limestones from dark red to pink or greenish to whitish (in the upper part) with reddish to orange cherts. Abundant planktonic foraminifera. In the upper part, several bioclastic larger foraminifera-rich intercalations are present. Few meters at the base, some "*mortadella*"-like breccias are present together with a plurimetric horizon with debris-flow and slumping phenomena with cretaceous *Scaglia's* clasts, olistoliths and clasts coming from the cretaceous carbonate platform (detritic breccia and slumping lithofacies, $SAA6_a$). From *Parasubbotina pseudobulloides* to *Hantkenina* biozones. Proximal slope/proximal basin. Max thickness 150-200 m. ***DANIAN - LUTETIAN p.p.***

SAA_{4a} SAA_4 **membro calcilutitico di Bacugno** (SAA_4): pink-to- red well bedded mudstones with abundant planktonic foraminifera with nodules, lists and lenses of red-to-orange cherts, pink in the basal part and rarely ocher-to-grey in color. The first meters of the member are characterized by white and bleached limestones. Lenses and/or horizons of resedimented calcarenites are present coming dominant along the eastern side of Mt. Bove and Cimata di Castello (litofacies calcarenitico micritica, SAA_{4a}). From *Helvetoglobotruncana helvetica* to *Contusotruncana contusa/Racemiguembelina frutticosa* biozones. Distal slope/proximal basin environment. Total thickness 150-200 m.
LOWER TURONIAN p.p. - MAASTRICHTIAN p.p.
The age of the entire formation is: ***LOWER TURONIAN p.p. - LUTETIAN p.p.***

CALCARI CRISTALLINI (CTN) (*cfr. formazione di Orfento -OFE- nel foglio 349 Gran Sasso*)
CTN Bioclastic rudstones, grainstones and packstones, with saccharoidal texture, with rudist fragments, echinoderms, benthic foraminifera and lithoclasts belonging to the cretaceous carbonate platform and to Scaglia Rossa formation. In the upper part (when crops out) there are fine-grained bioclastic wackestones and mudstones (with planktonic) intercalations increasing upwards. White nodules of cherts are rarely present. Lower and medium parts of *Globotruncana*, *Globotruncanita* and *Orbitoides* biozones. Outer ramp environment. Max thickness 35-40 m. ***CAMPANIAN p.p. - MAASTRICHTIAN p.p.***

SCHEME OF THE STRATIGRAPHIC SUCCESSIONS



- Quaternary deposits
- Oligo-Miocene common succession
  - Laga Formation
  - arenaceous-pelitic unit
- Monti Reatini succession
- Monte Nuria succession
- Monte Giano-Monte Gabbia succession
- Monti Rua-Marine-Mozzano succession

lower Jurassic p.p. - upper Oligocene p.p.

SCAGLIA BIANCA (SBI)
SBI SBI_a White and well-bedded mudstones with abundant planktonic foraminifera, light-brown to black (rarely orange) chert occurring in nodules, lenses and well-bedded layers. Bioclastic orbitolinids-rich intercalations are present but subordinated. Sometimes, the lower part of the formation is characterized by prevalent calcarenites, calcirudites, bioclastic floatstones and pebbly-mudstones made of rudist fragments and orbitolinids, white cherty nodules (litofacies calcarenitica, SBI_a). From the *Rotalipora appenninica* to *Whiteinella archaeocretacica* biozone (SBI); from the *Rotalipora* and *Orbitolina* biozone (*litofacies* SBI_a).
Distal slope/proximal basin. Thickness ranging from 60 to 90 m. ***UPPER ALBIAN p.p. - LOWER TURONIAN p.p.***

CALCARENITI E CALCIRUDITI A FUCOIDI (CCF)
CCF_b Only the upper part of the unit crops out. Fine-to-medium- grain sized bioclastic calcirudites and calcarenites with orbitolinids and rudists, with amalgamated m-thick-beds. Subordinated are wackestones, mudstones and marly limestones and marls, grey or greenish in colour, with planktonic foraminifera and black to purple chert. From part of the *Hedbergella* and *Orbitolina* and to the *Rotalipora* and *Orbitolina* biozones. Max thickness in outcrop is a few tens of meters. ***ALBIAN p.p. (age for the outcropping part)***

MARNE A FUCOIDI (FUC)
FUC Marly limestones and marls (wackestones and mudstones), often bioturbated, grey to greenish, with planktonic foraminifera and radiolarians, cm-thick-clayey interbeds with Mn and Fe mineralizations occur.
Red to greenish chert is present, sometimes occurring as purple nodules and black at the boundary with the underlying MAI. Many levels, especially located in the upper part of the unit, of fine-grained calcarenites and bioclastic calcirudites rich in orbitolinids and rudists, are present. Locally (Albaneto), there are black-shales horizons referring to the *Livello Selli*. From the *Leupoldina cabri* to the *Rotalipora ticinensis* p.p biozones. Basin to distal slope environment with occasional euxinic episodes and detrital feeding from the elevated zone of the carbonate platform. Thickness from 30 to 60 m.
LOWER APTIAN p.p. - UPPER ALBIAN p.p.

MAIOLICA (MAI)
MAI White to grey well-bedded radiolarians rich-mudstones and fine laminated calcarenites, with chert in nodules and lists from grey to black (at the top). Beds show thickness ranging between 20 cm and 1 m. From the *Crassicollaria* to *Globigerinelloides blowi* biozones. Basin environment. Total thickness ranges from 270 to 350 m.
UPPER TITONIAN p.p. - LOWER APTIAN p.p.

MAIOLICA DETRITICA (MAD)
MAD Calcarenites and resedimented calcirudites, often recrystallized with interbedded biodetritic wackestones and packstones with radiolarians increasing upwards. Beds are thin-to-medium in thickness, dark chert occurs. From the *Crassicollaria, Calpionella, Lithocodium aggregatum* and *Tubiphytes morronensis* to the *Colomisphaera, Radiolaria* and *Lithocodium aggregatum* biozones. Distal slope/shallow proximal basin. Max thickness in outcrop 120 m.
UPPER TITONIAN p.p. - NEOCOMIAN

CALCARI DIASPRIGNI (CDU)
Two different members, arranged in stratigraphic order, are recognizable:
CDU_2 **membro dei calcari a Saccocoma ed aptici** (CDU_2): mainly limestones and cherty marly limestones with thin to medium beds, partially dolomitized; crinoidal rudstones and intraclastic breccias are present. From the Radiolarians and *Saccocoma* to *Colomisphaera* e *Saccocoma* biozones. Basinal environment. Max thickness 30-40 m.
KIMMERIDGIAN p.p. - UPPER TITONIAN p.p.

CDU_1 **membro selcifero** (CDU_1): siliceous radiolarians limestones from green to dark grey, even red-purple in colour, with tabular and pinch and swell beds, up to cm-thick. Sometimes thin greenish clayey intervals are present. Bioclastic fine-grained calcarenites and calcisiltites (light-brown to grey) intercalations occur as well as greenish marly limestones partially recrystallized and /or dolomitized. From "*Posidonia-Bositra*" and radiolarians biozone to Radiolarians biozone.
BAJOCIAN p.p. - KIMMERIDGIAN p.p.

CALCARI DIASPRIGNI DETRITICI (CDI)
CDI_2 CDI CDI_1 Turbiditic calcarenites (packstones to grainstones), with thin-to-medium beds with ooids, aggregate microbial grains and bioclasts in the basal part and increasing upwards. White chert in nodules and irregular lists. In the lower part interbedded cherty limestones, similar to those of the CDU_1 member, are present, whereas in the upper part there are cherty microdetritic mudstones as the CDU_2 member. In the south-western outcrops two different members in stratigraphic order are mapped, the "**membro dei diaspri detritici**" (CDI_1) and the "**membro dei calcari a Saccocoma ed aptici**" (CDI_2). From large part of the "*Posidonia-Bositra*" and *Protopeneroplis striata* biozone to the *Saccocoma* and *Tubiphytes morronensis* biozone. Distal escarpment. Few meters in thickness.
BAJOCIAN p.p./BATHONIAN - UPPER TITONIAN p.p.

CALCARI DETRITICI CON POSIDONIA (DPO)
DPO_a DPO In the basal part occur fine-grained detritic wackestones to packstones and rarely mudstones with radiolarians, posidoniid bivalves and cherty horizons. From the medium-to-upper part of the unit, detritic intercalations of m-thick resedimented packstones/grainstones are abundant and/or predominant (**litofacies granulare**, DPO_a), with ooids, intraclasts and well-sorted grains, beds show erosional base. Intermediate to distal slope environment. Max thickness 150 m. ***UPPER TOARCIAN p.p. - BAJOCIAN (p.p.?)***

CALCARI E MARNE A POSIDONIA (POD)
POD Light-brown to grey mudstones with abundant posidoniid bivalves and cherts in nodules and lists. Turbiditic levels (packstones and subordinated grainstones) with ooids are frequent. Basin environment. Max thickness 130 m. ***UPPER TOARCIAN p.p. - BAJOCIAN p.p.***

ROSSO AMMONITICO (RSA)
RSA Dark red nodular marly limestones, marls, and marly clay. "*Posidonia-Bositra*" and *Nodosaridae* biozone. Paleoescarpment and/or upper ramp nearby the PCP's top. Few meters in thickness.
LOWER TOARCIAN p.p. - UPPER TOARCIAN p.p.

MARNE DI MONTE SERRONE (RSN)
RSN Medium-to-thick- detritic calcarenites and calcirudites alternations, with oolites, reddish mineralizations and pebbly mudstones, marly limestones and calcareous marls and marls from grey to brown color. Clayey and black shales intervals can be present. Black chert in lists and nodules of occur.
"*Posidonia-Bositra*" and *Nodosaridae* biozone. Toe of the slope/proximal basin. Thickness ranging between few meters to 100 m.
LOWET TOARCIAN p.p. - UPPER TOARCIAN p.p.

CALCARI NODULARI DELL'INFERNACCIO (IFC)
IFC Packstones, wackestones and floatstones with nodular appearance, grey to pink in colour, with oncoids and ooids and ammonites. *Agerina martana* and *Involutina liassica* biozone to part of "*Posidonia-Bositra*" biozone.
Top PCP environment. Few meters in thickness.
PLIENSBACHIAN p.p. - TOARCIAN p.p.

CORNIOLA (COI)
COI Well-bedded radiolarians and sponge spicules rich mudstones and wackestones with black, grey and light-brown chert in lists and nodules. Pebbly mudstones and fine-to-coarse-grained calcarenitic intercalations are present. Olistoliths and breccias of MAS are present within the unit (S of Valle San Vito). *Radiolaria* and sponge spicules biozone.
Pelagic basin/toe of the slope. Max thickness in outcrop 100 m.
SINEMURIAN p.p. - LOWER TOARCIAN p.p.

CORNIOLA DETRITICA (COK)
COK COK_a Turbiditic bioclastic calcirudites and calcarenites with dm-to-m-laminated and fining-upward trend with ooids, bioclasts and benthic foraminifera. Encrinites ("Marmarone" *Auctt.*), pebbly-mudstones and debris flow are present as well as subordinated intercalations of light-brown limestones with radiolarians and sponge spicules. Lists and nodules of white to grey cherts occur. Large portions of the basal/medium part of the unit contain megabreccias and olistolith of MAS (**litofacies con olistoliti**, COK_a). From the *Radiolaria*, *Palaeodasycladus*, *Anthozoa*, *Hydrozoa* biozone to the "*Posidonia-Bositra*", *Palaeod., Anth.* e *Hydr.* Biozone. Pelagic escarpment/proximal basin. Thickness not below 500 m.
SINEMURIAN p.p. - LOWER TOARCIAN p.p.

upper Triassic p.p. - lower Jurassic p.p.

CALCARE MASSICCIO (MAS)
MAS Packstones and grainstones with oncoids, peloids, ooids and bioclasts. Locally, mudstones and peloidal bindstones with *fenestrae* are present. Beds are distinctively massive. At the top of PCPs, very low thickness of wackestones-packstones, and intercalated grainstones with ooids, oncoids, calcareous sponges and spicules. *Valvulinidae* and *Rivulariaceae* biozone and *Palaeodasycladus mediterraneus* and *Rivularia piae* biozone. Carbonate platform *s.l.* environment. Max outcropping thickness up to 500-600 m.
HETTANGIAN - SINEMURIAN p.p. (PLIENSBACHIAN p.p. at the top of PCPs)

DOLOMIA PRINCIPALE (DPR)
DPR Grey-to-white saccharoidal dolostones, with decimeter-massive beds and high-fracture phenomena, and aulotortids. Rare laminate microbial bindstones and bioclastic packstones-grainstones occur. *Triasina hantkeni* and *Griphoporella curvata* biozone. Sabkha environment. Max thickness 150 m.
NORIAN p.p.? - RHAETIAN

upper Cretaceus p.p. - Miocene p.p.

MONTE NURIA SUCCESSION

CALCARI A BRIOZOI E LITOTAMNI (CBZ)
Only one member has been described for this formation.
CBZ_2 **membro delle calcareniti a punti rossi** (CBZ_2). Fine-to-medium-grained calcarenites, with *losangae*, and grey marly limestones and marls with red oxidations, benthic and planktonic foraminifera. Beds are tabular. At the top of the unit (Ponte Alto), a 2-m-thick-marly horizon rich in glauconite occurs. Middle ramp. Thickness ranging between 150-200 m.
LANGHIAN (p.p.?) - SERRAVALLIAN p.p.

Below the CBZ_2, a few tens of meters of greyish calcarenites with marly fraction, spicules, planktonic foraminifera, glauconite and bioturbation crops out. Calcarenites with larger benthic foraminifera crops out at the base, together with chert.
This portion can be referred to SPT formation, ***CHATTIAN p.p. - BURDIGALIAN/LANGHIAN p.p.? in age.***

UNITÀ SPONGOLITICA (SPT)
Only one lithofacies has been mapped.
SPT_c **litofacies a marne, losanghe, spicole e punti rossi** (SPT_c) Fine-to-medium-grained calcarenites with *losangae* and marly limestones with red/orange oxidations, benthic and planktonic foraminifera, glauconite and spicules. Upwards there is an increase of dark, thin-layered calcareous marls and clays. Locally, at the base there can be present marly limestones with big planktonic and larger foraminifera (lepidocyclinids). From SBZ23 to N12 (SBZ26 p.p. eq.) biozones. Proximal-to-intermediate-outer ramp. Max thickness 250 m. ***CHATTIAN p.p. - SERRAVALLIAN (p.p.?)*** (age of the outcropping portion)

SCAGLIA CONDENSATA (SGC) *(cfr. condensed succession -CFR3- of Sheet 358 358 Pescorocchiano)*
SGC Drowning succession of the carbonate platform made of at the base by packstones/grainstones with rudist fragments, rare calcisphaerulae and planktonic foraminifera ascribing to Coniacian p.p./Santonian; this part is succeeded by mudstones, sometimes microdetritic, with thin-to-medium beds and rare chert lists, marly limestones from orange to green in color with thin-to-medium beds and purple chert; breccias in a cenozoic matrix in which several centimeter-to-decimeter clasts coming from the cretaceous carbonate platform. From the *Dicarinella concavata* p.p. biozone to the *Morozovella lehneri* biozone. Downthrown block to toe of the slope environment. Thickness ranging from few meters to several tens of meters.
CONIACIAN p.p./SANTONIAN - MIDDLE EOCENE p.p.

lower Cretaceus p.p. - upper Cretaceus p.p.

CALCARI A RADIOLITIDI (RDT)
RDT Well-bedded mudstones with oligotypic facies, calcarenites and calcirudites with rudist fragments and black pebbles. *Fenestrae*-rich horizons are present. Upper part of the *Nezzazatinella* cf. *aegyptiaca* and *Nummoloculina* cf. *irregularis* biozone to the lower part of the *Accordiella conica* and *Rotorbinella scarsellai* biozone. Open shelf environment. Thickness in outcrop of few meters.
UPPER TURONIAN p.p. - CONIACIAN p.p. (age of the outcropping part)

CALCARI CICLOTEMICI A REQUIENIE (CIR)
CIR Well-bedded but very altered mudstones. *Archaealveolina reicheli* biozone. Inner platform environment. Thickness of few meters.
UPPER APTIAN p.p. (age of the outcropping part)

upper Cretaceus p.p. - Holigocene

MONTE GIANO-MONTE GABBIA SUCCESSION

SCAGLIA CINEREA (SCC)
SCC Thin-layered marly limestones, marls and clayey marls, with very thin beds, made of planktonic foraminifera, from greenish to whitish in colour. Nearby the pinch-out contacts onto the paleohights of the drowned platform, limestones with several glauconite grains and spicules occur. Black and grey/green chert is present as well as resedimented rudstones to floatstones rich in larger and Eocene planktonic foraminifera and lithoclasts of Cretaceous platform. Debris flows are recognizable. From the *Turborotalia cerroazulensis* biozone to the P22 biozone. Slope to middle to outer ramp environment. Thickness ranging from few meters to 150 m.
PRIABONIAN p.p. - CHATTIAN

SCAGLIA VARIEGATA (VAS)
VAS It is similar to the unit that crops out in the Monti Reatini succession. Thickness from few meters to 70 m.
LUTETIAN p.p. - PRIABONIAN p.p.

SCAGLIA ROSSA (SAA)
SAA_6 SAA SAA_4 It is similar to the unit that crops out in the Monte Reatini succession, but here the two members (SAA_4 and SAA_6) is not always recognizable. Slumping phenomena are common and thick up to 100 m with breccias and olistoliths of RDO unit within the SAA_6 member (Pendenti area,W of Menzano). From part of the *Dicarinella concavata* biozone to the *Hantkenina nuttalii* biozone. Slope/bypass margin environment deepening moving from S-SE to N-NO. Thickness ranging from tens meters to 200 m.
CONIACIAN p.p. - LUTETIAN p.p.

CALCARI CRISTALLINI (CTN) *(cfr. Orfento formation -OFE- sheet 349 Gran Sasso)*
CTN It is similar to the unit described in the Monti Reatini succession. Max thickness 20 m.
CAMPANIAN p.p. - MAASTRICHTIAN p.p.

SCAGLIA DETRITICA (SCZ)
SCZ It is present only the cretaceous member SCZ_1. At Pendenti (W of Menzano) there are rudstones and grainstones (probably Paleocene in age) with breccias of RDO, CCD, SGC, SAA_4 in a micritic matrix.
SCZ_1 **membro calcarenitico-calciruditico** (SCZ_1): calcarenites and calcirudites with rudist fragments, echinoderms, benthic and planktonic foraminifera, arranged in massive beds. From the *Helvetoglobotruncana* and *Hippuritidae* biozone to the *Globotruncana* and *Hippuritidae*. Slope environment. Thickness from 10 to 100 m.
TURONIAN p.p. - CONIACIAN p.p. (UPPER CAMPANIAN? - PALEOCENE at Pendenti)

SCAGLIA CONDENSATA (SGC) *(cfr. condensed succession -CFR3- sheet 358 Pescorocchiano)*
SGC Two different lithofacies in stratigraphic order but not always outcropping and separately mapped. The lower part of the unit consists of calcarenites and calcirudites with benthic foraminifera and rare planktonic, arranged in massive beds, medium-to-fine thick, intercalated with planctonic and calcisphaerulid wackestones. Rare cherty horizon. The upper part of the unit, less condensed, is made of mudstones, wackestones and rarely packstones with nodular-flaser structures, planctonic foraminifera; Mn-Fe oxides, glauconite and phosphates (hardgrounds) occur. Chert is present as lists and nodules. At the top, larger foraminifera marly limestones with high content of glauconite and planktonic foraminifera are recognizable. From the *Helvetoglobotruncana* and *Hippuritidae* biozone to the *Miogypsinoides* (SBZ 23), P 22 equiv. biozone. Slope to deep shelf, middle to outer ramp; pelagic structural highs, paleoescarpment, toe of the slope depositional environments. Thickness ranging from few decimeters to several tens of meters.
LOWER TURONIAN p.p. - CHATTIAN

upper Triassic p.p. - upper Cretaceus p.p.

CALCARI A RADIOLITIDI (RDT)
RDT This unit comprehends two different CARG Formations, arranged in stratigraphic order, because of their small thickness. a) Wackestones, packstones and floatstones, saccharoidal full of rudist fragments (radiolitids) and black pebbles (RDT); b) mudstones-wackestones and rare breccias with oxidation (IBX, here not mapped). Inner carbonate platform/backmargin. Total thickness from a few meters to a few tens of meters.
UPPER CENOMANIAN p.p. (IBX) ***and UPPER TURONIAN p.p. - CONIACIAN p.p.*** (RDT)

ALCARI CICLOTEMICI A REQUIENIE (CIR)
CIR Light-brown to whitish mudstones and wackestones with birdseyes, thin-to-medium beds and intercalated bioclastic packstones and subordinated grainstones/rudstones/floatstones with radiolitid fragments, orbitolinids and black pebbles, increasing towards the upper part of the unit. In the upper part several emersion horizons at the top of the cyclotemic interval are recognizable as well as greenish clayey levels. From the *Archaealveolina reicheli* biozone to large part of the *Ostracoda* and *Miliolidae* biozone. Lagoon/inner carbonate platform environment to backmargin environment in the external northern sectors. Max thickness 200 m.
UPPER APTIAN - LOWER CENOMANIAN p.p.

CALCARI E MARNE A SALPINGOPORELLA DINARICA E CHAROPHYTE (CMS)
CMS Light-brown well-bedded mudstones and wackestones with *Salpingoporella dinarica*, charophyte algae and miliolids. Locally, at the top of the beds mud-cracks, *fenestrae*, reddish horizons are present. Moving towards N-NO there are frequent intercalations made of bioclastic wackestone-floatstone with orbitolinids, caprotinids, corals and black-pebbles.
From the medium-upper part of the *Salpingoporella dinarica* biozone. Restricted lagoon with the inter-to-subtidal setting, with backmargin environment in the more external sectors. Thickness 50-80 m.
LOWER APTIAN p.p. - UPPER APTIAN p.p.?

CALCARI A REQUIENIE, CAPROTINE E OSTREIDI (RCO)
RCO Biomicritic floatstones, grainstones and rudstones, light-brown in colour, with thick and massive beds, rich in caprotinid, requienid and ostreid macrofaunas, rare caprinids; microbial, ostracod and birdseyes-rich mudstones are present. Some biodetritic horizons with orbitolinids (*Rectodictyoconus giganteus*) also are recognizable. First part of the *Salpingoporella dinarica* biozone. Open lagoon, from deep to subtidal setting, to backmargin (*sensu lato*) environment. Max thickness 30-40 m.
LOWER APTIAN p.p.

upper Triassic p.p. - upper Cretaceus p.p.

CALCARI A RUDISTE E ORBITOLINE (RDO)
RDO RDO_a Bioclastic rudstones and grainstones, with well-rounded clasts, highly recrystallized and compenetrated. Bioclastic calciruditic with orbitolinids, fragments of rudists (caprinids and caprotinids at the base) and caprinids and radiolitids (upper part) also are recognizable. Black-pebbles rich horizons (cm-thick) and emersion and paleokarst intervals occur especially in the upper part of the unit. Beds are generally massive. In the more external outcrops (north and western sectors) there are also floatstones and subordinated packstones with bioclastic fraction and rare planktonic foraminifera.
litofacies di retromargine (RDO_a): *packstones* and *floatstones* with orbitolinids, rudist fragments, gastropods and rare alveolinids, intercalated with *Salpingoporella dinarica*-rich wackestones (CMS unit) in the lower part and miliolids in the upper part (CIR unit). Black-pebbles, emersion features occur.
From the upper part of the *Lithocodium aggregatum* biozone to a large part of the *Orbitolina* biozone.
Platform margin or open shelf (with pelagites intercalations), backmargin setting *sensu lato* (*litofacies* RDOa) to more subordinated high-energy ramp-dominated setting with pelagic input. Max thickness 550-600 m.
BARREMIAN p.p. - LOWER CENOMANIAN p.p.

CALCARI CICLOTEMICI A GASTEROPODI (CCG)
CCG Mudstones with biolitoclastic intercalations arranged in meter-scale-shallowing upward cycles with subareal-emersion surfaces at the top, with erosional cavities infilled by vadose silt. Cycles are formed by an alternation of bio-intraclastic packstones/grainstones and supratidal bindstone with *fenestrae*. Beds are medium thick. In the basal part of the unit nerineid-rich-intercalations occur. From the medium-to-upper part of the *Favreina salevensis* e *Salpingoporella annulate* biozone to the ?*Cuneolina scarsellai* and *Cuneolina camposaurii* biozone. Lagoon environment with local episode of backmargin setting. Thickness 50 m.
BERRIASIAN p.p. - BARREMIAN

CALCARI A CLASTI NERI E GASTEROPODI (CNE)
CNE Greyish to whitish bioclastic/intraclastic grainstones and packstones and gastropod floatstones with intercalation of biomicritic and breccias-dominated levels with black-pebbles. Erosional subaerial surfaces and recrystallization phenomena are recurrent. First part of the *Lithocodium aggregatum* biozone. Lagoonal to backmargin environment. Max thickness several tens of meters.
BERRIASIAN p.p.

CALCARI A CORALLI E DICERATIDI (CCD)
CCD CCD_a Rudstones, grainstones, floatstones and subordinately bindstones, with medium to thick beds with corals, echinoderms, hydrozoans, bivalves (rudists), calcareous sponges and gastropods.
litofacies di retromargine (CCD_a): pseudosaccharoidal *packstones* with intercalated oncoids, gastropods and rudist-rich wackestones and subordinated mudstones and wackestones with birdeyes.
Partially final part of the *Tubiphytes morronensis* biozone to a large part of the *Lithocodium aggregatum* biozone.
Platform margin environment, with interfingering of adjacent backmargin (*litofacies* CCD_a) and foremargin/upper slope environments. Max thickness 550 m.
UPPER TITONIAN p.p. - BARREMIAN p.p.

CALCARI AD ELLIPSACTINIE (ELL)
ELL Bioclastic massive limestones organized in shallowing upward cycles, saccharoidal and with rare microdetritic intercalations made of ellipsactinids and corals. Upper part of the *Tubiphytes morronensis* biozone. Platform margin. Thickness ranging between 180 to 400 m. ***UPPER TITONIAN***

CALCARI DELLE GOLE DEL VELINO (VEL)
VEL VEL_a Wackestones/packstones with coarsening and shallowing upward cycles, rarely grainstones, whitish to light-brown in color, with turbiditic input and thick beds and well-defined stratification (especially at the base of the unit). At north of Vignola there are dm-thick purple well-bedded mudstones/wackestones and rare packstones/grainstones with small ammonites and frequent lists of chert (**litofacies selcifera**, VEL_a).
Upper part of the Radiolarians and *Tubiphytes morronensis biozone* and *Saccocoma* and *Tubiphytes morronensis* biozone.
Slope environment. Thickness ranging from 40 to 420 m.
KIMMERIDGIAN p.p. - TITONIAN p.p.

orizzonte a filaments *(fi)*
fi Grey to beige wackestones/packstones with dm-thick beds made of abundant thin-shelled bivalves (posidoniids) radiolarians and *Protoglobigerina* sp. Final part of the *Posidonia-Bositra* biozone. Pelagic carbonate platform environment. Thickness from 4 to 22 m.
LOWER BAJOCIAN p.p.

UNITÀ CALCAREO-DOLOMITICA (UCD)
UCD *mp* Dolomitezed mudstones, wackestones and packstones with birdeyes and *fenestrae* and rare clayey green layers intercalated with light-brown grainstones and packstones with small ooids and black-pebbles. At the base 10-to-30-m thick oolitic grainstones and packstones/grainstones with pellets are present, followed by a 10-m-thicked well-stratified mudstones/wackestones (light-brown to orange in color) with thin-to-medium beds in the lower part and medium-to-thick beds in the upper part, and toward the upper part grainstones/packstones and rare wackestones with nodular appearance, oncoids, black-to-reddish ooids and green clayey layers (**orizzone a macule policrome**, *mp*). In the upper part of the unit algal nodules floatstones to rudstones are also present. From part of the echinoderm, molluscs and *Favreina* biozone to part of the *Selliporella donzellii* biozone. Inner carbonate platform/proximal ramp. Max thickness 350 m.
TOARCIAN p.p. - LOWER BAJOCIAN p.p.

UNITÀ OOLITICA (UOO)
UOO *mp* Oolitic grainstones and bio-intraclastic grainstones/packstones with subordinated intercalations made of packstones/wackestones and mudstones sometimes dolomitized. Ooids are concentrated in layers and compenetrated each other, black-pebbles are also present. Beds show decimeter-to-meter stratification, massive at the base. In the lower part of the unit there is the "**orizzonte a macule policrome** (mp)" described in the UCD unit. From the *Gutnicella cayeuxi* biozone to the first part of the *Protopeneroplis striata* biozone. Shoal to backshoal environment. Thickness 250-300 m.
TOARCIAN p.p. - LOWER BAJOCIAN p.p.

CALCARI BIOCLASTICI DI MONTE DELLA SELVA (MSE)
MSE Grainstones with algal nodules, poor sorted with heterometric clasts, coated grains, ooids and oncoids, from beige to brown colour. Beds are generally medium thick, arranged in cycles. The upper part contains wackestones/mudstones with no fauna and associated red-to-green emersion layers, emersive breccias and/or small bauxitic ponds. From part of the *Palaeodasycladus*, *Anthozoa* and *Hydrozoa* biozone. High-energy environment, close to a platform margin. Max thickness in outcrop 150-200 m.
PLIENSBACHIAN (p.p.?) - LOWER TOARCIAN p.p.(age of the outcropping unit)

CALCARI A PALAEODASYCLADUS (CPL)
CPL CPL_a Cyclotemic sequences of mudstones-wackestones light-brown to grey in color, with birdseyes, alternating with peloidal and coated grains and ooidal packstones. Beds are medium thick. Floatstones with megalodontid-molluscs, corals and gastropods are present as well as pisolitic and desiccation layers. Sometimes dolomitized limestones and dolostones occur (**litofacies dolomitica**, CPL_a). Near the top of the formation bivalve-rich (*Lithiotis*) horizons are present (*Lithiotis* limestones). Large part of the *Palaeodasycladus mediterraneus* biozone. Carbonate platform with large restricted zones periodically characterized by emersion episodes. Thickness 300 m.
LOWER SINEMURIAN p.p. - LOWER TOARCIAN p.p.

CALCARE MASSICCIO (MAS)
MAS_b For this formation only the *Calcare Massiccio* dolomitized lithofacies is outcropping.
litofacies dolomitica (MAS_b): grey to white dolostones and subordinated dolomitized massive saccharoidal limestones. *Thaumatoporella parvovesiculifera* biozone. Open carbonate platform. Max thickness 250 m. ***HETTANGIAN (p.p.?) - LOWER SINEMURIAN p.p.***

DOLOMIA PRINCIPALE (DPR)
DPR Grey-to-white saccharoidal dolostones arranged in shallowing-upward cycles at meter scale. Microbial intertidal bindstones, pisoids, tepees and desiccation structures are present, with also bituminous thin and clayey layers. Emersion layers and vadose meteoric cement occur. Beds are decimeter-to-meter thick. Restricted carbonate platform, in humid climate setting, to low-oxygenated bottoms (sabkha setting) environment. Max thickness in outcrop 350-400 m.
NORIAN?/RHAETIAN - ?HETTANGIAN (p.p.?) (age of the outcropping unit)

lower Jurassic p.p. - Holigocene

SUCCESSIONE DEI MONTI RUA-MARINE-MOZZANO

SCAGLIA CINEREA DETRITICA (CDZ)
CDZ CDZ_a Poorly sorted grainstones and rudstones with larger foraminifera, bivalves, echinoderms and corals with intercalated marly and calcareous marly layers increasing toward the top of the unit. Beds are thin-to-medium thick. Chert occurs more in the finer layers and less in the detritic ones. From the SBZ18 to the SBZ 23 biozones. Middle to outer carbonate ramp. Thickness ranges from 20 m (S. Vittorino locality) to 150-200 m (Croce di Aielli/Castello di Paganica localities).
Litofacies calcarenitico-calciruditica (CDZ_a): occurring at the SE sector of the sheet; bioclastic calcarenites (floatstones, packstones and grainstones) with larger foraminifera, medium thick, glauconite grains. Planktonic microfauna occurs in non-lithified clasts and dispersed into the matrix of the coarser detritic layers. From the SBZ22A to SBZ23 biozones. Middle to outer carbonate ramp. Thickness 90-120 m.
BARTONIAN p.p. - CHATTIAN

SCAGLIA CINEREA (SCC)
SCC The unit presents characteristics similar to the unit described in the Monte Giano-Monte Gabbia succession. Slope or middle to outer ramp/proximal basin. Thickness ranges from 80-90 m (Mt. Lato) and 100-130 m (Teora and Basanello locality).
PRIABONIAN p.p. - CHATTIAN

SCAGLIA VARIEGATA (VAS)
VAS This unit is similar to the unit that crops out in the Monti Reatini succession. Thickness between 20 and 40 m.
LUTETIAN p.p. - PRIABONIAN p.p.

SCAGLIA DETRITICA (SCZ)
For this unit two different members are arranged in stratigraphic order and one lithofacies have been recognized.
SCZ_2 **Membro calciruditico-calcarenitico** (SCZ_2): bioclastic grainstones and packstones, sometimes recrystallized, intercalated with grey-to-light-brown wackestones with planktonic foraminifera. Several lenticular intercalations of larger foraminifera-bearing grainstones to packstones are present and dominant toward the top of the unit. Chert (beige to dark red) is discontinuous. From the SBZ 3 to the SBZ 13 biozones. Max thickness 80-90 m.
SELANDIAN p.p. - LUTETIAN p.p.

SCZ_1 SCZ_{1a} **membro calcarenitico-calciruditico** (SCZ_1): very coarse grainstones to medium-to-fine packstones, thin bedded towards the top and rich in echinoderm and radiolitid fragments. In the lower part saccharoidal packstones to wackestones with planktonic foraminifera and abundant calcisphaerulids occur.
Litofacies delle calcareniti e micriti chiare (SCZ_{1a}): whitish packstones to wackestones with planktonic foraminifera, thin-to-medium-thick, alternating with thick grainstones to rudstones. Chert is rare or absent. Max thickness of the lithofacies is 70-100 m. From the *Dicarinella* and *Radiolitidae* biozone to part of the *Globotruncana, Globotruncanita* and *Orbitoides* biozone.
Thickness of the member is 20-50 m (Mt. Lato and Menzano) up to 150 m (Mt. Mozzano)
CENOMANIAN p.p. - MAASTRICHTIAN p.p.

Depositional environment for the entire SCZ unit is consistent with a slope setting.
The age of the entire formation is: ***CENOMANIAN p.p. - LUTETIAN p.p.***

SCAGLIA ROSSA (SAA)
Two members in stratigraphic order.
SAA_6 **membro calcilutitico-calcarenitico di S. Giusta** (SAA_6): this member is similar to the one described in the Monte Reatini succession. Max thickness 50-100 m. ***THANETIAN - LUTETIAN p.p.***
SAA_4 **membro calcilutitico di Bacugno** (SAA_4): at the localities Colle Rusciu, Mt. Lato and Colleoncina, this member is similar to the one that crops out in the Monte Reatini succession. At the locality Basanello-Foce, there are white mudstones and wackestones with rare brown chert and planktonic foraminifera; fine-grained bioclastic resediments with thin to medium beds are present. From the *Dicarinella concavata* biozone to the *Contusotruncana ontusa/Racemiguembelina fructicosa*. Max thickness 170-180 m. ***CONIACIAN p.p. (TURONIAN p.p.*** at C.le Ara Grande locality) - ***MAASTRICHTIAN p.p.***
Depositional environment for SAA is a slope to structural pelagic high, with by-pass zone.
The age of the entire formation is: ***CONIACIAN p.p. (TURONIAN p.p.*** at C.le Ara Grande locality) - ***LUTETIAN p.p.***

CALCARI CRISTALLINI (CTN) *(cfr. Orfento formation -OFE- of sheet 349 Gran Sasso)*
CTN This unit shows similar characteristics to the one that crops out in the Monte Reatini succession. Max thickness 35 m.
CAMPANIAN p.p. - MAASTRICHTIAN p.p.

SCAGLIA BIANCA (SBI)
SBI_a For this formation only the **litofacies calcarenitica** (SBI_a) crops out and presents characteristics similar to the one of the Monte Reatini succession. Thickness from 40-60 m.
UPPER ALBIAN p.p. - CENOMANIAN p.p. (TURONIAN p.p. at C.le Ara Grande locality)

lower Jurassic p.p. - Holigocene

CALCARI BIOCLASTICI SUPERIORI (BLS)
BLS Basal part with dominant bioclastic grainstones and rudstones with orbitolinids, rudist fragments, echinoderms and corals; intercalations of bio-intraclastic shoaling bad-sorted grainstones with coated grains and black-pebbles. Locally, at the base polygenic breccias with older (in age) light-brown clasts, rudists, orbitolinids and chert are also present. The upper part is characterized by bioclastic and well-sorted grainstones, saccharoidal and massive with rare micritic beige plagues with planktonic foraminifera, abundant echinoderm, rudists and orbitolinid fragments. *Hedbergella* and *Orbitolina* biozone and *Rotalipora* and *Orbitolina* biozone. Upper slope environment. Thickness ranges between 60 m (Mt. Lato) and 120-130 m (northern sector of Mt. Rua).
APTIAN p.p. - CENOMANIAN p.p.

CALCARENITI E CALCIRUDITI A FUCOIDI (CCF)
Two different lithofacies in stratigraphic order are present; the highest (CCF_b) is not always outcropping.
CCF_b **litofacies delle marne e calcareniti** con selce (CCF_b): bioclastic laminated calcarenites, grey to brown in color, with medium thick beds and intercalation of massive grainstones to rudstones with abundant rudists and orbitolinids. Grey-to-green thin marls and marly limestone layers occur. Dark chert in lists. Thickness from 0 to 40 m.
CCF_a **litofacies delle calciruditi e calcareniti con selce** (CCF_a): coarse calcarenites and calcirudites with breccias, both lithoclastic and bioclastic, roughly stratified with rudist fragments and orbitolinids. Intercalated packstones to wackestones with planktonic are also present. Brown chert occurs within the calciruditic layers. Thickness from few meters up to 60-70 m. from the *Hedbergella* and *Orbitolina* biozone to part of the *Rotalipora* and *Orbitolina* biozone.
LOWER APTIAN p.p. - UPPER ALBIAN p.p.

MAIOLICA (MAI)
MAI This unit presents the same characteristic of the unit that crops out in the Monte Reatini succession. From part of the *Calpionella* biozone to the *Globigerinelloides blowi* biozone. Thickness between 100 and 150 m.
BERRIASIAN (UPPER TITONIAN p.p. at Mt. Marine) ***- LOWER APTIAN p.p.***

MAIOLICA DETRITICA (MAD)
MAD This unit presents the same characteristic of the unit that crops out in the Monte Reatini succession. Thickness between 50 and 150 m.
UPPER TITONIAN p.p. - BERRIASIAN p.p.

CALCARI CRISTALLINI A ECHINODERMI E CORALLI (ECC)
ECC Bio-intraclastic grainstones to packstones, beige to white in color, with medium to thick beds, rarely thin. Diffused dolomitization and/or recrystallization. At Mt. Lato area, in the basal part, there are intercalations of fine-grained packstones to wackestones with non-lithified clasts and calpionellids. From *Crassicollaria, Calpionella* and *Tubiphytes morronensis* biozone to the *Hedbergella* and *Lithocodium aggregatum* biozone. Proximal slope environment. Max thickness in outcrop 250-300 m.
UPPER TITONIAN p.p. - LOWER APTIAN p.p.

CALCARI BIOCLASTICI INFERIORI (BLI)
BLI Extraformational breccias and bioclastic/intraclastic grainstone/rudstone with ooids and peloids, often reworked, in thick and/or amalgamated beds, even turbiditic. Locally sporadic pelagic-mud layers and dark chert nodules are present. From the "*Posidonia-Bositra*" and *Protopeneroplis striata* biozone to the *Radiolaria* and *Tubiphytes morronensis*. Slope environment. Thickness 100 m.
BAJOCIAN p.p. - LOWER KIMMERIDGIAN

CALCARI DIASPRIGNI DETRITICI (CDI)
CDI This unit is similar to the unit that crops out in the Monte Reatini succession. Thickness 90-100 m.
BAJOCIAN p.p.?/BATHONIAN - UPPER TITONIAN p.p.

CALCARI DETRITICI CON POSIDONIA (DPO)
DPO_a DPO This unit is similar to the unit that crops out in the Monte Reatini succession, comprising the lithofacies DPO_a (**litofacies granulare**) in the medium-upper part of the formation. At Mt. Il Pago a marly/muddy facies occurs. Max thickness 110 m.
UPPER TOARCIAN p.p. - BAJOCIAN p.p.

VERDE AMMONITICO E CALCARI E MARNE A POSIDONIA (VAP)
VAP Mudstones with thin to medium beds, dark and green chert in lists and nodules, alternating with marls and clayey marls, thin-layered and with intercalations of thin to medium bedded bioclastic calcarenites, locally turbiditic. In the lower part fine-grained and marly deposits are dominant, whereas in the upper part limestones and marly limestones with chert and abundant filamentous rests occur. Lower slope/proximal basin. Thickness 60-90 m.
LOWER TOARCIAN p.p. - BAJOCIAN p.p.

MARNE DI MONTE SERRONE (RSN)
RSN This unit is similar to the unit that crops out in the Monte Reatini succession. At Mt. Marine and Mt. S. Lorenzo the unit is hardly recognizable because of the highly secondary dolomitization. Max thickness 50-60 m.
LOWER TOARCIAN p.p. - UPPER TOARCIAN p.p.

lower Jurassic p.p. - Holigocene

GRUPPO DEL BUGARONE (BU)
BU Pelagic and condensed succession, locally discontinuous, mostly constitutes by limestones, marly limestones and cherty limestones, highly dolomitized. It comprises four formations known as calcari nodulari dell'Infernaccio (IFC) calcari nodulari e marne verdi de I Ranchi (RNH), calcari nodulari a filamenti del Fosso del Presale (PLS) and calcari nodulari ad ammoniti ed aptici di Cava Bugarone (BGA). Top PCP environment. Total thickness from a few meters to 30-50 m.
PLIENSBACHIAN p.p. - UPPER TITONIAN p.p.

CORNIOLA DETRITICA (COK)
COK This unit is similar to the unit that crops out in the Monte Reatini succession; locally, it is partially dolomitized. The lower part is mainly detritic, whereas the upper part is finer. Max thickness 200-300 m.
LOWER SINEMURIAN p.p. - LOWER TOARCIAN p.p.

lower Jurassic p.p.

CALCARE MASSICCIO (MAS)
For this formation only the Calcare Massiccio dolomitized lithofacies is outcropping.
MAS_b **litofacies dolomitica** (MAS_b): grey to white dolostones and dolomitized massive saccharoidal limestones, crudely stratified and highly fractured. *Thaumatoporella parvovesiculifera* biozone. Open carbonate platform. Max thickness 450-500 m.
HETTANGIAN - LOWER SINEMURIAN p.p. (PLEINSBACHIAN p.p. at the PCP of Mt. Marine)

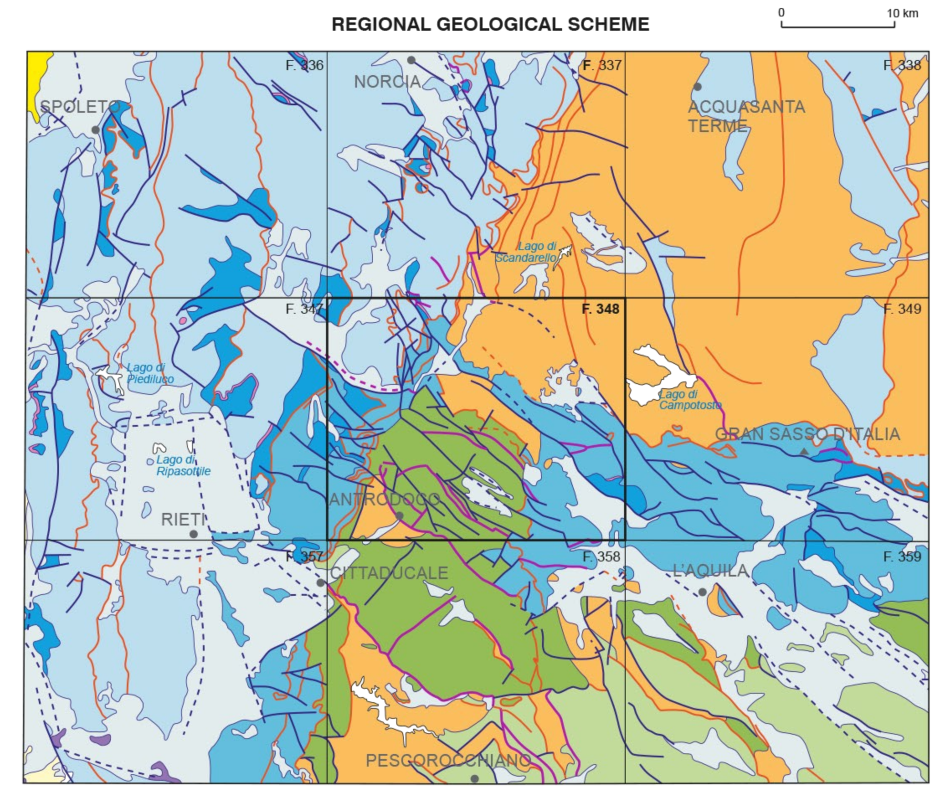
SEDIMENTARY FACIES OF QUATERNARY UNITS

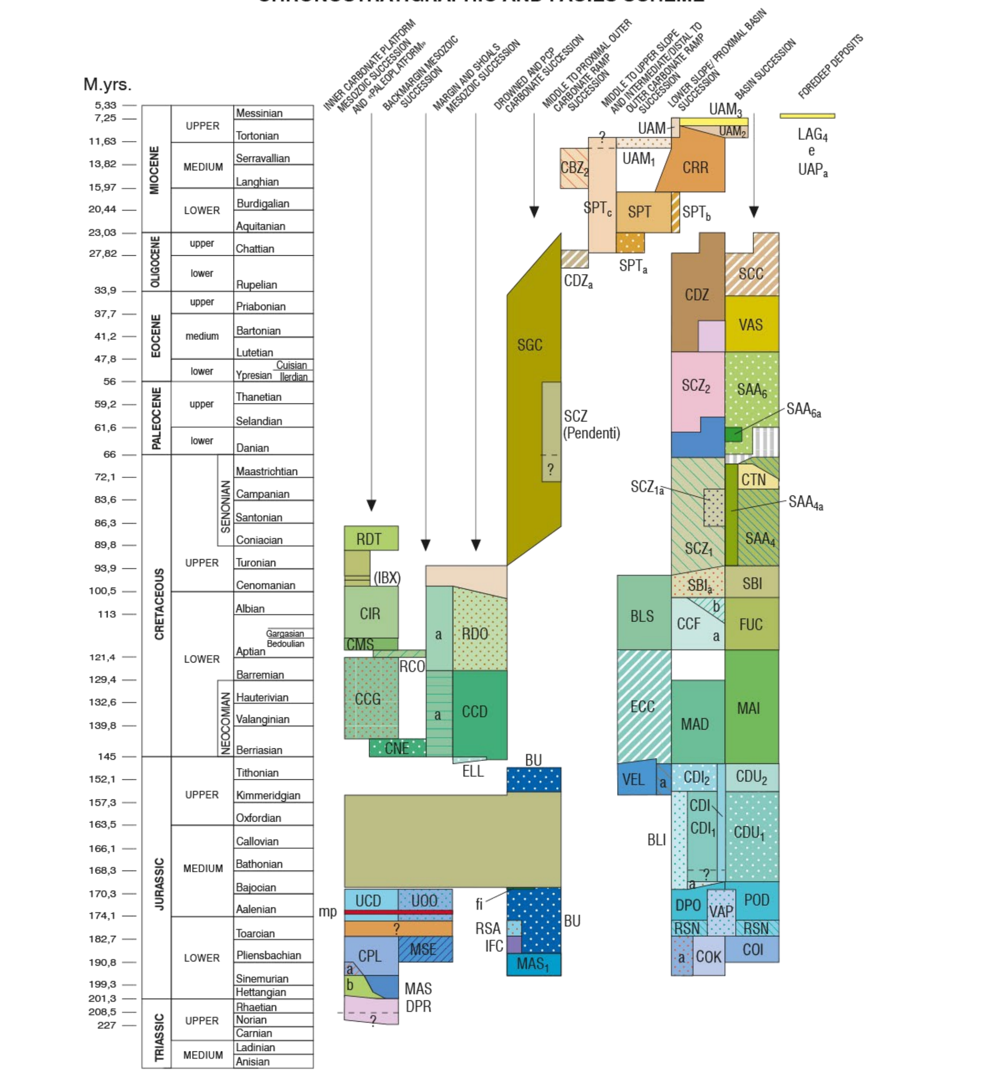
- a_1 landslide deposit
- a_1 landslide deposit with boulders
- a_1 ancient landslide deposit
- a_1 ancient landslide deposit with boulders
- a slope deposit
- a slope deposit with boulders
- a_3 scree deposit
- a_3 scree deposit with boulders
- b_2 b_6 b_7 eluvial-colluvial cover, eluvial product (alteritis), colluvial deposit
- i mixed-origin deposit: debris flow and/or torrential and/or avalanche
- b b_{n1} alluvial and terraced alluvial deposit (sand)
- b b_{n1} alluvial and terraced alluvial deposit (gravel and sand)
- b b_{n1} alluvial and terraced alluvial deposit (gravel)
- b b_{n1} alluvial and terraced alluvial deposit (silt and sand)
- b b_{n1} alluvial and terraced alluvial deposit (silt and gravel/gravel and silt)
- b b_{n1} alluvial and terraced alluvial deposit (clay and silt/silt and clay)
- e lacustrine, palustrine deposit (clay and sand)
- e lacustrine, palustrine deposit (silt and sand)
- e_2 lacustrine deposit (silt)
- e_2 lacustrine deposit (silt and clay)
- e_2 lacustrine deposit (silt and sand)
- e_3 palustrine deposit (silt)
- e_3 palustrine deposit (silt and sand)
- e_3 palustrine deposit(silt and sand)
- e_5 palustrine deposit (present and recent, possibly drained swamp)
- c_1 undifferentiated till
- l volcanoclastic deposit
- f_1 calcareous tufa
- h anthropic deposit
- h_1 landfill

strike and dip of strata:
- normal bedding
- clinostratification
- horizontal bedding
- vertical bedding with polarity indicator
- overturned bedding
- twisted bedding
- vertical bedding with unknown polarity

- slumping
- stratigraphic or lithological contact, inferred when line is dashed
- eteropic contact
- unconformity, inferred when line is dashed
- tectonic contact, inferred when line is dashed
- fault, inferred when line is dashed
- blind fault, inferred when line is dashed
- main thrust, inferred when line is dashed
- blind thrust
- secondary thrust, inferred when line is dashed
- reverse fault, inferred when line is dashed
- dextral strike-slip fault, inferred when line is dashed
- sinistral strike-slip fault, inferred when line is dashed
- synsedimentary fault, inferred when line is inferred
- dextral transtensive fault, inferred when line is dashed
- dextral transpressive fault, inferred when line is dashed
- landslide scarp edge
- trench of deep-seated gravitational slope deformation
- fluvial terrace edge
- trace of abandoned fluvial channel
- end or lateral moraine edge
- protalus rampart
- glacial cirque
- quarry scarp edge
- quarry area
- sinkhole
- alluvial, mixed origin, debris fan
- deep-seated gravitational slope deformation, block slide with recognized sliding direction
- anthropic structure
- active and inactive quarry
- landfill quarry
- significant erratic boulder
- spring
- S1 CARG borehole
- A A' trace of geological cross-section

REGIONAL GEOLOGICAL SCHEME



- Continental deposits (Pliocene-Holocene)
- Volcanic deposits
- Marine deposits (Pliocene)
- Foredeep deposits (Messinian)
- Foredeep deposits (Burdigalian-Tortonian)
- Carbonate platform deposits (Upper Triassic-Upper Cretaceous p.p.) and overlayed Miocene carbonate ramp deposits
- Carbonate platform deposits (Upper Triassic-Upper Cretaceous p.p.) and overlayed condensed deposits of drowned platform and of middle to outer carbonate ramp deposits (Upper Cretaceous p.p.- Miocene p.p.)
- Slope/middle to outer carbonate ramp deposits (Lower Jurassic p.p.-Upper Miocene p.p.)
- Basin to outer carbonate ramp deposits (Lower Jurassic p.p.-Upper Miocene p.p.)
- Condensed succession of pelagic carbonate platform (Jurassic p.p.)
- «Paleoplatform» deposits (Upper Triassic-Lower Jurassic p.p.)
- thrust, inferred or buried when line is dashed
- normal, strike-slip and generic faults, inferred or buried when line is dashed
- paleofault

CHRONOSTRATIGRAPHIC AND FACIES SCHEME