Università degli Studi di Siena
Centro di GeoTecnologie

Università degli Studi di Sassari
Dipartimento di Scienze della Natura e del Territorio

Università degli Studi di Cagliari
Dipartimento di Scienze Chimiche e Geologiche

GEOLOGICAL MAP OF SARDINIA (ITALY)

L. Carmignani[1], G. Oggiano[2], A. Funedda[3], P. Conti[1], S. Pasci[4]

1 Centro di GeoTecnologie, Università di Siena - Via Vetri Vecchi 34, San Giovanni Valdarno (Arezzo) - Italy
2 Dipartimento di Scienze della Natura e del Territorio - Università degli Studi di Sassari, via Piandanna, Sassari - Italy
3 Dipartimento di Scienze Chimiche e Geologiche - Università degli Studi di Cagliari, via Trentino 51, Cagliari - Italy
4 CARG project - APAT & Regione Autonoma della Sardegna

LEGEND

QUATERNARY DEPOSITS

1b: **Deposits showing present-day evolution.** Recent alluvial gravel, sand and silt , marsh shales. *Holocene*
1a: **Marine to continental Holocene deposits.** Alluvial, colluvial, eolian deposits; travertine, talus deposits, littoral gravel and sand. *Holocene*

2 **Landslides.** Main ancient and recent landslides. *Pleistocene-Holocene*

3b: **Ancient continental deposits.** Alluvial deposits, travertines and eolianites. *Pleistocene*
3a: **Ancient marine deposits.** Coastal to littoral conglomerates, sandstones and biocalcarenites ("Panchina tirreniana"). *Pleistocene*

VOLCANIC AND SEDIMENTARY COVER

Pliocene-Pleistocene alkaline, transitional and subalkaline volcanic cycle (0.14-5.3 Ma)

Complex Related to the Opening of the South Tyrrhenian Basin

4b: **Alkaline basalts.** Alkaline to transitional basalts, basanites, trachibasalts and hawaites in large lava flows (Giare and Gollei), locally bearing peridotitic nodules,scoriaceous cones (Basalti delle Giare-Logudoro; Golfo di Orosei; Campeda; Marmilla; Ogliastra; Trexenta). *Pliocene-Lower Pleistocene*
4a: **Trachytes and phonolites.** Lava domes, lava flows and rarely scoriaceous levels with trachytic, phonolitic-trachytic, phonolitic, thephritic-phonolitic and phonolitic- thephritic composition (Montiferro; Sarrabus: Capo Ferrato). *Pliocene-Lower Pleistocene*

5 **Continental deposits.** Conglomerates, sands and shales of fluvio-lacustrine environment (N.ghe Casteddu Fm.-Montiferro; Campeda; Baronie: Orosei; Marmilla); eolian sandstones (Capo Mannu Fm.-Sinis). *Upper Pliocene-?Lower Pleistocene*

6 **Monte Arci intermediate to acid volcanic rocks.** Lava domes and flows, with interlayered rare pyroclastic deposits, with rhyolitic to rhyodacitic composition, from aphyric to shallow porphryic texture, with obsidianaceous and perlitic structure; glassy and vesicles-rich porphiritic dacites (Marmilla: M.te Arci). *Pliocene*

7 **Pliocene marine deposits.** Coarse sandstones, bearing marine fossils (Fuile Fm.-Baronie: Orosei). Marine conglomerates, breccias and sands (N.ghe Baboe Fm.-Sinis). *Lower Pliocene*

Upper Miocene sedimentary succession

Complex Related to the Opening of the Algero-Provencal and North Tyrrhenian Basins

8 **Marine deposits of the third Miocene sedimentary cycle.** Fenestrae-rich limestones and breccias of supratidal and intertidal environment, with benthic foraminifers, echinoids, molluscs, balanides, algae (Torre del Sevo Fm.-Sinis); evaporitic, fine-grained limestones, sublittoral marls and bioclastic limestones, with foraminifers and molluscs (Calcari Laminati del Sinis; Capo S. Marco Fm.-Sinis). Messinian Shelf limestones and marly sandstones, with foraminifers, molluscs, annelids (Sinis); limestones with hermatypic corals, molluscs, foraminifers and algae (Monte Santo Limestones-Logudoro: M.te Santo, M.te Pelao). *Tortonian-Messinian*

9 **Continental deposits of the third Miocene sedimentary cycle.** Conglomerate with clayey matrix and sandstones of alluvial environment, illitic-caolinitic shales (Nurra). Tortonian-Lower Messininan Coarse silici-clastic sands with caolinitic matrix of fluvio-marine environment (Sabbie di Florinas-Logudoro: Florinas, M.te Santo, Codrongianus); marly sandstones, siltstones often with carbonatic matrix, of sublittoral environment, with planktonic foraminifers, molluscs (Arenarie di Pirri-Campidano: Cagliari). *Serravallian-Messinian?*

Lower-Middle Miocene volcano-sedimentary succession

10 **Upper lava flows of the second Miocene volcanic cycle.** Lava flows with rhyolitic to dacitic composition and peralkcaline affinity (comendites), locally with well exposed ropy structures ("Comenditi" fm. p.p.; Su Ruvu Mannu Group-Sulcis: Sant'Antioco Island and San Pietro Island); calk-alkaline lavas in neck and crypto-domes, with a andesitic to rhyodacitic composition ("andesiti terminali-α_3"-Logudoro: M.te Larenta, Mara; Anglona). *Upper Langhian-?Serravallian*

11b: **Marine deposits of the second Miocene sedimentary cycle.** Epibathyal marls and marly sandstones, with planktonic foraminifers, pelagic and benthic molluscs, corals (Argille di Fangario-Campidano: Cagliari). Upper Langhian-?Serravallian
Sandy and silty marls, sandstones, conglomerates and siliceous sands of sublittoral-epibathyal environment, with planktonic foraminifers, pelagic molluscs, echinoids, corals (Marne di Borutta; Marne di Gesturi; Marmilla fm. p.p.-Marmilla; Trexenta; Campidano; Logudoro; Sassarese; Gallura). *Upper Burdigalian-Middle-Upper Langhian*
11a: **Littoral carbonatic deposits of the second Miocene sedimentary cycle.** Sands, carbonatic sandstones and calcarenites (Calcari di Mores-Logudoro: Ardara. Mores, Thiesi; Sassarese: Sassari, Sennori; Anglona: Sedini). *Upper Burdigalian*

12b: **Continental deposits of the second Miocene sedimentary cycle.** Conglomerates and sands with clayey matrix and clasts from the Variscan basement and Tertiary volcanites (Oppia Nuova Fm.-Logudoro: Mores, Tula; Sulcis: Masainas, Santadi); deltaic conglomerates and sandstones (Baronie: Orosei). *Upper Burdigalian-Langhian*
12a: **Epiclastites of the second Miocene sedimentary cycle.** Continental deposits: pomiceous pyroclastic rocks, poorly welded, tuffs and ashes ("Lacustre" p.p.-Goceano; Logudoro: Mores; Anglona: Perfugas, Laerru). *Burdigalian*

13 **Pyroclastic flows of the second Miocene volcanic cycle.** Pyroclastic flows in one or more flow units, with rhyolitic and dacitic composition, with vitrofiric and brecciated levels ("trachiti superiori-τ_2"-Cala Lunga and Monte Sirai Groups; Logudoro; Iglesiente; Sulcis). *Upper Burdigalian-Langhian*

14 **Dikes of the second Miocene volcanic cycle.** Dikes with basaltic composition (Arburese: M.te Arcuentu). *Upper Oligocene-Lower-Middle Miocene*

15b: **Rhyolitic lavas of the second Miocene volcanic cycle.** Lava flows of rhyolitic-dacitic composition ("andesiti superiori-α_2" p.p.-Mejlogu: M.te Traessu, M.te Frusciu, Cossoine; Planargia). *Burdigalian-Serravallian*
15a: **Andesitic lavas of the second Miocene volcanic cycle.** Lava flows and autoclastic breccias of andesitic composition ("andesiti superiori-α_2" p.p.;Carbonia group-Sulcis; Arburese: M.te Arcuentu; Valle del Temo: M.te Unturzu). *Burdigalian*

Upper Oligocene-Lower Miocene volcanic-sedimentary succession

Complex Related to the W-Dipping Subduction of Adria Plate

16b: **Marine deposits of the first Oligo-Miocene sedimentary cycle.** Sandstones, conglomerates, tuffites, with planktonic foraminifers, benthic molluscs, corals, echinoids, etc. ("Arenarie di Gesturi"; Nurallao Fm.; Marmilla Fm. p.p.-Sarcidano: Isili; Trexenta: Gesturi; Marmilla; Logudoro; Anglona: Castelsardo; Arburese: Funtanazza) ichthyolitic clayey marls, sandstones and siltstones with benthic molluscs ("Marne di Ales"-Marmilla; Arburese: Funtanazza). *Upper Oligocene-Lower Burdigalian*
16a: **Littoral carbonatic deposits of the first Oligo-Miocene sedimentary cycle.** Hermatypic limestones and carbonatic sandstones, with interlayered rare silici-clastic sediments, with molluscs (Calcari di Villagreca; "Calcari di Isili"-Trexenta: Villagreca; Sarcidano: Isili). *?Upper Oligocene-Lower Burdigalian*

17b: **Lacustrine deposits of the first Oligo-Miocene sedimentary cycle.** Continental conglomerates and sandstones, with interlayered cherts, with plant remains ("Lacustre" p.p.-Barigadu: Lago Omodeo; Anglona); cherty limestones, siltstones, sandstones alternating with rhyolitic tuffs, with ostracods, plant remains, algae, molluscs ("Lacustre" p.p.-Logudoro: Oschiri, Berchidda; Anglona; Arburese: Funtanazza; Nurra: Porto Conte). *Aquitanian-Burdigalian*
17a: **Continental deposits of the first Oligo-Miocene sedimentary cycle.** Polygenic conglomerates and sandstones of fluvial environment (Ussana Fm.-Logudoro: Piano Ladu; Anglona: Casteldoria; Marmilla; Trexenta: Monastir, Nuraminis; Sarrabus: M.te Genis; Gerrei: S. Nicolò Gerrei; Sarcidano: Villanovatulo); continental poligenic conglomerates, carbonatic sandstones with reworked macro-foraminifers (Conglomerato di Cuccuru 'e Flores-Baronie: M.te Albo, La Caletta, M.te Tuttavista, Lanaitto). *?Oligocene-Aquitanian*

18 **Pyroclastic flows of the first Oligo-Miocene volcanic cycle.** Pomiceous and lithic pyroclastic flows, weakly or strongly welded, with a rhyolitic-dacitic composition ("trachiti inferiori- τ_1"; Piroclastiti di Siliqua-Planargia; Goceano; Logudoro; Anglona; Valle del Cixerri). *Aquitanian-Burdigalian*

19c: **Acid lavas of the first Oligo-Miocene volcanic cycle.** Lava flows of rhyolitic dacitic composition (Logudoro: M.te Pizzinnu di Romana). *Aquitanian-Burdigalian*
19b: **Andesitic lavas of the first Oligo-Miocene volcanic cycle.** Lava flows and rare hypoabyssal lava bodies, with alternating rare pyroclastic deposits, of andesitic composition (Serbariu di sopra group-Sulcis: Serbariu; Barigadu; Planargia; Campeda; Logudoro; Anglona). *Aquitanian*
19a: **Hypoabyssal lava bodies of the first Oligo-Miocene volcanic cycle.** Lavas in stocks and necks, of quartzo-andesitic-tonalitic-dacitic composition, with widespread hydrothermal alteration and related mineralization of Au and Cu (Complesso vulcanico di Siliqua; Andesiti di Monte Perda-Valle del Cixerri: M.te Silixanu, Acquafredda, M.te Exi, P.ta de su Ferru; Sulcis: Sarroch; Nurra: Calabona). *Upper Oligocene*

Paleogene marine to transitional successions

Authoctonous Volcano-sedimentary Cover of the South European Passive Margin

Paleogene succession of Sulcis and Campidano

20b: **Continental deposits.** Clayey reddish siltstones and sandstones, of continental environment, at the base locally ematitic conglomerates with clasts of the Variscan basement (Cixerri Fm.-Iglesiente; Sulcis; Campidano: Monastir). *?Middle-Upper Eocene-Oligocene*
20a: **Paralic deposits.** Littoral to transitional limestones with characee, ostracods, macro-foraminifers ("Calcari a macroforaminiferi"; "Miliolitico"-Sulcis); marly limestones, marls, shale of continental and paralic environmental, with carbonaceous deposits, bearing characee, palinomorphs, carophytes, ostracods ("Lignitifero"-Sulcis; Cixerri). *?Paleocene-Middle Eocene*

Eocene succession of Eastern Sardinia

21b: **Marine deposits.** Sublittoral limestones, marly limestones and clayey marls, with corals, echinoids, macro-foraminifers ("Calcari a nummuliti"; Monte Cardiga Fm. p.p.-Sarrabus; Gerrei; Salto di Quirra: M.te Cardiga; Baronie: Orosei). *Lower Eocene*
21a: **Continental deposits.** Sandstones and polygenic ,more or less quartzitic, conglomerates of fluvio-deltaic environment, with ceritides and oysters at the bottom of the "Calcari a nummuliti" (Monte Cardiga Fm. p.p.-Sarrabus; Gerrei; Salto di Quirra: M.te Cardiga). *?Upper Paleocene-Lower Eocene*

Mesozoic sedimentary successions

Upper Cretaceous marine successions

22b: **Middle-Upper Cretaceous succession of Western Sardinia.** Carbonatic shelf deposits: limestones, marls and glauconitic calcarenites of sublittoral environment with benthic foraminifers, algae, rudists, locally lacustrine limestones with carophyts (Capo Caccia Fm.; Nurra; Anglona); in Nurra with a bauxite-rich layer at the base (Nurra: Olmedo). *Middle-Upper Cretaceous (Cenomanian-Campanian)*
22a: **Middle-Upper Cretaceous succession of Eastern Sardinia.** Carbonatic shelf deposits: limestones and marls, cherty limestones, detritic glaucophane sandstones, of circa-infralittoral environment, with planktonic foraminifers, rudists and inoceramids (Baronie: M.te Tuttavista, Lanaitto, Gorropu). *Middle-Upper Cretaceous (Upper Albian-Maastrichtian)*

Middle Triassic-Lower Cretaceous marine and transitional successions

23b: **Lower Cretaceous succession of Western Sardinia.** Carbonatic shelf deposits: limestones, dolomitic limestones, oolitic limestones and bioclastic limestones of sublittoral environment (facies "Urgoniana"; Dragonara Fm.), with benthic foraminifers, algae, rudists, bryozoan, serpulids; at the base: paralic marly limestones and marls (facies "Purbeckiana"), with charophytes and ostracods (Cala d'Inferno Fm.-Nurra; Sant'Antioco Island). *Lower Cretaceous (Berriasian-Lower Aptian)*
23a: **Lower Cretaceous succession of Eastern Sardinia.** Carbonatic shelf deposits: bioclastic limestones and marly limestones, oolitic and cherty limestones ("Facies "Urgoniana"; Gorropu Fm.), with cephalopods, brachipods ; at the base: paralic marly limestones and marls (facies "Purbeckiana"; Orudè Fm.), with charophytes and ostracods (Barbagia; Supramonte; Baronie: Lanaitto, Orosei, M.te Albo). *Lower Cretaceous (Berriasian-Lower Albian)*

24c: **Jurassic succession of Western Sardinia.** Carbonatic shelf deposits: dolostones and dolomitic limestones, bioclastic limestones, oolithic and oncoid limestones, cherty limestones, mudstones, marly limestones and marls, with algae, crinoids, brachiopods, bivalves, cephalopods, coprolites (pollens, spores, ostracods; at the top: transition to the facies "Purbeckiana" with dolostones and lacustrine black dolomitic limestones (Nurra: Olmedo, M.te Doglia; Sulcis: Porto Pino). *Liassic-Malm.*
24b: **Upper Jurassic succession of Eastern Sardinia.** Bioclastic limestones, oolitic cherty limestones and mudstones, of littoral-circalittoral environment, with algae, benthic foraminifers and nerineids (Monte Bardia Fm.; Tului Fm.: Supramonte; Baronie: M.te Albo, M.te Tuttavista). *Dogger - Malm*
24a: **Middle-Upper Jurassic succession of Eastern Sardinia.** Dolostones, sandy dolostones, dolomitic limestones of littoral to circalittoral environment, with benthic and planktonic foraminifers, calcisphaeras, calcareous algae, cephalopods, echinoderms (Dorgali Fm. - Baronie: M.te Albo; Supramonte; Sarcidano; Ogliastra); at the base: fluvial and deltaic conglomerates, quartz-sandstones, siltstones, mudstones, alternating lignitiferous layers with plants remains and sporomorphs ("Genna Selole Fm." - Baronie; Sarcidano; Supramonte; Ogliastra). *Middle-Upper Jurassic (Dogger-Malm)*

25 **Triassic succession.** Dolostones, marly dolostones, marls with gypsum and mudstones ("Keuper"), with palynomorphs, agglutinated foraminifers, gasteropods, brachiopods (Nurra: Ghiscera Mala, P.ta Dei Visti; Sulcis: Porto Pino). Carbonatic shelf deposits of circalittoral to transitional environment: dolomitic limestones and dolostones, sandy dolostones, limestones and marly limestones, with rare gypsum intercalations, with conodonts, cephalopods, bivalves, brachiopods, crinoids, algae, sporomorphs, ichnofossils ("Muschelkalk"; P.ta Su Nuraxi Fm.-Nurra: Alghero, M.te S. Giusta; Iglesiente: Campumari; Arburese: Capo Pecora; Sarcidano: M.te Majore di Nureci; Sulcis: Porto Pino). Red-violet silty mudstones, micaceous and quartz-rich sandstones and alluvial conglomerates, with silicified limestones intercalations in the Arburese and Iglesiente regions, with plants remains, sporomorphs and pollens ("Buntsandstein"; "Verrucano sardo", P.ta S'Arridelli Fm.-Nurra: Cala Viola; Gerrei: Escalaplano; Arburese: Capo Pecora). *Middle-Upper Triassic*

Upper Carboniferous-?Lower Triassic continental succession

Complex Related to Post-collision Extension

26 **Volcano-sedimentary succession.** Conglomerates, sandstones, with alternating epiclastic rocks, volcanic breccias, lacustrine limestones, with cherty levels and anthracite lenses, shales, with plants remains, sporomorphs and pollens, ostracods and amphibians (Ru su Luda Fm.-Barbagia: Seui, Seulo; Ogliastra: Perdasdefogu; Gerrei: Lago di Mulargia); alluvial conglomerates, sandstones and siltstones, with plants (P.ta Lu Caparoni Fm.-Nurra: P.ta Lu Caparoni); sandstones, conglomerates, siltstones and fine laminated shales, with silicified limestones intercalations, locally with acidic lavas, tuffs and volcanic breccias, with sporomorphs and pollens, pteridophytes, ichnofossils, (Iglesiente: San Giorgio, Guardia Pisano; Arburese:Tuppa Niedda). *Westphalian D (?)-Autunian*

27b: **Rhyolitic-dacitic volcanites.** Pyroclastic flows and lava flows of rhyolitic and rhyodacitic composition, subordinate dacitic lava flows (Gallura: P.ta Salici; Baronie: Galtellì; Ogliastra: Perdasdefogu, M. Ferru near Tertenia; Gerrei : Escalaplano; Arburese: P.ta Acqua Durci); alkaline rhyolitic ignimbrites (Nurra: M. S. Giusta). Upper Carboniferous-Upper Permian-?Lower Triassic
27a: **Andesitic volcanites.** Lava flows, porphyritic subvolcanic bodies and breccias, with andesitic composition. *Upper Carboniferous-Upper Permian-?Lower Triassic*

VARISCAN BASEMENT

Upper Carboniferous-Triassic dike complex

Magmatic Complex Related to the Variscan Collision

28 29 30

28: **Acid dikes.** Porphyritic-microgranite dikes, microgranite domes; pegmatites and aplites although widespread are not mappable at this map scale.
29: **Basic dikes.** Calkalcaline, transitional and alkaline basaltic dikes.
30: **Hydrothermal dikes.** Quartz-rich dikes and subvolcanic bodies, often mineralised with sulphides, barite, fluorite, gold and silver, etc. *Upper Carboniferous-Lower Triassic*

Upper Carboniferous- Permian plutonic complex

31 **Leucogranites.** Generally equigranular granites, with microgranitic and porphiric facies (Gallura: Limbara; Sarrabus: Rio Picocca, San Vito; Sulcis: M.te Arcosu, Teulada); locally Grt-bearing leucogranites (Baronie: P.ta Tepilora). *Upper Carboniferous-Permian*

32 **Monzogranites.** Equigranular to inequigranular monzogranites with Kfs phenocrysts (Goceano: Buddusò, Bortamelone; Gallura: Costa Paradiso) (Gallura: Calangianus, Arzachena; Barbagia: Olzai); rare Na-rich sienites (Sarrabus: Villasimius). *Upper Carboniferous-Permian*

33 **Granodiorites.** Equigranular monzogranitic granodiorites (Gallura: S. Antonio; Barbagia: Gavoi) and inequigranular granodiorites (Gallura: Monti; Barbagia: Orotelli); disequigranular tonalitic granodiorites (Marghine: Bolotana; Barbagia: Mamoiada; Ogliastra: Villagrande; Goceano: Benetutti). *Upper Carboniferous-Permian*

34 **Quarzodiorites and gabbros.** Granodioritic tonalites and gabbro-tonalites (Barbagia: Oniferi; Marghine: Burgos, Ottana; Mandrolisai: Ortueri); Gabbros and gabbro-tonalitic bodies (Gallura: P.ta Falcone, Bortigiadas; Goceano: Osidda; Sarrabus: Solanas). *Upper Carboniferous-Permian*

35 **Peralluminous granites.** Crd-bearing granites (Nuorese: Rio Isalle). *Upper Carboniferous-Permian*

36 **Sin-kinematic granites.** Foliated granitoids, mostly tonalitic granodiorites and tonalites (Goceano: Pattada; Gallura: Bortigiadas, N.ghe Ola; Baronie: M.te Senes). *Upper Carboniferous-Permian*

37 **Anatectic granitoids.** Anatectic leucogranites and granodiorites, strongly foliated (Gallura: Barrabisa, S. Maria Island, Golfoaranci; Anglona: Tarra Padedda; Mandrolisai: M.te Grighini). *Carboniferous*

Variscan migmatitic complex

Successions Involved in the Collisional Variscan Chain

38 **Orthogneisses.** Granodioritic and monzogranitic orthogneisses (Asinara; Baronie: Tanaunella. Porto Ottiolu; Gallura: Valle del Liscia; Anglona: Tarra Padedda). *?Upper Ordovician*

39 **Migmatites.** Diatexites and metatessites with orthogneiss, locally with calc-silicates lenses (Gallura: Golfaranci, Palau; Anglona: Tarra Padedda; Baronie: Brunella, Straula; Asinara). *?Precambrian-?Lower Paleozoic*

40 **Amphibolites.** Lenses of amphibolites and ultramafic amphibolites, with granulitic relics, derived from layered basic complexes (Gallura: Montigiu Nieddu, M.te Plebi; Asinara: P.ta Scorno). *?Precambrian-?Lower Paleozoic*

Variscan metamorphic complex with dominant amphibolite-facies assemblage

41 **Amphibolites with eclogite relics.** Amphibolites with relics of eclogite paragenesis (Gallura: P.te del li Tulchi; Anglona: Giuncana). *Middle Ordovician*

42 **Granodioritic orthogneisses.** Granitic and granodioritic orthogneisses (Ortogneiss di Lodè; Gneiss occhiadini" - Baronie). *Ordovician*

43 **Paragneisses, Grt±St ±Ky micaschists.** Paragneisses and quartzites of amphibolite-facies, medium pressure metamophism, widespread amphibolite- to greenschist-facies mylonites (Baronie: Posada; Anglona: Giuncana).*?Paleozoic*

44 **HT-LP rocks.** Paragneisses, micaschists and quartzites of amphibolite-facies metamorphism, affected by a high-temperature metamorphic overprint (And±Sil±Crd) (Asinara; Anglona). *?Paleozoic*

45 **Micaschists and paragneisses.** Micaschists and paragneisses with Grt±oligoclase paragenesis (Baronie: Siniscola; Nurra: Stintino, Asinara) and Grt±Ab paragenesis (Baronie). *?Paleozoic*

Greenschist and sub-greenschist facies variscan metamorphic complex

INTERNAL NAPPES
(Gennargentu, southern Nurra)

Upper Ordovician-Lower Carboniferous succession

46 **Marbles.** Gray marbles, rare dolomitic marbles, with interlayered phyllites, locallly fossiliferous, with crinoids, conodonts (Ogliastra: Arcu Correboi, Genna Silana). *Devonian*

47 **Metagabbros.** Alkaline metagabbroes (Nurra: Biancareddu, Canaglia, M.te Rugginosu). Upper Ordovician-*?Lower Silurian*

48 **Ordovician-Silurian terrigenous successions.** Dark phyllites, locally carbonaceous, metasiltstones, black quartzites ("lidite") with alternating intercalated thin marble layers, and locally diamictite levels and ironstones (Nurra: Canaglia). *Upper Ordovician-Silurian*

Middle Ordovician volcano-sedimentary complex

49 **Calcalkaline metavolcanites.** Basic to acid metavolcanites, metaepiclastites and metagraywackes (Nurra; Gennargentu). *Middle Ordovician*

Terrigenous successions of uncertain age

50 **Bt-rich micaschists.** Bt-bearing metasandstones and phyllites (Barbagia: Orune; Nurra), of supposed Cambrian-Lower Ordovician age and locally of Devonian-Lower Carboniferous age. *Paleozoic*

51 **Lower Paleozoic terrigenous succession.** Metasandstones quartzites and phyllites with alternating interlayered acid metavolcanic rocks ("Postgotlandiano" - Gennargentu; Barbagia: Seulo; Ogliastra; Goceano; Baronie; Nurra). *Lower Paleozoic*

EXTERNAL NAPPES
(Goceano, Sarcidano, Quirra, Gerrei, Sarrabus, Arburese, Iglesiente-Sulcis p.p.)

Upper Ordovician-Lower Carboniferous succession

52 **Culm-like flysch deposits.** Metaconglomerates with clasts of "lydites", olistoliths and olistostromes of the Ordovician-Devonian succession; metasandstones, quartzites, phyllites and alkaline basic metavolcanites (Pala Manna Fm.-Sarrabus: Pala Manna; Trexenta: Mandas; Gerrei: Ballao, Armungia, Silius). *Lower Carboniferous*

53 **Devonian carbonatic succession.** Metalimestones, locally nodular, with crinoids, ammonites ("Calcari a Clymenie"; Calcari di Villasalto - Sarrabus: M.te Lora; Gerrei: Villasalto, M.te Taccu); in the lowermost tectonic units: marbles, dolomitic marbles and calcschists, with crinoids (Sarcidano: Asuni; Sarrabus: Rio Gruppa; Salto di Quirra: Castello di Quirra; Trexenta: Mandas; Goceano: Illorai, Silanus; Ozieri). *Middle Devonian - Lower Carboniferous*

54 **Black shales with graptolites and tentaculites.** Dark, carbonaceous metapelites with graptolites ("Scisti neri a graptoliti" - Gerrei: Goni; Sarrabus: Baccu Scottis), at the base black cherts ("lydites"). **54a:** lenses of nodular metalimestones, with orthoceratids, crinoids, pelagic tentaculites and conodonts ("Calcari ad Orthoceras"; "Ockerkalk"-Gerrei: Goni, Armungia; Sarrabus: Baccu Scottis, M.te Lora). Silurian
Thin levels of metalimestones and metasiltstones with tentaculites ("Scisti a tentaculiti" - Trexenta: Mandas; Sarrabus: Ballao). *Upper Silurian-Lower Devonian*

55 **Upper Ordovician terrigenous succession.** Metaconglomerates, metarkoses, metasiltstones, metagraywackes, with bryozoans, brachiopods, trilobites, gasteropods; locally in the upper part: diamictites (P.ta Serpeddì Fm.; Orroeledu Fm.; Rio Canoni shales-Sarrabus: Brecca, P.ta Serpeddì; Gerrei: Rio Canoni; Barbagia: Bruncu Nieddu, Orroeldu); metacalcarenites and metalimestones often silicified (Br. Su Pitzu Fm.; "Quarziti del Sarrabus"; Tuviois Fm.); in the upper part: alkaline metabasalts (Sarrabus: Bruncu Nieddu close Brecca; Gerrei: Silius, San Basilio). *Upper Ordovician (Katian-Hirnantian)*

Middle Ordovician magmatic and volcano-sedimentary complex

56b: **Acid metavolcanites.** Calkalkaline metapyroclastites with rhyolitic-dacitic composition, porphiric texture with mm-cm sized Qtz Kfs phenocrysts ("Porfidi grigi del Sarrabus"; Porfiroidi-Sarrabus: Brecca, Muravera, Baccu Locci; Gerrei: Silius, Goni); locally at the base: alternating quartzite, metasandstones and polygenic metaconglomerates with clast of intermediate-basic metavolcanites (Su Muzzioni Fm.-Sarrabus: Brecca, Baccu Scovas; Gerrei: Mulargia Lake). *?Middle Ordovician*
56a: **Intermediate to basic metavolcanites.** Calkalkaline metavolcanites, metaepiclastites and metagraywackes with intermediate and rarely basic composition ("Serra Tonnai Fm."-Sarcidano: M.te S. Vittoria, Mulargia Lake; Sarrabus: Brecca, Riu Gruppa); metaconglomerates with prevaling clasts of acid volcanic rocks ("Manixeddu Fm."-Sarcidano: M.te S. Vittoria, Mulargia Lake; Sarrabus: Riu Gruppa); rhyolitic metavolcanites, metatuffites and metaepiclastites ("Monte Corte Cerbos Fm."; "Porfidi bianchi"-Sarcidano: M.te S. Vittoria; Sarrabus: Muravera). At the base lenses of polygenic coarse metaconglomerates ("Conglomerato di Rio Ceraxa"; Metaconglomerato di Muravera-Sarrabus: Muravera, Brecca, Baccu Locci; Salto di Quirra: M.te Ollasteddu). *?Middle Ordovician*

57 **Metadolerites.** Dikes and subvolcanic bodies of dark porphyric mafic rocks, with basic composition, with phenocrysts of calcic amphibole and palgioclase, doleritic texture, foliated, intruded in the Arenarie of San Vito (Sarrabus: Porto Corallo; Salto di Quirra: Riu San Giorgio; Sarcidano: M.te S. Vittoria; Trexenta: Mandas). *?Middle-Upper Ordovician*

Pre-Middle Ordovician succession

58 **Cambro-ordovician terigenous succession.** Micaceous metasandstones and quartzites, interbedded with metapelites and rare quartzitic metaconglomerates and marbles in the upper part, with sedimentary structures, ichnofossilis, trilobites, jellyfish prints, and acritarchs ("Solanas Fm."; Arenarie di San Vito-Sarrabus: Rio Ollastu, Br. Laccoi, Riu Ceraxa, S. Vito; Sarcidano: Laconi, Villanovatulo; Gerrei: Br. Maresusus; Salto di Quirra: Rio S. Giorgio; Arburese). *Middle Cambrian-Lower Ordovician*

EXTERNAL FOLD AND THRUST BELT
(Iglesiente, Sulcis)

Middle Ordovician-Lower Carboniferous succession

59 **Culm-like flyschoid deposits.** Alternating quartzites, metasandstones, metapelites, metaconglomerates, metabreccias and metaconglomerates; olistolithes, olistostromes with large clasts of the Silurian-Devonian sedimentary sequence ("Culm") (Pala Manna Fm.-Sulcis: Rio Lilloni, Pula mountain). *Lower Carboniferous*

60 **Devonian carbonatic succession.** Nodular metalimestones with conodonts and pelagic tentaculites (Mason Porcus Fm.-Sulcis: M.te Padenteddu; Iglesiente: Su Nuargi, Mason Porcus, Perda S'Altari). Middle Devonian
Metalimestones, with graptolites, conodonts, cephalopods, crinoids ("Calcari ad Orthoceras"; Fluminimaggiore Fm.-Iglesiente: Xea S. Antonio, Mason Porcus; Sulcis: M. Padenteddu, Casa Sais). *Upper Silurian-Lower Devonian*

61 **Black shales with graptolites.** Graphitic black shales, with graptolites and black cherts at the bottom ("lydites") ("Scisti neri a Graptoliti"; Genna Muxerru Fm.-Iglesiente: Fluminimaggiore, M.te Linas, M.te Cortoghiana Becciu, Genna Quadroxius; Sulcis: Capoterra). *Lower Silurian*

62b: **Upper Ordovician terrigenous succession.** Metasiltstones and metasandstones with rare interbedded basic metavolcanites, with bryozoans, brachiopods, tentaculites, graptolites, crinoids, trilobites (Monte Orri Fm.; Portixeddu Fm.; Domusnovas Fm.; Rio San Marco Fm.-Iglesiente: Rio San Marco; Sulcis: Bacu Abis, M.te Orri). *Upper Ordovician (Katian-Hirnantian)*
62a: **"Ordovician Puddinga".** Metaconglomerates with olistoliths and clasts of Cambrian limestones and dolostones, alluvial and coastal violet-reddish slates and metasandstones ("Puddinga"; Monte Argentu Fm.-Iglesiente: Portixeddu, Buggerru, Fluminimaggiore, P.ta S'Argiola, P.ta Su Amadori, Mason Porcus, Rio Cannamenda, Caput Aquas; Sulcis: Narcao, Rosas). *Middle-Upper Ordovician*

Middle Ordovician magmatic complex

63 **Capo Spartivento Orthogneisses.** Coarse-grained granodioritic orthogneisses, with Qtz and Kfs phenocrysts. *?Middle-Upper Ordovician*

Pre-Middle Ordovician succession

64 **Cabitza Formation.** Shales, metasandstones, and metasiltstones with rare carbonatic lenses ("Scisti di Cabitza"; Cabitza Fm.) at the base nodular metalimestones ("Metallifero p.p."; "Calcescisti"; Campo Pisano Fm.), with trilobites, benthic graptolites, benthic foraminifers, sponges, carpoids, Hyolithida, brachiopods (Iglesiente: Cabitza, M.te S. Giovanni, Nebida, Campo Pisano, Gonnesa, Villamassargia). Lower Cambrian-Lower Ordovician

65 **Gonnesa Formation.** Metalimestones and dolostones, with rare archaeocyats, trilobites, echinoderms ("Metallifero" p.p.; "Calcare ceroide"; "Dolomia grigia"; San Giovanni Fm.-Iglesiente: Is Ollastus, Acquacadda, S. Giovanni); stromatolitic metadolostones and metalimestones, with rare archaeocyats ("Dolomia rigata"; Santa Barbara Fm.-Iglesiente: Planu Sartu, Arcu Biaxerria, S. Barbara). Lower Cambrian

66b **Nebida Formation ("Arenarie Fm."). 66b: Punta Manna Mb.** Metasandstones with carbonatic cement, metadolostones, oolitic metalimestones, micritic metalimestones, with trilobites, archaeocyats, algae, brachiopods, lingulids, rare Hyolithida and echinoderms. *Lower Cambrian.*
66a: **Matoppa Mb.** Metasandstones and silty metasandstones with rare metalimestone intercalations, with algae, archaeocyats. Lower Cambrian

67 **M. Settiballas schists.** And-bearing micaschists (Sulcis: Chia). *?Precambrian*

Symbols

- Quaternary volcanic eruptive center

Cenozoic Tectonics: Fault; Buried Fault; Normal Fault; Transcurrent Fault; Reverse Fault, Thrust

Variscan Tectonics: Fault, tectonic contact; Normal Fault; Transcurrent Fault; Main Thrust; Minor Thrust

Contributions
G.P. Cherchi[4,8] e E. Sarria[4,8] (Magmatic complex related to the Variscan chain); F. Leone[3] & A. Loi[3] (Stratigraphy of the South Sardinia basement); E.D. Patta[4] (Quaternary deposits); P.C. Pertusati[5] (Structural geology)

Map compiled using:

- unpublished maps by:
M. ARRIGO[3], A. ASSORGIA[3], A. AVERSANO[4], S. BARCA[3], M. BENEDETTI[5], C. BUTTAU[3], P. CALZIA[4], L. CARMIGNANI[1], R. CAROSI[10], M. CECCHERELLI[7], N. CERBAI[7], G.P. CHERCHI[8], G.F. CHIGHINE7, F. CINCOTTI[7], F. COCCO[3], P. CONTI[1], S. CONTI[7], P. COSSEDDU[7], L.G. COSTAMAGNA[3], A. DI PISA[2], L. DISPERATI[1], F.M. ELTER[9], G. FARCI[7], A. FORCI[4], A. FUNEDDA[3], M.R. LANGIU[4], A. LOI[3], F. LEONE[3], M. GATTIGLIO[10], S. LUXORO[7], P. MAMELI[2], M. MAXIA[8], F. MEDDA[4], E. MELIS[8], M.A. MELONI[3], A. MURTAS[4], M. MURTAS[4], G. MUSUMECI[6], G. OGGIANO[2], S. PASCI[4], E. PATTA[4], P. PAVANETTO[3], P.C. PERTUSATI[6], G. PISANU[4], R. PISCHEDDA[7], A. RONCHI[11], V. SALE[4], E. SARRIA[4,8], F.A. SECCHI[2], M. SERRA[4], R. SERRI[4], C. SPANO[3], V. URAS[4].
- Official maps published by the Italian Geological Survey at the 1:50,000 (CARG project) and 1:100,000 scale.
- published geological maps:

ASSORGIA A., PASSIU A., SPANO C. (1983): Carta geologica del settore Capo della Frasca, scala 1:10.000.
ASSORGIA A., MACCIONI L., MACCIOTTA G., SAVELLI C. (1983): Carta geopetrografica del vulcanismo pliocenico della Sardegna centro-meridionale, scala 1:50.000.
ASSORGIA A., BARCA S., BRAVIN E., CARTA M., FARRIS M., FIORI M., GRILLO S.M., MARCELLO A., PRETTI S., RIZZO R., SPANO C. (1983): Carta geologica e delle georisorse del distretto vulcanico Monastir-Furtei, scala 1:25.000
ASSORGIA A., BARCA S., FLORE G., LONIS R., LUXORO S.S., PINNA M., PORCU A., SECCHI F., SPANO C. (1996): Carta geologica del settore vulcanico e sedimentario cenozoico compreso tra Fordongianus e Sini (Sardegna Centrale), scala 1:50.000.
ASSORGIA A., BECCALUVA L., DI PAOLA G.M., MACCIONI L., MACCIOTTA G., PUXEDDU G., SANTACROCE R., VENTURELLI G. (1993): Carta geopetrografica del complesso vulcanico di Monte Arci (Sardegna), scala 1:50.000.
ASSORGIA A., BROTZU P., LONIS R., MORBIDELLI L., TRAVERSA G. (1986): Carta geologica del complesso vulcanico calco-alcalino oligo-miocenico dell'Arcuentu (Sardegna centroorientale), scala 1:25.000.
ASSORGIA A., BROTZU P., CALLEGARI E., FADDA A., LONIS R., OTTELLI L., RUFFINI R., ABBRATE T. (1992): Carta geologica del distretto vulcanico cenozoico del Sulcis (Sardegna sud-occidentale), scala 1:50.000.
ASUNIS M., PECORINI - G., SPANO C. (1983) Carta geologica del settore del settore di Castelsardo (1983, scala 1:10.000).
BARCA S. ET AL. (1986): Sketch map in: Carmignani et al. (Ed.) IGCP- Newsletter, 5, Sp. Issue, 45-49.
BARCA S. ET AL. (1986): Sketch map in: Carmignani et al. (Ed.) IGCP- Newsletter, 5, Sp. Issue, 51-60.
BARCA S. ET AL. (1992): Sketch map in: Carmignani L., Sassi F.P. (Ed) IGCP, 276, Newsletter, 5, Sp. Issue, 33-44.
BARCA S. ET AL. (1995): Sketch map in: Boll. Soc. Sarda Sc. Nat., Vol. 30, 1-11.
BARCA ET AL. (1996): Sketch map in "Atti Soc. Tosc. Sci. Nat., s.A, 102.
BECCALUVA L., DERIU M., MACCIOTTA G. (1981): Carta geopetrografica del vulcanismo plio-pleistocenico della Sardegna nord-occidentale, scala 1:50.000.
BECCALUVA L., MACCIOTTA G & VENTURELLI G. (1974): Nuovi dati e considerazioni petrogenetiche sulle serie vulcaniche plio-quaternarie del Montiferro (Sardegna Centro-Occidentale), Mem. Soc. Geol. It., 13, 4, pp. 539-547.
BECCALUVA L., MACCIOTTA G., VERNIA L. (1981): Carta geopetrografica del complesso vulcanico del Montiferro (Sardegna centro-occidentale), scala 1:50.000.
CARMIGNANI L. ET AL. (1982): Sketch map in: Carmignani et al.: Guida alla Geologia del Paleozoico sardo, 95-107.
CARMIGNANI L. ET AL. (1982): Sketch map in: Carmignani et al.: Guida alla Geologia del Paleozoico sardo, 119 -125.
CARMIGNANI L., COCOZZA T., PERTUSATI, P.C. (1983): Carta geologica del Paleozoico dell'Iglesiente (Sardegna sud-occidentale), scala 1:50.000.
CARMIGNANI L. ET AL. (1986): Sketch map in: Carmignani et al. (Ed.) IGCP- Newsletter, 5, Sp. Issue, 73-85.
CARMIGNANI L., COCOZZA T., GHEZZO C., PERTUSATI P.C., RICCI C.A. (1987): Structural Model of the Hercynian basement of Sardinia. scala 1:500.000.
CARMIGNANI L. ET AL. (1992): Sketch map in: Carmignani L.. - Sassi F.P. (Ed) IGCP, 276 , Newsletter, 5, Sp. Issue, 83-96.
CHERCHI A., MARCELLO A., MARINI A., MURRU M., PRETI S., SALVADORI I. (1982): Carta geologica della Sardegna, scala 1:250.000.
CHERCHI G.P., MUSUMECI G. (1987): Sketch map in: Atti Soc. Tosc. Sc. Nat. Mem.,93, 13-29. - CHERCHI G.P. ET AL. (1987): Sketch map in: Rend. Soc. It; Mineral. Petrol., Special Issue, 42, (2), 332.
DERIU M.: Cartina geopetrografica del Bosano della Planargia e del Montiferro sett.
ELTER F.M., GATTIGLIO M. (1986): Sketch map in: Carmignani et al. (Ed.) IGCP- Newsletter, 5, Sp. Issue, 73-85.
ELTER F.M. ET AL. (1986): Sketch map in: Carmignani et al. (Ed.) IGCP- Newsletter, 5, Sp. Issue, 87-97.
FUNEDDA A., OGGIANO G. & PASCI S. (2000) Geological map of Logudoro, 1:50.000 scale. Boll. Soc. Geol. It, 119, 31-38. Roma.
FUNEDDA, A., NAITZA, S., CONTI, P., DINI, A., BUTTAU, C., TOCCO, S. AND CARMIGNANI, L. -2011- The geological and metallogenic map of the Baccu Locci mine area (Sardinia, Italy), Journal of Maps, 2011, scala 1:10.000.
GARBARINO C., MACCIONI L., SALVADORI I. (1985) Carta geologica dell'Isola di S. Pietro (Sardegna), scala 1:25.000.
MAZZARINI F., PERTUSATI P.C. (1992): Sketch map in: Boll. Soc. Geol. It., 110, 747-755.
MACCIONI L., MARCHI M., ASSORGIA A. (1990): Carta dell'Isola di S.Antioco, scala 1:250.000.
NAUD G. (1982): Sketch map in: Carmignani et al.: Guida alla Geologia del Paleozoico sardo, 109-115.
OGGIANO G.: Carta geologica della pianura costiera turritana (Sardegna settentrionale), scala 1:50.000.
PORCU A. (1983): Carta Geologica del Graben di Ottana (Sardegna centrale), scala 1:50.000 -Rend. Sem. Fac. Sc. Univ. Cagliari, LIII.

1 Centro di GeoTecnologie - Università degli studi di Siena
2 Dipartimento di Scienze della Natura e del Territorio - Università degli studi di Sassari
3 Dipartimento di Scienze Chimiche e Geologiche - Università degli studi di Cagliari
4 CARG project- APAT & Regione Autonoma della Sardegna
5 IGEA - Iglesias (CA)
6 Dipartimento di Scienze della Terra, Università degli studi di Pisa
7 Professional geologist
8 ARPAS - Regione Autonoma della Sardegna
9 Dipartimento per lo studio del territorio e delle sue risorse, Università di Genova
10 Dipartimento di Scienze della Terra, Università di Torino
11 Dipartimento di Scienze della Terra e dell'ambiente, Università di Pavia

© Journal of Maps 2015