APPENDICE
APPENDIX

LEGEND OF GEOLOGICAL MAP

NEOGENE-QUATERNARY CONTINENTAL DEPOSITS

Recent and Present Deposits (**UID_{b2}**)
Detrital, landslide, debris flow, mixed and marsh deposits; active detrital-colluvial blanket, mainly from altered basement and inferred gravitational deposits.
OLOCENE - PRESENT

DORA BALTEA AND RHONE BASINS

MIAGE SYNTHEM (postglacial unit) *OLOCENE-PRESENT*

Les Iles Subsynthem (**MGE_2**) (active postglacial unit *p.p.*)
Fluvial deposits of present riverbed and lower alluvial terraces. Undifferentiated glacial deposits of present glacial margins. *PRESENT*

Château Blanc Subsynthem (**MGE_1**) (completely formed postglacial unit *p.p*)
Ablation till of glacial systems at the head of the valleys, including most of glacial deposits in the Swiss side of the map. *OLOCENE*

IVREA SYNTHEM (last glacial episode)
LATE PLEISTOCENE-EARLY OLOCENE

Pileo Subsynthem (**IVR_4**)
Glacial and minor fluvio-glacial deposits along the bottom and lower slopes of principal and tributary valleys.
LATE PLEISTOCENE (LGM p.p. - Tardiglacial)

Excenex Subsynthem (**IVR_3**)
Undifferentiated, ablation and lodgement till; landslide deposits with glacial transport; skeletal till; contact, glaciolacustrine and fluvio-glacial deposits; wide and thick strips mainly at low altitudes of the principal valley.
LATE PLEISTOCENE (LGM p.p.)

Colle San Carlo Subsynthem (**IVR_2**)
Undifferentiated, lodgement and skeletal till, contact and glaciolacustrine deposits at middle altitudes of principal valley slopes and hanging strips of tributary basins (St Barthélemy, Valtournenche).
LATE PLEISTOCENE (LGM p.p.)

Nissod Subsynthem (**IVR_1**)
Hanging sheets of undifferentiated and skeletal till and minor glaciolacustrine deposits along slopes of the principal and some tributary valleys, related to maximum glacial development.
LATE PLEISTOCENE (LGM p.p.)

AUSTROALPINE
Tectonic system derived from the hyperextended Adriatic continental margin and/or extensional allochtons within the Mesozoic Ligurian-Piedmont ocean, formed by upper and lower Austroalpine outliers (Dent Blanche nappe *s.l.*) and the Sesia-Lanzo inlier.

UPPER AUSTROALPINE OUTLIERS, NON ECLOGITIC: DENT BLANCHE S.S., MONT MARY-CERVINO, PILLONET
Detached Mesozoic cover and basement units with Eocene greenschist facies metamorphism and Late Cretaceous blueschist relics, north of the Aosta-Ranzola normal fault.

Mesozoic cover units and related rocks
Mainly carbonate successions, detached and transposed along the ductile shear zone between the Dent Blanche *s.s.* and Mont Mary-Cervino nappes (Roisan Zone Auct.) and in Pillonet klippe.

Calcschists and marbles (**RKJ**)
Normal to carbonate-rich calcschists, yellowish arenaceous marbles with silicoclastic and pelitic interbeddings, grey crystalline limestones and metamorphic sedimentary breccias, locally including lenses and tectonic sheets of Triassic marbles and dolostones, carbonaceous breccias, marbles with thin quartzitic beds and basement mylonites, unrepresentable at the map scale.
JURASSIC - EARLY CRETACEOUS ?

Roisan Marbles (**ROI**)
Marbles, dolomitic marbles, fine-grained dark crystalline dolostones, coarser and bedded whitish dolostones, marbles with thin quartzitic beds, local dolomitic and calcareous-dolomitic breccias; Col de S. Barthélemy, M. Grand Pays, Bivacco Tzan and M. Blanc du Creton area. Stromatolytic laminae, massive horizons with dasicladali algae (Griphorella curvata), suggesting a carbonate platform environment; benthyc forams (Aulotortus spp., Gandinella spp., Glomospirella spp.) at M. Grand Pays. *LATE TRIASSIC*. Rare massive white quartzites at the base of carbonate sequences.
EARLY TRIASSIC ?

Alpine mylonites and phyllonites (**DBK**)
Leaden-gray phyllonites and black mylonites derived from Mesozoic terrigenous metasediments and crystalline basement (mainly granitoids), greenish mylonites from intermediate-mafic protoliths, including sheets of dolomitic marbles and being associated to the Mesozoic carbonate successions and ductile shear zones.

Marbles and Fe-Mn quartzites from Cignana (**MQC**)
Impure marbles and finely bedded quartzites with Mn-rich garnet and micas, hematite, sodic amphiboles, epidote and stilpnomelane, north-west of Cignana lake. Age of protoliths: *PREVARISCAN ?*

Upper basement units
Top units of the Dent Blanche *s.s.* and Mont Mary - Cervino thrust sheets (Valpelline Series Auct.): Lower continental crust with prealpine high-grade metamorphism and partial Alpine retrogression.

High-grade paragneiss (Kinzigitic complex *Auct.*) (**MYS**)
Coarse-graines biotite-garnet-sillimanite gneiss and anatectic migmatites, with pegmatitic-leucogranitic dykes and interbeddings of crystalline marbles and mafic rocks; granulite-amphibolite facies metamorphism and feeble to pervasive Alpine retrogression.

Amphibolites and mafic granulites (**MYS_c**)
Metric-hectometric plagioclase-calcic amphibole ± biotite bodies, garnet-amphibolites, mafic granulites and their greenschist facies Alpine derivatives.

Old marbles (**MYS_d**)
Yellowish pure and silicate-rich crystalline marbles from prevariscan protoliths, including white mica, phlogopite, diopside, amphiboles, epidote, garnet, calcic plagioclase, scapolite.

Prealpine Mont Mary mylonites (**MYS_e**)
Very fine, hard and blackish biotite-rich mylonites with ovalized porphyroclasts of plagioclase, garnet and sillimanite.

Biotite-garnet-sillimanite paragneiss (**MYS_e**)
Generally coarse-grained high-grade paragneiss, cordierite migmatites and minor granulites with well preserved pre-alpine fabric (Kinzigite Auct.).

Felsic granulites (**MYS_i**)
Major occurrences of light gray garnet, pyroxene, plagioclase ± kyanite felsic granulites, partly evolved to prealpine amphibolite-facies derivatives.

Strongly retrogressed kinzigitic gneiss (**MYS$_l$**)
Micaschists, phyllonites and mylonites with alpine fabric, mainly located along the contact between the Valpelline and Arrolla tectonic units.

Lower basemet units
Upper-intermediate continental crust with poorly to pervasive polyphase alpine overprint.

Metagranitoids - Arolla Series Auct.

Undifferentiated gneissic granitoids (**DBA**)
Biotite and/or phengite granitic gneiss, migroaugengneiss and augengneiss (Arolla gneiss *Auct.*), fine-grained albite-biotite-amphibole-epidote ± chlorite gneiss and mylonites from calc-alkaline granitoids dominated by often crenulated Alpine S_2. Age of protoliths: *EARLY PERMIAN* (U-Pb zircon: 289±2 Ma)

Augengneiss (DBA$_a$)
Granitic gneiss with euedral to ovalized K-feldspar phenocrysts, partly replaced by chessboard albite, derived from biotite ± hornblende porphyric granite.

Greenschist facies mylonitic gneiss (**DBA$_b$**)
Fine-grained homogeneous or banded gneiss, with albite-phengite-chlorite-epidote ± biotite, calcic amphiboles, stilpnomelane, derived from granitic-quartzdioritic protoliths; mylonitic gneiss with cataclastic horizons, local black mylonites.

Fine-grained gneiss (**DBA$_c$**)
Fine-grained gneiss associated with intercalations of micaschists, marbles, metabasites and mylonites unrepresentable at the map scale; Pillonet klippe.

Alpine tectonites of St Barthélemy valley (**DBA$_d$**)
Dark mylonitic gneiss with reddish alteration surface, phyllonites and cataclasites from granitoids and paraschists of the crystalline basement, at the base of Cima Bianca carbonate successions, and associated with mylonitic orthogneiss in the southern side.

Metagranitoids (**DBB**)
Massive or poorly foliated principal bodies of isotropic to porphyric metagranitoids of granitic-quartz-dioritic composition, with abundand igneous relics (K-feldspar, quartz, partly saussuritized plagioclase, red-brown biotite ± centimetric hornblende), and Alpine weak to moderate coronitic overprint (albite, chessboard albite, epidote, quartz II, white mica, olive green biotite II, actinolite, stilpnomelane); Mt Morion, P. Tzan, Bouquetins, P. d'Otemma. Schistose varieties in the Swiss side.

Metagranitoids with mafic enclaves (DBB$_a$)
Metagranitoids filled with decimetric-plurimetric-sized lenticular enclaves of fine-grained comagmatic mafic rocks; Comba Crête Sèche, Becca Morion, P. Tzan.

Punta d'Otemma metagranodiorites (**DBO**)
Massive metamorphic granodiorites and schistose-gneisssic varieties with pervasive foliation and peculiar brownish weathering; mineral assemblage: K-feldspar, generally altered oligoclase, relict hornblende and biotite within a matrix of quartz, albite, epidote, sericite and stilpnomelane.

Bouquetins metaquartzdiorites (**DBQ**)
Metamorphic quartzdiorites with green hornblende, partly altered plagioclase and minor quartz, weak to pervasive foliation; schistose varieties consist of albite-chlorite-epidotes ± actinolitic amphiboles, biotite and white mica, in places finely-zoned, sheared or mylonitic.

Metagabbros and cumulitic peridotites

Metagabbros (**DBG**)
Gabbros, olivine gabbros and local cumulitic peridotites (Cervino, Mont Collon, la Sassa) in mylonitic contact with the Arolla gneiss. Locally well preserved, these rocks display greenschist facies alteration and pervasive fracturing and are cut by small acidic and mafic dikes. Age of protoliths: *EARLY PERMIAN* (U-Pb zircon: 284.2±0.6 - 282.9±0.6 Ma; Ar^{40}-Ar^{39} kaersutite: 260.2±0.7 Ma, K-Ar phlogopite: 250±5 Ma)

Metamorphic diorites and amphibolic gabbros (**DBG_a**)
Metamorphic diorites and gabbros with relics of igneous plagioclase, brown amphibole and rare pyroxene within a schistose matrix of green amphibole, chlorite, epidotes and albite; some schistose-mylonitic derivatives from cumulitic peridotites; Tantané, la Sassa, Stockji, La Lire, Bouquetins, Ruinette.
EARLY PERMIANO ?

Cumulitic peridotites (**DBG_b**)
Peridotites associated to the Permian gabbros, consisting of cumulitic olivine, orthopyroxene ± plagioclase and itercumulus clinopyroxene, reddish-brown pargasitic amphibole and phlogopite, together with various amounts of alteration products (talc, chlorite, white mica, ore minerals); only the body associated to la Sassa metagabbro can be represented at the map scale.

Mylonitic gabbros (**DBG_c**)
Fine-grained and whitish rocks, often including emerald green fuchsite, and occurring as continuous horizons around the megabbro bodies of Cervino and Tantanè (Pillonet).

Dykes
Acidic dykes: principal dykes of gneissic aplites and leucogranites inside the Permian igneous bodies, variously transposed by Alpine ductile deformations (**fa**). Basic dykes: biotite-rich amphibolites (from basalts and lamprophyres) and fine-grained foliated metagabbros with greenschist facies overprint; Leone glacier, Crête Sèche (**fb**). Leucocratic dykes inside metagabbros: principal aplite-pegmatite and trondhjemite dykes with weak to pervasive metamorphic overprint (**fc**).

Polymetamorphic crystalline basement

Undifferentiated polymetamorphic complex (**MMY**)
Paraschists with relics of prealpine garnet and red-brown biotite and pervasive polyphase alpine overprint under blueschist facies (garnet, sodic amphiboles ± aegirine micaschists in the Pillonet klippe) and greenschist facies conditions (everywhere); locally intercalated pegmatites, crystalline marbles and mafic rocks.

Banded paraschists (**MMY_c**)
Alpine greenschis facies variety of paragneiss and micaschists with multiple interbeddings of white mica leucocratic gneiss derived from mylonitic pegmatites, Mont Mary element *s.s.*

Comba di Arpisson plagioclase-amphibolites (**MMY_e**)
Body of prealpine hornblende-calcic plagioclase amphibolite with feeble alpine greenschist facies alteration, Comba di Arpisson, Valpelline.

Red-brown schists (**MMY_h**)
Micaschists, phyllonites and alpine mylonites, often crenulated and with very marked red-brown alteration surface.

Pillonet old marbles (**MMY_i**)
Principal interbeddings of pure and silicate-bearing (diopside, epidote ± garnet) crystalline marbles from prevariscan protoliths, north of Col Pillonet.

Pillonet amphibolites (**DBY**)
Albite-epidote amphibolites from protoliths of unknown age, in places with abundant relics of eoalpine sodic amphiboles (Rb-Sr, Ar^{40}-Ar^{39} phengite: 75-73 Ma), west of Col Pillonet.

Mt Morion pre-granitic complex (**DBP**)
Biotite-garnet paragneiss and migmatites intruded by Mt Morion - Crête Sèche granitoids, and greenschist facies alpine derivatives (micaschists and phyllonites).

Amphibolites (**DBP$_a$**)
Prealpine amphibolites and leucocratic varieties with feeble to significant alpine retrogression, associated to pre-granitic paraschists; Mt Morion - Crête Sèche.

LOWER AUSTROALPINE OUTLIERS, ECLOGITIC: ETIROL-LEVAZ AND CREBUCHETTE SLICE
Basement units with Eocene eclogitic metamorphism, along the tectonic contact between the Combin and Zermatt-Saas ophiolitic Piedmont units, Valtournenche.

Etirol-Levaz micaschists (**ETL**)
Garnet micaschists with variscan relics and minor igneous bodies, with eclogitic imprint of Eocene age (Rb-Sr phengite, U-Pb zircon: 47-45 Ma), and feeble to pervasive greenschist facies retrogression.

Enclaves-rich leucocratic schists (**ETL$_a$**)
Light eclogitic schists with abundant lenses and nodules of more or less retrogressed Eocene glaucophane-white mica eclogites, probably derived from Permian leucocratic granitoids.

Etirol-Levaz mafic rocks (**ETL$_b$**)
Main bodies of eclogites, eclogitic gabbros and albite-epidote-garnet amphibolites.

Eclogitic gabbros with granulite relics (**ETL$_c$**)
Noritic gabbros with layers and lenses of cumulitic websterites, prealpine granulitic fabric and alpine eclogitic overprint, marked by coronitic development of zoisite-kyanite-quartz-jadeite (on plagioclase), omphacite-garnet-talc-phengite (cpx), talc-garnet-kyanite-chlorite (opx), clorite-garnet-corundum-chloritoid-talc-kyanite (spinel).

PIEDMONT ZONE OF CALCSCHISTS AND GREENSTONES
Ophiolitic units issued from the closure of the Mesozoic Ligurian-Piedmont ocean, including some Permian-Mesozoic units with continental affinity.

UPPER UNITS
Combin Zone *Auct.*, also called Tsaté nappe (Valais), non eclogitic: tectonic sole of the upper Austroalpine outliers, this zone groupes greenschist facies ophiolitic units with rare blueschist relics, and Permian-Mesozoic units derived from a continental basement.

Combin unit (Italy) and Luette unit (Valais)

Calcschists *s.l.* (**ZCO**)
Undifferentiated pelitic and carbonate calcschists with interbeddings of arenaceous marbles, phyllitic schists, quartzites and metamorphic ophiolites.
JURASSIC-CRETACEOUS

Calcschists with multiple prasinite interbeddings (**ZCO$_a$**)
Alternances of metasediments and minor tabular metabasalts (prasinites), unrepresentable at the map scale.

Quartzitic-micaceous schists, quartzites and mineralized quartzites (**ZCO$_b$**)
Micaceous schists with quartz strips and lenses, micaceous quartzites with chlorite ± garnet, in places mit discrete Mn-mineralization; quartzites with sodic amphiboles, garnet-bearing marbles and Cu-Fe-rich quartzites, Les Vorpilles, Valtournenche.

Prasinites (**ZCP**)
Tholeiitic metabasalts with porphyroblastic albite, actinolite, chlorite, epidote ± carbonate, as major bodies and tabular interbeddings inside calcschists; albite-epidote amphibolites and ocellar-albite-rich varieties (ovardites *Auct.*)

Prasintes with multiple calcschists interbeddings (**ZCP$_b$**)
Alternances of prasinites and minor calcschists, unrepresentable at the map scale.

Metagabbros (**ZCG**)
Greenschist facies metagabbros (aggregates of calcic amphiboles within a matrix of albite, epidote ± chlorite), characterized by a coarse-grained flaser texture and a generally pervasive or mylonitic schistosity, as small bodies scattered within the calcschist-prasinite successions; Pancherot, Fenêtre Durand, Val de Bagnes.

Serpentinites (ZCS)
Massive, schistose, fractured or milonitic antigorite-magnetite serpentinites; Pancherot, Mt Meabè-Becca d'Aver, Motta di Pleté, Conca di By. Rodingitic reaction zones at the contact with some calcschists and metabasites; Testa di Balme-M. Avril, Conca di By.

Mt Meabé serpentinitic breccias (**ZCS$_b$**)
Tectonic breccias with centimetric calcareous-dolomitic fragments within a mylonitic serpentinite matrix.

NON OPHIOLITIC UNITS

Pleureur and Mauvoisin units

Pleureur unit (**PEU**)
Light phyllitic marbles, metasedimentary breccias with calcareous and dolomitic fragments, quartz-micaceous calcschists with reddish surface alteration; Swiss side of the map. *CRETACEOUS?*

Mauvoisin unit (**MUV**)
Light quatz-micaceous marbles, reddisch marbles with albite, chlorite and scarce epidote, and intercalations of quartzites, carbonate breccias, calcschists, quartzites and basal breccias; Boussine window, near the Mauvoisin lake (Switzerland), on the top of the Mont Fort nappe. *JURASSIC-CRETACEOUS?*

Pancherot - Cime Bianche unit

Undifferentiated carbonatic and siliciclastic metasediments (**PCB**)
Ophiolite-free brownish carbonate-rich calcschists, phyllitic calcschists and scarce metasedimentary breccias with dark dolomitic fragments. *JURASSIC-CRETACEOUS?;* dolostones and calcareous-dolomitic marbles, *MIDDLE-UPPER TRIASSIC?;* tabular white quartzites, *LOWER TRIASSIC?;* quartz-micaceous schists with porphyroblastic albite, *PERMIAN*?

Carbonatic successions (**PCB$_b$**)
Dolostones, marbles and dolomitic marbles, and associated metasedimentary breccias with dolomitic fragments; Becca d'Aran, Chamois-Cheneil, Pancherot. *MIDDLE-UPPER TRIASSIC?*

Tabular quartzites (**PCB$_c$**)
Tabular, generally pure white quartzites, with spaced films of white micas and local microclasts of quartz and microcline, Becca d'Aran, Chamois-Cheneil, Pancherot; micaceous quartzites with rust reddy alteration, Mt Meabè.
LOWER TRIASSIC?

Quartzitic schists (**PCB$_d$**)
Quartz-micaceous gray-silvery schists with porphyroblastic albite, minor fine-grained metaconglomerates with quartz-feldspathic clasts; Becca d'Aran-Cheneil, Vofrede-Fenêtre de Tsignanaz (Cignana). *PERMIAN?*

Madzeria unit and minor Triassic strip

Marbles and dolostones (**MZD**)
Small slices and slivers of marbles, dolomitic marbles, dolostones, metasedimentary breccias and carnieules, on the top or inside the Métailler unit, Swiss side of the map, doubtfully attributed to the Tsaté nappe in the Chanrion map. *MESOZOIC*

LOWER OPHIOLITIC UNIT

Zermatt-Saas unit: fragments of oceanic litosphere with oceanic alteration, Eocene eclogitic imprint, locally coesite-bearing (Cignana lake), and discontinuous greenschist facies retrogression, located below the Combin Zone and the Etirol-Levaz unit and over the Monte Rosa nappe.

Undifferentiated calcschists (**ZZS**)

Pelitic and carbonaceous calcschists and eclogitic micaschists with calcite and/or ankerite, garnet ± Mg-chloritoid, glaucophane and rare sodic pyroxene, including marbles, phyllitic schists, micaceous quartzites and small ophiolitic bodies, unrepresentable at the map scale. *JURASSIC-EARLY CRETACEOUS?*

Metasediments with intercalation of metabasites (**ZZS**$_a$)

Alternances of metasediments and generally retrogressed, unrepresentable glaucophane-rich eclogites; Plan Maison, Champ Long - Promindo-Cleyva Groussa.

Quartzites and terrigenous metasediments (**ZZS**$_b$)

Principal intercalations of quartzites, garnet-bearing quartzitic schists (torrent Marmore), carbonate or albitic phyllites, leaden phyllonites ± garnet (Goillet lake).

Coesite metasediments and eclogites of Cignana lake (**ZZS**$_h$)

Quartz-phengite-garnet schists and phengitic quartzites with interbeddings of garnet ± green emerald sodic pyroxene and calcschists, associated to eclogitic metabasalts and grading downward to manganiferous varieties; right shoulder of the Cignana dam. *JURASSIC*

Manganiferous quartzites (**ZZS**$_f$)

Quartzites and quartz-chlorite-micaceous schists with multicolored nodules, lenses and beds of spessartine, piedmontite and braunite; NE of Plan Maison, Cignana dam. *LATE GIURASSIC?*

Albite amphibolites with eclogitic relics (**ZSA**)

Diablastic aggregates of calcic amphibole-albite, epidote, chlorite and relics of HP garnet ± glaucophane, derived from retrogression of eclogites and glaucophanites (former MORB); epidote-rich amphibolites and minor prasinitic varieties.

Eclogites (**ZSA**$_b$)

Eclogites and glaucophane-eclogites consisting of garnet, omphacite, rutilo ± glaucofane, zoisite, Na-Ca amphiboles, white mica and carbonate, with weak and discontinuous greenschist facies alteration; Breuil, Gran Plan, Cignana.

Glaucophanites (**ZSA**$_c$)

Garnet ± carbonate glaucophanites, including losange-shaped pseudomorphs of zoisite and white mica after lawsonite, derived from tholeiitic basalts with strong oceanic alteration; Breuil, Antey-Herin.

Metagabbros (**ZSG**)

Coarse-grained massive to flaser Mg-metagabbros, with calcic amphiboles, clinozoisite, chlorite ± garnet; light green mylonitic gabbros, in places with Cr-mica; Valtournenche.

Eclogitic gabbros (**ZSG**$_a$)

Eclogitic Fe-Ti gabbros, with massive, flaser and mylonitic texture, and intercalations of eclogites, glaucophanites and garnet amphibolites (road to Herin, slope below Etirol); metagabbros and massive metatroctolithes with HP coronitic assemblages; Crepin.

Serpentiniti (**ZSS**)

Antigorite-magnetite serpentinites with aggregates and veins of alpine titanclinohumite-olivine-diopside and thin intercalations of chlorite-schists; Valtournenche, Breuil.

Rodingites (**fr**)

Principal dykes and boudins, inside serpentinites, of rodingitic metagabbro (grossularite-andradite, diopside, epidote, vesuvianite) mantled by chloritic schists (Barmaz, Perrière-Gouffre de Busserailles-Valtournenche); rodingitic reaction zones between serpentinites and some surrounding rocks (Goillet lake).

MIDDLE-PENNINIC GRAN ST BERNARD TECTONIC SYSTEM

Tectonic multinappe system derived from the European continental margin and referred to the briançonnais domain.

MONT FORT NAPPE

Uppermost and internal tectonic element of the Gran St Bernard system, including units with alpine blueschist and greenschist facie metamorphism, free of high-grade variscan relics; Boussine window, Bagnes valley, Swiss side.

Métailler unit (**MTL**)

Albitic gneisses, chloritoid ± garnet and sodic amphiboles micaschists, minor quartzites and carbonate-bearing schists (Métailler complex in the Sheet 090 Aosta). *CAMBRO - ORDOVICIAN?*

Métailler metabasites (**MTL_a**)

Main intercalations of pretriassic metabasalts with alpine blueschist and greenschist facies imprint: glaucophanites, prasinites, ovardites, albite-chlorite ± carbonate schists.

Mont Fallère unit (**FLR**)

Micaschists with chlorite, chloritoid and garnet, albitic gneiss and multiple prasinitic interbeddings, reddish alteration surface (Mt Fallère complex in the Sheet 090 Aosta). *CAMBRIAN?*

TECTONIC AND HYDROTHERMAL ROCKS

Principal cataclasites, fault breccias and pseudotachylytes inside Arolla metagranitoids (Chavacour - Trois Villes fault), metagabbros (Col de Crête Sèche) and along the reactivated segments of the tectonic contact between the Valpelline and Arolla units, right slope of lower Valpelline (**ca**).

Carnieules and carbonate breccias related to the tectonic and fluid activity along late-alpine faults (**cc**).