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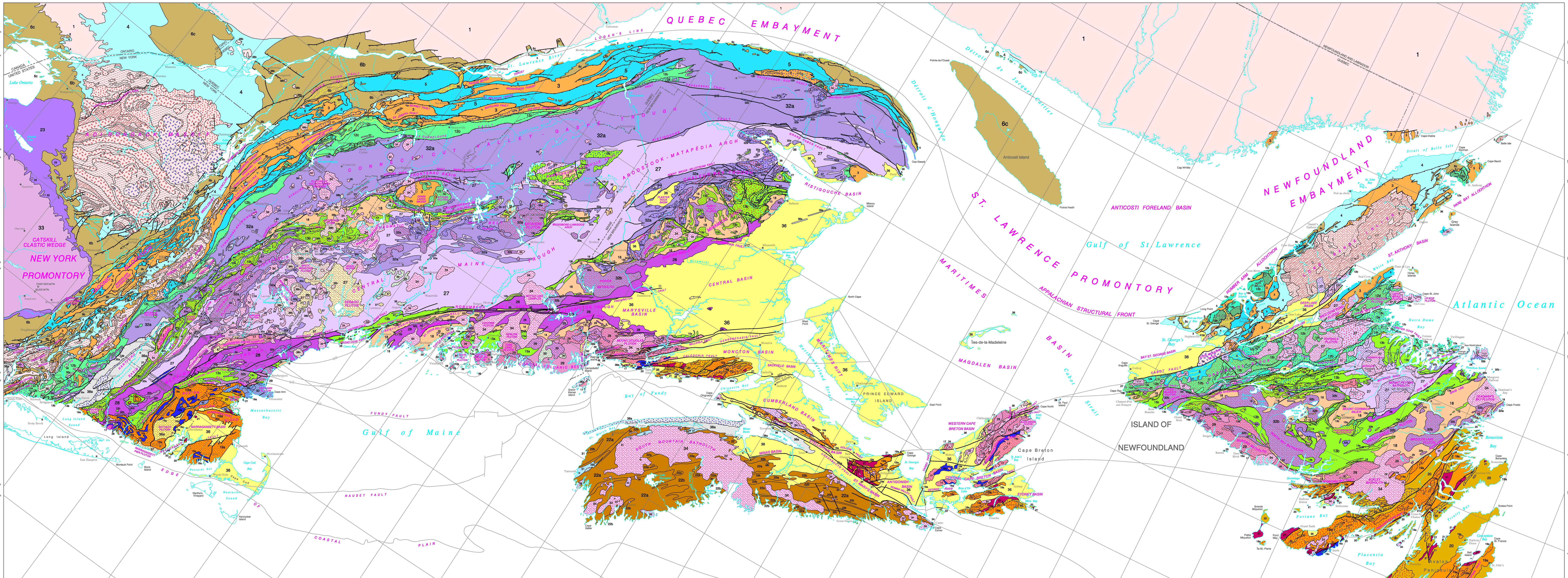

Atlantic Ocean

LEGEND

This legend is common to both the north and south sheets of this map.
Not all lithotectonic units shown in the legend necessarily appear on this sheet.
Examples of representative stratigraphic units given in red.

Era	Period	Epoch	Ma
MESOZOIC	CRETACEOUS		65
	JURASSIC		145.6
	TRIASSIC		208
PALEOZOIC	PERMIAN		245
	CARBONIFEROUS	PENNSYLVANIAN	286
		MISSISSIPPIAN	333
	DEVONIAN	Late	362
		Middle	383
		Early	394
	SILURIAN	Late	418
		Early	429
	ORDOVICIAN	Late	443
			458
PALEOZOIC	ORDOVICIAN	Late	443
		Middle	459
		Early	465
	CAMBRIAN	Late	490
		Middle	500
		Early	511
PROTEROZOIC	NEO		542
			650
			750
			850
	MESO		1000

Time scale modified from:
McKerrow, W.S. and van Staal, C.R.
2000: The Palaeozoic time scale reviewed; *in* Orogenic Processes: Quantification and Modelling in the Variscan Belt, (ed.) W. Franke, V. Haak, O. Oncken, and D. Tanner; Geological Society of London, Journal, Special Publications, v. 179, p. 5–8.

KEY

- Mélange and broken formation
- Volcanic rocks (felsic / mafic)
- Intrusive rocks (felsic / mafic)
- Mafic and ultramafic components of an ophiolite and areas of isolated ultramafic and meta-ultramafic bodies
- Shear zone

For Unit 1 only

- Orthogneiss
- Anorthosite-mangerite-charnockite suite rocks (mangerite, charnockite, granite / gabbro, anorthosite)
- Paragneiss and metavolcanic rock

39 Plutonic rocks of unknown age and origin. Greensboro intrusive suite

Continental rift basins and magmatism related to formation of the Atlantic Basin

38 38a. Alluvial and lacustrine clastic sedimentary rocks and local basalt, granite, syenite, gabbro, and minor felsic volcanic rocks; rift basins immediately preceding formation of the Atlantic Ocean. Newark Supergroup, North Mountain Basalt, Wolfville Formation
38b. New England–Quebec igneous suite; alkalic granite, syenite, and gabbro with minor felsic volcanic rocks. White Mountain magmatic suite

Southern Appalachians

35 Lower Mississippian to Lower Permian mainly terrestrial clastic sedimentary rocks that form westward transgressive wedges; includes minor cratonal facies near base.
35a. Mauch Chunk-Pottsville clastic wedge. Mauch Chunk Group
35b. Pennington-Lee clastic wedge. Lee Formation
35c. Ouachita clastic wedge. Pottsville Group

Alleghanian plutonism

37 Carboniferous to Permian plutonic rocks. Rolesville batholith, Narragansett Pier pluton, Sebago pluton

Northern Appalachians

36 Middle Devonian to Permian mainly terrestrial and marine clastic sedimentary rocks. Includes minor limestone, evaporite, and volcanic rocks. Commonly deposited in fault-controlled basins, collectively referred to as the Maritimes Basin in Canada. Narragansett Bay group, Horton Group, Pictou Group
36a. Late Devonian alkalic plutons related to Late Devonian rift-related volcanism in the Narragansett basin. Scituate pluton

34 Middle Devonian to earliest Carboniferous plutonic rocks. Concord pluton, Deer Isle Granite, South Mountain batholith, Ackley batholith

Acadian clastic wedge

33 Mainly Middle to Upper Devonian dominantly terrestrial clastic sedimentary rocks deposited on the west flank (Catskill clastic wedge) and on interior portions of the Appalachian Orogen; includes minor carbonate rocks. Hamilton Group, Genesee Group, Sonyea Group
— on Laurentian Realm —

Northern Appalachians
(except unit 32c)

Syn-Acadian sedimentary and magmatic rocks

32 32a. Upper Silurian and Lower Devonian mainly marine with subordinate terrestrial clastic sedimentary rocks; commonly lying unconformably on pre-Upper Silurian rocks. Calcareous rocks are locally prominent in the west. Includes non-arc volcanic and associated bimodal magmatic rocks. Unit extends into Middle Devonian in Gaspésie. Seboomook Group, upper part of Chaleurs Group (above Salinic unconformity), Piscataquis magmatic suite
32b. Non-arc volcanic rocks and bimodal magmatic rocks of possibly unrelated tectonic settings. Exeter pluton, North Pole pluton, Rose Blanche pluton, North Bay batholith
32c. Upper Silurian to Lower Devonian plutonic rocks confined to Carolinia. Concord-Salisbury Plutonic Suite

Southern Appalachians

Mid-Paleozoic clastic wedge and time-equivalent rocks

23 Middle Ordovician to Lower Devonian, generally thin, shallow marine to terrestrial, clastic sedimentary wedge with subordinate carbonate rocks and chert. Includes unit 33 in southernmost Appalachians and carbonate rocks that are either the cratonward equivalent of unit 6 or lie unconformably on rocks deformed during the Taconic Orogeny. Tuscarora Formation, Tonoloway Formation, Salina Group
— on Laurentian Realm —

Extensional basin and cover rocks

24 Upper Ordovician to Lower Mississippian clastic sedimentary rocks and diamictite lying unconformably on unit 4. Talladega Group
— on southern Laurentian Realm —

Mid-Paleozoic magmatism mainly in Axial Realm

25 Middle Ordovician to Lower Silurian plutonic rocks and orthogneiss mainly confined to the Piedmont domain. Shelton Granite Gneiss, Cortlandt complex

Marine basin

26 Upper Ordovician slate, schist, quartzite, and conglomerate with minor metavolcanic rocks. Arvonia Formation
— on Axial Realm —

Mid-Paleozoic upper-plate sedimentary and magmatic rocks

27 Upper Ordovician to Upper Silurian, syntectonic, submarine to terrestrial clastic locally calcareous sedimentary and associated magmatic rocks of extensional to arc affinity. Badger Group, Madrid Formation, Grog Brook Group, Botwood Group
— on Laurentian and Axial realms and Ganderia —

Marine foredeep basin

28 Upper Ordovician to Upper Silurian syntectonic submarine clastic sedimentary rocks, commonly with calcareous siltstone. Merrimack Group, Bucksport Formation, Kingsclear Group, Indian Islands Group
— on Axial Realm and Ganderia —

29 Silurian to Lowest Devonian arc and rifted-arc bimodal magmatic rocks and associated marine sedimentary rocks confined to the Peri-Gondwanan Realm. Some faunas exhibit "Old World" affinities. Newbury Volcanic Complex, Eastport Formation, Mascarene Group, Kingston Complex, La Poile Group, Burgeo batholith, Cadillac Mountain pluton

Mid-Paleozoic bimodal magmatism in Peri-Gondwanan Realm

30 Upper Ordovician to Lower Silurian bimodal alkalic magmatic rocks of unknown tectonic affinity confined to Avalonia. Quincy Granite, Cape Ann pluton

Meguma cover sequence

31 Upper Ordovician to Devonian shallow marine to terrestrial clastic sedimentary and local magmatic rocks. Annapolis Group
— on Meguma —

LAURENTIAN REALM
(entire orogen)

Taconic foreland basin

6 Westward-transgressive clastic wedges mainly derived from an eastern source and associated carbonate rocks. Locally includes mélange.
6a. Lower Middle Ordovician Sevier clastic wedge. Sevier Formation
6b. Middle to Upper Ordovician Taconic clastic wedge; gradational with unit 23. Martinsburg Formation, Walloomsac Formation
6c. Lower to Upper Ordovician Tourelle-Humber wedge; extends into Lower Silurian on Anticosti Island. Tourelle Formation, Goose Tickle Group

Knox–Beekmantown–St. George unconformity

Iapetus drift facies - passive margin sequence

4 Lower Paleozoic basal transgressive clastic sequence and overlying dominantly carbonate platform sequence containing local clastic rocks. Chilhowee Group, Knox Group, Beekmantown Group, Philipsburg Group, Port au Port Group, Potsdam Sandstone

5 Continental slope-and-rise facies; locally may contain oceanic volcanic rocks and rift-facies rocks. Conestoga Limestone, Ottauquechee Formation, Trois-Pistoles Group, Northern Head Group, West Castleton Formation

Iapetus rift facies

3 Neoproterozoic to Cambrian mainly clastic sedimentary rocks filling rift basins and associated magmatism related to Iapetan rifting. Locally contains fragments of oceanic crust. Ocoee Supergroup, Catoctin Formation, Pinnacle Formation, Tibbit Hill Formation, Bateau Formation, Lynchburg Formation

2 Encratonic magmatic rocks (ca. 750–680 Ma) and associated sedimentary rocks; southern Appalachians. Grandfather Mountain Formation, Crossnore Complex

Grenville basement of Laurentia including ca. 1 Ga inliers within the hinterland

1 Gneiss, schist, and plutonic rocks affected by the Grenville Orogeny and associated post-orogenic granitoid bodies. Elk Park Plutonic Suite, Mount Holly Complex, Disappointment Hill Complex
1a. Basement components ≥ 1.5 Ga.

AXIAL REALM

Southern Appalachians

PIEDMONT DOMAIN

Composite magmatic arc and other magmatic rocks

8 8a. Mainly Lower to Middle Ordovician metamagmatic rocks and associated metaclastic rocks of the Chopawamsic volcanic arc. Chopawamsic Formation
8b. Other metamagmatic rocks and associated metaclastic rocks of rift, magmatic-arc, or oceanic affinity. Dadeville Complex

10 Unseparated schist, gneiss, and migmatite; may include rocks as young as Silurian. Contains detrital zircon populations distinct from those of units 7 and 9. Unnamed gneiss and schist east of Brindle Creek fault

9 Neoproterozoic to Lower Paleozoic mainly clastic metasedimentary rocks, schist and gneiss locally associated with amphibolite and meta-ultramafic rocks. Separated from unit 7 by a generally closer spatial relationship with unit 8a, more prevalent migmatization, no direct association with ca. 1 Ga basement, the lack of eclogite, and distinct structural style. Unnamed gneiss and schist of the Six Mile Nappe

Multiply tectonized accretionary complex

7 Neoproterozoic to Lower Paleozoic mainly clastic metasedimentary rocks, schist, and gneiss containing metaclastic mélanges and subordinate amphibolite, meta-ultramafic rocks, and eclogite. Locally associated with ca. 1 Ga gneiss of unit 1. Likely includes rocks equivalent to units 1, 3, 4, 5, 6, 8, and 9. Ashe Formation, Evington Group
7a. Metaclastic rocks and amphibolite of the Smith River allochthon; metaclastic rocks yield Early Cambrian monazite ages. Fork Mountain Formation

GOOCHLAND DOMAIN

Metamorphic rocks of unknown origin

11 High-grade paragneiss, orthogneiss, and amphibolite of unknown affinity that structurally overlie ca. 1 Ga basement of unit 1. Locally contains small bodies of Devonian orthogneiss. Maidens Gneiss

Northern Appalachians

Peri-Laurentian Arc System (Iapetan)

12 12a. Mainly Cambrian (> 495 Ma) ophiolitic and suprasubduction-zone magmatic rocks with associated sedimentary rocks, broken formation and mélange. Characterized by Laurentian fauna. Belvidere Mountain and Mt. Orford complexes; Lushs Bight Group
12b. Mainly Lower to Upper Ordovician ophiolitic and magmatic-arc rocks with associated sedimentary rocks; older strata contain Laurentian fauna. Hawley Formation, Snooks Arm Group
12c. Lower to Upper Ordovician forearc sedimentary rocks, in part deformed into broken formation and mélange, largely deposited above 12b during its translation onto the Laurentian margin. Saint-Daniel Mélange, Flat Water Pond Group
12d. Upper Ordovician to Lower Silurian (445–434 Ma) magmatic-arc rocks. Locally includes associated/interlayered sedimentary rocks. Attean pluton, Pointe-aux-Trembles Formation, Burlington pluton

Peri-Gondwanan Arc System (Iapetan)

13 Lower Paleozoic oceanic and volcanic-arc rocks commonly deposited on Ganderia.
13a. Cambrian to Lower Ordovician ophiolitic and suprasubduction-zone magmatic rocks and associated sedimentary rocks, mélange, and broken formation. Characterized by Celtic and/or Gondwanan faunas. Ellsworth Formation, Tally Pond Group
13b. Lower to Upper Ordovician ophiolitic, suprasubduction-zone, and rifted volcanic-arc magmatic rocks with associated sedimentary rocks, mélange, and broken formation. Older strata characterized by Celtic and/or peri-Gondwanan faunas. Ammonoosuc Volcanics, Oliverian Plutonic Suite, Tetagouche Group, Exploits Group
13c. Upper Cambrian to Upper Ordovician magmatic and sedimentary rocks of unknown affinity. Marlboro Formation

PERI-GONDWANAN REALM

Southern Appalachians

CAROLINIA

Suprastructural magmatic-arc and associated rocks

14 14a. Younger magmatic-arc/back-arc and overlying sequences — Neoproterozoic to Lower Paleozoic magmatic sequences with associated clastic sedimentary rocks; generally < 580 Ma. Albemarle Group
14b. Older magmatic arc — Neoproterozoic magmatic-arc rocks with associated clastic sedimentary rocks; generally > 580 Ma. Virgilina Formation
14c. Unseparated magmatic and clastic sedimentary sequences. Spring Hope Formation
14d. Mafic-ultramafic complex of probable oceanic origin. Complex of Halifax County

Infrastructural magmatic-arc/oceanic rocks

15 Gneiss, schist, metavolcanic rocks, and amphibolite, with local mélange and ultramafic bodies. Locally yield Neoproterozoic to Cambrian radiometric ages. Battleground Formation

Northern Appalachians

GANDERIA

Passive margin

18 Mainly Cambrian to Lower Ordovician quartzose clastic slope-and-rise deposits; locally contains mafic dikes. Albee Formation, Baskahegan Lake Formation, Grand Pitch Formation, Cape Elizabeth Formation, Miramichi Group, Cookson Group, Gander Group

Magmatic arc

17 Mainly Upper Neoproterozoic to Lower Cambrian continental magmatic-arc/back-arc rocks with associated clastic sedimentary rocks. Peak magmatism at ca. 620 Ma and ca. 570 to 540 Ma. Includes locally minor Middle to Late Cambrian magmatism. Dry Hill Gneiss, Massabesic Gneiss, Brookville Gneiss

Peri-Gondwanan basements

16 16a. Migmatite, paragneiss, pelite, marble, platformal quartzite-carbonate sequences, and olistostromal clastic rocks; > 630 Ma. Blackstone Group, Westboro Formation, Green Head Group, Blues Brook Formation, Islesboro Formation
16b. Orthogneiss; > 700 Ma (confined to Avalonia). Economy River Gneiss
16c. Mafic magmatic rocks with associated clastic sedimentary rocks; ca. 760 Ma (confined to Avalonia). Burin Group

AVALONIA

Clastic shelf

21 Upper Neoproterozoic to Lower Devonian clastic sedimentary rocks with local carbonate rocks and mafic and felsic magmatic rocks; Middle Cambrian and younger rocks lie unconformably on unit 19. Characterized by an 'Avalonian' fauna. Conanicut Group, Saint John Group, Iron Brook Group, Wabana Group, Braintree Argillite

Magmatic arc to rift

20 Upper Neoproterozoic volcanic rocks with marine to terrestrial clastic sedimentary rocks transitional between older magmatic-arc rocks and younger clastic shelf. Boston Bay Group, Musgravetown Group, Coldbrook Group, Fourchu Group

19 19a. Younger Neoproterozoic magmatic arcs — felsic magmatic rocks with intermediate and mafic magmatic rocks and marine to terrestrial clastic sedimentary rocks; ca. 630 to 580 Ma. Dedham Granite, Marystown Group, Love Cove Group, Conception Group, Broad River Group
19b. Older Neoproterozoic magmatic arcs — felsic magmatic rocks with intermediate and mafic magmatic rocks and associated clastic sedimentary rocks; > 670 Ma. Stirling Group, Tickle Point Formation

MEGUMA

Abyssal fan deposits

22 Upper Neoproterozoic to Ordovician marine clastic sedimentary rocks. Meguma Group
22a. Mainly sandstone. Goldenville Formation
22b. Mainly dark shale. Halifax Formation

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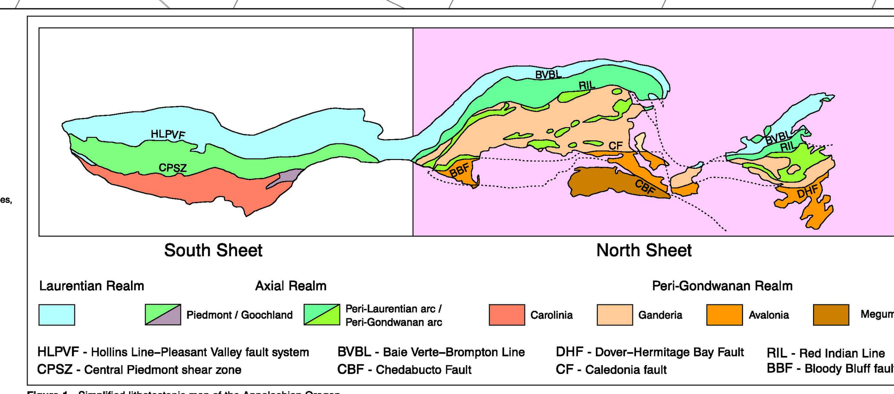

Figure 1. Simplified lithotectonic map of the Appalachian Orogen.

- Geological boundary
- Thrust fault
- Strike-slip (arrows indicate relative movement) or undefined fault
- Normal fault
- Submerged major structures and/or geological boundaries

Copies of this map may be obtained from the Geological Survey of Canada:
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MAP 2096A

LITHOTECTONIC MAP OF THE APPALACHIAN OROGEN

CANADA–UNITED STATES OF AMERICA

Scale 1:1 500 000/Échelle 1/1 500 000

kilometres 50 0 50 100 150 kilomètres

Hotine Oblique Mercator Projection (Azimuth Centre)
Central meridian -72.55, Scale Factor 1.0

Projection Mercator oblique de Hotine (azimuth centre)
Méridien central -72.55, facteur d'échelle 1.0

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Sheet 2 of 2, North Sheet

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