U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

MISCELLANEOUS INVESTIGATIONS SERIES
MAP I-2176 (SHEET 2 OF 2)

DESCRIPTION OF ACCRETED TERRANES

[Arranged alphabetically by map symbol. Numbers in parentheses following terrane names indicate region(s) where they are found: 1, northern and central Alaska north of 64° N. and northwestern Yukon Territory, Canada; 2, southern Alaska south of 64° N., west of 141° W.; 3, southeastern Alaska and western Canada (southwestern Yukon Territory and British Columbia) north of 53° N.; 4, British Columbia, Canada, south of 53° N., and northern Washington; 5, eastern Oregon, southeastern Washington, and western Idaho; 6, western Washington, western Oregon, and northern California north of 40° N.; 7, Nevada, Sierra Nevada and eastern California; 8, coastal California south of 40° N.; 9, southeastern California, western Arizona, and northern Mexico north of 25° N.; 10, southern Mexico south of 25° N.]

Arctic Alaska terrane (1)

AAC **Coldfoot subterrane**—Metagraywacke, phyllite, and quartz-mica schist polymetamorphosed in late Mesozoic; age of protolith uncertain, but probably middle Paleozoic

AAD **DeLong Mountains subterrane**—Complex stratigraphic assemblage characterized by thick Devonian and Mississippian carbonate rocks and younger sequences of chert and argillite; includes Kelly River, Ipnavik River, and Nuka Ridge thrust sequences of Mayfield and others (1978)

AAE **Endicott Mountains subterrane**—Stratified sequence of Devonian terrigenous clastic rocks, Carboniferous shale and shelf carbonate rocks, and upper Paleozoic and lower Mesozoic, mainly deep-marine chert, argillite, and calcareous rocks such as those of Otuk Formation

AAH **Hammond subterrane**—Structurally complex and polymetamorphosed assemblage of middle Paleozoic and older marble, schist, quartzite, and metarhyolite; possibly includes Precambrian crystalline basement rocks. Intruded by gneissic Late Devonian granitic rocks

AAN **North Slope subterrane**—Precambrian to lower Paleozoic basement rocks overlain by stratified sequence of Mississippian conglomerate, Carboniferous shelf carbonate rocks, and Permian to lower Mesozoic strata of the Sadlerochit Group and Shublik Formations composed of nonmarine to deep shelf, partly calcareous, fine-grained, terrigenous clastic rocks

AAN-AAE **North Slope-Endicott Mountains subterrane**—Thrust-imbricated stratigraphic assemblage that combines the characteristics of AAN (such as the presence of lower Paleozoic rocks) and AAE (such as incorporating the lower Mesozoic Otuk Formation), or else is a structural composite of these two subterranes

AG **Applegate terrane (6)**—Mafic and intermediate volcanic rocks interbedded with minor lower Mesozoic(?) marble and metasedimentary rocks of marine origin

AM **Angayucham terrane (1)**—Structurally and stratigraphically complex assemblage of oceanic rocks, including gabbro, diabase, pillow basalt, chert, graywacke, argillite, and minor limestone; sedimentary rocks range in age from Mississippian to Jurassic

AR **Arteaga terrane (10)**—Composite terrane of metamorphosed Triassic volcaniclastic rocks structurally juxtaposed with Paleozoic schist

AX **Alexander terrane, undifferentiated (3, 4)**—Schist and gneiss derived from feldspathic sedimentary rocks, felsic to mafic volcanic rocks, and minor pelitic and carbonate rocks

AXA **Admiralty subterrane (3)**—Devonian and Mississippian basalt, carbonate rocks, and chert in fault contact with Ordovician flysch. Overlying Permian and Triassic rocks are the same as those of the Craig subterrane

AXC **Craig subterrane (2, 3)**—Pre-Ordovician metamorphic complex and thick, relatively complete, Ordovician to Triassic succession of volcanic rocks, including pillow basalts, interstratified with mainly marine clastic and carbonate rocks. Volcanic rocks range from felsic to mafic; comagmatic intrusive rocks are mainly of early Paleozoic age. Includes Annette subterrane of Alexander terrane of Monger and Berg (1987)

AZ **Alcatraz terrane (8)**—Sandstone, mudstone, and conglomerate containing abundant detrital potassium-feldspar and a single occurrence of Early Cretaceous megafossils; among the typical exposures of the Franciscan Complex

BA **Baker terrane (5)**—Disrupted upper Paleozoic oceanic crust, associated deep-marine upper Paleozoic and Triassic sedimentary rocks, and a wide variety of tectonically admixed rocks including large masses of serpentine and blocks of shallow-marine upper Paleozoic limestone, some of which contain Tethyan fusulinids; forms most of the Central melange terrane of Dickinson (1979)

BH **Burnt Hills terrane (8)**—Variably metamorphosed arkosic graywacke, mudstone, and conglomerate interbedded with minor radiolarian chert, contains mid-Cretaceous and Late Cretaceous fossils

BL **Bucks Lake terrane (7)**—Composite of three structurally complex, fault-bounded belts consisting of (1) upper Paleozoic to lower Mesozoic argillite and metachert, (2) undated meta-andesite and metatuff, and (3) disrupted serpentinite, ultramafic rocks, and fine-grained metasedimentary and mafic metavolcanic rocks; from east to west, these belts correspond to the Calaveras, Franklin Canyon, and Horseshoe Bend Formations

BP **Broad Pass terrane (2)**—Structurally complex assemblage of chert, argillite, phyllite, bedded tuff, graywacke, and limestone; contains Mississippian radiolarians in chert and middle Paleozoic corals in limestone

BR **Bridge River terrane (4)**—Tectonically disrupted, variably metamorphosed, Middle Triassic to Lower Jurassic chert, argillite, basalt, ultramafic rocks, and minor sandstone and carbonate rocks

BRK **Black Rock terrane (7)**—Composite or tectonically telescoped terrane of upper Paleozoic to middle Triassic oceanic-basin and island-arc rocks; includes upper Paleozoic pelitic and cherty rocks associated with partly volcanogenic sandy or conglomeratic turbidites, Permian andesitic rocks and conspicuous limestone units, and Triassic deep-marine, partly tuffaceous, mostly fine-grained strata

BRY **Baldry terrane (1)**—Polymetamorphosed structural complex of chert, marble, greenschist, and mica schist; protolith ages probably early to middle Paleozoic

BV **Barkerville terrane (3, 4)**—Variably metamorphosed, possibly Late Proterozoic and Paleozoic pelite and grit, with minor volcaniclastic rocks, carbonate rocks, and conglomerate. Treated as a subterrane of the Kootenay terrane by Wheeler and others (1988)

BY **Baldy terrane (8, 9)**—Lower greenschist- to lower amphibolite-facies metamorphic rocks having protoliths of graywacke and minor pelite, chert, marble, basalt, and serpentine; includes the Pelona, Orocopia, and Rand Schists

CA **Cassiar terrane (3, 4)**—Upper Precambrian to Devonian platformal carbonate rocks, sandstone, and graptolitic shale

CAB **Caborca terrane (9)**—A composite of North American Precambrian basement rocks, their Paleozoic miogeoclinal cover, overthrust Paleozoic allochthons of deep-marine terrigenous clastic rocks, and younger overlap deposits, all of which are interpreted as having been displaced southeastward with respect to North America in Middle Jurassic time

CC **Cache Creek terrane, undifferentiated (3, 4)**—Disrupted Pennsylvanian and Permian chert, argillite, basalt, and carbonate and ultramafic rocks; local high-grade blueschist of Late Triassic metamorphic age

CCB **Bonaparte subterrane (4)**—Melange having a matrix of Permian to Upper Triassic chert and argillite and blocks of chert, basalt, ultramafic rocks, and Middle Pennsylvanian to Lower Permian limestone

CCF **French Range subterrane (3)**—Permian carbonate rocks overlying mafic or felsic volcanic rocks; interbedded Upper Triassic chert and graywacke present locally

CCM **Marble Range subterrane (4)**—Middle and Upper Permian shallow-water carbonate rocks and minor basalt and chert; locally associated with Lower Triassic radiolarian limestone and calcareous tuff

CCN **Nakina subterrane (3)**—Coherent sequence of Mississippian basalt overlain by Mississippian to Permian carbonate rocks and Middle or Upper Triassic chert

CCP **Pavilion subterrane (4)**—Lower and Upper Triassic argillite, chert, and siltstone; minor Permian and Upper Triassic limestone, volcaniclastic rocks, and basalt

CCS **Sentinel subterrane (3)**—Disrupted Pennsylvanian, Permian, and possibly Mesozoic radiolarian chert and argillite, pillow basalt, diabase sills, and extensive, probably olistostromal sandstone and carbonate breccia containing clasts ranging in age from Mississippian to Permian

CD **Condrey Mountain terrane (6)**—Quartz-mica schist, metachert, metatuff, and scarce metaserpentinite; contains metamorphic minerals transitional between blueschist and greenschist facies

CE **Central terrane (6, 8)**—Disrupted melange of highly sheared argillaceous matrix containing tectonic blocks of all sizes, some of the larger of which are recognized as separate terranes; microfossils from matrix mudstone, radiolarian tuff, and chert range from Late Jurassic (Tithonian) to Early Cretaceous (Valanginian) age; tectonic blocks in the melange, such as the Laytonville Limestone, are as young as mid-Cretaceous (Turonian)

CG **Chugach terrane (2, 3)**—Complexly deformed, weakly metamorphosed Upper Cretaceous (Maastrichtian) graywacke and slate, locally interleaved with disrupted assemblages of Triassic to Cretaceous radiolarian chert, gabbro, ultramafic rocks, pillow basalt, and tuff, as well as rare blocks of limestone, diorite, and other exotic lithologic types

CH **Chulitna terrane (2)**—Folded and thrust-faulted, but stratigraphically coherent sequence of Upper Devonian ophiolite, Mississippian chert, Permian volcanic conglomerate, limestone, chert, and argillite, Lower Triassic limestone, Upper Triassic redbeds, pillow basalt, limestone, sandstone, and shale, and Jurassic argillite, sandstone, and chert

CK **Chilliwack terrane (4)**—Devonian to Permian argillite, siltstone, sandstone, conglomerate, carbonate rocks, and dacitic to basaltic volcanic rocks overlain by Upper Triassic and Lower Jurassic argillite, siltstone, and volcanic sandstone

CM **Central metamorphic terrane (6)**—Amphibolite-grade Salmon Schist and overlying Abrams Schist that are of Devonian metamorphic age and have protoliths of mafic to intermediate magmatic rocks

CO **Coastal terrane (6, 8)**—Broken formation consisting largely of arkosic sandstone, characterized by abundant laumontite veins; included fossils range from Late Cretaceous to Eocene in age

COA **Coahuila terrane (9, 10)**—Deformed and metamorphosed flysch and fore-arc igneous rocks of an upper Paleozoic magmatic arc and fore-arc assemblage, and distal deep-water marine deposits spanning the Paleozoic; all unconformably overlain by Triassic to Jurassic continental redbeds and evaporites

CR **Crescent terrane (4)**—Basalt flows, pillow lava, tuff, breccia, and comagmatic mafic dikes, intercalated in part with lower and middle Eocene, deep-marine, flyschoid argillite and volcanic sandstone; younger Eocene and Oligocene basaltic volcanic rocks and associated sedimentary rocks are of deep marine to subaerial origin

CT **Catalina terrane (8)**—Amphibolite-grade metasedimentary and metavolcanic rocks structurally overlying similar, but glaucophanitic, greenschists, which in turn structurally overlie metagraywacke, metachert, and metavolcanic rocks metamorphosed to blueschists

CTS **Cortes terrane (8, 9)**—Amphibolite-grade metamorphic rocks and minor marble formed from Paleozoic miogeoclinal strata having a Precambrian basement; represents a metamorphosed continent fragment. The distribution of major lithic associations within the part of the Cortes terrane in northern Baja California and contiguous California is shown by Gastil and Miller (1983)

CW **Clearwater terrane (2)**—Structurally complex and variably metamorphosed assemblage of argillite, pillow basalt, and limestone that contains Late Triassic (late Norian) fossils

CZ **Crazy Mountains terrane (1)**—Quartzitic sandstone of probable Cambrian age associated with younger marine sandstone, grit, slate, chert, and carbonate rocks as young as Early Devonian in age

DL **Dillinger terrane (2)**—Complexly deformed lower Paleozoic sequence of graptolitic shale, basinal marine carbonate rocks, and turbiditic sandstone, shale, and grit; locally overlain unconformably by marine Lower Jurassic calcareous sandstone and siltstone

DO **Don Pedro terrane (7)**—Structurally complex assemblage of metamorphosed mafic and intermediate volcanic rocks, argillite, and minor marble; generally equivalent to the metavolcanic unit of the Calaveras Complex of Sharp and Wright (1981)

DP **Del Puerto terrane (8)**—Ophiolite of island-arc affinity overlain by Lotta Creek Tuff of Hopson and others (1981) and by fine-grained, flyschoid sedimentary rocks of Late Jurassic and Cretaceous age

EC **Elder Creek terrane (8)**—Disrupted ophiolite of oceanic crustal nature overlain unconformably by mafic breccia and Jurassic (Kimmeridgian) to Cretaceous, generally flyschoid sedimentary rocks

EK **Eastern Klamath terrane (6)**—Island-arc volcanic rocks and intercalated sedimentary rocks of Devonian through Middle Jurassic age; forms a younging-eastward, but internally deformed sequence comprising (1) chiefly spilitic greenstone, intermediate and silicic volcanic flows, pyroclastic rocks, tuff, and minor limestone of Devonian age; (2) pyroclastic, volcaniclastic, and tuffaceous rocks and mudstone of Mississippian age; (3) thick marine limestone of Early Permian age; (4) mudstone, volcaniclastic and tuffaceous rocks, and chert of Middle to Late Triassic age; (5) marine limestone and shale of Late Triassic age; and (6) mainly submarine and intermediate volcaniclastic and volcanic rocks of latest Triassic to Middle Jurassic age

EP **El Paso terrane (7, 9)**—Composite of Cambrian(?) to Devonian fine-grained, terrigenous clastic rocks, bedded chert, and greenstone, stratigraphically overlain by lowermost Mississippian siliciclastic rocks and thrust over lower and middle Paleozoic deep-water miogeoclinal strata; all of these rocks overlapped by (1) Carboniferous terrigenous flysch and associated carbonate rocks; (2) Lower Permian carbonate debris flows, chert conglomerate, and volcaniclastic rocks; and (3) Upper Permian andesitic volcanic rocks; and intruded by plutonic rocks of Late Permian or Early Triassic age

FH **Foothills terrane (7)**—Structurally complex assemblage of flyschoid slate, metagraywacke, and metavolcanic tuff and breccia of Middle to Late Jurassic (Callovian-Oxfordian) age; metabasalt flows, pillow lavas, and breccia mainly of Middle to Late Jurassic age; serpentinite and chert-argillite melange; and ophiolitic igneous rocks both as tectonic blocks in melange and as coherent bodies stratigraphically related to Jurassic metavolcanic rocks of island-arc affinity

FJ **Fort Jones terrane (6)**—Metachert, metabasalt, and metatuff containing blue-schist minerals having a metamorphic age of about 220 Ma

FR **Feather River terrane (7)**—Serpentinite, metaperidotite, and other metamorphosed ultramafic and mafic plutonic rocks of the highly deformed Feather River ultramafic body of Irwin (1977); Carboniferous radiometric ages are reported from dikes and intrusions cutting older rocks of terrane

FU **Fulmar terrane (6)**—Thick, zeolitized, micaceous arkosic wacke and interbedded siltstone of early Eocene age; interpreted from correlative basaltic rocks of the Siletz terrane to be bounded on the east by a pre-late Eocene dextral transform fault

GB **Goldbeach terrane (6)**—Island-arc volcanic rocks overlain by flyschoid, quartz-poor, volcaniclastic sedimentary rocks and scarce Upper Jurassic (Tithonian) radiolarian chert of the Otter Point Formation; these rocks unconformably overlain by Upper Cretaceous sandstone, mudstone, and conglomerate

GC **Golconda terrane (7)**—Deformed and imbricated thrust slices of upper Paleozoic deep-marine, pelagic and turbiditic, terrigenous clastic or volcaniclastic sedimentary rocks, radiolarian chert, and pillow basalt of the Golconda allochthon, and unconformably overlying Triassic strata, part or all of which are interpreted to be post-accretionary deposits. East boundary of Golconda terrane as shown on map delimits eastern extent of the widely scattered, isolated exposures of the terrane that are geographically associated with rocks of the Roberts terrane and the North American miogeocline

GD **Goodnews terrane (2)**—Disrupted assemblage of chert, pillow basalt, tuff, minor limestone, and blocks of ultramafic rocks; lawsonite-bearing metamorphic rocks represented locally. Limestone blocks range from Ordovician to Permian in age, cherts from late Paleozoic to Mesozoic in age. Three subterranes within the Goodnews terrane were proposed by Box (1985)

GR **Ghost Rocks terrane (2)**—Strongly deformed assemblage, locally a melange, of pillow lava, pillow breccia, and tuff of andesitic to basaltic composition interbedded with sandstone, mudstone, and minor limestone; contains rare planktonic foraminifers of Late Cretaceous and Paleocene ages and is intruded by sparse quartz-diorite to tonalite plutons of middle Paleocene age

GS **Grindstone terrane (5)**—Disrupted, poorly exposed assemblage including blocks of (1) Middle Devonian limestone interstratified with chert sandstone, chert, and argillite; (2) Mississippian limestone intermixed with calcareous or conglomeratic sandstone; (3) Pennsylvanian terrigenous clastic rocks; (4) abundant Lower Permian limestone; and (5) Permian and Lower Triassic chert, siliceous argillite, and clastic rocks in a matrix of uncertain nature and age (Blome and Nestell, 1991). Grindstone terrane was included in the Central melange terrane of Dickinson (1979)

GU **Guerrero terrane (9, 10)**—Upper Jurassic and Lower Cretaceous andesitic volcanic rocks and associated marine and nonmarine sedimentary rocks

HB **Healdsburg terrane (8)**—Middle Jurassic ophiolite overlain by Upper Jurassic to Lower Cretaceous conglomerate, sandstone, and mudstone; scarce andesitic(?) flows and breccias in lower part of sedimentary sequence

HF **Hayfork terrane (6)**—Meta-andesite at base overlain by volcaniclastic sedimentary rocks, chert, argillite, and minor limestone; melange near structural top. Structurally lower, western part interpreted to be a Middle Jurassic arc. Limestone blocks in eastern part of terrane contain Pennsylvanian and Permian fossils, including Tethyan forms; radiolarian chert largely of Late Triassic age

HG **High Sierra-Goddard terrane (7)**—Upper Paleozoic fine-grained, terrigenous clastic and calcareous marine metasedimentary rocks, including metachert, in contact with Permian to Middle Jurassic felsic to intermediate metavolcanic and volcanogenic metasedimentary rocks. As such, this terrane combines the High Sierra and Goddard terranes of Nokleberg (1983). Much of its northern part (corresponding to the High Sierra terrane) was reinterpreted by Schweickert and Lahren (1987) as a structural complex of rocks resembling the Golconda, Roberts Mountains, and Walker Lake terranes to the east in western Nevada. Metasedimentary rocks forming the northwestern most pendant included in the High Sierra terrane are compared by Lahren and Schweickert (1989) to uppermost Precambrian and Lower Cambrian miogeoclinal rocks of cratonic North America(?) in southern California

HO **Hoh terrane (6)**—Upper Oligocene to middle Miocene melange and broken formation that is largely offshore, forming the continental slope of Washington and Oregon

HR **Haro Spieden terrane (4)**—Andesitic sandstone, conglomerate, and minor Upper Triassic marine calcareous rocks of the Haro Formation in probable fault contact with Upper Jurassic and Lower Cretaceous andesitic conglomerate, sandstone, and mudstone of the Spieden Formation

HZ **Hozameen terrane (4)**—Structurally disrupted and metamorphosed bedded chert, argillite, and basalt associated with minor carbonate and ultramafic rocks; radiolarian cherts range from Permian to Middle Jurassic age. Regarded by Wheeler and others (1988) as a part of the Bridge River terrane displaced on the Fraser-Straight Creek fault system

IN **Innoko terrane (1, 2)**—Folded and disrupted assemblage of chert, argillite, minor graywacke, limestone blocks, and volcanogenic sandstone, conglomerate, and tuff; dated limestone bodies are mainly Carboniferous in age, and dated chert blocks range from Late Devonian to Late Triassic

IZ **Izee terrane (5)**—Thick, mainly flyschoid, clastic sedimentary rocks and subordinate volcaniclastic and volcanic rocks of Late Triassic (Karnian(?) to Norian) through Middle Jurassic (Callovian) age; corresponds to the Mesozoic clastic terrane of Dickinson (1979)

JN **Jackson terrane (7)**—Upper Triassic pelagic and deep-marine volcanogenic sedimentary rocks grading up into the Jurassic island-arc complex of the Happy Creek Volcanics; locally overlain unconformably by poorly dated, younger Mesozoic nonmarine conglomeratic and lacustrine deposits

JO **Jungo terrane (7)**—Well-deformed, extremely thick succession of basinal marine, turbiditic, exclusively fine-grained, continentally derived, terrigenous clastic rocks intercalated with minor calcareous units; mainly late Late Triassic (Norian) in age, but locally as young as Early Jurassic (Pliensbachian); basement of Jungo terrane unknown. Includes the local occurrence of Lower or Middle Jurassic quartzite of the Boyer Ranch Formation and the associated Humboldt gabbroic complex

JZ **Juarez terrane (10)**—Highly deformed Upper Jurassic to Lower Cretaceous marine calcareous sedimentary rocks and andesite

KA **Kandik River terrane (1)**—Highly deformed, incipiently metamorphosed, thick sequence of flyschoid pelitic rocks and sandstone; mainly of Early Cretaceous age

KG **Kagvik terrane (1)**—Strongly deformed, mainly deep-marine assemblage of chert, argillite, turbiditic limestone, minor tuff, and intermediate to silicic volcanic rocks; dated cherts range from Mississippian to Triassic age. Kagvik terrane resembles correlative parts of Endicott Mountains subterrane of Arctic Alaska terrane and is regarded by some as part of it

KH **Kahiltna terrane (2)**—Structurally disrupted, deep-marine, partly volcaniclastic, flyschoid graywacke and pelitic rocks, including minor amounts of chert, limestone, and conglomerate; mainly Early Cretaceous, but includes rocks ranging from Late Jurassic to Late Cretaceous (Cenomanian) in age

KI **Kings Range terrane (6)**—Upper Cretaceous pillow lava overlain by thin-bedded turbidites of probable early Cenozoic to middle Miocene age

KIL **Kilbuck terrane (2)**—Biotite-hornblende gneiss, garnet amphibolite, quartz-mica schist, and minor marble, having Precambrian metamorphic ages

KK **Kachemak terrane (2)**—Pillow basalt, Triassic radiolarian chert, and minor limestone. Probably a large tectonic block, or assemblage of blocks, related to those occurring within the Chugach terrane

KL **Kluane terrane (3)**—Quartz-biotite schist possibly derived from a Jurassic-Cretaceous clastic sedimentary protolith

KN **Kings terrane (7)**—Lower Mesozoic continental-margin, and possibly continental magmatic-arc, metasedimentary rocks, including thick units of quartzitic or arkosic metasandstone, slate, and marble; subordinate amounts of intermediate tuff and volcanic breccia. Fossils from different roof-pendant exposures are Late Triassic and Early Jurassic in age

KO **Kootenay terrane (3, 4)**—Variably metamorphosed, lower Paleozoic strata comprising pelitic rocks, quartz grit, mafic volcanic rocks, limestone, and Devonian and possibly older intrusive rocks that were deformed prior to deposition of upper Paleozoic pelitic rocks, conglomerate, sandstone, limestone, and mafic volcanic rocks. Expanded by Wheeler and others (1988) to include the Barkerville and part of the Yukon-Tanana terrane

KR **Kettle Rock terrane (7)**—Lower and Middle Jurassic, mainly andesitic and dacitic volcanic flows, tuffs, and breccia along with volcaniclastic, pelitic, and quartzose clastic sedimentary rocks that are mainly submarine deposits

KW **Kaweah terrane (7)**—Disrupted ophiolite of Kings-Kaweah ophiolite belt of Saleeby (1978), tectonically accumulated in latest Paleozoic to Jurassic time, and associated deep-marine and olistostromal sedimentary and volcanic rocks, all of which were metamorphosed during emplacement of the Sierra Nevada batholith

KY **Koyukuk terrane (1, 2)**—Andesitic volcanic rocks, associated volcaniclastic rocks, and mudstone; local intercalations of marine limestone contain Early Cretaceous (Valanginian) fossils

LG **Livengood terrane (1)**—Highly deformed, but weakly metamorphosed Paleozoic marine sedimentary rocks; includes Livengood Dome Chert of Ordovician age, overlying dolomite, chert, volcanic rocks, and terrigenous clastic rocks, serpentinite, and minor Devonian limestone

LP **La Paz terrane (10)**—Plutonic and metamorphic complex including metasedimentary and metagabbroic rocks, in part of presumed Paleozoic age; intruded by granitic plutons

LZ **Lopez terrane (4)**—Highly deformed, partly disrupted, graywacke-argillite flysch of Late Jurassic to mid-Cretaceous age; associated with dismembered Middle or Late Jurassic ophiolitic rocks including radiolarian chert, pillow lava, mafic and ultramafic plutonic rocks, and serpentinite

MAN **Manley terrane (1)**—Complexly deformed, flyschoid Mesozoic sedimentary rocks, including Upper Triassic argillite and chert, Upper Jurassic quartzite containing clasts of Upper Triassic chert, Lower Cretaceous (Valanginian and Albian) graywacke-pelite flysch, and volcanic conglomerate of uncertain age

MB **Marble Mountain terrane (6)**—Metasedimentary rocks, including metachert and quartz-biotite schist, amphibolite, and marble; interpreted as possibly a metamorphosed tectonic melange

MC **May Creek terrane (6)**—Metamorphic rocks, including garnet schist, quartzite, and amphibolite, of unknown provenance and age

MD **McLeod terrane (3)**—Metamorphic rocks, including micaceous garnet and chlorite schists, minor metaquartzite, and granitic rocks

MG **Magdalena terrane (9, 10)**—Composite of disrupted Mesozoic(?) metaophiolite and an Upper Jurassic island-arc assemblage

MH **Marin Headlands terrane (8)**—Pillow lava, overlain by thick section of Lower Jurassic to mid-Cretaceous radiolarian chert capped unconformably by mid-Cretaceous (Cenomanian) sandstone

MI **Mount Ingalls terrane (4)**—Highly tectonized serpentinite and serpentinized peridotite with large and small inclusions of metasedimentary rocks (flysch and chert), mafic and intermediate volcanic rocks, and diabasic and gabbroic intrusive rocks; U-Pb and radiolarian ages, respectively from gabbro and chert, are Late Jurassic

MK **McKinley terrane (2)**—Structural composite of (1) upper Paleozoic flysch associated with Triassic chert, pillow basalt, gabbro, and diabase; (2) Jurassic(?) to Cretaceous flysch and chert; and (3) a subterrane of Mississippian to Triassic radiolarian chert structurally included in the upper Mesozoic flysch

ML **Maclaren terrane (2)**—Pelitic gneiss and schist, amphibolite, and foliated granodiorite

MM **McCoy Mountains terrane (9)**—Metavolcanic rocks disconformably overlain by nonmarine metasedimentary clastic rocks of both volcano-plutonic and cratonic provenance. Originally thought to have been deformed and metamorphosed by late Middle Jurassic time but reinterpreted by Stone and others (1987) as including strata of Cretaceous age and being autochthonous with respect to the North American craton

MN **Minchumina terrane (1)**—Complexly folded assemblage of chert, argillite, and minor quartzite; contains Ordovician graptolites and Ordovician and Devonian(?) radiolarian chert

MNK **Minook terrane (1)**—Upper Paleozoic (Permian?) flysch and minor chert-clast grit and conglomerate

MO **Monashee terrane (4)**—Early Proterozoic high-grade metamorphic rocks comprising cores of paragneiss and orthogneiss as old as 2.5 Ga, mantled by quartzitic, semipelitic, and calc-silicate gneiss, and minor marble and metaquartzite cut by 2.0 Ga orthogneiss intrusions

MR **Merced River terrane (7)**—Structurally complex, partly chaotic assemblage of argillite, chert, metaconglomerate, quartzitic sandstone, and marble. Stratigraphic ages generally unknown; main metamorphic fabric of chert-argillite assemblage is pre-Jurassic. This terrane corresponds to the central belt of the typical Calaveras Formation

MT **Methow-Tyaughton terrane (4)**—Thick, mainly terrigenous clastic sequence of Late Triassic to Late Cretaceous age overlying Upper Triassic basalt. Predominantly composed of deep-marine to nonmarine volcanic-lithic or arkosic sandstone and associated pelitic rocks that are complexly interstratified with subordinate conglomerate, volcaniclastic and volcanic rocks, and very minor limestone

MU **Malibu terrane (8)**—Metasedimentary and metavolcanic rocks of the Upper Jurassic Santa Monica Slate and the Santa Cruz Island Schist, which are intruded by intermediate plutons and unconformably overlain by Upper Cretaceous and younger strata

MX **Mixteca terrane (10)**—Lower Paleozoic metamorphic and ultramafic rocks deformed with their cover of Pennsylvanian terrigenous clastic rocks and unconformably overlain by Jurassic and Cretaceous marine sedimentary rocks

MY **Mystic terrane (2)**—Complexly deformed, but partly coherent assemblage of Ordovician graptolitic shale and associated(?) pillow basalt, Silurian massive limestone, Upper Devonian sandstone, shale, conglomerate, and reefal limestone, uppermost Devonian to Pennsylvanian radiolarian chert, Permian flysch, chert, argillite, and conglomerate, and pillow basalt and gabbro of possible Triassic age

MYA **Maya terrane (10)**—Heterogeneous assemblage of metamorphosed Permian to Triassic plutonic rocks, Paleozoic flysch, and Jurassic redbeds and volcanic rocks; probably a displaced part of the Coahuila terrane

MZ **Motozintla terrane (10)**—Metamorphosed volcanic (mainly andesitic), volcaniclastic, gabbroic, and ultramafic rocks of unknown age

NA **Nason terrane (4)**—Mostly metapelite of the Chiwaukum Schist, intercalated with gneissic amphibolite and rare marble in its lower part; overthrust by Mount Ingalls terrane after early regional metamorphism but before Late Cretaceous intrusion of Mount Stuart batholith

NF **North Fork terrane (6)**—Tectonically disrupted ophiolite and overlying limestone, chert, siliceous tuff, and sandstone; locally is represented by melange including tectonic blocks of blueschist and of Permian limestone containing Tethyan faunas. Radiolarian cherts range in age from Late Triassic to Middle(?) Jurassic

NK **Nooksack terrane (4)**—Upper Triassic(?) and Lower Jurassic to Lower Cretaceous clastic rocks, interbedded intermediate to felsic volcanic rocks, and their metamorphosed equivalents. Subdivided by Wheeler and others (1988) into Jurassic island-arc rocks, forming a discrete terrane, and postaccretion upper Mesozoic overlap-assemblage rocks

NN **Nenana terrane (2)**—Deformed and locally metmorphosed, partly bioclastic limestone and impure limestone marble, associated with quartzite, black siltstone, and gabbro; Late Triassic pelagic bivalves found at one locality

NR **Nicasio Reservoir terrane (8)**—Pillow basalt intercalated with and overlain by radiolarian chert of Early Cretaceous (Valanginian) age; probably represents part of a seamount

NQ **Novato Quarry terrane (8)**—Graywacke, mudstone, and conglomerate of Late Cretaceous age, probably representing a submarine-fan deposit; locally tightly folded, but generally less deformed than other terranes of Franciscan Complex

NSI **Northern Sierra terrane (7)**—Tectonically disrupted rise and slope deposits consisting of Ordovician(?) to Devonian(?) phyllite, quartzose and turbiditic sandstone, tuff, and radiolarian chert, all of which are intruded by Devonian granitic and gneissic rocks and form the Shoo Fly Complex. This complex unconformably overlain by deformed, but mainly stratigraphically coherent, arc-related, marine-volcanic, volcaniclastic, and sedimentary rocks ranging from Late Devonian to Middle Jurassic in age

NX **Nixon Fork terrane (1, 2)**—Stratified sequence of Paleozoic (Ordovician to Upper Devonian) reefal and platformal carbonate rocks overlain by mainly terrigenous clastic or cherty Permian, Triassic, and Cretaceous marine sedimentary rocks; Precambrian metasedimentary and metavolcanic basement rocks represented as clasts in Permian strata

NY **Nyack terrane (2)**—Andesitic, trachytic, and basaltic flows and breccias with interbedded volcaniclastic rocks containing Middle Jurassic fossils

OC **Olympic Core terrane (6)**—Disrupted and low-grade metamorphosed subduction-accretion prism of flyschoid marine sedimentary rocks and oceanic basalt ranging from Eocene to Miocene in age

OF **Olds Ferry terrane (5)**—Upper Triassic, submarine, mafic and intermediate volcanic and volcaniclastic rocks containing some limestone pods, overlain by structurally disrupted Lower Jurassic limestone, gypsum, and coarse-grained volcaniclastic rocks, and by Lower to Middle Jurassic, partly flyschoid sandstone and pelite. This terrane includes Huntington arc terrane of Dickinson (1979)

OP **Olney Pass terrane (4)**—Melange composed mainly of argillaceous matrix and tectonic blocks as big as mountains of sandstone and, less commonly, greenstone, metagabbro, chert, limestone, and metatonalite. Fossils in blocks include Middle Jurassic to Early Cretaceous megafossils and radiolarians, and Permian fusulinids; U-Pb ages of meta-igneous rocks are Late Jurassic

OW **Owyhee terrane (5)**—Metamorphic terrane of interlayered mica schist, quartzite, and marble, representing protoliths of pelitic, sandy, and orthoquartzitic terrigenous clastic rocks and limestone of unknown age; intruded by Late Cretaceous granitic rocks of Idaho batholith

OWN **Owens terrane (7)**—Metamorphosed, stratigraphically coherent, lower Paleozoic (Lower Cambrian to Silurian), calcareous, siliciclastic, and cherty marine sedimentary rocks, and latest Triassic to Early Jurassic intrusive rocks of the Sheelite granitoid sequence of Stern and others (1981); interpreted as a displaced part of the North American miogeocline

OX **Oaxaca terrane (10)**—Crystalline metamorphic basement rocks of Grenville age, overlain by lower Paleozoic terrigenous clastic rocks, various upper Paleozoic sedimentary rocks, undated redbeds, and mid-Cretaceous limestone

OZ **Ozette terrane (6)**—Subduction-accretion prism of lower(?) and middle Eocene melange and broken formation unconformably overlain by less deformed upper Eocene and Oligocene strata

PA **Point Arena terrane (8)**—Little-deformed turbiditic sandstone, shale, and conglomerate of Late Cretaceous to Eocene age; derived from both granitic and basalt-gabbro source areas

PAP **Papanoa terrane (10)**—Metamorphosed andesite, diorite, gabbro, and pyroxenite, along with limestone and quartzite of presumed early Paleozoic age

PAR **Patton Ridge terrane (8)**—Zeolite-cemented graywacke and subordinate basalt, chert, serpentinite, and ultramafic rocks of presumed Mesozoic age and unconformably overlain by Oligocene and younger marine sedimentary and volcanic rocks. Exposures are entirely submarine

PC **Porcupine terrane (1)**—Precambrian(?) phyllite, slate, quartzite, and carbonate rocks, overlain by a thick, structurally and stratigraphically complex assemblage of shelfal carbonate rocks and shale ranging from Cambrian(?) to Late Devonian age; upper Paleozoic rocks include limestone, fine-grained terrigenous clastic rocks, and chert-pebble conglomerate

PE **Peninsular terrane (2)**—Stratigraphically coherent sequence comprising (1) rare Permian limestone; (2) local Upper Triassic limestone, argillite, and basalt; (3) widespread Lower Jurassic andesitic volcanic and volcaniclastic rocks; and (4) Middle Jurassic to Cretaceous, predominantly clastic, marine sedimentary rocks. This terrane includes major batholithic intrusions of Jurassic granitic rocks

PM **Permanente terrane (8)**—Structurally complex, partly chaotic basalt, pelagic limestone, radiolarian chert, and volcanogenic sandstone; interpreted as mainly Lower Cretaceous sea-mount basalt and its Upper Cretaceous (Cenomanian), partly pelagic, cover

PN **Pingston terrane (2)**—Strongly folded, weakly metamorphosed upper Paleozoic (Pennsylvanian and Permian) phyllite, minor limestone, and chert, associated with distinctive Upper Triassic, deep-marine, thin-bedded limestone, black carbonaceous shale, calcareous quartzose siltstone, and minor quartzite; includes many mafic intrusive bodies of unknown age

PP **Pickett Peak terrane (6)**—Strongly deformed metamorphic rocks (quartz-mica schist, metagraywacke, metabasalt, and metachert) containing blueschist-facies minerals; radiometrically determined metamorphic age probably Early Cretaceous

PR **Pacific Rim terrane (4)**—Tectonically disrupted, deep-marine, Upper Jurassic and Lower Cretaceous sedimentary and volcanic rocks, mixed with andesitic volcanic rocks and associated Upper Triassic limestone

PRL **Parral terrane (9)**—Highly deformed, partly calcareous, Upper Jurassic and Lower Cretaceous turbiditic sandstone

PW **Prince William terrane (2)**—Strongly deformed thick assemblage of graywacke and argillite, with minor conglomerate, pillow basalt, basaltic tuff, and dike rocks; contains rare fossils of Paleocene and Eocene(?) age and is intruded by gabbro, tonalite, and granodiorite of early middle Eocene age

QN **Quesnellia terrane, undifferentiated (3, 4)**—Upper Triassic and Lower Jurassic calc-alkaline to alkaline volcanic rocks and comagmatic plutonic granitic rocks, along with volcaniclastic rocks, argillite and minor limestone; locally includes some upper Paleozoic carbonate rocks Undifferentiated rocks of this terrane overlap its two subterranes, the Harper Ranch (QNH) and Okanagan (QNO) subterranes, composed mainly of upper Paleozoic rocks

QNH **Harper Ranch subterrane (4)**—Upper Devonian to Permian argillite, lithic and volcanic sandstone, and conglomerate, mafic to felsic volcanic rocks, and carbonate rocks

QNO **Okanagan subterrane (4)**—Structurally disrupted and variably metamorphosed radiolarian chert, argillite, and basalt; locally includes tectonic blocks of upper Paleozoic limestone and ultramafic rocks

RB **Ruby terrane (1, 2)**—Structurally complex assemblage of metamorphic rocks, including phyllite, mica schist, quartzite, marble, calc-silicate schist, dolomitic marble, amphibolite, and greenschist; locally includes metachert and gneissic to nonfoliated granitic rocks. Protolith and metamorphic ages uncertain; this terrane may include both Precambrian and Paleozoic rocks

RC **Roaring Creek terrane (4)**—Composite metamorphic terrane including (1) the Mad River terrane of Tabor and others (1987), consisting of a variety of highly folded schistose rocks, minor marble, and metamorphosed ultramafic rocks intruded(?) by Paleozoic or older orthogneiss; (2) the Swakane terrane of Tabor and others (1987), consisting largely of the Swakane Biotite Gneiss of Precambrian protolith age; and (3) the Chelan Mountain terrane of Tabor and others (1980), a migmatite consisting of Triassic tonalite and Permian or older metasedimentary and metavolcanic rocks

RD **Rodgiquez terrane (8)**—Miocene basaltic rocks of a seamount and their cover of upper Cenozoic pelagic strata; exposures entirely submarine

RM **Roberts terrane (5, 7)**—Devonian and older, deformed and thrust-imbricated, deep-marine to continental-slope rocks of the Roberts Mountains allochthon and the associated shallow-marine to nonmarine upper Paleozoic strata known or inferred to have been unconformably deposited on the allochthon before emplacement of the structurally higher Golconda allochthon (included in the Golconda terrane). Lower Paleozoic rocks of the Roberts Mountains allochthon include bedded chert, graptolitic pelitic rocks, pillow basalt, and quartzitic and arkosic sandstone. East boundary of Roberts terrane shown on map delimits eastern extent of its widely scattered, isolated exposures that are geographically associated with rocks of the Golconda terrane and the North American miogeocline; separation of the Roberts terrane from the miogeocline is controversial where shown queried on map south of lat 39° N.

RS **Rattlesnake terrane (6)**—Structurally complex, largely chaotic mixture of sedimentary and igneous rocks, including some large, relatively coherent slabs of ophiolite, intermediate volcanic rocks, and graywacke-pelite sedimentary rocks. Tectonic blocks include Triassic limestone, Triassic and Jurassic radiolarian chert, and radiometrically dated Early Jurassic ophiolitic rocks

SA **Santa Ana terrane (8, 9)**—Stratigraphically coherent, but locally highly deformed and metamorphosed, Jurassic to Lower Cretaceous sedimentary and intermediate volcanic rocks, largely deposited by marine mass-transport processes; intruded by Cretaceous granitic rocks of the Peninsular batholith

SB **San Bruno terrane (8)**—Moderately deformed, unfossiliferous sandstone, mudstone, and scarce conglomerate; characterized by abundant detrital potassium-feldspar in sandstone and interpreted to be part of Franciscan Complex

SCM **Snow Camp Mountain terrane (6)**—Middle Jurassic ophiolite overlain by Upper Jurassic and Lower Cretaceous sedimentary rocks of the Riddle and Days Creek Formations

SD **Seward terrane (1)**—Regionally metamorphosed, structurally complex assemblage of mica schist, micaceous calcareous schist, metavolcanic rocks (in part glaucophane bearing), marble, and high-grade gneissic rocks; includes rocks of Precambrian(?) and Devonian age, but most protolithic and metamorphic ages are uncertain

SE **Saint Elias terrane (2, 3)**—Fault-bounded, intermediate- to high-grade metamorphic equivalent of the Chugach terrane; mainly composed of quartz-mica schist and gneiss and of migmatitic rocks

SH **Shuksan terrane (4)**—Metamorphosed, greenschist- and blueschist-grade, mafic volcanic rocks, pelite, and pelitic quartz grit having a protolith age of Late Triassic(?) to Jurassic; metamorphosed in Late Jurassic to Early Cretaceous time

SHE **Sheenjek terrane (1)**—Sedimentary sequence of thin, basinal, Mississippian limestone overlain by upper Paleozoic to Triassic(?) radiolarian chert and argillite; contains abundant sills of gabbro and diabase

SHM **Shadow Mountain terrane (9)**—Metamorphosed, calcareous and fine-grained terrigenous clastic rocks considered to have a protolith age of early and middle Paleozoic

SJ **San Juan terrane (4)**—Argillite-chert melange having both Paleozoic and Mesozoic components; tectonic blocks include chert, greenstone, metasedimentary rocks, meta-intrusive rocks, marble, and ultramafic rocks. Permian fusulinids of Tethyan kind from marble; U-Pb ages of 190 Ma for zircons from tonalite gneiss; includes the Roche Harbor, Constitution, and Eagle Cove terranes and the Turtleback Complex of Whetten and others (1978)

SK **Skagit terrane (4)**—Greenschist- to amphibolite-grade metamorphic rocks, including migmatite, derived from a predominantly clastic sequence containing subordinate volcanic rocks; includes a variety of metamorphosed intrusive rocks; most recently metamorphosed in Late Cretaceous time

SL **Salinia terrane (8)**—Mid-Cretaceous plutonic rocks intrusive into a heterogeneous assemblage of metasedimentary strata including quartzo-feldspathic gneiss, granofels, and metagraywacke; plutonic and metamorphic rocks overlain by Upper Cretaceous and Tertiary strata within which a regional middle Paleocene to early Eocene unconformity is recognized

SM **Slide mountain terrane (3)**—Upper Paleozoic, primarily deep-marine chert, argillite, sandstone, conglomerate, and local mafic intrusions, stratigraphically or structurally overlain by basalt, local alpine-type ultramafic rocks, and limestone. In southern British Columbia, forms basement to Quesnellia terrane (Wheeler and others, 1988)

SME **Sierra Madre terrane (9, 10)**—Deformed upper Mesozoic rocks of the Gulf of Mexico transgressive sequence and their diverse basement rocks, which include, at different places, Precambrian crystalline rocks and structurally juxtaposed Paleozoic sedimentary rocks, Lower Jurassic sedimentary rocks structurally associated with Precambrian and Paleozoic rocks, and pre-Upper Jurassic redbeds and volcanic rocks

SN **San Nicolas terrane (8)**—Jurassic plutonic basement complex overlain by Upper Cretaceous flysch, unconformably overlain in turn by Paleocene and younger Tertiary strata

SOM **Sombrerete terrane (10)**—Mid-Cretaceous calcareous flysch

SR **Salmon River terrane (4)**—Metamorphosed andesitic(?) volcaniclastic rocks structurally overlain by disrupted rocks, mainly chert and clastic sedimentary rocks, overlain in turn by more coherent, partly pillowed basalt, limestone, chert, and argillite; limestone contains Permian fusulinids of Tethyan kind, chert contains radiolarians of Permian, Late Triassic, and Early and Middle Jurassic ages. This terrane may be equivalent to parts of the Hayfork and North Fork terranes

SS **San Simeon terrane (8)**—Part of Franciscan Complex consisting chiefly of melange composed of mixed oceanic and continentally derived rocks of differing Mesozoic ages, lithologic character, and metamorphic grade; includes some slabs of coherent Cretaceous flysch; unconformably overlain by Eocene and younger strata

ST **Stikinia terrane (2, 3, 4)**—Mississippian to Jurassic mafic to felsic volcanic and clastic rocks, interstratified with thick upper Paleozoic units of carbonate rock; mainly island-arc deposits. Includes Jurassic granodioritic batholithic rocks

STM **Stanley Mountain terrane (8)**—Middle Jurassic Coast Range ophiolite overlain by Upper Jurassic and Cretaceous tuffaceous chert and flysch; unconformably overlain by Eocene and younger strata

SU **Susitna terrane (2)**—Pillow basalt and intercalated marine volcaniclastic sedimentary rocks containing Late Triassic (Norian) fossils

SV **Seventymile terrane (1)**—Scattered remnants of a folded sheet of harzburgitic ultramafic rocks, gabbro, pillow basalt, and radiolarian chert, dated locally as Permian

SW **Snow Mountain terrane (8)**—Mesozoic seamount province of basalt, alkalic rhyolite, and intercalated sedimentary rocks; interpreted as a tectonic block within the Central terrane of the Franciscan Complex

SZ **Siletz terrane (6)**—Lower and middle Eocene basaltic flows, pillow lava, volcanic breccia, and intercalated sedimentary rocks of the Siletz River Volcanics, overlain by thick middle Eocene turbidites, such as the Tyee Formation, and by upper Eocene tuffaceous sedimentary rocks, basalt, and andesite

TA **Tracy Arm terrane (3)**—Metamorphic terrane of pelitic and quartzo-feldspathic schist and paragneiss, marble, amphibolite, and minor serpentinite. Late Proterozoic(?) protolith age in northwestern British Columbia, Canada; farther south these rocks may be high-grade metamorphic equivalents of flanking terranes

TG **Togiak terrane (2)**—Structurally complex, thick assemblage of Jurassic and Lower Cretaceous, mainly intermediate and mafic volcanic and volcaniclastic rocks containing minor chert and impure limestone. Subterranes within Togiak terrane were proposed by Box (1985)

TJ **Tujunga terrane (8, 9)**—Composite of Precambrian metamorphic terranes, intruded by Jurassic, Cretaceous, and Tertiary plutonic rocks, and overlain depositionally by Cretaceous and Tertiary graywacke

TK **Tikchik terrane (2)**—Structurally complex, noncoherent assemblage of radiolarian chert of Paleozoic and Mesozoic age, Permian limestone and clastic rocks, pillow basalt, and graywacke

TO **Toliman terrane (10)**—Highly deformed, partly coarse-grained Upper Jurassic(?) flysch containing exotic limestone blocks

TR **Trinity terrane (6)**—Strongly deformed, recrystallized peridotite, minor layered and intrusive gabbro, diabase dike and sill complex, and minor volcanic rocks; radiometric ages are early Paleozoic

TS **Twin Sisters terrane (4)**—Enstatite-bearing dunite and subordinate saxonite; altered to serpentinite at margins, all of which are interpreted as faults

TU **Taku terrane (3)**—Variably metamorphosed upper Paleozoic and Triassic basalt and local felsic volcanic, carbonate, and pelitic rocks; includes undated metamorphosed clastic and volcanic rocks similar to Jurassic and Cretaceous strata of Gravina-Nutzotin overlap assemblage. The northern part of the Taku terrane is reinterpreted as an offset sliver of the Wrangellia terrane by Plafker and others (1989)

TZ **Tozitna terrane (1)**—Structurally complex assemblage of gabbro, diabase, pillowed and massive basalt, chert, argillite, tuff, graywacke, and minor conglomerate and Permian(?) shell-fragment limestone; radiolarian chert ranging from Mississippian to Triassic in age. This terrane includes the Rampart Group of east-central Alaska

VA **Van Arsdale terrane (8)**—Pillow lava, minor Upper Jurassic(?) radiolarian chert, and mudstone, all unconformably overlain by Upper Cretaceous (Maastrichtian) sandstone and shale

VEN **Venetie terrane (1)**—Sedimentary sequence of graywacke, siltstone, and pelitic rocks, and minor (tectonic?) blocks of limestone, overlain (structurally?) by folded radiolarian chert, varicolored argillite, and minor volcanic and volcaniclastic rocks. Fossils from clastic rocks and limestone blocks are probably Devonian in age, radiolarian chert ranges from Mississippian to Triassic in age, and volcaniclastic rocks are Triassic in age

VZ **Vizcaino terrane (9)**—Triassic to Cretaceous oceanic, ophiolitic, and volcanic-arc rocks, in places structurally overlying melange similar to Franciscan Complex

WA **Wallowa terrane (5)**—Coherent terrane of Lower Permian to Upper Triassic, mainly calc-alkaline, mainly submarine, mafic and intermediate volcanic and volcaniclastic rocks, overlain by nonvolcanic, middle Upper Triassic carbonate rocks and Upper Triassic to Lower Jurassic basinal marine, partly calcareous, fine-grained clastic metasedimentary rocks. Locally, these strata are unconformably overlain by marine mudstone, siltstone, and sandstone of late Middle to early Late Jurassic age. This terrane was regarded as a possible part of the Wrangellia terrane by Jones and others (1977) and corresponds to the Wallowa Mountains–Seven Devils Mountains volcanic arc terrane of Brooks and Vallier (1978) and the Seven Devils terrane of Dickinson (1979)

WC **Woodchopper Canyon terrane (1)**—Pillow basalt and pillow breccia, tuff, and volcanic graywacke of the Woodchopper Volcanics, and minor fossiliferous black shale and limestone of Devonian age

WF **West Fork terrane (2)**—Massively bedded volcanic mudstone and intermediate or mafic tuff structurally juxtaposed with disrupted argillite, Upper Jurassic radiolarian chert, and sandstone; both massively bedded and disrupted rocks include lenses or fault slivers of Lower Jurassic phosphatic, impure limestone

WHM **White Mountains terrane (1)**—Ordovician volcanic and volcaniclastic rocks and conglomerate overlain by Silurian and Devonian carbonate rocks, overlain in turn by undated clastic sedimentary rocks

Western Klamath terrane (6)

WKB **Briggs Creek subterrane**—Garnet-bearing amphibolite, micaceous quartzite, quartz schist, and metachert; may represent a deep-seated part of the Rogue Valley subterrane (WKR)

WKD **Dry Butte subterrane**—Metaperidotite, metagabbro, metaquartz diorite, and metavolcanic rocks, intruded by plutons of Late Jurassic age

WKR **Rogue Valley subterrane**—Ophiolite, overlain by an island-arc sequence of basaltic to andesitic flows, tuff, and breccia included in the Rogue Formation, and Upper Jurassic (Oxfordian to Kimmeridgian) mudstone and minor sandstone of the Galice Formation

WKS **Smith River subterrane**—Josephine ophiolite and overlying deep-marine, fine-grained clastic sedimentary rocks of the Upper Jurassic (Oxfordian to Kimmeridgian) Galice Formation

WM **Windy-McKinley terrane (2, 3)**—Composite of the Windy and McKinley terranes, composed of Devonian to Triassic ultramafic rocks, limestone, chert and pillow basalt, all more or less metamorphosed

WMP **White Mountain Peak terrane (7)**—Metavolcanic and metasedimentary rocks, some of which have Late Jurassic and earliest Cretaceous U-Pb zircon ages and are thus younger than the Middle Jurassic plutonic body that separates this terrane from the North American craton, making large displacement of the White Mountain Peak terrane with respect to the craton unnecessary (Hanson and others, 1987)

Walker lake terrane (7)

WPD **Paradise subterrane**—Upper Paleozoic andesitic volcanic and partly turbiditic volcaniclastic rocks associated with, and locally overlain by, mid-Triassic through Lower Jurassic, marine to nonmarine carbonate, volcaniclastic, and siliciclastic rocks. Oldest Mesozoic rocks containing abundant quartzose, continentally derived clastic materials are latest Triassic in age; youngest stratified rocks are partly synorogenic deposits of late Early Jurassic and possibly younger age. Rocks of this terrane occur in numerous thrust nappes representing several major juxtaposed allochthons

WPN **Pine Nut subterrane**—Upper Triassic basinal-marine volcanic and carbonate rocks overlain by Lower Jurassic fine-grained, marine siliciclastic and tuffaceous sedimentary rocks and by partly nonmarine sandstone, coarse clastic rocks, and volcanic rocks of late Early Jurassic and younger age. This subterrane has some stratigraphic similarities to the Paradise subterrane (WPD), but shares only part of its late Mesozoic structural history and is separated from it by the Pine Nut fault

WR **Wrangellia terrane (2, 3, 4)**—Stratigraphically coherent, but locally deformed and metamorphosed, succession consisting at base of upper Paleozoic, and possibly older, arc-related volcanic breccia, flows, and volcaniclastic rocks. These are overlain by Permian limestone and deep-marine pelitic rocks and chert of Late Permian to Middle Triassic age and by several thousand meters of mid-Triassic subaerial to pillowed basalt that is overlain in turn by platformal to basinal Upper Triassic limestone grading upward into basinal, spiculitic and argillaceous, calcareous rocks. Younger Jurassic parts of the Wrangellia terrane are either terrigenous clastic rocks or, locally, volcanic rocks along with comagmatic granitic intrusive rocks. Two juxtaposed subterranes of the Wrangellia terrane were recognized by Nokleberg and others (1985) in the Alaska Range: the Slana subterrane, which resembles typical exposures in the Wrangell Mountains, and the Tangle subterrane, a generally deeper water equivalent

WS **Wickersham terrane (1)**—Quartz-rich sandstone and grit, shale, and varicolored slate; lacks penetrative metamorphic recrystallization and structural fabric, and locally contains fossils of probable Cambrian age. This terrane is equivalent to the Beaver terrane of Churkin and others (1982)

WY **Windy terrane (2)**—Disrupted assemblage of serpentinite, basalt, metachert, and blocks of Devonian limestone and shale, all in a matrix of upper Mesozoic conglomeratic flysch

XO **Xolapa terrane (10)**—Migmatitic metamorphic suite yielding Jurassic to Tertiary metamorphic ages

YA **Yakutat terrane (2, 3)**—Upper Mesozoic graywacke-shale submarine-fan deposits; includes structurally interleaved masses of disrupted chert, argillite, and volcanic rocks and of Eocene basalt and shale

YB **Yolla Bolly terrane (6, 8)**—Intercalated graywacke, shale, conglomerate, and radiolarian chert, all intruded by diabase, gabbro, and quartz keratophyre, and subsequently metamorphosed to blueschist facies; chert contains radiolarians of Middle(?) Jurassic to mid-Cretaceous age

YO **York terrane (1)**—Weakly metamorphosed, structurally complex assemblage of Precambrian(?) to lower Paleozoic fine-grained clastic rocks, argillaceous limestone, and fossiliferous limestone of Ordovician and Silurian age

YR **Yreka terrane (6)**—Imbricate thrust sheets of Ordovician to Silurian keratophyre and arclike volcanic rocks, fine- to coarse-grained clastic sedimentary rocks, including conspicuous siltstone and both wacke and quartz sandstone, and minor limestone and radiolarian chert; middle of three principal thrust sheets highly disrupted in part

YT **Yukon-Tanana terrane (1, 2, 3)**—Polydeformed metamorphic rocks occupying much of east-central Alaska and adjacent Yukon Territory in Canada. Predominantly composed of quartz-mica schist, quartzite, metaquartzitic grit, metarhyolite, gneissic plutonic rocks, and minor ophiolitic rocks and marble. Protolith ages only partly known but include middle Paleozoic radiometric ages for some igneous rocks and Devonian paleontologic ages for carbonate rocks; final metamorphic event late Mesozoic in age. In Yukon Territory and contiguous British Columbia, this terrane is subdivided and reassigned to an expanded Kootenay terrane (KO), a subterrane of the Kootenay, and two new terranes (Wheeler and others, 1988). Subdivisions of the Yukon-Tanana terrane in Alaska were proposed by Churkin and others (1982) and Nokleberg and Aleinikoff (1985)

SCALE 1:5 000 000

Base modified from U.S. Geological Survey 1:10,000,000 North America, 1982
Transverse Mercator projection, Central Meridian (100° west)
scale factor equals 0.926

LITHOTECTONIC TERRANE MAP OF THE NORTH AMERICAN CORDILLERA

By
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1992

[1]Geological Survey of Canada

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