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Tectonostratigraphic Terrane Map of the Circum-Pacific Region

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This map is preliminary and has not been reviewed for conformity with U.S. Geological Survey editorial standards and stratigraphic nomenclature.

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Recent geological and geophysical studies have shown that much of the crust of the North American Cordillera has grown through the accretion of discrete tectonostratigraphic terranes. Further study suggests that terrane accretion also has occurred along the margin of most of the remainder of Pacific basin. We have tested the hypothesis of circum-Pacific terrane accretion by compiling a preliminary tectonostratigraphic terrane map of this vast region at a scale of 1:20 million.

Tectonostratigraphic terranes are fault-bounded geologic entities of regional extent, each characterized by a geologic history which is distinct from that of neighboring terranes. Individual terranes can be divided into three types: (1) stratigraphic terranes composed of coherent sequences which represent depositional environments of continental fragments, continental margin and ocean basins, and/or volcanic arcs; (2) disrupted terranes characterized by blocks of heterogeneous lithology and age set in a matrix of sheared graywacke or serpentinite; and (3) metamorphic terranes represented by structural blocks with a regional penetrative metamorphic fabric that obscures and is more distinctive than original lithotypes.

Terranes of the circum-Pacific vary enormously in size, from those which are too small to depict at 1:20 million, to large continental blocks. Many terranes are now disjunct, as they have been dismembered by post-accretionary strike slip faulting, but unless a genetic linkage is unequivocal we take a conservative stance and treat the disjunct pieces as separate terranes.

The distribution and nature of oceanic plateaus in the modern Pacific basin depicted on the terrane map give insight into the accretion process. Oceanic plateaus comprise fragments of continents, oceanic islands, hotspot tracks, remnant arcs, and anomalously thick volcano-plutonic piles of unknown origin. The presence of these same lithotectonic elements in onshore accreted terranes, often dismembered and detached from their basement, suggests that continental growth and orogeny occurs as a result of collision of oceanic plateaus at continental margins. Postaccretionary consolidation of terranes may be even more important than initial accretionary events in effecting deformation in a cordillera and its foreland.

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CIRCUM-PACIFIC TECTONOSTRATIGRAPHIC TERRANES

SIBERIA

ALU Aluchin (South Anyui subterrane?): Pre-Tr ophiolitic rocks

ALZ Alazeya: ophiolite overlain by late Pz-early Mz island arc; local blueschist metamorphism of chert, basalt, keratophyre

ANY Anadyr: lower-middle Mz ocean floor obducted in Late Jr-K, overlain by Cenzoic sedimentary basin strata

BKJ Bureya-Khanka-Jiamusi massif: continental massif with Precambrian basement, Proterozoic to Pz sedimentary and volcanic strata

CHK Chukotsk: continental block, probably part of North Slope Alaska (AAN)

CKM Central Kamchatka: thought to be underlain by sialic crust; has been interpreted as part of Sea of Okhotsk massif

CPM Central Primor'e: late Pz foldbelt; Carb-Early Perm basalt, chert, carbonate, and clastics, early Perm ultramafics and gabbro, overlain by late Perm island arc volcanics, may be accreted by latest Perm; overlapped by Perm-Mz molasse

CSK Cherskiy: lower and upper Pz carbonate, volcanic, ultramafic rocks and Tr-Jr island arc volcanic rocks; basement possibly oceanic

EKM East Kamchatka: Pz(?) or Mz ultramafic, mafic basement overlain by metasedimentary rocks

EKO Ekonay (Koryak subterrane): Silurian-Carboniferous ocean crust obducted in middle K (pre-Coniacian)

EPM East Primor'e: Mz foldbelt; Tr-K basalt, chert, clastic and carbonate strata, K clastic and carbonate rocks, may have Jr-Early K ophiolite at base, exposed on western border; middle-Late K plutons stitch suture

ERP Eropol (Omolon subterrane?): possible island arc sequence within OMO; has deeper water facies, more volcanic rocks, Tr-Jr unconformity

KEP Keperveyem massif (North Anyui subterrane): Precambrian crust, Pz strata

KHR Khroma massif: possible continental microplate--geophysical data only

KOT Koryak--Taygonos Peninsula region: composite island arcs, subduction complex recording subduction migrating NW-SE from Carb-Jr. Arc accretion in Late Jr, 183 my ophiolite obducted in Early K

KOY Koryak: 380 m.y. ocean crust, 320-350 m.y. blueschists thrust over Upper Jr-Hauterivian sed rocks; ophiolite may be obducted onto an island arc, which was later accreted to Siberia

KUH Kuhktuy (Okhotsk massif): pre-Pz continental massif, possibly collided with Siberia in Permian

KVK Kvakhon: Upper Jr-Lower K blueschist facies island arc metavolcanics, overlapped by Lower-Upper K coarse clastics with blueschist pebbles, thrust over ophiolitic(?) melange and breccia

MGO Mongolo-Okhotsk: "eugeosynclinal" sed rocks, may be margin of Siberia from pre-Pz to late Pz; may be composite and contain Late Jr island arc rocks; Mz rocks intensely deformed in Late Jr to middle K collision between SOK and BUR

NAY North Anyui: volcanic uplifts separated by fault-bound slate-filled basins; might be island arc(s), probably late Mz

NOV Novosibirsk: early Pz carbonate platform, possibly part of Siberian margin or Cherskiy terrane.

OLO Oloi: Upper Jr to Lower K island arc volcanic rocks, oceanic basement, deformed coastal marine rocks; accreted Early K(?)

OLY Olyutorsk: Upper K (Maestrichtian) oceanic crust obducted in Paleocene to Eocene

OMO Omolon: continental basement; lower Pz volcanic rocks, Pz-Mz shallow marine seds and volcanic rocks, accreted in Middle to Late Jr

PRK Prikolymsk: lower Pz coarse clastic, Pz-Mz marine sedimentary rocks over continental basement; accreted in Middle Jr(?)

SAY South Anyui: oceanic crust and deep sea sed rocks--eugeosyncline; closed in Hauterivian-Valanginian; contains Upper Jr ophiolite, Jr-K arc volcanic and sed rocks.

SKA Sikhote Alin: may have continental basement; Pz to Jr basalt, graywacke, shale, and siliceous rocks with middle K-Aptian arc developed on top. Permian paleolat. = 33.9° N

SOK Sea of Okhotsk: composite: in north, may be continental massif; in south, composed of island arc volcanics

SPM South Primor'e: middle Pz foldbelt; Cambrian to early Dev ultramafic, gabbro, basalt, chert, carbonate, and clastic rocks, Dev volcanic and granitic rocks; folded in Late Dev; overlain by Permo-Tr clastic rocks and basalt

UML Uda-Murgal: accreted arc with ophiolite and blueschist border at south; age estimates of Jr and 100-130 my.

VKH Verkhoyansk: margin of Siberian platform; thick platform sed rocks in eastward thickening wedge

YRK Yarakvaam (South Anyui sub terrane?): deep marine sed, arc volcanic rocks of ? age overlain by coastal-terrigenous sed, volcanic rocks; uplifted in Tr, accreted pre-Aptian

CHINA AND MONGOLIA

(* indicates subdivisions of the marine Triassic in China of Wang Yi-gang and others, 1981; many of the district names have been changed. All have Tethyan faunal affinities except NDH)

ALS Ala Shan: probably a continental block connected to SKE, TAR(?)

ALT Altay fold belt: composite lower-upper Pz arc rocks, ultramafics; Late Permian island arc collision in south

CNT* Central Nianqing-Tanggula (or Nyenchen-Thanglha): possible pre-Pz basement overlain by Ord-Perm marine sed rocks; Dev-Carb submarine mafic volcanic rocks and turbidites may indicate opening of Neo-Tethys; Late Perm-Late Jr unknown, possible hiatus; Lower-middle K volcs and marine deposits change to continental facies in Late K post accretion of this part of Tibet

CTY* Cathaysian fold system: Pre-Devonian arc, may be accreted by Carboniferous; Mz accretion more likely

CQL Central Qilian: microcontinent with Precambrian basement, Early Pz marine clastic rocks, Dev-Carb redbeds and non-marine clastic rocks, Perm-Tr marine clastic rocks

DAB Dabie Shan: may be a microcontinent between Yangtze and Sino-Korean blocks; has Precambrian crust, Pz clastic strata, Upper Pz-Mz granitic rocks, and is bounded by ophiolite belts.

DZF Dzungarian foldbelt: may connect with ALT, GBI; Dev-Perm ophiolitic and island arc rocks, Carb-Perm deep marine clastic, volcanic rocks, and chert; ophiolite possibly obducted in Late Perm during collision of island arc between ALT, and DZS

DZS Dzungarian stable block: continental block, probably accreted pre late Pz, may connect to ALS, INM

GBI Gobi foldbelt: composite, contains Late Dev-Carb island arc, upper Pz ophiolite and geosynclinal sed rocks; probably connected to ALT

GYJ* Garze-Yajiang area: Tr fold belt; shallow marine sed strata, flysch, minor volc rocks

HHC Hangayn-Hanteyn crystalline belt: middle-upper Pz geosynclinal sed rocks, lots of granitic plutons, possibly with lower Pz ophiolitic boundary to North

HNJ Hunan-Jiangxi: probably has pre-Pz basement, marine clastic strata deformed in early Pz, overprinted in late Pz; Tr shallow marine, Jr-K nonmarine

INM Inner Mongolia foldbelt: apparently a series of accreted arcs, Silurian-Permian, with several ophiolite suites of different ages and geosynclinal sed strata

IYS Indus-Yaluzangbu (Tsangpo) suture zone: Jr-K ophiolite thrust over middle K-Eocene volcanogenic sed rocks; Upper K-Paleocene outer arc sed rocks crushed as suture formed when Himalayas/India collided with Tibet

KCH Kachin: high grade metamorphic basement may be pre-Pz; this continental block could either be a part of the Shan massif (SWM) or a part of Tibet (CNT) faulted to the south

KUN* Kunlun foldbelt: composite Ord-Dev island arc, subduction complex, Late Dev-Carb ophiolite emplacement and arc accretion, Permo-Carb geosynclinal sed and grantic rocks, Mz marine sed strata; accreted in late Pz (?)

LYZ* Lower Yangtze: may be margin of Yangtze block, with Pre-cambrian basement, Dev-Upper Pz geosynclinal strata deformed in Permo-Tr

MEK* Mekong foldbelt: subduction zone, suture between Indochina and Yangtze; Pz-Mz deep marine sed rocks, flysch, blueschist and ophiolite formed during Late Tr-Jr collision; may include Tr volcanic island arc

NDH* Nadan hada foldbelt: upper Pz geosynclinal strata, Mz deep marine-bathyal strata with Boreal fauna, tuffs, volc rocks

NNS* Nan shan: composite early Pz(?) fold system; lower Pz deep marine rocks, Upper Dev-Carb island arc volc rocks, upper Pz ophiolite, geosynclinal strata deformed in Permo-Triassic collision of ALS and TAR and Yangtze block with SKE

NNT* North Nianqing-Tanggula: Upper Tr-Upper K deep marine chert, volcanogenic sandstone, shale are intensely deformed and overlie Ord-Sil marble and shale (late Pz unknown); Upper K-Tertiary shallow marine to continental clastic rocks are undeformed; may indicate Late K accretion along ophiolitic suture to north with TGS

NQL North Qilian: composite early to middle Pz foldbelt; early-middle Pz ophiolite, island arc volcanic, geosynclinal strata

NTH* Northern Tethyan Himalaya: pre-Pz gneissic basement over-lain by Pz marine clastic strata, very thick Tr deep sea flysch, chert, mafic volc rocks, overlain by Jr quartzofeldspathic sandstone, shale, limestone; possibly deep-marine northern margin of India during Mz, telescoped during collision of India with Tibet

ONA Onon-Argun foldbelt: Early Pz fold system; middle-upper Pz ophiolitic, ultramafic, granitic, and geosynclinal rocks

OUL Oulungbruk: microcontinent; Precambrian basement, Sinian-Pz clastic, carbonate strata, tillite, middle-Upper Jr nonmarine rocks

QAM* Qamdo area: possible Perm island arc built on Ord-Upper Pz ocean crust, collides during northward movement of Tibet; marine deposition until middle Jr, followed by deposition of terrigenous coarse clastic rocks

PES Pei shan: probably a continental block accreted Pre-Tr

SBG* Songban-Ganzi fold system: mostly Tr feldspathic graywacke, Permian intermediate volcanic rocks; no pre-late Pz rocks known; ophiolite emplaced in south during collision of Tibet in Triassic

SEM Southeast Maritime: late Pz foldbelt; Pz geosynclinal strata, deformed in late Pz; overlain and intruded by extensive Jr and K volcanic and plutonic rocks, deformed again in Mz; may have Mz ophiolite at western border suture

SGP Songpan: possible continental block with Archean basement rifted from SCH block; bounded by deep fractures and thrusts

SKE Sino-Korea: microcontinent, Pz platform, shallow marine deposits; shows characteristic, ubiquitous Silurian-Devonian hiatus; paleomag shows Permian paleolat 11° N for central portion

SLO Songliao basin: may have pre-Pz basement and may be a microcontinent; thick Mz sed rocks may be overlap on previously accreted INM

SLW Salween fold belt: possible Precambrian or Pz metamorphic basement may be part of Shan massif (SWM); Upper Pz platform deposits, Tr marine, geosynclinal strata; 217-197 m.y.-old blueschist; ophiolite belt borders

STH* Southern Tethyan Himalaya: pre-Pz gneissic basement overlain by Pz marine clastic rocks, thick Tr fossiliferous miogeoclinal facies, marine sedimentation through middle Tertiary; may be northern margin of India/Gondwana during Mz; has shallower water facies than NTH

SYT Sayan-Tuva foldbelt: composite early Pz fold system; ophiolitic and granitic rocks (early Pz?), upper Pz continental clastic and basin rocks; in north, late Precambrian and early Pz ophiolitic and deep marine rocks thrust over Precambrian and Pz sialic rocks

TAR Tarim: microcontinent with complete Pz carbonate sequence, Mz platform deposits; ophiolite belt borders

TCR Taiwan coast ranges: Neogene volcanoclastic sed rocks; Pliocene-Pleistocene ophiolitic melange border with WTW.

TGS* Tanggula shan: metamorphic basement age unknown, overlain by Pz (Dev?) to Tr marine platform facies; 99-20 m.y. intrusives in south, folding in Jr-K

THM* Transhimalaya range: possible Tr island arc built on Pz oceanic crust and sed rocks; overlain by Late K-Eocene arc complex and intruded by widespread granitics averaging 40-70 m.y.; paleomag shows more than 2500 km northward movement since 50 m.y.B.P.

TNS Tien Shan: composite of island arcs, flysch basins, ocean floor; ophiolite and arc rocks as old as Ord-Sil, Dev-Carb; may be part of early-late Pz paleo-Tethys; accretion in Permo-Tr, change to continental facies sedimentation

TSA Tsaidam basin: probable continental block, accreted to TAR in early Pz(?) with ophiolitic suture of Astin-Tagh Mtns; pre-K basement rocks of unknown type

TSL Tsinling fold belt (or Qinling): composite of upper Pz(?) to Mz ophiolite belts, possible lower-middle Pz arc rocks, Perm-Carb unstable continental shelf sequences, Tr graywacke, intermediate-silicic volcanic and intrusive rocks

WTA Wan-ta foldbelt: Upper Pz geosynclinal strata, mafic volcanic rocks, nonmarine Mz strata; may have Precambrian basement

WTW Western Taiwan: Paleogene argillite-slate series and Neogene clastic rocks on pre-Tertiary metamorphic complex; Pleistocene andesites in north

YHW Yu-hwai: may have pre-Pz basement, but seems to be suture zone between SKE and Yangtze continents; probably pre-Tr

YID* Yidun area: may be a microcontinent caught in subduction complex of MEK; probable Precambrian basement overlain by Sinian to lower Carboniferous carbonate and marine clastic strata

YMU Yushu-Muli: Tr island arc volcanics, Upper Tr melange; ophiolite and blueschist belt is eastern boundary

YNS Yin Shan: may be margin of SKE block; seems to have Precambrian basement; bordered on all sides by ophiolites (350-331 m.y. ultramafics), with northern border ophiolites becoming younger to north toward INM

SOUTHEAST ASIA AND INDONESIA

AYM Arakan-Yoma: composite; Tr-K shallow-deep marine strata, highly deformed Lower Tertiary ultramafic rocks, flysch in suture between AYM and CBB--may be equivalent to IYS

BAG Banggai-Sula: continental fragment from New Guinea; Pz and early Mz granitic and metamorphic rocks, Mz stable shelf, shallow water strata, lower T sandstone and limestone

BAT Batjan: probably a fragment of a Tertiary island arc; undated granitic and metamorphic rocks, QT arc volc rocks

BEN Bentong: ophiolitic melange, suture of Carb-Dev(?) age between continental blocks KKM, SWM, and possible intervening late Pz arcs; overlapped by Tr granitic batholithic rocks; may be equivalent of TAK

BUT Buton: T melange and dismembered ophiolite; may include Mz rocks

CBB Central Burma Basin: upper Mesozoic melange; thick upper T shallow marine clastic and carbonate strata

CSE Central-SE Sulawesi: Tr, Jr, K, and T(?) low grade metamorphosed pelagic and terrigenous-clastic, chert, and limestone strata; structurally complex

CSW Central Sulawesi: composite; Upper K, Paleogene blueschist and melange suture zone between WSW, BAG, TBP

EHM East Halmahera: T and K(?) ophiolite, melange

ESE East, Southeast arms of Sulawesi: (composite); KT ophiolite and Tr(?)-T deep marine sed strata obducted in Miocene; Miocene melange overlain by late Mio-Plio molasse with ophiolitic debris; structurally underlain by BAG

KKM Khorat-Kontum: composite; possible pre-Pz basement, middle Pz shallow marine, eugeosynclinal strata, upper Pz arc rocks; nonmarine sed rocks in Indochina, Tr tin granites; very thick Tr-K molasse; much of post Tr is nonmarine; Permo-Carb flora in East Sumatra is Chinese affinity, Tethyan fusilinids present in E Sumatra

KNJ Central Kalimantan-NE Java: Mz "melange" with K ophiolitic rocks, KT foreland basin strata

SBA Sabah: meta-ophiolite; may be Jr or older; overlain(?) by Upper K to Eocene chert; locally thrust over Olig-Mio strata

SBS Sarawak-Brunei-Sabah: Eocene melange

SUM Sumba: continental fragment from Java sea-Sulawesi shelf; Paleogene and older (Jr?) highly deformed graywacke, carbonate, volc rocks overlain by Upper Tertiary-Holocene shallow water strata

SWK Western Sarawak: Jr-Lower K oceanic melange; may also be composite with Tr island arc volc rocks (correlative with UTD?); overlain by latest K or early T strata, intruded by late K granitic plutons

SWM Shan-West Malaysia-Sumatra: continental fragment; pre-Pz basement, Pz marine seds, thick Permo-Carb graywacke, coarse clastic rocks with western source; Mz shallow to nonmarine strata may be correlative with Tibet, west border with CBB is ophiolite belt suture

TAK Chiang Mai-Tak: lower-middle Pz marine strata, upper Pz-Tr strongly deformed arc volc, sed rocks and tholeiitic intrusive and volc rocks; thrusting, metamorphism and change to continental facies in Early to Middle Jr after SWM and KKM collision

TBP Tukang-Besi Platform: continental fragment, probably from New Guinea; Tr continentally derived strata tectonically overlain by Jr-Mio imbricately faulted marine strata, ophiolitic slices on Butung Island

UTD Uttaradit: Silurian or older ophiolite obducted in Permo-Tr or Middle Tr; upper Pz island arc volc rocks, graywacke, Tr-Jr arc volc rocks; collision in Jr accompanied by thrusting, metamorphism, nonmarine sedimentation; in SW Kampuchea, is intruded by undeformed 180 m.y.-old granitic rocks.

WSW West Sulawesi: K ultramafics overlain by KT clastic and blueschist rocks, overlain by Neogene island arc

PHILLIPINES

CEB Cebu-Bohol: Lower K diorite (105 m.y. Rb-Sr) and Upper K volcanic, marine sed strata

COT Cotobato: island arc active K-Quaternary; collided with LSM in Miocene

CPH Central Phillipines: Eocene-Holocene island arc rocks

LSM East Luzon-Samar-Mindanao: island arc active from K to Oligocene; ophiolite at base obducted during collision of COT

PAL Palawan: microcontinent, possibly from southern China; Carboniferous-Jr slightly metamorphosed continental shelf strata overlain by Cenozoic marine sed, arc volcanic rocks

PMD West Panay-Mindoro: Jr-K ophiolite and Miocene-Recent limestone and clastic rocks occur as blocks in melange

SPA South Palawan: Paleocene-Eocene ophiolite and metamorphic rocks overlain by Upper Oligocene and younger marine and continentally-derived sed rocks

ZAM Zambales-Bayo: middle Eocene ophiolite overlain by marine sed rocks

ZBS Zamboanga-Sulu: Upper K ophiolite, Paleocene metased and metavolc rocks, overlain by Miocene and younger arc rocks

JAPAN

ABU Abukuma: Pz sed rocks, metamorphic rocks and granitics

ASH Ashio: Jr graywacke

CHB Chichibu, Kurosegawa, and Sambosan combined: middle Pz continental knockers, Tr chert, volcaniclastic, volcanic rocks, local blueschist metamorphism

HDK Hidaka: overturned meta-ophiolite, high-T metamorphic rocks overlain by flysch, ocean basin strata

HID Hida: Precambrian metamorphic basement, Pz shelf strata, Tr-Jr metamorphic and granitic rocks, Jr-K thick molasse, extensive Upper K granites and rhyolites; amalgamated to MIN by Upper Jr (?) or Upper K

ISH Ishikari: Pz(?) to Lower K ophiolite overlain by deep water seds, volcanics, K turbidites; correlative rocks on north Sakhalin give K-Ar age of 87 m.y. for ophiolite dikes

IWZ Iwazumi: Upper Pz-Mz graywacke, chert, limestone, basalt

KIT North Kitakami: Jr(?) metagraywacke

KMK Kamuikotan: high grade blueschist rocks

MIN Mino: Permo-Carboniferous-Tr seamount and deep sea rocks, imbricated and high T metamorphosed in lower K; overlapped by upper K rhyolites

NEM Nemuro: K-T green tuff and granitic rocks overlain by shallow marine to nonmarine sed strata

RYK Ryoke: pre-upper Pz banded gneiss, upper Pz-Jr marine sed and mafic volc rocks metamorphosed to greenschist, amphibolite and migmatite in Late Jr-K (?)

SAB Sanbagawa: upper Pz-K (?) deep marine turbidites, basalts, metamorphosed to blueschist, structurally interleaved with eclogite, serpentinite, granulite, amphibolite, overlain by unmetamorphosed, deformed Upper K sed rocks and flat lying Eocene strata

SAG Sangun: Carboniferous, Permian and Tr(?) mafic, ultramafic igneous rocks, marine sed rocks metamorphosed to blueschist (in Permo-Tr(?)), unconformably overlain by Upper Tr-Tertiary deep to shallow to coastal marine strata, Upper K silicic volcanic rocks

SHM Shimanto: Upper Jr-Lower K ocean floor assemblage, including chert, basalt, ultramafic rocks, distal turbidites

SKI South Kitakami: Pz-Mz neritic-littoral clastic, limestone strata

TOK Tokuro: ophiolite, Jr subduction complex (?)

AUSTRALIA-NEW ZEALAND REGION, NEW GUINEA, AND ANTARCTICA

ALF Albany-Frazer: Proterozoic mobile and metamorphic belt, metamorphic and magmatic events at 1.69-1.56 & 1.3-1.25 b.y.

ANN Anakie-Nebine: metamorphosed Late Proterozoic to Cambrian turbidites, basic volcs, ophiolite(?); intruded by Ordov. granite; Cambrian arc and forearc rocks, lower Pz shallow marine to continental sed rocks; Dev. granites, sed rocks

ARA Arunta: Proterozoic mobile and fold belt, old rocks correlate with KLH(?), 1.8 b.y. sed, volc rocks, 1.8-1.7 b.y. metamorphism, magmatism; younger high grade metamorphism

ASB Ashburton: Proterozoic mobile and fold belt; sed, volc rocks metamorphosed, deformed 1.9 b.y.; 1.9-1.6 b.y. granitic rocks

CAP Caples: greenstones, serpentinite melange (? age), Perm volcanic, volcanogenic sed rocks

CAU Central Australia: Composite; Proterozoic mobile and fold belt, 1.4-1.3 b.y. deformation, metamorphism

CGE Coen-Georgetown: Proterozoic mobile and fold belt, marine sed rocks, mafic volcs, metamorphism, granites 1570 m.y.; 1470, 1400-1300 m.y. granites, volcs, metamorphism

COL Cooper-Lolworth-Ravenswood: Composite; Late Proterozoic basement, early Pz sed, volc rocks (marginal basin), lower Pz granites, metamorphics, mid Pz shallow marine to continental sed rocks

CRW Curnamona-Willyama: Proterozoic mobile and fold belt, B.I.F., volcs 1.8 b.y; metamorphism 1.7 b.y., younger Proterozoic granite

CYC Cyclops: Paleogene island arc rocks and ophiolite

DTN Dundas-Tyennan: Late Proterozoic-late Paleozoic foldbelt; Eocambrian-Cambrian sed rocks, dismembered ophiolite, Cambrian arc volcs, early Pz shallow marine to continental seds rocks, mid Pz granites, Perm cover

EAN East Antarctica: Archean craton, rifted from Australia mid-K

ENG East New Guinea: Paleogene or Upper K ophiolite, (116 m.y. age on basalts, Upper K fauna in interpillow marls); Mid Miocene melange, volcanic arc rocks; emplaced in early Eocene over Upper K blueschist and greenschist metased rocks

ETM East Tasmania: Ordovician to early Dev. micaceous qtzose turbidites, intruded by Dev-early Carb granites; Perm cover

EYA East Yilgarn: Archean craton; granitoid-greenstone belt, 2.7 b.y.

GAS Gascoyne: Proterozoic mobile and fold belt, sed and volc rocks metamorphosed, deformed 1.9 b.y; granitics 1.9-1.6 b.y.

GAW Gawler: Proterozoic mobile and fold belt, B.I.F., basic volcs,1.6 b.y.; metamorphism, granites 2.5-2.3; 1.8, 1.7; 1.65 b.y. granites and felsic volcs.

GIR Girilambone: Late Proterozoic, Cambrian qtzose turbidites, chert, basic volcs, ultrabasics (ophiolite?); possible basement to early Pz arc; Sil-Dev granitics, shallow marine sed rocks, mid Pz and younger sed rocks, cover

GYM Gympie: Late Proterozoic-late Paleozoic foldbelt, and ophiolitic rocks

HBY Hodgkinson-Broken River-Yarrol-Tamworth: Composite; early-mid Pz marine seds, volcanogenic turbidites; volc arc, mid-late Pz shallow marine-continental strata, bimodal volcs, granitics; may have Pre-Pz basement in part

HJB Hunstein-Jimi-Bismarck: Jr-K granitic and metamorphic rocks, with possible continental crust affinity, ophiolite borders to south

HOK Hokunui: Permian ophiolite, melange overlain by volcanogenic sed rocks, turbidites, Mz calc-alkaline volc, sed strata

HTS Howqua-Tabberabbera-Stavell-Bendigo: Paleozoic fold and thrust belt; early Pz ophiolite, isl arc volcs, turbidites, mid Pz shallow marine strata, granites, volcs; Perm cover

JAM Jubilee-Adamsfield: early Pz seds, ophiolitic rocks (?); bounded by Precambrian basement blocks

KAI Kaikoura: early Mio-recent turbidites, accretionary prism

KIM Kimberly: Archean craton; cover rocks 1815-1760 m.y.

KLH King Leopold-Halls Creek: Proterozoic mobile and fold belt, sed, ign rocks 2.8-2.2 b.y,; deformation, metamorphism 1.96 b.y,; volcs, granitics 1.9 m.y.; final deformation >1.75 m.y.

KMG Kanmantoo-Glenelg: metamorphosed Late Ptz(?) to Cambrian turbidites, volcs, ophiolites(?), Ord granites, Silurian volcs, continental strata

MEL Melbourne: Ord-Mid Dev. turbidites; Late Dev. granites, volcs

MMO Molong-Monaro: early Pz volc arc, marine strata; quartzose turbidites in fore-arc basin; mid Pz granites, seds, back-arc? volcs; mid-late Pz shallow marine, continental strata

MTI Mt. Isa: Proterozoic mobile and fold belt, 1.86 b.y. felsic ign rocks; 1.8-1.76 sed rocks, felsic, mafic volcs; granites, metamorphism 1.74-1.7 b.y.; younger Ptz seds, metamorphism

MUS Musgrave: Proterozoic mobile and fold belt, 1.56 b.y. seds, 1.33 b.y. ign rocks; high grade metamorphism, granites 1.2-1.1; vocs, granites, basic-ultrabasic dikes 1050-900 m.y.

NAB Nabberu: cratonic cover of B.I.F, marine seds, basic volcs over Archean block and Proterozoic mobile and fold belt

NAR Narooma: Ord qtzose turbidites, chert, volcs; accretionary prism?; Dev-Carb bimodal volcs, sed strata; late Pz granite

NAU North Australia: Composite; Proterozoic mobile and fold belt, sed, volc rocks metamorphosed 1.95-1.81 b.y.; granite, seds, volc rocks 1.77-1.65 b.y.

NBR New Britain: Eocene-Holocene volcanic island arc

NBU Nambucca: late Pz metaseds, some volcs; Perm-Jr granites

NNC North New Caledonia: K-Eocene blueschist, melange; metamorphosed in Late Eocene-Oligocene

NOR Northland: Jr-K, T(?) oceanic crust; late K-Olig sed rocks emplaced 22 m.y.B.P.

NOW Norseman-Wiluna: Archean craton; greenstone belt

NUM New Caledonia ultramafic massif: Late K-T(?) serpentinized peridotite thrust over K-Eocene sed rocks

OWS Owen Stanley: Pg-Mid Tertiary melange, K volcanogenic sed rocks from continental arc source; blueschist and greenschist with K(?) oceanic protolith, metamorphosed in Eocene

PIL Pilbara: >3.5-2.5 b.y. granitoid-greenstone terrain

RUM Rum Jungle-Nanambu: Archean granitoid and gneiss dome terranes >2.5-1.8 b.y.; Ptz orogenic belt 2.4-1.8 m.y.

SBO Sydney-Bowen: Paleozoic fold and thrust belt; may be composed of previously accreted terranes

TCM Tennant Creek-Murphy: Composite; Proterozoic mobile and fold belt, marine seds, felsic, mafic volcs; 1.9-1.8 b.y. metamorphism; ign rocks 1.8-1.66 b.y.

TEW Texas-Woolomin: Dev-Carb qtzose to volcanogenic greywacke, chert, jasper, over basalt, ophiolite, late Carb granites, Permo-Tr Andean arc volcs; Tr-Recent cover

TMS Timor-Seram: TQ flysch(?) melange obducted onto Australia during collision of Banda arc

TOR Torlesse: imbricately faulted Permian to K quartzo-feldspathic graywacke turbidites with minor volc rocks, chert

TUH Tuhua: pre-Pz-Dev metamorphic basement, Cambrian volc arc, unconformably overlain by P-Tr fluvio-deltaic quartzose conglomerate, intruded by K granitic rocks

WAN Wandilla: Dev-Carb qtzose to volcanogenic greywacke, chert, jasper, over basalt, ophiolite

WAO Wagga-Omeo: Ord. qtz wacke turbidites, chert, basic volcs; metamorphosed and intruded by Silurian granites

WAT West Antarctica: Mz foldbelt, probably contains Mz island arc and oceanic rocks in Antarctic Peninsula.

WTM West Tasmania: Ptz metamorphic basement, Late Ptz sed strata, Cambrian sed and volc rocks; mid Pz granites

WYA West Yilgarn: Archean craton; high-grade gneiss >3 b.y.

YIL Yilgarn: Archean craton; high-grade gneiss >3 b.y.

SOUTH AMERICA

ATP Altiplano: Precambrian metamorphic massif; may be part of Guyana shield; accreted by Silurian

ARQ Arequipa: Precambrian massif and Pz sedimentary strata; Devonian faunal affinity possibly not native to South America.

BEL Bellon schist; 1.0 b.y. metamorphic rocks

BRZ Brazilianes: 900-550 m.y.-old orogenic belt; local ophiolitic rocks at western border

CCR Chile Coast Ranges: composite; pre-Jr and Pz (342 m.y.) ophiolitic melange and blueschist metamorphosed flysch thrust over continental margin strata

CDC Cordillera de la Costa: composite; pre-Mz gneissic basement, Jr-K high grade quartzose metased rocks and local eclogite; K medium to high grade metasedimentary and metavolcanic rocks thrust over Paleogene flysch

CDW Cordillera Darwin: K ophiolitic basement overlain by deep marine strata, K silicic volcanic rocks; stitched by 80-90 m.y.-old plutons.

CET Caucagua-El Tinaco-Paracotos: composite; pre-Mz gneissic basement in part; K low grade metamorphosed quartzose sedimentary rocks; Upper Cretaceous(?) mafic metasedimentary and metaigneous rocks (in Paracotos); ultramafic bodies occur along fault slices

CHC Choco: Late K-T ophiolitic and primitive magmatic arc rocks; emplaced in late T

COL Cordillera Occidental: post-Barremian ophiolite in complex structural relation with metagraywacke, chert, tuff and turbidites

CPJ Cordillera Central-Sierra Perija: composite, Precambrian(?) basement, Pz metamorphic rocks, Pz and Mz shallow and non marine strata; complexly metamorphosed and deformed; Pz and Mz volcanics and plutonics in Perija

CPU Central Peru: Mz mio- and eugeosynclinal strata; includes island arc volcanic rocks, middle K-T plutons

CUR Curepto: Carboniferous blueschist metamorphosed eugeosynclinal strata, intruded by Upper Pz granites, metamorphism older than in PIC

EBR East Brazilian shield: Archean craton separated from west Brazilian shiel by Ptz orogenic belt

ECR Ecuador Coast Range: may correlate with CHC; late K-T ophiolitic rocks

GRB Guarico-Roblecito: Paleogene flysch and melange

GUA Guajira: Precambrian basement, Pz metamorphic rocks, thick Mz clastic and carbonate strata; deformed and metamorphosed in Mz

GUY Guyana and West Brazilian shields: Archean craton

IMA Imataca: Precambrian metamorphic terrane; may be portion of Guyana shield; cut by Triassic dikes whose paleomag shows no movement since Tr.

MAR Maranon: Precambrian basement(?), Mz graywacke of distinctly contrasting lithofacies to neighbors

MDD Madre de Dios: Penn-Perm limestone, graywacke, quartzite; possible blueschist

MEJ Mejillo: fault bounded lower Pz geosynclinal rocks and Jr eugeosynclinal rocks

MER Cordillera Meridia: Precambrian(?) basement, Pz metamorphic rocks, Pz and Mz clastic strata

NIR Nirivio: Carboniferous high T/P metamorphosed continental margin strata, intruded by upper Pz granite

NPU North Peru: pre-Ordovician schist

PAG Paraguana: Paleozoic metaigneous basement; Mz metavolcanic and metasedimentary rocks; overlain by thick Tertiary strata; includes Mz(?) ultramafic complex

PAM Pampean ranges: early Pz metamorphic basement; middle Pz cover strata

PIC Pichilemu: Carboniferous medium grade metamorphosed eugeosynclinal strata; intruded by upper Pz granitic rocks

PIU Piura: Precambrian and lower Pz geosynclinal rocks

PTB Patagonian batholith: K island arc volcanic rocks; may be built on continental crust

PTM Patagonian massif: Precambrian(?) basement, metachert, argillite and marble

SAM Siquisque-Aroa-Mision: composite; melange of Jr-K ophiolitic, volcanic and sedimentary rocks emplaced in Paleogene flysch; melange may contain Precambrian metamorphic blocks

SCB South Caribbean deformed belt: composite; K oceanic basement and Mz-early T pelagic and submarine fan strata; paleomag shows large translation and/or rotation

SMA Santa Marta: Precambrian basement; Pz metamorphic and igneous rocks, local Pz sedimentary rocks; thick Mz volc and volcaniclastic rocks; extensive Mz metamorphism and deformation

UEA Ultima Esperanza: Permo-Carboniferous schist; cut by Jr-Lower K volcanic and plutonic rocks

VDC Villa de Cura: K island arc volc and volcaniclastic rocks, over basement of 120 m.y.-old blueschist and greenschist metavolcanic rocks

MEXICO, CARIBBEAN, AND CENTRAL AMERICA

CAB Caborca: 1.7-1.8 b.y. Precambrian crust and Pz continental margin strata; may be para-autochthonous North American craton

CHI Central Hispaniola: Pre-K ultramafic rocks, blueschist, greenschist metavolcs overlain by K-T basalt, limestone, clastic strata; may include Paleocene accretionary prism

CHO Chortis: continental crust, Pz metamorphic and igneous rocks, Mz non marine and shallow marine strata, volc rocks

COA Coahuila: deformed upper Pz flysch and andesite, Cambrian-upper Pz deformed sed rocks; probably accreted in late Pz

CYJ Cayo Coco-Yaguajay-Jatibonico-Las Villas: obducted Jr-K carbonate bank rocks of Bahamas; contains Eo deep-water carbonate slope-scarp strata; deformed, intruded latest K-T

DCA Domingo-Cabaiguan: Jr ophiolite belt emplaced lower-mid Eo; also includes K diorite, granite, volcs; mica-garnet schist

ENH Enriquillo-Massif de la Hotte: Early-Late K basalt, limestone, T transgressive coarse clastic rokcs and limestones; deformed by wrench tectonics; probably not emplaced before 10 m.y.

GUE Guerrero: composite; mostly Upper Jr-K volcanic arc rocks

HIS Hispanola: Jr metamorphic rocks, K arc, forearc and accretionary strata

JUA Juarez: severely deformed Upper Jr calcareous clastic rocks, Neocomian cherty limestone and arc rocks, ultramafic rocks; thrust over MAY

LAP La Paz: K batholithic rocks and pre-batholithic rocks of unknown age

MAY Maya: Precambrian(?) rocks, highly deformed and metamorphosed Pz flysch, Permo-Tr meta-plutonic complex; overlapped by Mz redbeds, volcanic and marine sed rocks, accreted late Pz

MIX Mixteca: Pz metamorphic rocks, upper Pz terrigenous strata, Mz marine strata

NIC Nicoya: late Jr-T ophiolitic rocks, turbidites and limestone; emplaced in latest K or Paleogene

NPR North Puerto-Rico: K volc, volcaniclastic rocks, chert; Upper K pillow basalts, Upper K-Eo intrusive rocks, Eo limestone, mid T carbonate cap.

OAX Oaxaca: 1.1 b.y. gneisses and Pz sed strata with South American faunal affinities, Mz redbeds and limestone

PLC Placetas-Cifuentes: Lower K micaceous ss with continental source faulted against Eo clastic rocks; meta-arc basement?

RUS Rusias: Carboniferous limestone, clastic rocks

SBI Sonnabari: metaplutonic arc(?) rocks

SEP Cordillera Septentrional: Composite; 1) blueschist carbonate bank rocks from collision with Bahamas at 53 m.y.; 2) Early K ophiolite, tuffs, greenschist metavolcs overlain by late K-T volcs, Eo olistostrome, subaerial clasitc strata, Oligo-Mio carbonate, clastic rocks

SMD Sierra Madre: upper Mz sed strata with Pz and Precambrian metamorphic basement

SPR South Puerto Rico: structurally complex >110 m.y. peridotite, pillow basalts, chert, overlain by Late K carbonate rocks; overthrust in later K by pelagic ls, unconformably overlain mid-T carbonate cap

TRI Trinidad Mtns: Jr passive margin clastic, carbonate rocks blueschist metamorphosed in K; K-Ar age 73-78; K diorite

VIS Viscaino: Tr and Jr ophiolites

XOL Xolapa: Jr metamorphic rocks

YOL Yolaina: Mz continental and marine strata, Cz sedimentary and volcanic rocks; may be built on oceanic crust

ALASKA AND CANADA

AAC Arctic Alaska--Coldfoot subterrane: metagraywacke, phyllite, and quartz mica schist, polymetamorphosed in late Mz; age of protolith may be Mississippian

AAD AA--Delong Mountains subterrane: complex assemblage of Devonian, Mississippian carbonates, younger chert, argillite

AAE AA--Endicott Mountains subterrane: Devonian clastic rocks, Mississippian shale and carbonate, younger chert, argillite

AAH AA--Hammond subterrane: structurally complex, polymetamorphosed assemblage of middle Pz carbonate, schist, quartzite, metavolcanic rocks; may have Precambrian basement

AAN AA--North Slope subterrane: Precambrian continental crust, Precambrian, Pz and Mz clastic and carbonate rocks; probably a displaced portion of North American craton

AGM Angayucham: tectonically complex assemblage of pillow basalt, Tr radiolarian chert, and underlying Mississipian chert; contains blocks of Pz limestone, mafic and ultramafic rocks (ophiolitic)

ALX Alexander: Precambrian(?), Pz, and Mz volcanic, clastic, and carbonate rocks

CCK Cache Creek: Mississippian to Upper Tr melange and deformed chert, argillite, basalt, ultramafic rocks, carbonate, local blueschist; contains Permian Tethyan fauna

CGH Chugach: deformed upper Mz flysch and melange, including Mz chert, gabbro, ultramafic and volcanic rocks, and limestone

CHU Chulitna: Devonian ophiolite overlain by Pz chert, conglomerate, limestone, flysch; Mz limestone, redbeds, flysch, and chert

DIL Dillinger: complexly folded assemblage of lower and middle Pz graptolitic shale, micaceous, quartzose calcareous sed rocks, turbidites, limestone; overlain unconformably by Lower Jr clastic rocks

EAS Eastern composite (Kootenay, Slide Mtn, McLeod, Cassiar, Monashee): upper Pz and lower Mz (?) basalt, ultramafic rocks, deep marine strata

END Endicott: metamorphosed lower to upper Pz clastic and carbonate strata intruded by Pz granitic rocks

GNW Goodnews: structurally complex assemblage of lower Pz to Lower K pillow basalt, chert, limestone, blueschist, ultramafic rocks, and graywacke

INN Innoko: deformed upper Pz to lower Mz chert, argillite, minor graywacke, volcanogenic clastic rocks and tuff, limestone

KAM Kaminak: Archean craton

KGV Kagvik: disrupted and deformed assemblage of Mississippian to Tr radiolarian chert, argillite, shale, and minor volcanic rocks

KYK Koyukuk: Andesitic volcanic, volcaniclastic strata and local Lower K limestone; depositional base unknown

LVG Livengood: composite; (1) deformed, metamorphosed Ordovician to Devonian chert, dolomite, volcanic rocks, serpentinite, clastic strata; (2) Ordovician volcanic, volcaniclastic rocks overlain by Silurian and

Devonian carbonate; (3) Cambrian(?) quartz-rich clastic rocks, shale, and slate

MNA Minchumina: Complex assemblage of chert, argillite and quartzite; Ordovician to Devonian(?) ages

MTB Methow-Tyaughton and Bridge River combined: Perm-Middle Jr melange, deformed chert, argillite, basalt, ultramafic rocks

NUT Nutak: Archean craton

NXF Nixon Fork: Precambrian metamorphic rocks overlain by Pz and Mz carbonate, clastic rocks and chert

NYK Nyack: arc-related assemblage of volcanic and sed rocks with Middle Jr fossils

PCP Porcupine: Precambrian(?) phyllite, slate, quartzite and carbonate rocks overlain by thick, structurally complex Cambrian to Upper Devonian carbonates and shale; upper Pz clastic and carbonate rocks; local Jr strata

PEN Peninsular: rare Pz limestone, Tr basalt, argillite and limestone, Lower Jr andesitic arc volcanic and volcaniclastic rocks, younger clastic rocks; may have originally formed on continental basement, though basement is unexposed

PMW Pingston, McKinley and Windy combined: (1) upper Pz phyllite and Tr limestone and shale; (2) Permian flysch, Tr chert, pillow basalt, and upper Mz flysch and conglomerate; (3) disrupted serpentinite, basalt, metachert, Devonian shale and limestone, in a matrix of upper Mz flysch

PRW Prince William: deformed lower Cz flysch and volcanic rocks

QNL Quesnellia: upper Pz and Lower Tr volc, volcaniclastic, and carbonate rocks; Upper Tr-Lower Jr volc, clastic strata, argillite also deposited on EAS, possibly on CCK; may include upper Precambrian to lower Pz continental crustal basement

RCU Reindeer-Circum-Ungava: 1.9-1.6 b.y.-old orogenic belt

RUB Ruby: middle-upper Pz metavolcanic and metased rocks

SEW Seward Peninsula: structurally complex assemblage of Precambrian to Pz metased, metavolcanic, carbonate strata

SHU Shukson: blueschist metamorphic rocks

SJN San Juan and Lopez combined: deformed Mz chert, argillite, graywacke and volcanic rocks partly in melanges, with blocks of lower Pz plutonic rocks, Pz chert, carbonate and volcanic rocks; Permian limestone blocks contain Tethyan fusulinids

SKG Skagit: metamorphic terrane

SLV Slave: Archean craton

STK Stikinia: may have upper Precambrian basement; Carboniferous to Permian volcaniclastic, mafic to silicic volcanic rocks, carbonate; deformed, intruded in Middle-Late Tr; overlapped by Upper Tr-Middle Jr andesites of (?) CCK

SUP Superior: Archean craton

SVM Seventy-mile: upper Pz (Permian?) disrupted ophiolite; tectonically overlies YKT

TKU Taku: structurally complex assemblage of upper Pz volcaniclastic rocks, limestone, flysch(?), and lower Mz basalt, limestone and flysch

TOG Togiak: structurally complex, thick Jr to Lower K basaltic to andesitic flows, breccia, tuff, volcanic graywacke and argillite, and chert, minor Lower K limestone

TOZ Tozitna: structurally complex assemblage of Pz(?) to Mz gabbro, basalt, diabase, argillite, chert, tuff, graywacke, conglomerate, and Permian(?) limestone; Mississippian to Tr cherts; late Tr gabbro

TRA Tracy Arm: structurally complex assemblage of marble, pelitic gneiss, and schist of unknown ages

WOP Wopmay: 1.9-1.6 b.y.-old orogenic belt

WRN Wrangellia: Pz island arc overlain by limestone, clastic rocks and chert, Upper Tr pillow and subaerial basalts, Tr and Jr limestone, clastic, volc rocks; amalgamated to PEN by Middle Jr, but paleomag shows low paleolatitude in Tr

YAK Yakutat: upper Mz graywacke and shale, with structurally interleaved chert, argillite, volc rocks, Eocene basalt

YKT Yukon-Tanana: Precambrian and Pz polymetamorphosed continentally-derived quartzose sed, volc, and granitic rocks; youngest metamorphism dated as mid-K

YOK York: Tectonic assemblage of lower Pz shelf carbonate thrust over Precambrian(?) to lower Pz slate; Ordovician rocks contain trilobites of non-North American affinity

WESTERN CONTERMINOUS UNITED STATES

BDY Baldy: high P/T metamorphosed graywacke, basalt, and chert, age unknown

BLM Blue Mtns: melange with blocks of Pz ophiolite, limestone, chert, and Mz chert and sandstone structurally overlain by Tr and Jr volcaniclastic rocks

CAT Catalina: K blueschist, graywacke, basalt, and chert

CEN Central: K melange

CLV Calaveras: composite; western belt of melange with ophiolite and Mz chert, and eastern belt of quartzose clastic rocks argillite and minor Permian limestone

CMM Central Metamorphic: Devonian or older metamorphic complex composed of mica schist, amphibolite schist, and gneiss

COS Coastal: Upper K graywacke

CRE Crescent: Tertiary basalt seamounts

CRZ Cortez: pre-Pz sialic basement, Pz continental margin strata

DPO Del Puerto: Jr ophiolitic arc basement, Upper Jr and K volcanic arc sed strata

EKL Eastern Klamath: middle to upper Pz clastic, volc rocks, carbonate overlain by Tr, Jr volc rocks and minor limestone

ELC Elder Creek: upper Mz Great Valley turbidite strata over ophiolite

FRA Franciscan undifferentiated (includes CEN and YBP)

FUL Fulmer: Eocene nonvolcanic sandstone and shale basin

GLC Golconda: deformed assemblage of chert, argillite, minor limestone and volcanic rocks of Miss-Perm age

GRE Grenville: 1.1 b.y.-old orogenic belt

HMA Huntington and Malheur combined: Mz volcanic arc and forearc strata

HOH Hoh: Oligocene(?) sed rocks

HSG High Sierra-Goddard: continental margin strata

KIN King Range: Upper K ophiolite overlain by Upper K-T sed rocks

MOJ Mojave desert: composite; includes Pz deep marine strata, Mz volcanic, sed, and granitic rocks

NSI Northern Sierra: lower Pz clastic rocks, upper Pz and lower Mz volcanic and associated sed rocks

OLM Olympic core: lower Cz volc and deep and shallow water sed rocks; presumed to have oceanic basement

OPT Otter Point: Jr volcanic arc

OZT Ozette: middle Eocene-middle Miocene deep marine turbidites, sed strata; olistostromal basalt blocks in Eocene strata

PAR Pacific Rim: Upper Jr, Lower K flysch and melange

PTR Patton: Upper K to Tertiary graywacke

RBM Roberts Mtn: structurally complex assemblage of chert, argillite, sandstone, basalt, and minor limestone; Cambrian to Late Devonian or Mississippian age

ROD Rodriguez: Tertiary seamounts

SAL Salinia: meta-pelites, marble, and graywacke of unknown age intruded by K granite; continental crustal affinity

SCM Snow Camp Mountain: Middle Jr ophiolite overlain by Late Jr-Early K sed rocks

SFH Sierra foothills: Upper Jr andesite, volcaniclastic rocks, phyllite, slate and graywacke, and Upper Jr ophiolite

SLZ Siletzia: lower Cz volcanic and sedimentary rocks; paleomag data show post-Eocene 70° clockwise rotation

SNC Nicolas: Jr ophiolite (?) and K graywacke

SSM San Simeon: melange; graywacke, argillite, chert, and serpentinite

STM Stanley Mtn: Jr ophiolite, Upper Jr-K graywacke

TRP TrPz belt of Klamath Mtns: structurally complex assemblage of Lower Mz ophiolite, chert, basalt, Jr andesite and associated sed rocks

TUJ Tujunga: Precambian metamorphic rocks, Tr and K plutons, K graywacke

WKL Walker Lake: upper Pz and lower Mz arc volc rocks, Mz clastic rocks

WKM Western Klamath composite--Dry Butte, Briggs Crk, Rogue River, Smith River: Upper Jr island arc rocks

WYO Wyoming: Archean craton

YBP Yolla Bolly and Pickett Peak: blueschist metagraywacke, metachert, and metabasalt

APPALACHIANS AND SOUTHERN U.S.
(Appalachian terranes from Williams & Hatcher, 1982)

AVA Avalon: upper Precambrian sed, volc rocks relatively unmetamorphosed, undeformed; local Precambrian intrusions, Cambrian shales with Atlantic realm trilobites; probably composed of several late Precambrian terranes, including arc, tholeiitic, ophiolitic sequences linked by Cambrian time. Linked to GAN by Dev plutons; Sil-Dev sed strata

BRU Brunswick: delineated based on magnetic, gravity data; low frequency, symmetrical, long-wavelength anomalies

DUN Dunnage: early Pz mafic island arc volcs, marine sed rocks, melanges over ophiolite , mildly deformed; structurally complex ophiolitic boundaries; overlapped to W and E by Ord cgl, olistostromes

GAN Gander: pre-Mid Ord clastic sequence in N, volcs, shale over gneiss domes to S; continental basement, mid-Pz intrusions common. Intense metamorphism and deformation in mid-Pz

HUA Humber Arm: a Taconic allochthon; complex thrust sheets of ign, ophiolitic, metamorphic rocks over early Pz sed rocks; Mid Ord overlap link with miogeocline

MEG Meguma: Cambrian-Lower Ord graywacke, shale w/ continental source to SE; overlain by Ord tillite to Dev terrestrial sed sequence; Dev plutons unlike AVA; Carb overlap with AVA

MRN Marathon: Pz eugeosynclinal deposits, flysch, deformed in Penn-Perm

OUA Ouachita: Pz eugeosynclinal deposits, flysch, deformed in Penn-Perm

PIE Piedmont: late Precambrian-early Paleozoic metaclastics on Grenvillian basement ; metamrophosed to upper greenschist-amphibolite; intensely deformed; ophiolitic mafic, ultramafic bodies throughout terrane; plutonism and metamorphism indicate thrusting over miogeocline during Permo-Carb orogeny

STL St. Lawrence: a Taconic allochthon; lower Pz sed rocks overthrust by volc, ign, ophiolitic rocks of a variety of environs; overlap by Sil, Dev rocks to E

TAC Taconic Ranges: composite, structurally complex; lower Pz sed rocks overthrust by volc, ign, and ophiolitic rocks which may represent seamounts and oceanic crusts; overlap by mid Ord strata

TAL Talladega: lower Pz or older sed strata; overlain by Dev. chert, island arc mafic volcs

TAS Tallahassee-Suwannee: delineated by magnetic and gravity data; high-frequency magnetic pattern and positive gravity; Pz strata with European faunas from drillhole data

Oceanic Plateaus

Oceanic plateaus are anomalously high parts of the sea floor that at present are not parts of continents, active volcanic arcs, or active spreading ridges (Ben-Avraham et al., 1981; Nur and Ben-Avraham, 1982). These rises might be viewed as modern allochthonous terranes in migration, moving with the oceanic plates in which they are embedded and fated eventually to be accreted to continents adjacent to subduction zones that ring the Pacific.

Oceanic rises, which span a wide range of water depth and crustal thicknesses, may be classified on the basis of information from drill holes, dredgings, multi-channel seismic surveys, and core records: extinct arcs (e.g. Bowers Ridge, Aves Ridge), abandoned spreading ridges (e.g. West Philippine Ridge), detached and submerged continental fragments (e.g. Lord Howe Rise), anomalous volcanic piles (e.g. Hess Rise), and hot spot traces (e.g. Cocos Ridge) (Table 1).

Many of the large oceanic plateaus rise thousands of meters above their surrounding sea floor. Some, such as the Chatham Rise, actually rise above sea level, whereas most are submerged as much as 2000 m below sea level. Most of the plateaus for which seismic refraction and gravity data are available range in thickness from 20 km to over 40 km, much more than usual oceanic crust (Figure 1). Plateaus exhibit weak or no magnetic lineations, suggesting that they are not formed as typical oceanic crust. Although the nature of several plateau margins has been identified, e.g., an ancient subduction margin at the Bowers Ridge and a rifted margin at the Ontong Java Plateau, the nature of most plateau margins is still unknown.

Geological evidence from some plateaus shows strong continental affinities. For example, Precambrian basement is inferred for the South Tasman Rise and the Broken Ridge. Granitic basement was also found in the Paracel Islands in the South China Sea. Consequently, some plateaus or parts thereof are probably submerged continental fragments. The causes for their subsidence are not known.

Other plateaus are of oceanic rather than continental origins. For example, the Cocos and Carnegie Ridges are probably the result of the continuous extrusion of basalts onto the Cocos plate, overriding an active hot spot. Other plateaus are of unknown nature. Drilling into the Ontong Java Plateau revealed a few meters of Lower Cretaceous basalt beneath a cover of more than 1 km of calcareous sediments, indicating shallow deposition since Early Cretaceous time. The nature of the rock underlying the volcanics remains unknown.

Some constraints on the nature of the enigmatic plateaus may be obtained from their crustal seismic velocities (Figure 1). Much depends on the interpretation of compressional velocity V_p = 6.0-6.3 km/s in the upper 5 to 15 km in many of the plateaus. These values of V_p and thickness combined with the relief and gravity data, suggest a continental structure for the Ontong Java and Manihiki Plateaus.

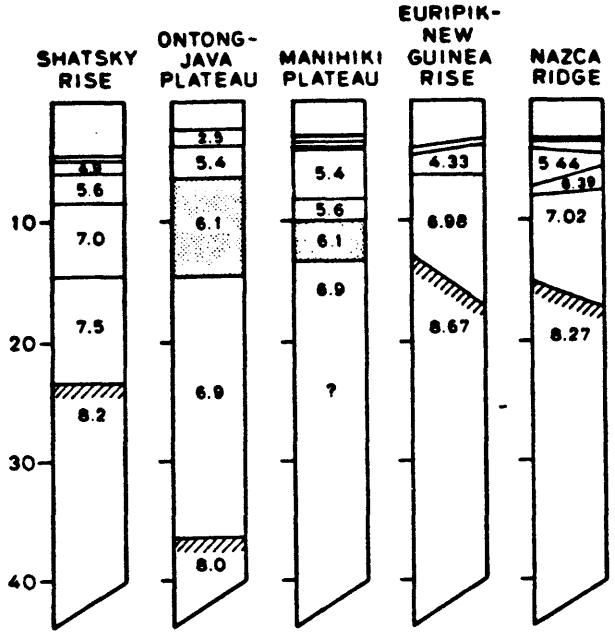
Whatever the nature of oceanic plateaus, they must possess light roots because most of them show no isostatic gravity anomalies. These roots, if confined to the thickened crust, as inferred from seismic refraction data, must typically be 8% to 12% lighter than normal oceanic upper mantle. Because of the relatively light mass of plateaus, upon arrival to a continental margin they will usually collide with the margin rather than underthrust beneath it.

FIGURE CAPTIONS

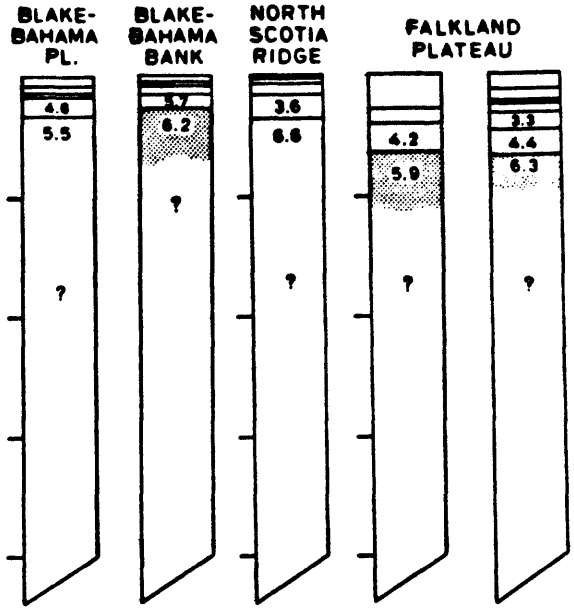
Fig. 1 (a) Summary of crustal structure data for oceanic plateaus in the Pacific, Atlantic, and Indian oceans and the Caribbean Sea. The vertical scale gives depth below sea level in kilometers; numbers in column indicate compressional wave velocities according to the references at the bottom of each column. Dotted zones indicate p velocities typical for continental basement rocks. See Nur and Ben-Avraham, 1982 for additional references for structures of individual plateaus.

(b). Summary of crustal structure data for oceanic plateaus in the marginal seas. See Figure 1a caption for details. Adapted from Nur and Ben-Avraham, 1982.

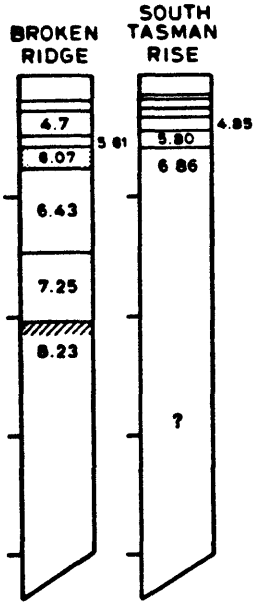
PACIFIC OCEAN



ATLANTIC OCEAN



INDIAN OCEAN



CARIBBEAN

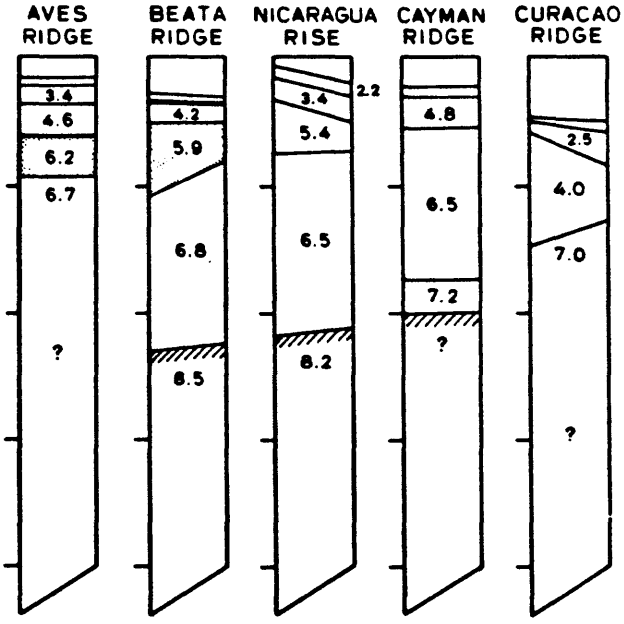


Fig 1a

MARGINAL BASINS

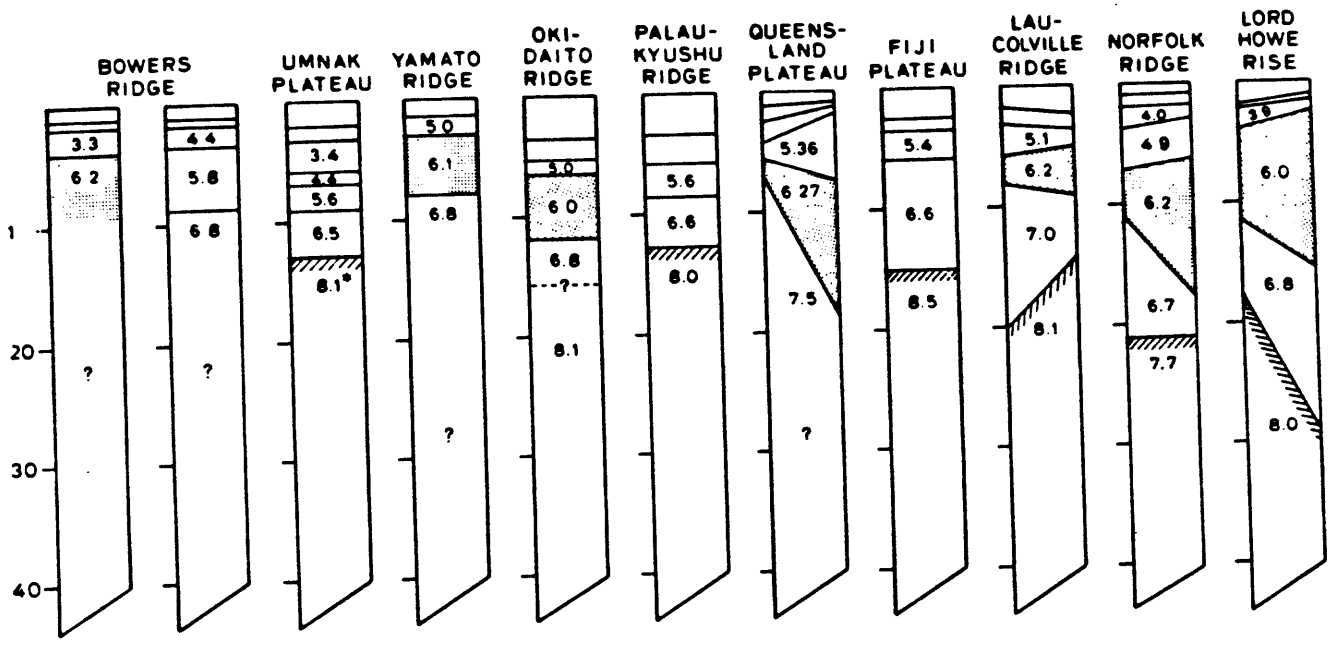


Fig 1b

TABLE 1. Oceanic Plateaus: Distribution and Type

Name	Water Depth, km	Relief, km	Crustal Nature			
			Continent	Ocean	Island Arc	?
		Pacific Ocean				
Alaska Seamounts (Pratt-Welker and Kodiak)	1	3		x		
Bismark Archipelago	1–2	2				x
Campbell Plateau	0–1	4.5	x			
Carnegie Ridge	1	2		x		
West Caroline Ridge	0–1	4				x
Chatham Rise	0–1	4.5	x			
Cocos Ridge	1–2	3		x		
Coiba Ridge	1	2		x		
Colville Ridge	1.7				x	
Eauripik-New Guinea Rise	0–2	4				x
Fiji Plateau	0	3		x		
Galapagos Rise	3–4	1		x		
Hess Rise	2	3				x
Izu Ridge	0–1	4				x
Juan Fernandez	0–1	4				x
Kermadac Ridge	0.7–2.5	2			x	
Lau Ridge	1	2			x	
Louisville Ridge	2	3.5				x
Magellan Rise	3	2.5				x
Magellan Seamounts	2	3.5				x
Malpelo Ridge	0–2	3		x		
Manihiki Plateau	2.5	3				x
Marcus Ridge	1–2	4				x
Meiji Guoyt	3	2.5				x
Mid-Pacific Mountains	2	3.5				x
Nazca Ridge	1	3				x
Necker Ridge	2	2.5				x
Ontong Java	1.7	3				x
Shatsky Rise	2	3.5				x
Tehuantepec Ridge	2–3	2		x		
Three Kings Rise	1	2				x
Bering Sea						
Bowers Ridge	0.6	3			x	
Shirshov Ridge	1	2				x
Umnak Plateau	0.2	3				x
Coral Sea						
Bellona Plateau	0.2	3				x
Louisiade Plateau	2	2				x
Queensland Plateau	0	4				x
Torres Rise	1	3				x
Japan Sea						
Yamato Ridge	1	2	x			
Philippine Sea						
Amami Plateau	2	3				x
Benham Rise	2	3				x
Daito Ridge	1.5	4.5				x
Oki-Daito Ridge	1.5	4.5				x
Palau-Kyushu Ridge	3	2			x	
Philippine Ridge	5.0	1		x		
South China Sea						
Macclesfield Bank	0.2	4	x			
Paracel Islands	0	2	x			
Reed Bank Crustal Block (Dangerous Grounds)	0–1	4.5	x			
Tasman Sea						
Challenger Plateau	1	3	x			
Lord Howe Rise	1	3	x			
Norfolk Ridge	0–1	3.5				x
East Tasman Plateau	2	2.5	x			
South Tasman Rise	1–2	3.5	x			

TABLE I. (continued)

Name	Water Depth, km	Relief, km	Crustal Nature: Continent	Ocean	Island Arc	?
Indian Ocean						
Broken Plateau	2	2.5	x			
Cuvier Plateau	3	2	x			
Exmouth Plateau	1.0	4.5	x			
Naturaliste Plateau	2-3	3	x			
Roo Rise	2.5	2.5				x
Scott Plateau	1.0	4.5	x			
Wallaby Plateau	2.5	2.5	x			
Atlantic Ocean						
Barracuda Ridge	3.5	2				x
Bermuda Rise	0	4.5		x		
Blake-Bahama Plateau	0-1	4				x
Falkland Plateau	0-1	3	x			
N. Scotia Ridge	0-1	3	x			
Caribbean						
Aves Ridge	1	3				x
Barbados Ridge	1	2			x	
Beata Ridge	2	2				x
Cayman Ridge	0-1	4.5				x
Curacao Ridge	0-1	4				
Nicaragua Rise	0-1	3				x
Antarctic Ocean						
Balleny Island	0	3				x
Peter Island	0	4				x
Arctic Ocean						
Chukchi Cap	1	3	x			
Mendeleyev Ridge	2	2				x

adapted from Nur and Ben-Avraham, 1982.