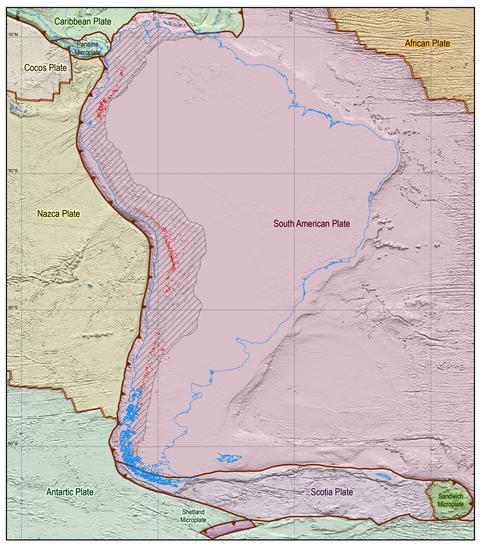

Commission for the Geological Map of the World

Philippe ROSSI
President

Manuel PUBELLIER
Secretary General

CCGM CGMW

Commission de la Carte Geologique du Monde

Carlos SCHOBBENHAUS
Vice–President for South America

Jorge GÓMEZ TAPIAS
Secretary General for South America

Lêda Maria FRAGA BARRETO
Deputy Secretary General for South America

GEOLOGICAL MAP OF SOUTH AMERICA

General Coordinators

Jorge GÓMEZ TAPIAS

Carlos SCHOBBENHAUS

Compiled by

Jorge GÓMEZ TAPIAS, Carlos SCHOBBENHAUS and Nohora Emma MONTES RAMÍREZ

Map prepared with the technical and financial support of:

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CPRM Serviço Geológico do Brasil
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Director–President
Geological Survey of Brazil

With the cooperation of

ASGMI Asociación de Servicios de Geología y Minería Iberoamericanos
Association of Iberoamerican Geological and Mining Surveys

Scale 1:5 000 000

100 0 100 200 300 400 500 km

Coordinate System: World Polyconic
Projection: Polyconic
Datum: WGS 1984
Central Meridian: -59,0000

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2019 Edition

Descarga el mapa en PDF
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80°W
75°W
70°W
65°W
60°W
55°W
50°W
45°W
40°W
35°W
95°W
90°W
85°W
30°W
25°W
20°W
10°N
5°N
0°
5°S
10°S
15°S
20°S
25°S
30°S
35°S
40°S
45°S
Caribbean Sea
San Andrés
Central America
Cocos Ridge
Coiba Ridge
Malpelo Ridge
Carnegie Ridge
Grijalva Ridge
Alvarado Ridge
Sarmiento Ridge
Pacific Ocean
Nazca Ridge
Maracaibo Lake
Maracaibo
Barranquilla
La Asunción
Port of Spain
Maturín
Ciudad Bolívar
San Fernando de Apure
Venezuela
Colombia
Georgetown
New Amsterdam
Linden
Nieuw Nickerie
Paramaribo
Saint-Laurent-du-Maroni
Cayenne
Saint-Georges
Suriname
French Guiana
Guiana
Boa Vista
Lethem
Apoteri
Caracaraí
Cali
Esmeraldas
Ecuador
Guayaquil
Piura
Iquitos
Leticia
Peru
Trujillo
Pucallpa
Cruzeiro do Sul
Rio Branco
Cobija
Puerto Maldonado
Manaus
Manicoré
Carauari
Apuí
Porto Velho
Guajará-Mirim
Costa Marques
Vilhena
Macapá
Santarém
Altamira
Itaituba
Belém
Paragominas
Imperatriz
Tucuruí Reservoir
Atlantic Ocean
North Brazilian Ridge
Paraiba Ridge
Fortaleza
Parnaíba
Sobral
Teresina
Mossoró
Natal
João Pessoa
Recife
Maceió
Aracaju
Salvador
Petrolina
Picos
Floriano
Pastos Bons
Palmas
São Félix do Araguaia
Barreiras
Euclides da Cunha
Xique-Xique
Brazil
125 Az lineament
Transbrasiliano Lineament
Brasília
Goiânia
Montes Claros
Vitória da Conquista
Porto Seguro
Abrolhos Volcanic Complex
Vitória
Vitória – Trindade Chain
Rio de Janeiro
Santos
São Paulo
Belo Horizonte
Curitiba
Florianópolis
Porto Alegre
Patos Lagoon
Bolivia
Trinidad
Santa Cruz
Corumbá
Cuiabá
Campo Grande
Paranaíba
Bauru
Paraguay
Fuerte Olimpo
Filadelfia
Mayor Pablo Lagerenza
Concepción
Asunción
Coronel Oviedo
Formosa
Corrientes
Posadas
Paraguay
Mar Chiquita Lake
Ambargasta Salt Lake
Grandes Salt Lake
Tucumán
La Rioja
San Juan
Mendoza
San Luis
Córdoba
Santa Fe
Paraná
Rosario
Buenos Aires
Montevideo
Maldonado
Uruguay
Rivera
Melo
Tacuarembó
Paysandú
Argentina
Santa Rosa
Tandil
Dolores
Mar del Plata
Bahía Blanca
Chile
Valdivia
Puerto Montt
Comodoro Rivadavia
General Carrera Lake
Río Gallegos
Río Grande
Punta Arenas
Scotia Sea
Jean Charcot Chain
São Paulo Ridge
Rio Grande Rise
Mid-Atlantic Ridge
Northeast Georgia Rise

Geological Map of South America at a scale of 1:5M

Abstract

A new edition of the Geological Map of South America (GMSA) at a scale of 1:5 M was developed by the Subcommission for South America of the Commission for the Geological Map of the World (CGMW), approved by the CGMW General Assembly held in Oslo (Norway), during the 33rd International Geological Congress.

This third version has been prepared with the cooperation of the Ibero–American Association of Geology and Mining Surveys (ASGMI), the geological surveys of Argentina, Brazil, Chile, Colombia, Ecuador, Peru, and Uruguay; and several additional universities and research institutes that are mentioned in the collaborators information.

The subcommission followed a methodology for integrating the geological information from each country as follows: first, a new code was generated for each chronostratigraphic unit according to the proposed legend, by using digital layers provided by the geological survey of each country; second, symbology and colors were created with patterns representative of rock type and colors depicting the ages; and third, a map with coded units was prepared at a scale of 1:5 M.

With the objective of generalization and linking units by hand, the GMSA was printed at a scale of 1:3 M with the new codification. Next, the GMSA was scanned and georeferenced in order to generalize the geological units, faults and folds at a scale of 1:5 M. Once this was done, and despite the small–scale of the GMSA, the chronostratigraphic units, faults and folds on the map were adjusted with the aid of shaded relief images (STRM from NASA) in order to improve the matching between relief and the mapped geological units. Finally, the geology between countries was harmonized. It is worth noting that the updating of the GMSA was done through consultation of internationally indexed published papers.

The map is based on a Polyconic Projection (Latitude × Longitude), centered on Meridian –59°, WGS–1984 datum; data for offshore areas were taken from the Tectonic Map of South America at scale 1:5,9 M (Cordani et al., 2016); the Sea Floor Topography from GEBCO 08 Grid, version 20100927; and the Crustal Age Grid: NCEI/NOAA.

Collaborators:

The GIS map/database was developed by Nohora Emma MONTES RAMÍREZ and Helena Soares ZANETTI EYBEN. The shaded relief images and the style were prepared by Fernando Alirio ALCÁRCEL GUTIÉRREZ.

Data were supplied, or critically evaluated, in collaboration with the following, listed in alphabetical order by country:

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Venezuela: Franco URBANI from the Central University of Venezuela and Funvisis.

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Offshore

Cordani, U.G., Ramos, V.A., Fraga, L.M., Cegarra, M., Delgado, I., de Souza, K.G., Gomes, F.E.M. & Schobbenhaus, C. 2016. Tectonic Map of South America at 1:5.9 M. CGMW, CPRM & SEGEMAR.

Caribbean Plate
Panama Microplate
African Plate
Cocos Plate
Nazca Plate
South American Plate
Antartic Plate
Scotia Plate
Shetland Microplate
Sandwich Microplate
10°N
10°S
30°S
50°S

Map of Plate Tectonics of South America

▲ Volcano
▨ Andean orogenic belt

Conventions

Tectonic features

- Fault defined / inferred / concealed
- Strike–slip fault, right–lateral offset defined / concealed
- Strike–slip fault, left–lateral offset defined / concealed
- Thrust fault defined / inferred / concealed
- Normal fault defined / concealed
- Lineament
- Magnetic lineament
- Anticline
- Plunging anticline
- Doubly plunging anticline
- Overturned anticline
- Syncline
- Plunging syncline
- Doubly plunging syncline

Geological features

- Cretaceous basaltic dike
- Jurassic basaltic dike
- Cambrian basaltic dike
- Ediacaran basaltic dike
- Statherian basaltic dike
- Kimberlite cluster and related rocks
- ◆ Kimberlite and related rocks
- ○ Impact crater
- ▲ Volcano
- ✱ High pressure metamorphic rocks (retro–eclogite)
- ☆ Paleogene alkaline volcanic
- ★ Cretaceous alkaline intrusion / carbonatite
- ★ Jurassic alkaline intrusion / carbonatite
- ★ Triassic alkaline intrusion / carbonatite
- ★ Ediacaran alkaline intrusion / carbonatite
- ★ Cryogenian alkaline intrusion / carbonatite
- ★ Stenian alkaline intrusion / carbonatite
- ★ Ectasian alkaline intrusion / carbonatite
- ☆ Statherian alkaline intrusion / carbonatite
- ★ Orosirian alkaline intrusion / carbonatite

303 → Number to identify the basaltic dikes on the map and legend

293 → Number to identify the alkaline intrusion / volcanic on the map and legend

Oceanic crustal age

- Pleistocene
- Pliocene
- Miocene
- Oligocene
- Eocene
- Paleocene
- Upper Cretaceous
- Lower Cretaceous
- Undefined age (seamounts, oceanic plateaus, LIPS, volcanic ridges and interpreted lavas from Seaward Dipping Reflectors–SDRs)

Oceanic features

- Fracture zone
- Axis of ancient oceanic accretionary ridge
- Plate boundary by axis of active subduction zone
- Plate boundary by axis of active oceanic accretionary ridge
- Plate boundary by transform fault
- Plate boundary by thrust fault
- Lineament
- Continent–ocean boundary

The drawing, on this map, between the coastal boundary and oceanic crust (bluish tones) represent the bathymetry. It has no legal force in the framework of the agreements that establish the limits of the territorial sea.

Cartographic features

- ✱ National capital
- • City
- River
- Coast line
- Salt lake
- Lake, lagoon or dam
- Glacier

Bathymetry (depth in meters)

- 0–200
- 200–2000
- 2000–4000
- 4000–6000
- 6000–8000

Legend

Ages taken from:

Cohen, K.M., Harper, D.A.T., Gibbard, P.L. 2018. ICS International Chronostratigraphic Chart 2018/08. International Commission on Stratigraphy, IUGS. www.stratigraphy.org (visited: 2018/09/10)

Sedimentary Rocks and Unconsolidated Deposits
s1: Siliciclastic
s2: Carbonatic
s3: Evaporitic
s4: Undifferentiated

Volcanic Rocks
θ: Andesitic and related
β: Basaltic
α: Rhyolitic
δ: Alkaline
σ: Volcano–sedimentary
ω: Undifferentiated

Plutonic Rocks
γ: Granitic
μ: Gabbroic and Ultramafic
λ: Alkaline

Metamorphic Rocks
m1: Low to medium grade
m2: Medium to high grade
m3: Undifferentiated

Eon	Era	Period	Ma	s1	s2	s3	s4	θ	β	α	δ	σ	ω	γ	μ	λ	m1	m2	m3
Phanerozoic	Cenozoic	Quaternary	2.58	292, 270, 284	291	290, 283	269, 289	288, 282	287, 281	286		285, 280							
		Neogene	23.03	279, 268				278, 267	277, 266	276, 265		275, 264	274	273, 263	272	271	262		
		Paleogene	66.0	261, 252				260, 251	259	258	257	256, 250	255	254, 249	253	☆ 302			
	Mesozoic	Cretaceous	145.0	248, 233, 216	247		246	245, 232	244, 231, 307	243	242	241, 230	240	239, 229	238, 228	237, ★ 301	236, 227	235	234
		Jurassic	201.3	226, 215				225	224, 214, 306	223		222	221	220, 213	219, 212	211, ★ 300	218	217	
		Triassic	251.9	210, 204, 194					209	203		208		207, 202, 193	206	★ 299	201	200, 205	
	Paleozoic	Permian	298.9	199, 192, 150, 175	198, 191		197	190				189	196	195, 149, 188, 163		187	186, 148	147, 185	
		Carboniferous	358.9	184, 174, 168	183		182	181				180	179	178, 173			177, 172	171, 176	
		Devonian	419.2	170, 167, 162										169			166		165
		Silurian	443.8	164, 161				160						159			158	157	
		Ordovician	485.4	156, 146, 110	145					155		144		154, 143	153		152, 142	151, 141	
		Cambrian	541.0	140, 134					305	139				138, 109	137		136	135	
Proterozoic	Neoproterozoic	Ediacaran	635	133, 124, 108	132		131		304	130		107, 129		128, 123, 75, 106	127	105, ★ 298	126, 122	125, 104, 121, 31	103
		Cryogenian	720	120, 102			119, 101			118		117	116	115	114	113, ★ 297	112	111	
		Tonian	1000	100, 94			99					98		97, 93, 52	92		96	95, 74, 91	
	Mesoproterozoic	Stenian	1200	90, 73			72, 89		88			87		86	85	84, ★ 296	83	82, 71	70
		Ectasian	1400	81, 69										80	79	78, ★ 295	77	76	
		Calymmian	1600						68					67, 63, 51		66	65	64	
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