U.S. DEPARTMENT OF THE INTERIOR
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Text accompanies map

Map of Quaternary Faults and Folds of Ecuador and Its Offshore Regions

Mapa de Fallas y Pliegues Cuaternarias de Ecuador y Regiones Oceanicas Adyacentes

International Lithosphere Program Task Group II-2,
Major Active Faults of the World

Internacional de la Litósfera, Grupo de Trabajo II-2,
Principales Fallas Activas del Mundo

A cooperative project of the U.S. Geological Survey, Denver, Colorado
and the National Polytechnical School, Quito, Ecuador.
Data compiled by Arturo Eguez, Alexandra Alvarado, and Hugo Yepes.
Digital representation by Richard L. Dart (USGS).
Project coordination by Michael N. Machette (Co-chairman, ILP Task Group II-2).

Un proyecto de cooperacion entre el U.S. Geological Survey, Denver, Colorado
y la Escuela Politécnica Nacional, Quito, Ecuador.
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2003

Scale 1:1,250,000; Mercator Projection
(longitude of central meridian, 78°W; latitude of true scale 0°; Clarke 1866 spheroid)

Escala 1:1.250.000; Proyección de Mercator
(longitud de meridiano central, 73°W; latitud de escala verdadera 0°;
con base en el esferoide de Clarke 1866)

International Lithosphere Program (ILP)

Programa Internacional de la Litósfera (ILP)

QUATERNARY FAULTS AND FOLDS OF ECUADOR
FALLAS Y PLIEGUES CUATERNARIAS DE ECUADOR

Number Numeró	Name of structure Nombre de structuro	Sense of movement (major/minor) Sentido de movimiento (mayor/menor)	Time of most recent movement Edad del último movimiento	Slip rate (mm/yr) Tasa de movimiento (mm/año)
EC-01	**San Lorenzo lineament**	Unknown	<1.6 Ma	<1 (unknown)
EC-02	**Esmeraldas fault**			
EC-02a	Northern section	Unknown	<1.6 Ma	<1 (unknown)
EC-02b	Southern section	Sinistral, reverse	<1.6 Ma	<1 (unknown)
EC-03	**Río Canandé fault**			
EC-03a	Western section	Normal, dextral	<1.6 Ma	<1 (unknown)
EC-03b	Central section	Dextral	<1.6 Ma	<1 (unknown)
EC-03c	Eastern section	Dextral	<1.6 Ma	<1 (unknown)
EC-04	**Galera fault**	Dextral, normal	<1.6 Ma	<1 (unknown)
EC-05	**Buga fault**	Reverse	<1.6 Ma	<1 (unknown)
EC-06	**Mache lineament**	Unknown	<1.6 Ma	<1 (unknown)
EC-07	**Cañaveral fault**			
EC-07a	Northern section	Reverse, dextral	<1.6 Ma	<1 (unknown)
EC-07b	Central section	Dextral, normal	<1.6 Ma	<1 (unknown)
EC-07c	Jama section	Unknown	<1.6 Ma	<1 (unknown)
EC-07d	San Isidro section	Normal, dextral	<1.6 Ma	<1 (unknown)
EC-08	**Quinindé fault**	Reverse, transpressive	<1.6 Ma	<1 (unknown)
EC-10	**Bahía fault**			
EC-10a	Northern section	Sinistral (?)	<1.6 Ma	<1 (unknown)
EC-10b	Southern section	Reverse, transpressive (?)	<1.6 Ma	<1 (unknown)
EC-11	**Calceta fault**	Unknown	<1.6 Ma	<1 (unknown)
EC-12	**Daule fault**	Unknown	<1.6 Ma	<1 (unknown)
EC-13	**Buena Fe fault**	Unknown	<1.6 Ma	<1 (unknown)
EC-14	**Jipijapa fault**			
EC-14a	Jipijapa section	Reverse(?)	<1.6 Ma	<1 (unknown)
EC-14b	Julcuy (fault) section	Reverse(?)	<1.6 Ma	<1 (unknown)
EC-15	**Río Colimes fault**	Unknown	<1.6 Ma	<1 (unknown)
EC-16	**Colonche fault**			
EC-16a	Northwestern section	Reverse(?)	<1.6 Ma	<1 (unknown)
EC-16b	Northern section	Reverse, transpressive	<1.6 Ma	<1 (unknown)
EC-16c	Central section	Sinistral	<1.6 Ma	<1 (unknown)
EC-16d	Southeastern section	Reverse	<1.6 Ma	<1 (unknown)
EC-17	**Carrizal fault**	Unknown	<1.6 Ma	<1
EC-18	**La Cruz fault**	Dextral	<1.6 Ma	<1
EC-19	**Chanduy fault**	Unknown	<1.6 Ma	<1 (unknown)
EC-20	**Posorja fault**	Normal	<1.6 Ma	<1 (unknown)
EC-21	**Jambeli fault**	Normal	<1.6 Ma	<1 (unknown)
EC-22	**Puná fault**	Dextral	<1.6 Ma	<1 (unknown)
EC-23	**San Isidro fault**	Dextral(?)	<15 ka	0.2-1.0
EC-24	**El Angel fault**	Reverse, dextral(?)	<15 ka	<1 (unknown)
EC-25	**Río Ambi fault**	Reverse, dextral(?)	<1.6 Ma	<1 (unknown)
EC-26	**Otavalo fault**	Dextral	<1.6 Ma	<1 (unknown)
EC-27	**Billecocha-Huyrapungo fault**			
EC-27a	Billecocha section	Normal	<15 ka	<1 (unknown)
EC-27b	Huyrapungo section	Dextral	<1.6 Ma	<1 (unknown)
EC-28	**Apuela fault**			
EC-28a	Northeastern section	Dextral	<1.6 Ma	<1 (unknown)
EC-28b	Central section	Dextral	<1.6 Ma	<1 (unknown)
EC-28c	Southern section	Unknown	<1.6 Ma	<1 (unknown)
EC-29	**Nanegalito fault zone**	Dextral	<15 ka	1-5
EC-30	**El Cinto fault**			
EC-30a	Guayacán section	Sinistral (?)	<1.6 Ma	<1 (unknown)
EC-30b	Río Cinto section	Sinistral	<1.6 Ma	<1 (unknown)
EC-31	**Quito fault**			
EC-31a	Northern section	Reverse, dextral	<15 ka	0.2-1.0
EC-31b	Southern section	Reverse, dextral	<15 ka	0.2-1.0
EC-32	**Tandapi fault**	Sinistral	<15 ka	1-5
EC-33	**Papallacta fault**	Dextral	<1.6 Ma	<1
EC-34	**Río Baba fault**	Reverse, dextral	<1.6 Ma	<1 (unknown)
EC-35	**Machachi fault**	Dextral	<1.6 Ma	<1 (unknown)
EC-36	**Poaló fault**	Reverse	<1.6 Ma	<1 (unknown)
EC-37	**Nagsiche anticline**	Reverse	<1.6 Ma	<1 (unknown)
EC-38	**Latacunga anticline**	Reverse	<1.6 Ma	<1 (unknown)
EC-39	**Yanayacu anticline**	Reverse	<1.6 Ma	<1 (unknown)
EC-40	**Guangaje fault**	Strike slip(?)	<1.6 Ma	<1 (unknown)
EC-41	**Chugchilan-Sigchos fault**			
EC-41a	Sigchos section	Transpressive, dextral(?)	<1.6 Ma	<1 (unknown)
EC-41b	Chugchilan section	Reverse	<1.6 Ma	<1 (unknown)
EC-42	**Pucayacu fault**	Reverse	<1.6 Ma	<1 (unknown)
EC-43	**Valencia-La Maná fault**			
EC-43a	Valencia section	Unknown	<1.6 Ma	<1 (unknown)
EC-43b	La Maná section	Reverse	<1.6 Ma	<1 (unknown)
EC-44	**Quinsaloma fault**	Reverse	<1.6 Ma	<1 (unknown)
EC-45	**Calabí fault**	Unknown	<1.6 Ma	<1 (unknown)
EC-46	**Río Salinas fault**			
EC-46a	Salinas section	Unknown	<1.6 Ma	<1 (unknown)
EC-46b	Southern section	Reverse(?)	<1.6 Ma	<1 (unknown)
EC-47	**Guaranda fault**	Reverse, dextral(?)	<1.6 Ma	<1 (unknown)
EC-48	**Montalvo fault**	Reverse	<1.6 Ma	<1 (unknown)
EC-49	**Chillanes fault**	Reverse	<1.6 Ma	<1 (unknown)
EC-50	**Pallatanga fault zone**			
EC-50a	Pallatanga section	Dextral, reverse	<15 ka	1-5
EC-50b	Central section	Dextral(?)	<1.6 Ma	<1 (unknown)
EC-50c	Southern section	Reverse, dextral(?)	<1.6 Ma	<1 (unknown)
EC-51	**Pancho Negro fault**	Dextral (?)	<1.6 Ma	<1 (unknown)
EC-52	**Naranjal fault**	Reverse	<1.6 Ma	<1 (unknown)
EC-53	**Ponce Enríquez fault**	Reverse	<1.6 Ma	<1 (unknown)
EC-54	**Chingual fault**	Dextral	<15 ka	>5
EC-55	**Reventador fault**			
EC-55a	Northern section	Reverse	<1.6 Ma	<1 (unknown)
EC-55b	Southern section	Dextral	<1.6 Ma	<1 (unknown)
EC-56	**Salado fault**	Reverse, dextral	<15 ka (Historic?, 1987)	<1 (unknown)
EC-57	**Baeza-Chaco fault**	Dextral, reverse,	<15 ka(?)	1-5
EC-58	**Cosanga fault**	Reverse, dextral	<1.6 Ma	<1 (unknown)
EC-59	**Huacamayos fault**	Dextral	<1.6 Ma	<1 (unknown)
EC-60	**Pisayambo fault**	Dextral	<1.6 Ma	<1 (unknown)
EC-61	**Patate fault**	Dextral(?)	<1.6 Ma	<1 (unknown)
EC-62	**Candelaria fault**	Strike-slip(?)	<1.6 Ma	<1 (unknown)
EC-63	**Guamote fault**	Dextral	<1.6 Ma	<1 (unknown)
EC-64	**Cascales fault**	Reverse	<1.6 Ma	<1 (unknown)
EC-65	**Payamino fault**	Reverse	<1.6 Ma	<1 (unknown)
EC-66	**Sumaco fault**	Reverse, transpressive (dextral?)	<1.6 Ma	<1 (unknown)
EC-67	**Hollín fault**	Reverse(?)	<1.6 Ma	<1 (unknown)
EC-68	**Tena fault**	Reverse	<1.6 Ma	<1 (unknown)
EC-69	**Pusuno fault**	Reverse	<1.6 Ma	<1 (unknown)
EC-70	**Arajuno fault**	Reverse	<1.6 Ma	<1 (unknown)
EC-71	**Anzu fault**	Reverse	<1.6 Ma	<1 (unknown)
EC-72	**Mera fault**	Reverse	<1.6 Ma	<1 (unknown)
EC-73	**Puyo fault**	Reverse	<1.6 Ma	<1 (unknown)
EC-74	**Pastaza fault**	Sinistral	<1.6 Ma	<1 (unknown)
EC-75	**Santiago-Upano fault**	Reverse	<15 ka	<1 (unknown)
EC-76	**Macuma fault**	Reverse	<1.6 Ma	<1 (unknown)
EC-77	**Taisha fault**	Reverse	<1.6 Ma	<1 (unknown)
EC-78	**Paute fault**	Unknown	<1.6 Ma	<1 (unknown)
EC-79	**Gualaceo fault**	Reverse	<1.6 Ma	<1 (unknown)
EC-80	**Tarqui fault**	Unknown	<1.6 Ma	<1 (unknown)
EC-81	**Girón fault**			
EC-81a	Northeastern section	Normal	<15 ka	<1.0
EC-81b	Southwestern section	Normal, dextral	<15 ka	<1.0
EC-82	**Celica-Macará fault**			
EC-82a	Celica section	Unknown	<1.6 Ma	<1 (unknown)
EC-82b	Macará section	Reverse	<1.6 Ma	<1 (unknown)
EC-83	**La Toma fault**	Reverse	<1.6 Ma	<1 (unknown)
EC-84	**Catamayo fault**	Reverse	<1.6 Ma	<1 (unknown)
EC-85	**Las Pitas fault**	Unknown	<1.6 Ma	<1 (unknown)
EC-86	**El Tambo fault**	Reverse	<1.6 Ma	<1 (unknown)
EC-87	**Loja fault**	Reverse	<1.6 Ma	<1 (unknown)
EC-88	**Solanda fault**	Unknown	<1.6 Ma	<1 (unknown)
EC-89	**Las Aradas fault**	Reverse	<1.6 Ma	<1 (unknown)
EC-90	**Numbala fault**			
EC-90a	Northern section	Reverse	<1.6 Ma	<1 (unknown)
EC-90b	Southern section	Reverse	<1.6 Ma	<1 (unknown)
EC-91	**Nangaritza fault**	Transcurrent, reverse	<1.6 Ma	<1 (unknown)
EC-92	**Colombia-Ecuador trench (subduction zone)**	Reverse	Historic (1906)	>5 (ca. 70)

ILP FAULT MAPS	USGS OPEN-FILE REPORT NO.
1. ARGENTINA	00-103
2. BOLIVIA	00-293, Plate 1
3. BRAZIL	00-230
4. CHILE	00-283, Plate 2
5. COLOMBIA	02-284
6. COSTA RICA	98-481
7. ECUADOR	This report
8. PANAMA	98-779
9. PERU	In preparation
10. MANGUA, NI.	00-437
11. VENEZUELA	00-018

MAP EXPLANATION

TIME OF MOST RECENT SURFACE RUPTURE
- Historic (year)
- Holocene (<10,000 yrs) or post glacial (<15,000 yrs)
- Quaternary, undifferentiated (<1,600,000 yrs)

SLIP RATE
- 1-5 mm/yr
- 0.2-1 mm/yr
- <0.2 mm/yr (or unknown)

QUALITY
- Continuous at map scale
- Poor or discontinuous at map scale
- Inferred or concealed

STRUCTURE TYPE

FAULTS
- Thrust or reverse fault (teeth on upper block)
- Right-lateral (dextral) strike-slip fault
- Left-lateral (sinistral) strike-slip fault
- Normal fault (bar and ball on downthrown block)

FOLDS
- Anticline
- Syncline
- Monocline

OTHER SYMBOLS
- Location of fault section boundary
- 15 Ecuador fault number (EC-)
- CO-15 Other fault numbers (for example, in Colombia)

SIMBOLOGIA DEL MAPA

EDAD DE ULTIMA RUPTURA SUPERFICIAL
- Histórica (año)
- Holocena (<10,000 años) o post glacial (<15,000 años)
- Cuaternaria, sin diferenciar (<1,600,000 años)

TASA DE MOVIMIENTO
- 1-5 mm/año
- 0.2-1 mm/año
- <0.2 mm/año (o desconocida)

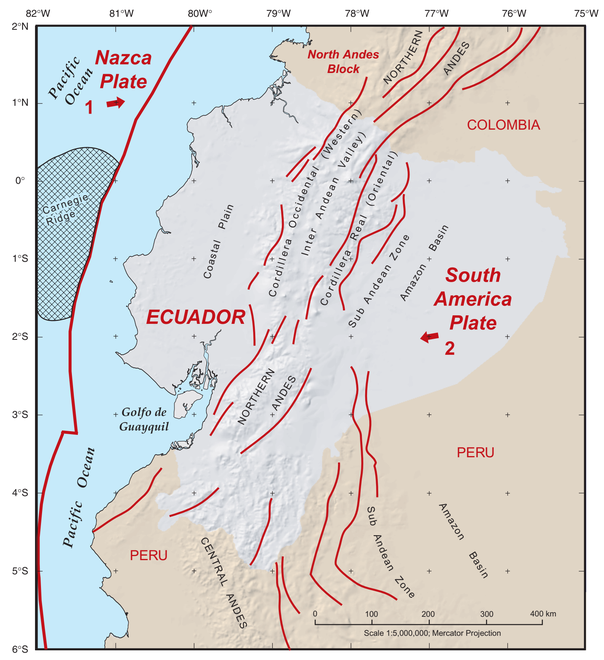
CALIDAD
- Continua a la escala del mapa
- Pobre o discontinua a la escala del mapa
- Inferida u oculta

TIPO DE ESTRUCTURA

FALLAS
- Falla inversa o corrimiento (triángulos en bloque superior)
- Falla de rumbo dextral
- Falla de rumbo sinestral
- Falla normal (círculo en bloque hundido)

PLIEGUES
- Anticlinal
- Synclinal
- Monoclinal

OTROS SIMBOLICOS
- Extremidad de sección de falla
- 15 Numero de falla de Ecuador (EC-)
- CO-15 Otro numeros de falla (por ejemplo, en Colombia)



RELATIVE PLATE MOTION

No.	Location	Fixed Plate	Moving Plate	Velocity	Direction
1	81°W, 1°N	South America	Nazca	7.3 cm/yr	79.1°
2	77°W, 2°S	Nazca	South America	7.0 cm/yr	261.3°

Source: Relative Plate Motion Calculator, Nuvel-1A Model; Kensaku Tamaki, Ocean Research Institute, University of Tokyo, 1-15-1 Minamidai, Nakano-ku, Tokyo, 164, Japan (tamaki@ori.u-tokyo.ac.jp)

Diagram of major plate boundaries for Ecuador
Esquema de límites de placas para Ecuador

Digital data prepared with ARC/INFO version 7.2.1 running under Solaris version 2.6 on a Unix workstation.
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Map prepared by M.N. Machette using Adobe Illustrator version 10.0.
Last revision July 2003.

This map is available as a PDF file at http://geology.cr.usgs.gov

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