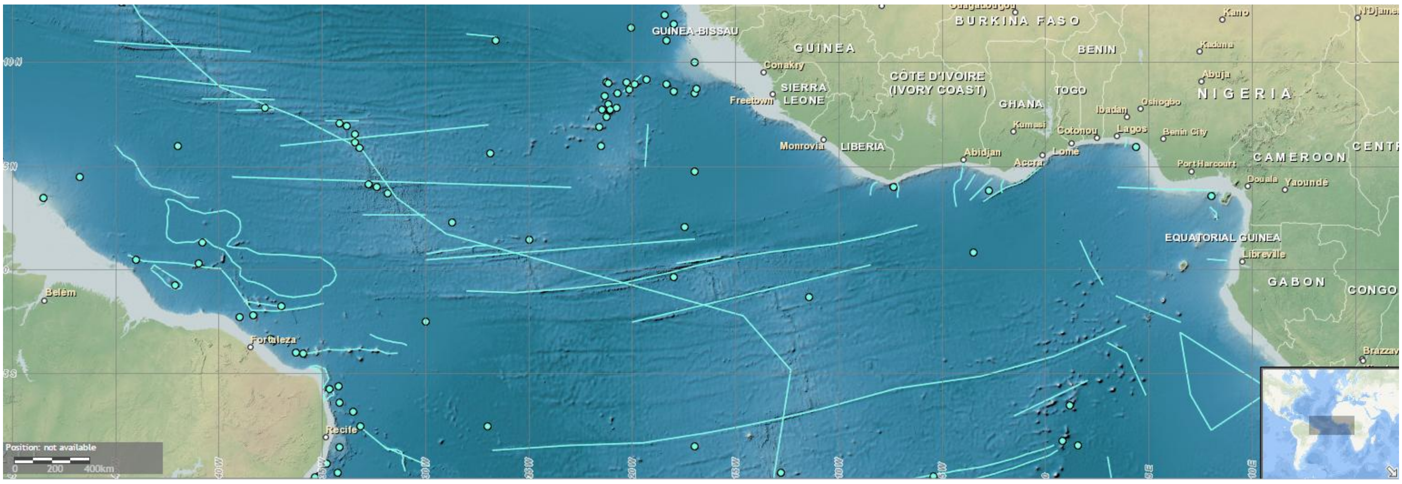
Report to 28th SCUFN meeting.

Directorate of Hydrography and Navigation - DHN, Brazil, 08th September 2015.

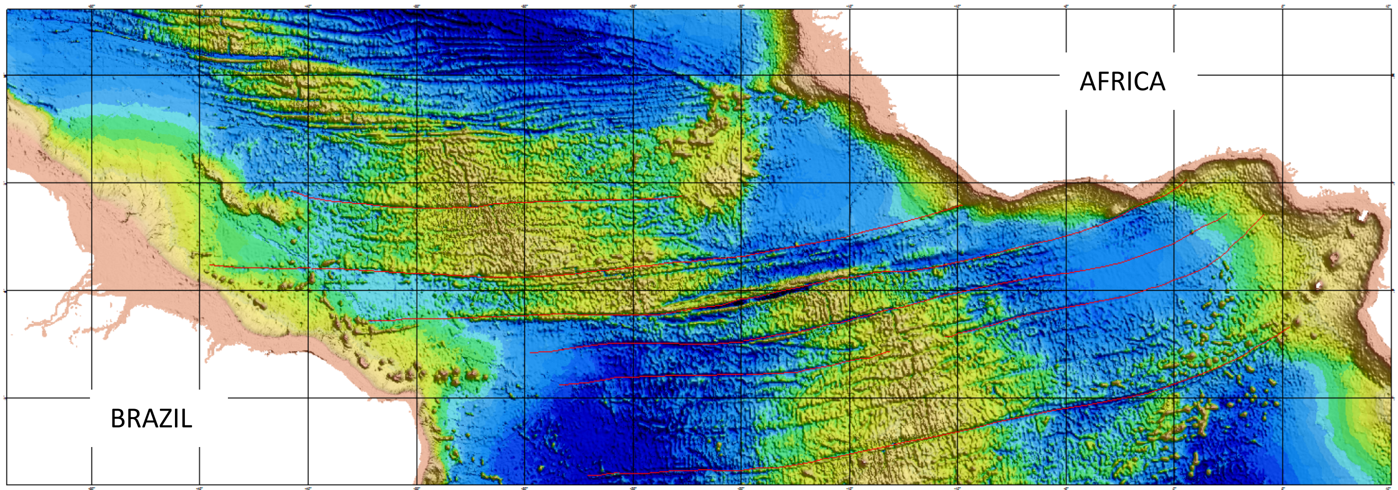
1. After a review over on-line GEBCO Gazetteer it was observed that are seven fracture zones located between the equatorial Brazilian continental margin and the African continental margin which are represented by lines that does not reflect the full feature or even are not represented on-line GEBCO Gazetteer. They are: **Strakhov Fracture Zone (known as Four North Fracture Zone); Saint Paul Fracture Zone; Romanche Fracture Zone; Chain Fracture Zone; Ascension Fracture Zone; Fernando de Noronha Fracture Zone, and Charcot Fracture Zone.**

Analyzing the Digital Terrain Model - DTM together with the Free-Air model we may better define these features in order to update de GEBCO Gazetteer shape files dataset.

On-line GEBCO Gazetteer Map



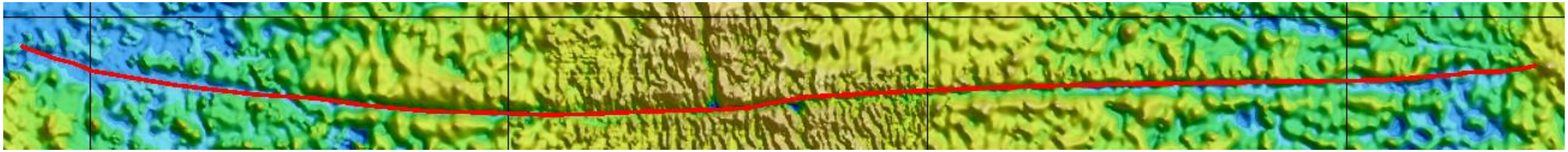
Digital Terrain Model - DTM between Brazil and Africa and the Fracture Zones in red lines



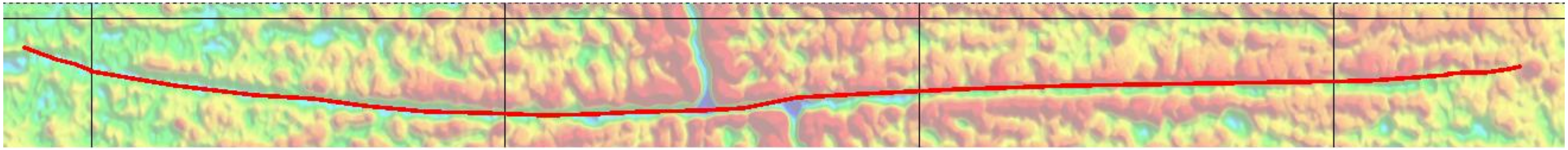
1.1. Strakhov Fracture Zone (known as Four North Fracture Zone)

On-line GEBCO Gazetteer

Digital Terrain Model - DTM



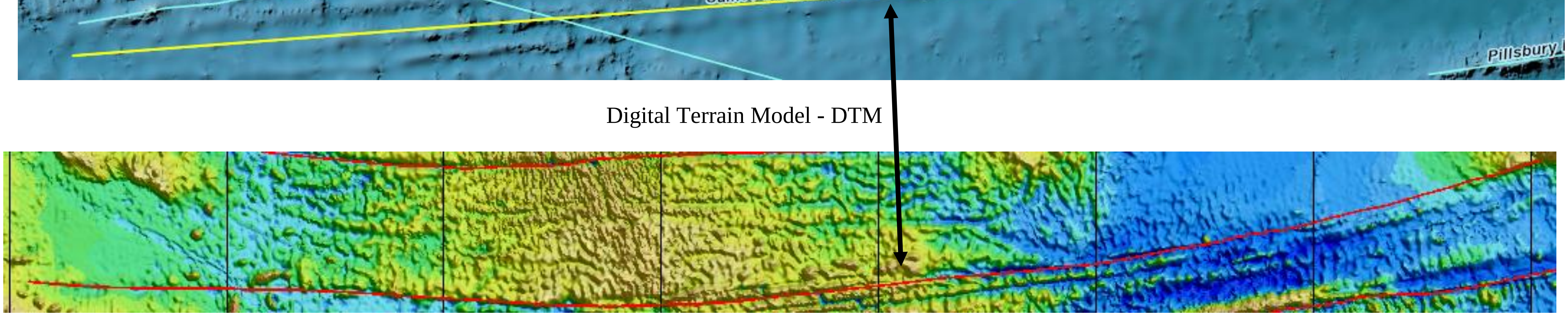
Free-Air model



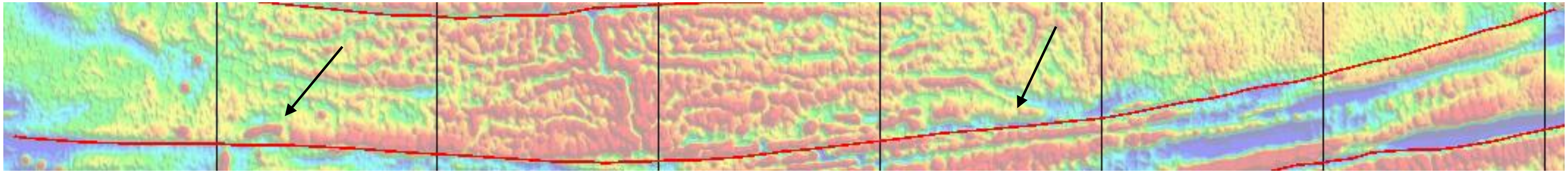
1.2. Saint Paul Fracture Zone

On-line GEBCO Gazetteer

Digital Terrain Model - DTM

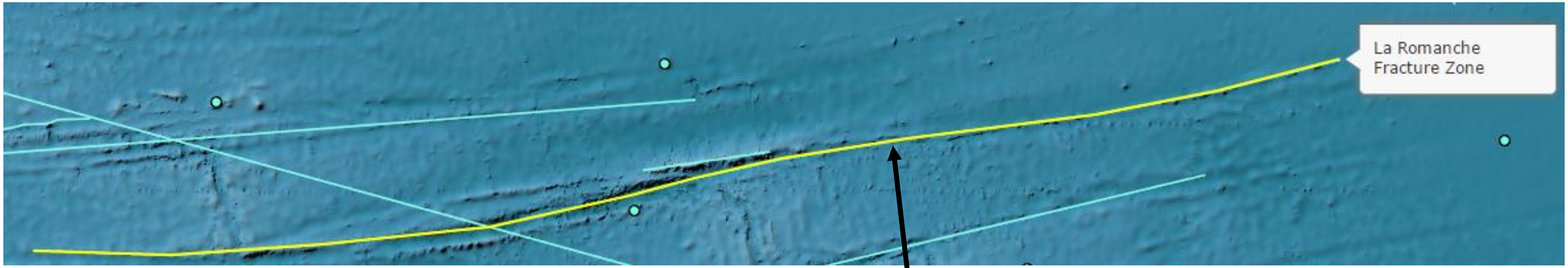


Free-Air model

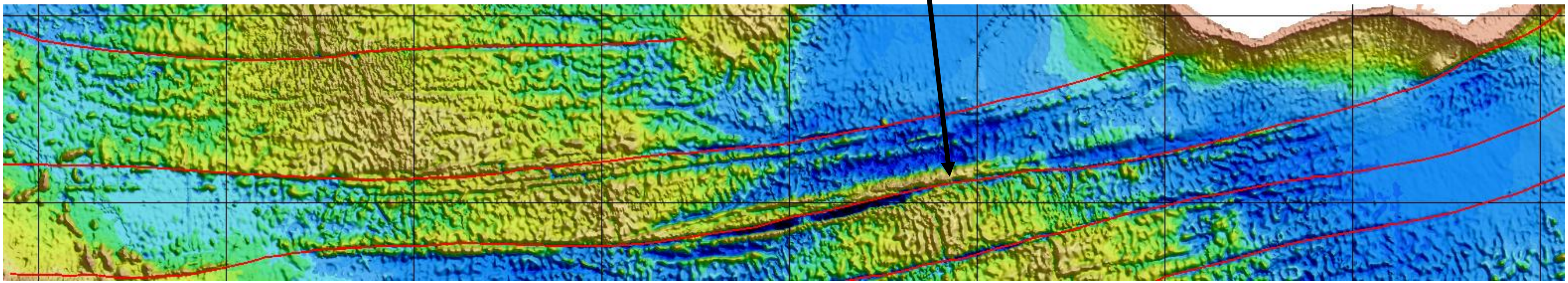


1.3. Romanche Fracture Zone

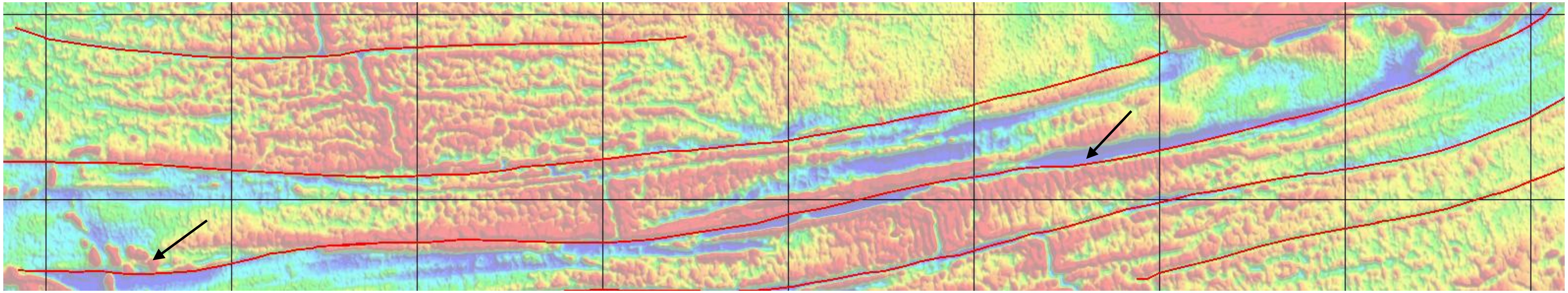
On-line GEBCO Gazetteer



Digital Terrain Model - DTM

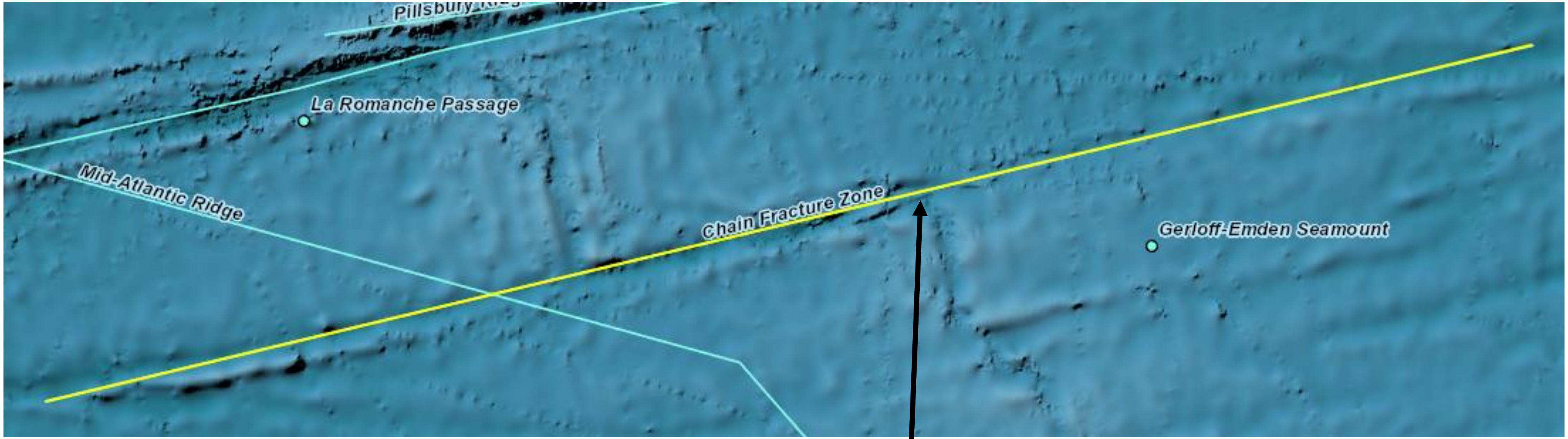


Free-Air model

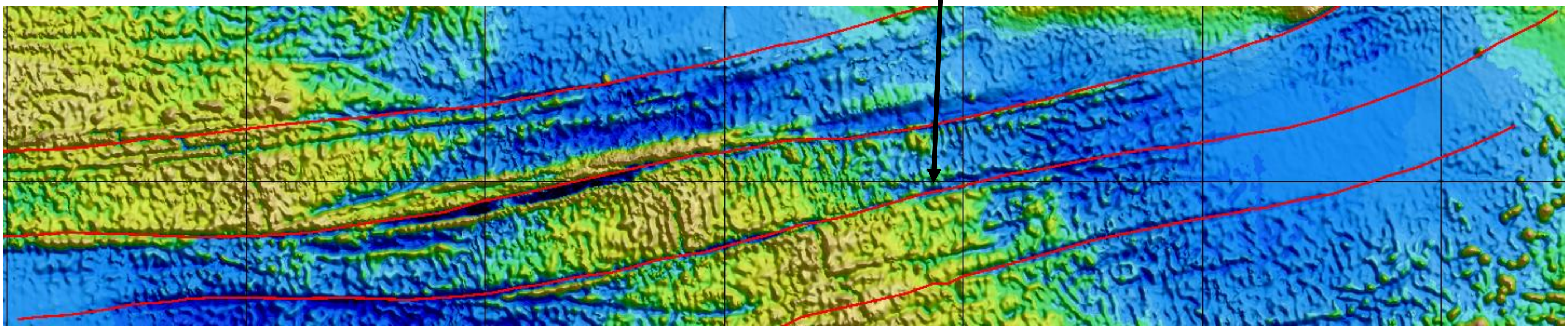


1.4. Chain Fracture Zone

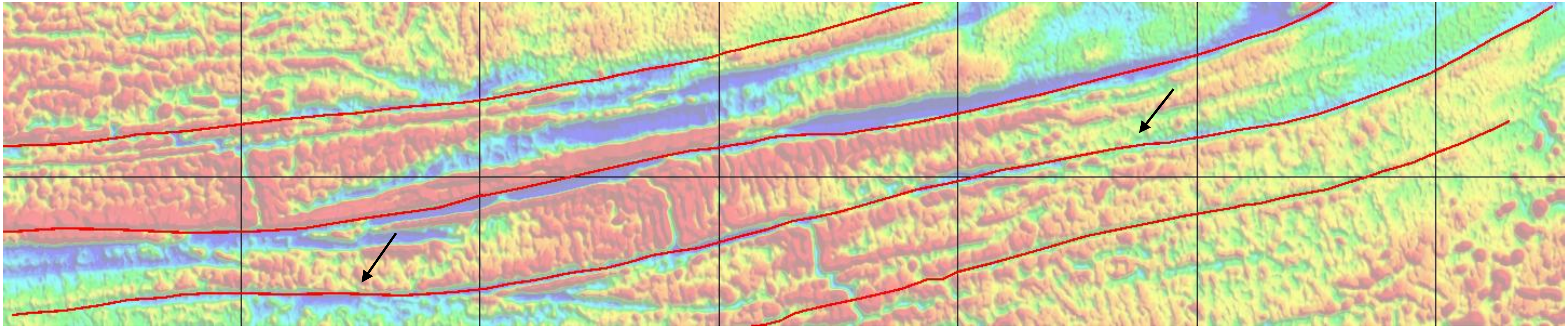
On-line GEBCO Gazetteer



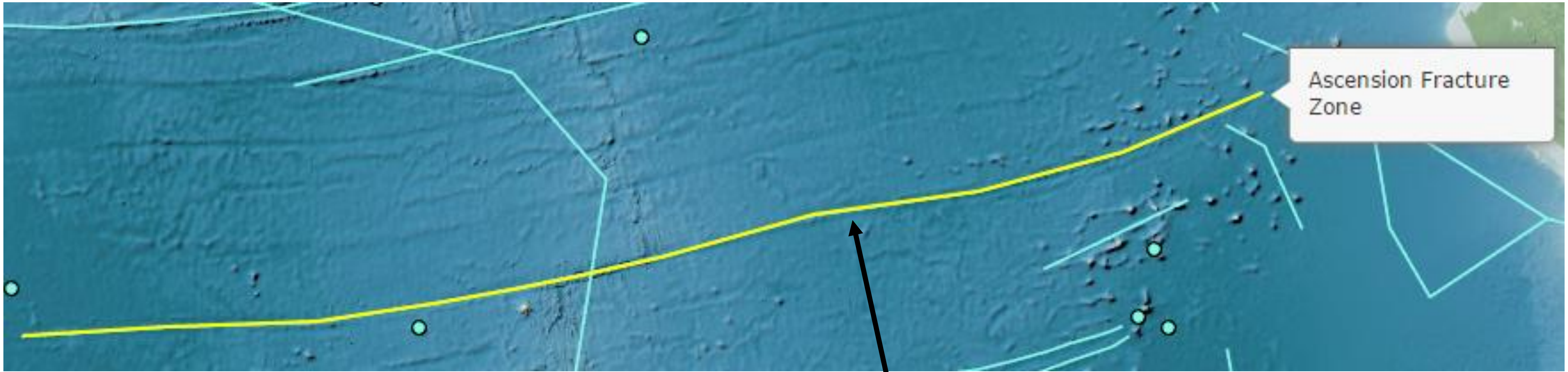
Digital Terrain Model - DTM



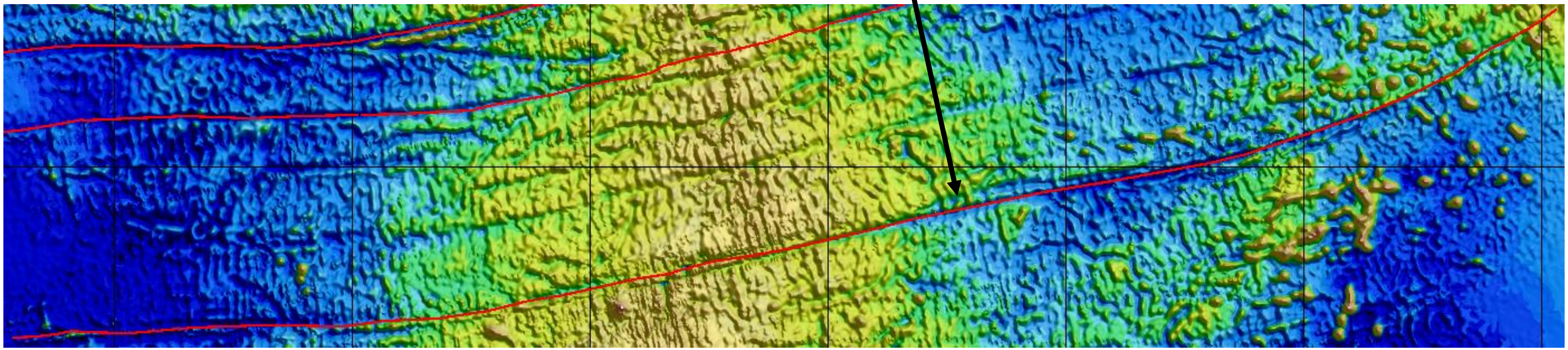
Free-Air model



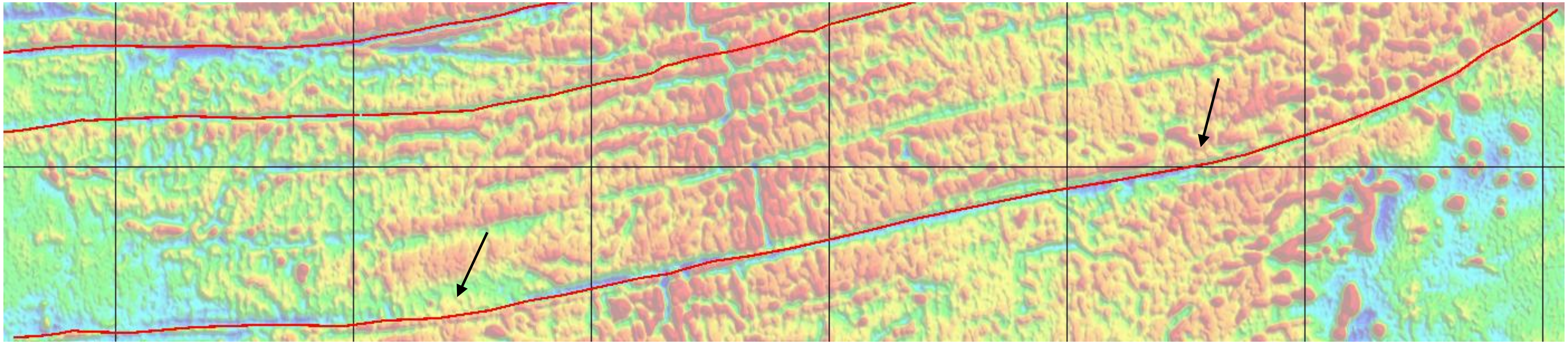
1.5. Ascension Fracture Zone



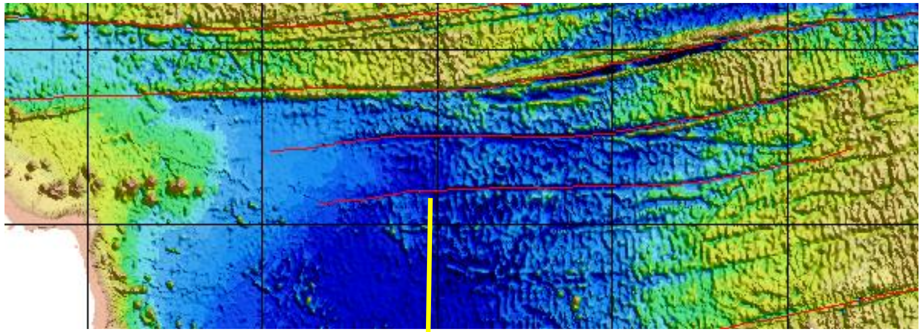
Digital Terrain Model - DTM



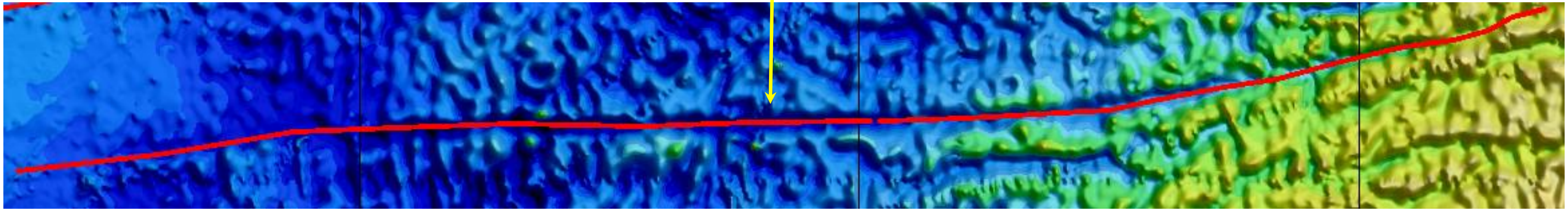
Free-Air model



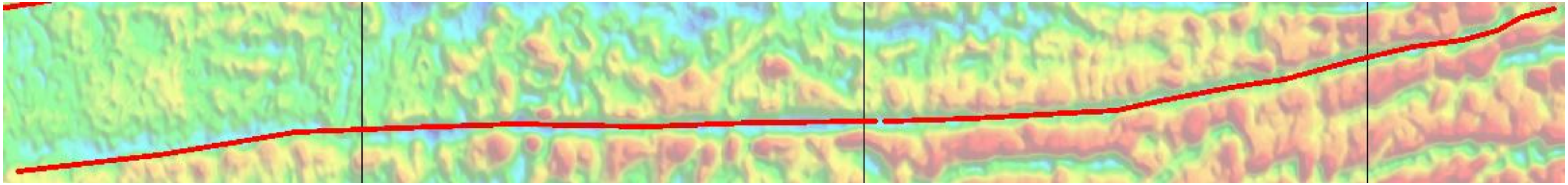
1.6. Fernando de Noronha Fracture Zone (not represented on-line GEBCO Gazetteer)



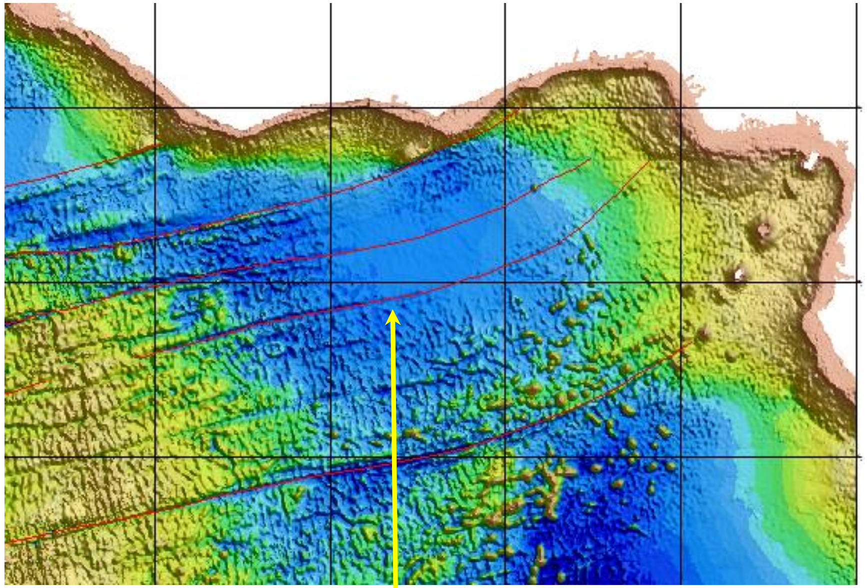
Digital Terrain Model - DTM



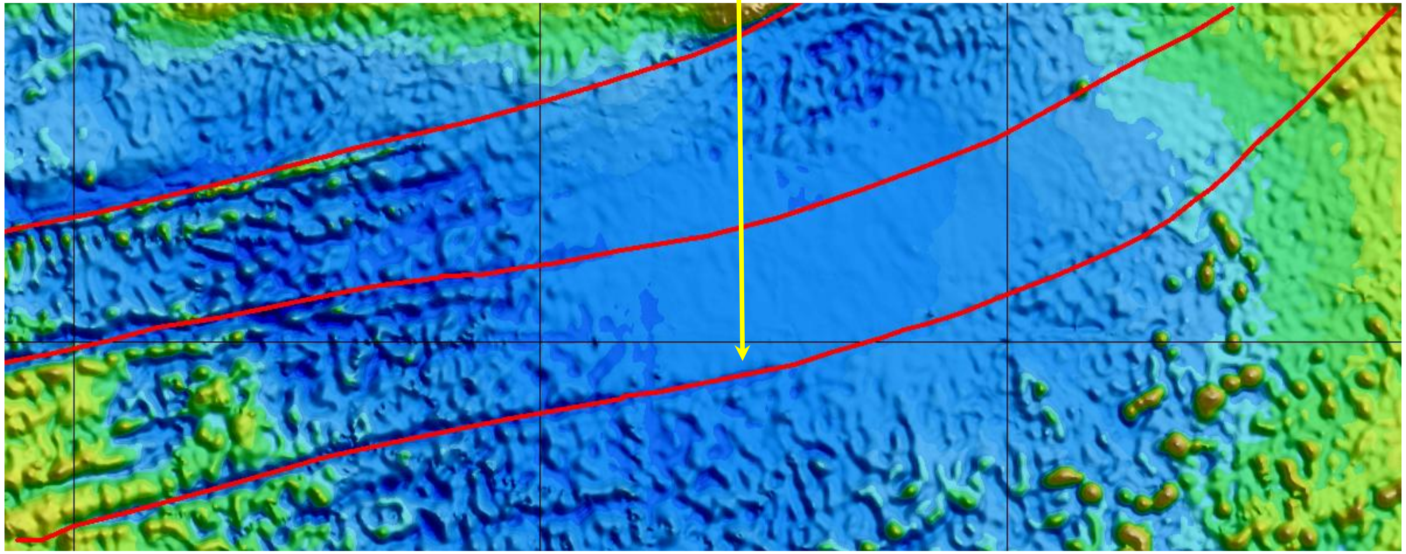
Free-Air model



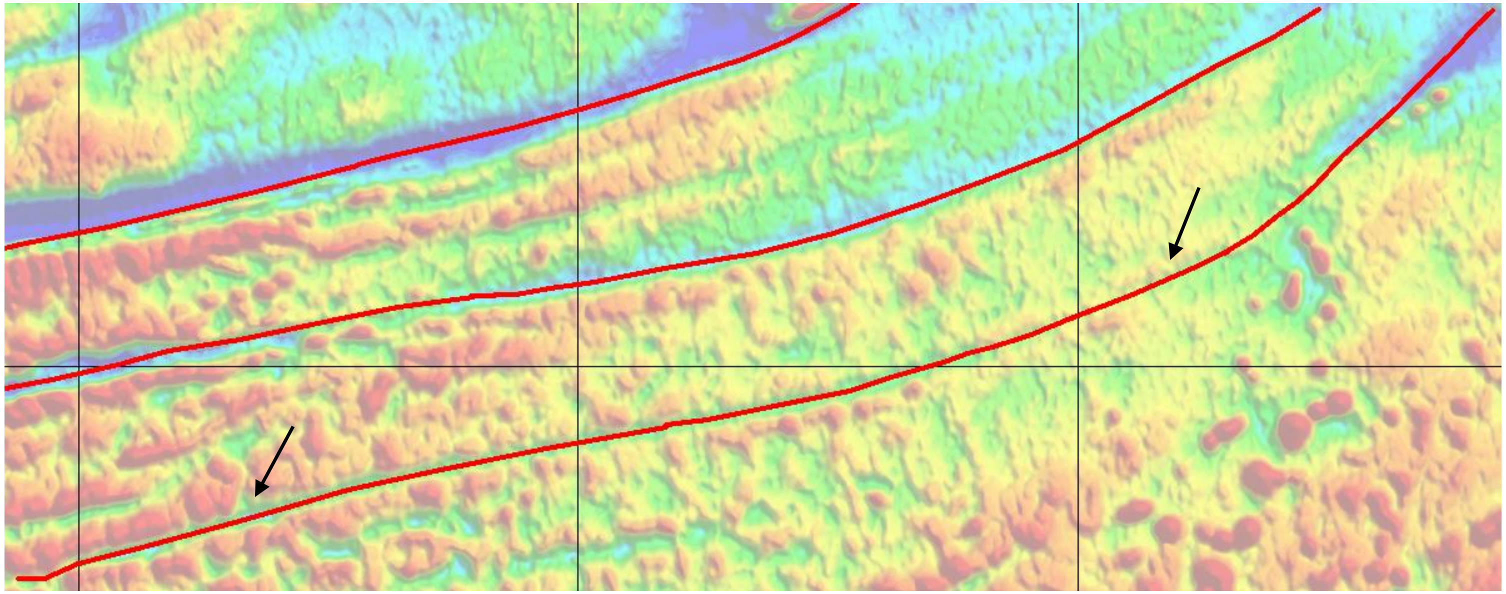
1.7. Charcot Fracture Zone (not represented on-line GEBCO Gazetteer)



Digital Terrain Model - DTM



Free-Air model



Tectonophysics, 155 (1988) 1–26
Elsevier Science Publishers B.V., Amsterdam – Printed in The Netherlands

Tectonic fabric map of the ocean basins from satellite altimetry data

L.M. GAHAGAN [1], C.R. SCOTESE [2], J.-Y. ROYER [3], D.T. SANDWELL [3], J.K. WINN [1], R.L. TOMLINS [1], M.I. ROSS [1], J.S. NEWMAN [1], R.D. MÜLLER [4], C.L. MAYES [1], L.A. LAWVER [3] and C.E. HEUBECK [1]

[1] *The Department of Geological Sciences, The University of Texas, Austin, TX 78713 (U.S.A.) and The Institute for Geophysics, The University of Texas, 8701 Mopac Boulevard, Austin, TX 78759 (U.S.A.)*
[2] *Shell Development Co., Bellaire Research Center, P.O. Box 481, Houston, TX 77001 (U.S.A.)*
[3] *The Institute for Geophysics, The University of Texas, 8701 Mopac Boulevard, Austin, TX 78759 (U.S.A.)*
[4] *Geologisch- Paläontologisches Institut und Museum der Christian-Albrechts Universität Kiel, Olshausenstrasse 40, D-2300 Kiel 1 (F.R.G.)*

(Received April 10, 1987; revised version accepted March 4, 1988)

Abstract

Gahagan, L.M., Scotese, C.R., Royer, J.-Y., Sandwell, D.T., Winn, J.K., Tomlins, R.L., Ross, M.I., Newman, J.S., Müller, R.D., Mayes, C.L., Lawver, L.A. and Heubeck, C.E., 1988. Tectonic fabric map of the ocean basins from satellite altimetry data. In: C.R. Scotese and W.W. Sager (Editors), Mesozoic and Cenozoic Plate Reconstructions. *Tectonophysics*, 155:1–26

Satellite altimetry data provide a new source of information on the bathymetry of the ocean floor. The tectonic fabric of the oceans (i.e., the arrangement of fracture zones, ridges, volcanic plateaus and trenches) is revealed by changes in the horizontal gravity gradient as recorded by satellite altimetry measurements. SEASAT and GEOSAT altimetry data have been analyzed and a global map of the horizontal gravity gradient has been produced that can be used to identify a variety of marine tectonic features. The uniformity of the satellite coverage provides greater resolution and continuity than maps based solely on ship-track data. This map is also the first global map to incorporate the results of the GEOSAT mission, and as a result, new tectonic features are revealed at high southerly latitudes.

This map permits the extension of many tectonic features well beyond what was previously known. For instance, various fracture zones, such as the Ascension, Tasman, and Udintsev fracture zones, can be extended much closer to adjacent coninental margins. The tectonic fabric map also reveals many features that have not been previously mapped. These features include extinct ridges, minor fracture zone lineations and seamounts. In several areas, especially across aseismic plateaus or along the margins of the continents, the map displays broad gravity anomalies whose origin may be related to basement structures.

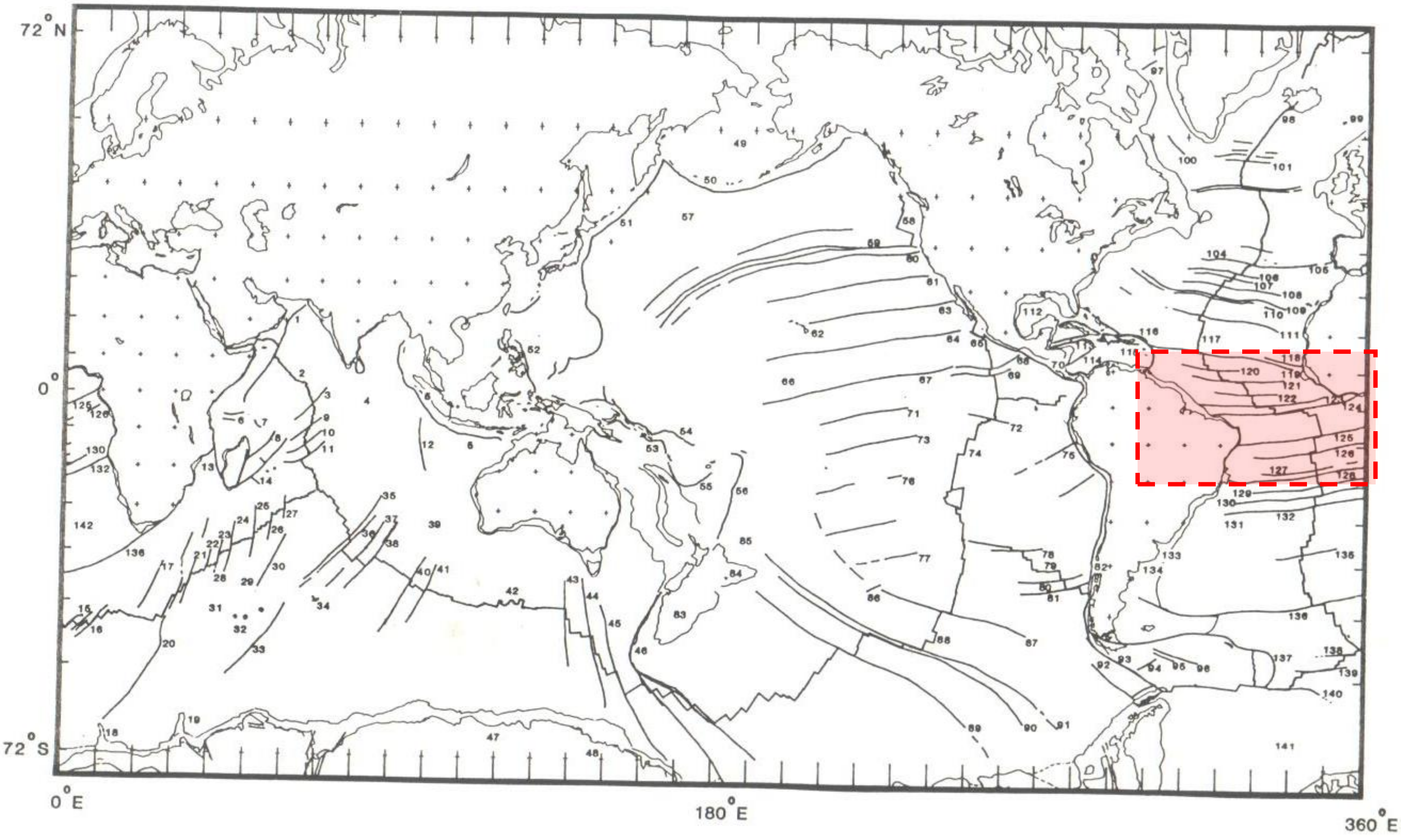

72°N
0°
72°S
0°E
180°E
360°E

Fig. 8. Areas mentioned in the text as well as features that are visible on the tectonic fabric map are shown here.

Indian Ocean: *1*—Owen Fracture Zone (FZ); *2*—Carlsberg Ridge; *3*—Mabahiss FZ; *4*—Central Indian basin; *5*—Java–Sumatra Trench (TR); *6*—Somali Basin; *7*—Amirante TR; *8*—Mahanoro and Mauritius FZ; *9*—Vema FZ; *10*—Argo FZ; *11*—Marie Celeste FZ; *12*—Investigator FZ; *13*—Davie Ridge; *14*—Mascarene Basin; *15*—Bouvet, Moshesh and Isla Orcadas FZ; *16*—Shaka and Dingaan FZ; *17*—Dutoit FZ; *18*—Astrid Ridge; *19*—Gunnerus Ridge; *20*—Astrid FZ; *21*—Prince Edward FZ; *22*—Bain FZ; *23*—Discovery FZ; *24*—Indomed FZ; *25*—Gallieni FZ; *26*—Atlantis II FZ; *27*—Melville FZ; *28*—Del Caño Rise; *29*—Crozet Bank; *30*—L'Astrolabe FZ; *31*—Conrad Rise; *32*—Marie Dufresne Seamount; *33*—Kerguelen FZ; *34*—Kerguelen Plateau; *35*—Amsterdam FZ; *36*—St. Paul FZ; *37*—Mitra FZ; *38*—Varuna Fz; *39*—Broken Ridge Plateau; *40*—Soma FZ; *41*—Surya FZ; *42*—Australian–Antarctic Discordance; *43*—George V FZ; *44*—Tasman FZ; *45*—Balleny FZ; *46*—Macquarie Ridge; *47*—Wilkes Land; *48*—George V Land.

Pacific Ocean: *49*—Bering Sea; *50*—Aleutian TR; *51*—Kuril TR; *52*—Philippine TR; *53*—South Solomon TR; *54*—Vitiaz TR; *55*—New Hebrides TR; *56*—Tonga–Kermadec TR; *57*—Emperor Seamounts; *58*—Juan de Fuca Ridge; *59*—Mendocino FZ; *60*—Pioneer FZ; *61*—Murray FZ; *62*—Hawaiian Islands; *63*—Molokai FZ; *64*—Clarion FZ; *65*—Rivera FZ; *66*—Line Islands; *67*—Clipperton FZ; *68*—Tehuantepec FZ; *69*—Siquieros FZ; *70*—Mid-American TR; *71*—Galapagos FZ; *72*—Quebrado FZ; *73*—Marquesas FZ; *74*—East Pacific Rise; *75*—Mendana FZ; *76*—Austral FZ; *77*—Agassiz FZ; *78*—Chile FZ; *79*—Chile Rise; *80*—Valdivia FZ; Guafo FZ; *82*—Peru–Chile TR; *83*—Cambell Plateau; *84*—Chatham Rise; *85*—Louisville Ridge; *86*—Henry Trough; *87*—Menard FZ; *88*—Pacific–Antarctic Ridge; *89*—Udintsev FZ; *90*—Tharp FZ; *91*—Heezen FZ; *92*—Hero FZ; *93*—Shackleton FZ; *94*—West Scotia Ridge; *95*—Quest FZ; *96*—Endurance FZ.

Atlantic Ocean: *97*—Baffin Bay; *98*—Reykjanes Ridge; *99*—Faeros Ridge; *100*—Labrador Sea; *101*—Bight FZ; *102*—Charlie Gibbs FZ; *103*—Kurchatov FZ; *104*—Pico FZ; *105*—East Azores FZ; *106*—Ocanographer FZ; *107*—Hayes FZ; *108*—Cruiser FZ; *109*—Atlantis FZ; *110*—Tyro FZ; *111*—Kane FZ; *112*—Gulf of Mexico; *113*—Cayman Trough; *114*—Hess Escarpment; *115*—Muertos Trough; *116*—Puerto Rico TR; *117*—Atlantic Ridge; *118*—Jacksonville FZ; *119*—Fifteen-Twenty FZ; *120*—Vema FZ; *121*—Sierra Leone FZ; *122*—Four North FZ; *123*—St. Paul FZ; *124*—Romanche FZ; *125*—Ascension FZ; *126*—Bode Verde FZ; *127*—St. Helene; *128*—Hotspur FZ; *129*—Martin Vaz FZ; *130*—Rio de Janeiro FZ; *131*—Rio Grande Ridge; *132*—Rio Grande FZ; *133*—Salado Basin; *134*—Colorado Basin; *135*—Tristan da Cunha FZ; *136*—Falkland–Agulhas FZ; *137*—South Sandwich TR; *138*—Conrad FZ; *139*—Bullard FZ; *140*—South Sandwich FZ; *141*—Weddell Sea; *142*—Walvis Ridge.

JOURNAL OF GEOPHYSICAL RESEARCH, VOL. 98, NO. B5, PAGES 8275–8291, MAY 10, 1993

Deformation of the Oceanic Crust Between the North American and South American Plates

R. DIETMAR MÜLLER

Scripps Institution of Oceanography, La Jolla, California

WALTER H.F. SMITH[1]

Institute of Geophysics and Planetary Physics, Scripps Institution of Oceanography, La Jolla, California

Fracture zone trends and magnetic anomalies in the Atlantic Ocean indicate that the North American plate must have moved with respect to the South American plate during the opening of the Atlantic. A comparison of plate tectonic flow lines with fracture zones identified from Geosat and Seasat altimeter data suggests that the North American-South American plate boundary migrated northward from the Guinea–Demarara shear margin to the Vema Fracture Zone before chron 34 (84 Ma), to north of the Doldrums Fracture Zone before chron 22 (51.9 Ma), and to north of the Mercurius Fracture Zone between chron 32 (72.5 Ma) and chron 13 (35.5 Ma) . The paleoridge offset through time identified from magnetic anomalies and the computed cumulative strike slip motion in the plate boundary area, indicate that the triple junction may have been located between the Mercurius and the Fifteen-Twenty fracture zones after 67 Ma (chron 30). Plate reconstructions indicate a Late Cretaceous phase of transtension, followed by transpression in the Tertiary for the Tiburon/Barracuda Ridge area south of the Fifteen-Twenty Fracture Zone. The ocean floor in this area is characterized by a series of ridges and troughs with large Bouguer gravity anomalies (up to ~135 mGal). We use smoothing spline estimation to invert Bouguer anomalies for crustal layer structure. Our model results suggest that the Moho is uplifted 2-4 km over short wavelengths (~70 km) at the Barracuda and Tiburon ridges and imply large anelastic strains. The severely thinned crust at the two ridges implies that crustal extension must have taken place before they were uplifted. We propose that the North-South American plate boundary migrated to the latitude of the Tiburon Ridge, bounded by the Vema and Marathon fracture zones, before chron 34 (84 Ma). Post-chron 34 crustal thinning during a transtensional tectonic regime may have been localized at preexisting structural weaknesses such as the Vema, Marathon, Mercurius, and Fifteen-Twenty fracture zone troughs, but reaching the Fifteen-Twenty Fracture Zone and future Barracuda Ridge area only after chron 32 (72.5 Ma). This interpretation concurs with our crustal structural model, which shows stronger crustal thinning underneath the Tiburon Ridge than at the Barracuda Ridge. Subsequent transpression may have continued along the existing zones of weakness in the Tertiary, creating the presently observed crustal deformation and uplift of the Moho, accompanied by anelastic failure of the crust. Middle-Eocene-Upper Oligocene turbidites on the slope of the Tiburon Ridge, now located 800 m above the abyssal plain, suggest that most of its uplift occurred at post-Oligocene times. The unusually shallow Moho underneath the Tiburon and Barracuda ridges represents an unstable density distribution, which may indicate that compressive stresses are still present to maintain these anomalies, and that the North American-South American plate boundary may still be located in this area.

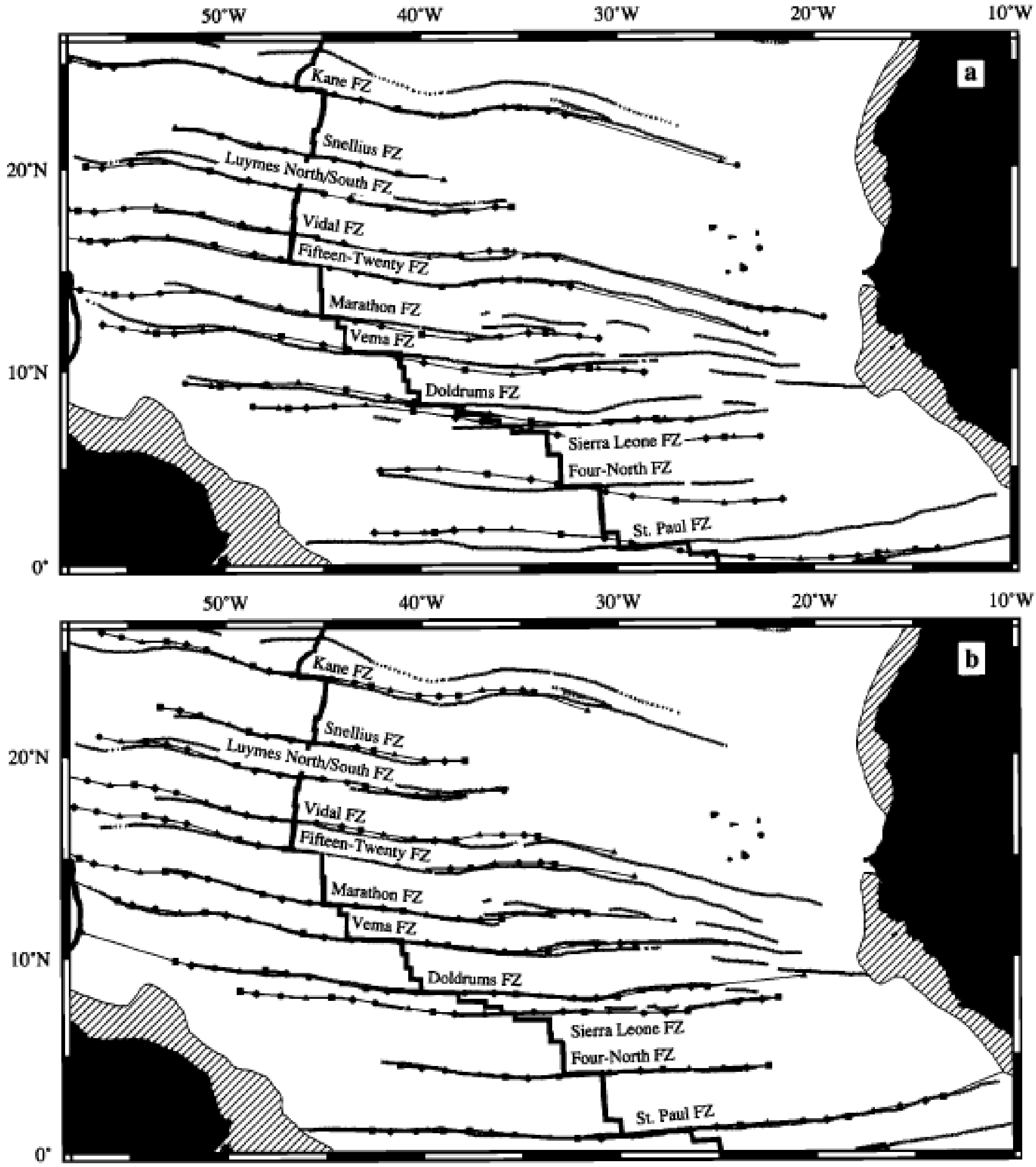


Fig. 3. Fracture zones identified from Geosat and Seasat altimetry data and plate tectonic flow lines from (*a*) North American-African stage poles and (see *Müller and Roest* [1992] for summary) and (*b*) from South American-African stage poles [*Shaw and Cande*, 1990]. Flow lines in Figure 3*a* are constructed for chrons 5 (10.0 Ma), 6 (20.0 Ma), 13 (35.5 Ma), 21 (49.5 Ma), 25 (59.0 Ma), 30 (67.5 Ma), 32 (72.5 Ma), 33y (74.3 Ma), 33o (80.2 Ma), 34 (84.0 Ma), M-0 (118.0 Ma), M-4 (126.0 Ma), M-10N (131.5 Ma), M-16 (141.5 Ma), M-21 (149.5 Ma), and M-25 (156.5 Ma); The South Atlantic flow lines in Figure 3*b* are computed for chrons 5 (8.9 Ma), 6 (19.4 Ma), 8 (26.9 Ma), 13 (35.3 Ma), 20 (44.7 Ma), 22 (51.9 Ma), 25 (58.6 Ma), 30 (66.7 Ma), 33y (74.3 Ma), 33o (80.2 Ma), 34 (84.o Ma) and 100 Ma (extrapolated from the stage 33o-34). See text for discussion. The central North Atlantic flow lines (a) mismatch all fracture zones south of the Sierra Leone Fracture Zone (SLFZ) for times younger than chron 34 (84 Ma) and mismatch all fracture zones south of the Fifteen-Twenty Fracture Zone (Fifteen-Twenty Fracture Zone) for times younger than chron 13 (36 Ma); the South Atlantic flow lines (b) clearly mismatch fracture zones north of the Fifteen-Twenty Fracture Zone. The North American-South American plate boundary must have been located in the area between the Fifteen-Twenty Fracture Zone and the SLFZ through most of the spreading history in this area. Hatchures indicate stretched continental crust.

Earth Science & Climatic Change

Samaila and Likkason, J Earth Sci Climat Change 2013, S12
http://dx.doi.org/10.4172/2157-7617.S12-004

Research Article Open Access

Role of Equatorial Fracture Zones on Fluid Migration across the South Atlantic Margins

N.K. Samaila[1*] and O.K. Likkason[2]

[1]*Geology Programme, Abubakar Tafawa Balewa University, Bauchi,P.M.B. 0248, Bauchi, Nigeria*
[2]*Physics Programme, Abubakar Tafawa Balewa University, Bauchi,P.M.B. 0248, Bauchi, Nigeria*

Abstract

The continental margin basins of Brazil and West Africa share very similar tectono-stratigraphic megasequences that are recognizable in petroliferous basins, as a result of the Late Jurassic-Early Cretaceous rifting of the South Atlantic basins. A number of oil families present along the South Atlantic conjugated margins are composed of genetically related oils of mixed provenance. Motion of tectonic plates and their configurations which depend so much on the nature of the boundaries and their orientations strongly influence fault tectonics within both continents The tectonic evolution of the plates leads to the formation of fracture zones parallel to the direction of plate motion. The Middle Benue Trough of Nigeria and by extension, the whole Benue Trough, is bound by two offshore transform faults (the Chain and the Charcot Fracture Zones). These faults are asymmetric longitudinally with an oblique transverse fault bounding the basin, and have been outlined by the presence of magnetic lineation. Five E-W profiles across the Middle Benue Trough were selected for the application of Werner deconvolution and subjected to harmonic analysis. The magnetic dataset was used in concluding that the Equatorial Fracture Zones (EFZ) in the South Atlantic Ocean extending from South America into the Gulf of Guinea are mainly responsible for long distance migration of marine hydrocarbons from the West Africa margin to the offshore of Brazil.

Citation: Samaila NK, Likkason OK (2013) Role of Equatorial Fracture Zones on Fluid Migration across the South Atlantic Margins. J Earth Sci Climat Change S12: 004. doi:10.4172/2157-7617.S12-004

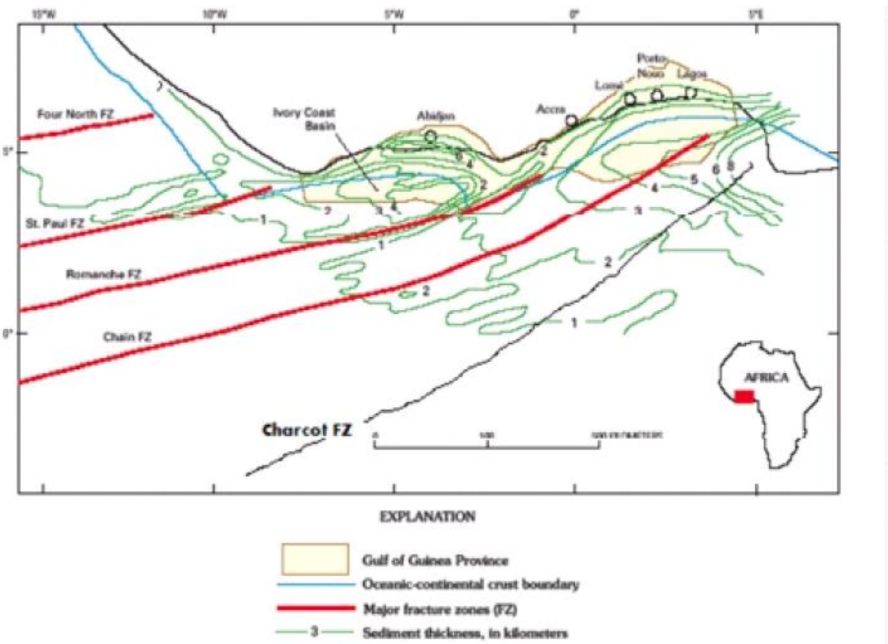


Figure 10: Sketch map showing major Fracture Zones (FZ), sediment thickness, and oceanic-continental crust boundary for the Gulf of Guinea Province [44].

THE TECTONIC FABRIC OF THE EQUATORIAL ATLANTIC AND ADJOINING CONTINENTAL MARGINS: GULF OF GUINEA TO NORTHEASTERN BRAZIL (*)

MARCUS AGUIAR GORINI (**)

(*) Submitted in partial fulfillment of the degree requirements for the Degree of Doctor of Philosophy in the Faculty of Pure Science of Columbia University, 1977

(**) Professor of "Departamento de Geologia do Instituto de Geociências da Universidade Federal do Rio de Janeiro" and Researcher of "Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq)"

ABSTRACT – Fracture zones are very prominent and generally linear basement features which bound segments of oceanic crust and offset the mid-oceanic ridge. Major fracture zones offset the Mid-Atlantic Ridge in the equatorial region by distances ranging from 300 to 900 km. Saint Paul's, Romanche, Chain, Jean Charcot/Fernando de Noronha, and Ascension Fracture Zones were mapped from the African to the Brazilian coast across the equatorial Atlantic. Each of these fracture zones displays a ridge and trough morphology that can be traced laterally (when available data permitted) from the offset region of the Mid-Atlantic Ridge to the continental margins on either side of the Atlantic. Mapping of the basement features (ridges and troughs) in the equatorial Atlantic reveals that a marked east–west basement fabric exists for the entire ocean floor and that the Mid-Atlantic Ridge axis is asymmetrically located toward west. The fracture zones in the equatorial Atlantic vary considerably in width (⩾50 km), complexity, trend, and morphology along their strikes. They extend nearly continuously from the Brazilian shield to the West African shield and divide the ocean floor into segments bounded by linear ridges and intervening troughs. In the continental shelves, horst and graben structures occur laterally along the continuation of fracture-zone trends and half-graben(*) basins occur in the continental shelves in the crustal segments between these fracture-zone trends. The fracture-zone trends were established at the onset of rifting; these trends did not necessarily originate along old weakness zones in the Precambrian shields and platforms.

Marginal fracture ridges which occur in the continental margin of the equatorial Atlantic are very prominent physiographic features which are lateral continuations of the transverse ridges of fracture zones in mid-ocean. The very high relief and the youthfulness of volcanism in some of the marginal ridges suggest that tectonic adjustments have been taking place along fracture zones at distances far from the offset region of the Mid-Atlantic Ridge axis.

Other important structural features which are intimately related to rifting in the equatorial Atlantic and which are examined in detail in the present study are the Marajó System of Grabens, the Benue Trough, and the Cameroon Structural Trend. The Marajó System of Grabens (in the Amazon area of Brazil) originated from the southward propagation of the rifting direction that was probably associated with the opening of the North Atlantic Ocean. The Benue Trough in Africa is flanked by fracture-zone directions that imprinted a horst-and-graben setting in the basin. Folding in the Benue Trough is probably caused by vertical tectonism associated with the uplift and differential tilting of buried basements horsts. This vertical tectonism may have been caused by adjustments to changes in transform motion between the African and South American plates. The Cameroon Trend is a horst-like feature whose origin may be associated with the breakup of the continents and is probably linked with the reactivation of a Precambrian lineament that is represented in both sides of the Atlantic by the Pernambuco Lineament in Brazil and by the Ngaoundéré Fault Zone in West Africa. The tectonic reactivation of this lineament caused the occurrence of magmatism and the development of horst-like features that acted as a physiographic barrier to salt deposition in the South Atlantic during the Aptian. To the north of the lineament no salts were deposited, whereas a large salt basin existed to the south. The Cameroon Volcanic Line has been reactivated since the Late Mesozoic by complex magmatism (granites, basalts, and alkaline rocks) and block faulting. On the Brazilian side, the Pernambuco Lineament was also reactivated in the Late Mesozoic. The Cameroon Trend is apparently a landward continuation of the Ascension Fracture Zone.

The remarkable geological fit of Africa and Brazil in the equatorial Atlantic suggests that the rifting and subsequent drifting of the two continents did not involve appreciable crustal distortion of the two continents.

KEY WORDS: Brazil; Gulf of Guinea; Brazilian Continental Margin; African Continental Margin; Equatorial Atlantic Ocean; Structural geology; Physiography; Tectonism; Sedimentary processes; Fracture zones; Plate tectonics; South Atlantic evolution; Atlantic type continental margin; Geological history.

(*) *Here, the term "half-graben" does not have the meaning of an* asymmetric graben. *As used in this context, it means a* rifted pull apart basin. – (The Editor)

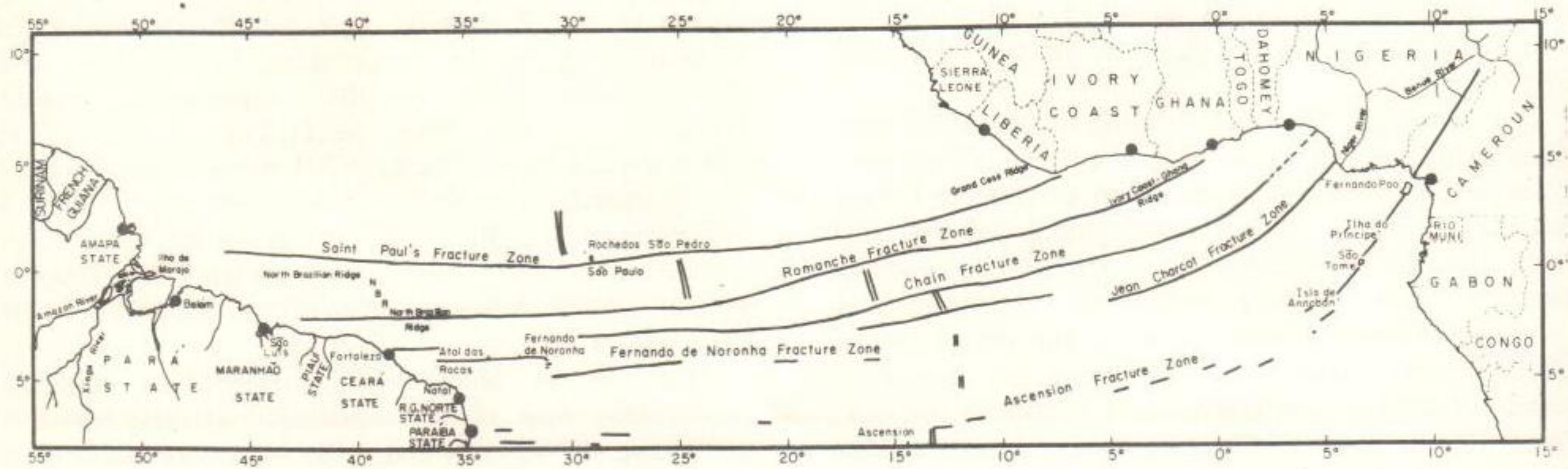


Fig. 1

The equatorial Atlantic and the fracture zones studied in this work.

2.4 – *FERNANDO DE NORONHA/JEAN CHARCOT FRACTURE ZONE*

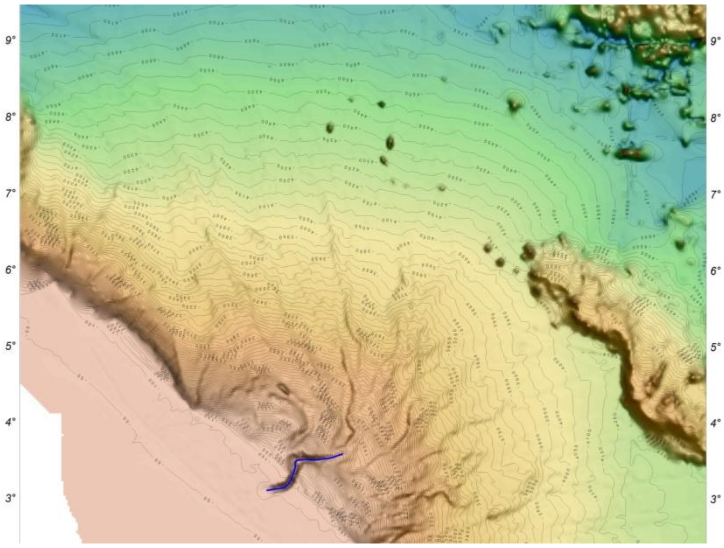
The discovery by French workers of an important lineament to the south of Chain Fracture Zone, which consisted of a buried ridge in the continental rise of the Gulf of Guinea, led to the speculation that this lineament represented a fracture zone in mid-ocean (DELTEIL *et alii,* 1974). The lineament, the Jean Charcot Ridge, is not only a prominent ridge, as seen in profile 6, but also marks a pronounced basement level change. This implies that the ridge indeed corresponds to a fracture zone trend (Figs. 3 and 4, profiles 9, 11-15, and 20). Seismic profiles are not available between 5°W and 12°W longitudes, but profiles 36 and 37 (Figs. 3 and 4) suggest that a prominent fracture zone, to the south of Chain Fracture Zone, may well correspond to the Jean Charcot lineament in mid-ocean. This last assertion is in agreement with the so-called Charcot Fracture Zone shown in EMERY *et alii* (1975).

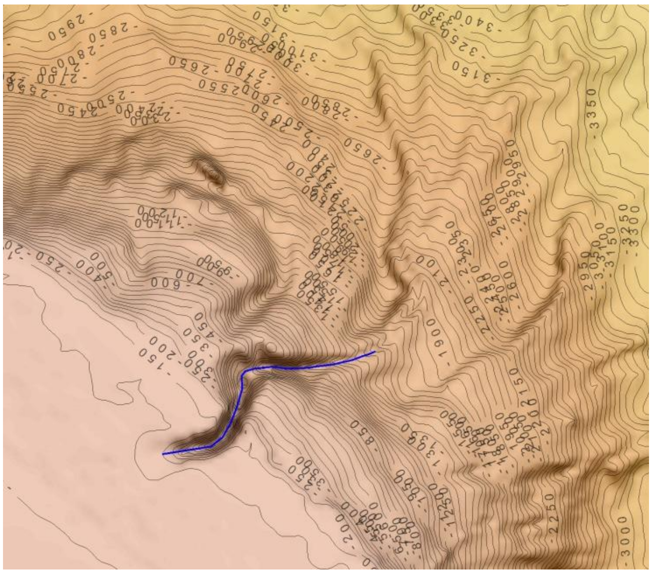
Fernando de Noronha seamount chain was visualized as a continuous ridge when Lamont-Doherty Geological Observatory made geophysical surveys in the continental margin of northern Brazil. The lineament of Fernando de Noronha together with the North Brazilian Ridge confined the sedimentation of a part of the northeastern Brazilian margin (GORINI & BRYAN, 1974). Further studies demonstrated that the guyots, volcanic islands, seamounts, and basement highs of Fernando de Noronha Ridge were continuous with a fracture zone to the east of 31°W, hence named as Fernando de Noronha Fracture Zone (Figs. 3 and 4, profiles 49, 50, 52-54, 56-58, 60, and 62) – (GORINI *et alii,* 1974). The fracture zone was mapped as far east as 25°W and it could not be followed farther eastward because of a lack of closely spaced crossings. Profile 43 shows a topographically complex zone between two markedly distinct basement levels, thus suggesting a fracture zone. This fracture zone is correlated laterally to the probable fracture zone depicted in profile 39 and may also correspond to the fracture zone seen in profiles 36 and 37. Consequently, Fernando de Noronha Fracture Zone is believed to be in the same lineament on the Brazilian side as the Jean Charcot Fracture Zone on the African side: both have the same relative positions with respect to Chain Fracture Zone on either side of the Atlantic (Fig. 7). However, as it will be discussed later, in the early rifting history of Brazil and Africa the two lineaments had distinct geographic locations.

2. Amazon Canyons: POINT (-48.5 3.5) **(on-line GEBCO Gazetteer position).**

The feature is identified at on-line GEBCO gazetteer only by one point (yellow circle).

Name	Amazon Canyons
Proposed By	
Discovered By	
Last Updated	2014-10-02
Associated Meeting	
Origin of Name	
Additional Information	Formerly, Amazon Canyon.





This is a long feature that extend up to 1400 m depth and it can be better define as a line using the Brazilian Digital Terrain Model - DTM (blue line). A shape file will be provided.

The name of this feature should be changed to Amazon Canyon instead Canyons, since there is only one canyon. Furthermore it is used as Amazon Canyon in scientific papers and maps.

===

III.1.3.1. Le canyon de l'Amazone

La partie la plus amont du système turbiditique correspond au canyon de l'Amazone qui incise la plateforme continentale externe et atteint un relief maximal de 600 m (Damuth *et al.*, 1995) (**Fig. III.13**). Le canyon s'étend jusqu'à l'éventail supérieur, qui s'initie vers 1400 m de profondeur, où sa largeur et son relief diminuent fortement (Damuth *et al.*, 1988).

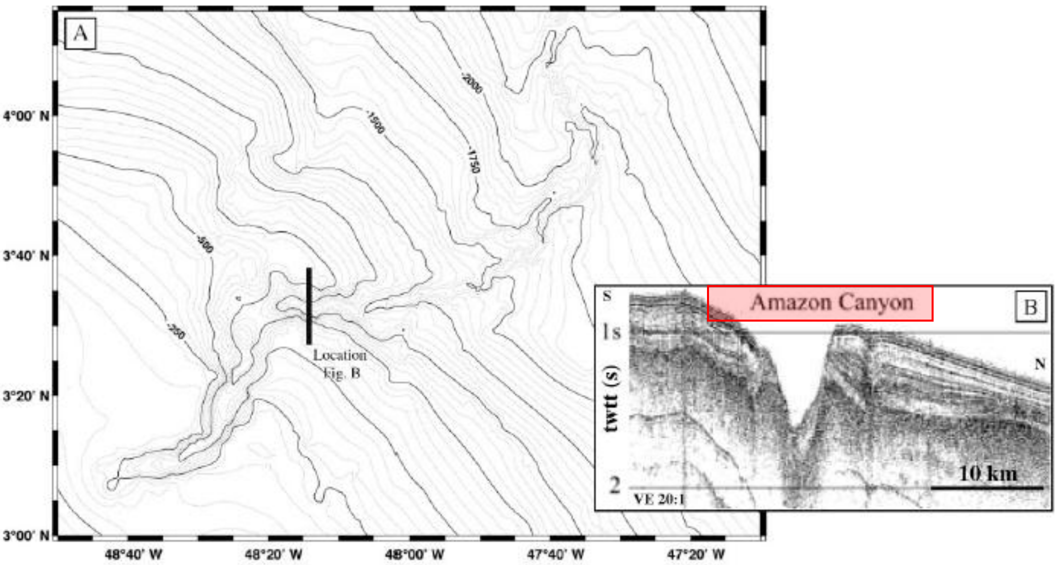


Fig. III.13- (A) Carte bathymétrique au niveau du canyon de l'Amazone et de l'éventail supérieur avec la localisation du profil sismique présenté en (B) (isocontours tous les 50 m) (d'après Pirmez, 1994). (B) Profil sismique watergun (<250 Hz) au niveau de la partie inférieure du canyon de l'Amazone (d'après Damuth et al., 1995).

"Etude de la transition chenal-levées/lobe dans les systèmes turbiditique de l'Amazone et au Néofan Du Petit-Rhône. These/Universite de Brest, présentée par Isabelle Jegou, 2008,

Flood, R.D., Piper, D.J.W., Klaus, A., et al., 1995
Proceedings of the Ocean Drilling Program, Initial Reports, Vol. 155

3. MORPHOLOGY AND STRUCTURE OF AMAZON CHANNEL[1]

Carlos Pirmez[2] and Roger D. Flood[3]

Amazon Channel is the youngest channel-levee system within the distributary channel network of Amazon Fan (channel 1 of Damuth et al., 1983a; Fig. 1). The channel was surveyed in detail, with almost 100% SeaBeam coverage, closely spaced seismic reflection profiles (water-gun and 3.5 kHz), and several piston cores (Manley and Flood, 1988; Flood et al., 1991; Pirmez, 1994). It is a continuous channel system that is directly connected to Amazon Canyon on the outer shelf and that extends for at least 900 km into abyssal depths. The path of Amazon Channel developed as a result of numerous channel bifurcations (Fig. 1). In each of these events, turbidity currents flowed to the low-lying valleys adjacent to the channel-levee system, and a portion of the channel became abandoned as a new channel-levee system developed downstream. The upstream segment of the channel remained active after a bifurcation, and was continuously reused as a pathway for the turbidity currents redirected to the new channel system downstream. As a result, different segments of the channel reflect a different growth history, and the upstream portions of the channel underwent a longer period of development compared to the lower segments. Bifurcations were interpreted to occur by avulsion (Damuth et al., 1983b, 1988; Manley and Flood, 1988), that is, by sudden abandonment of a portion of the channel as a result of levee breaching.

Amazon Cone: Morphology, Sediments, Age, and Growth Pattern

JOHN E. DAMUTH
NARESH KUMAR
Lamont-Doherty Geological Observatory of Columbia University, Palisades, New York 10964