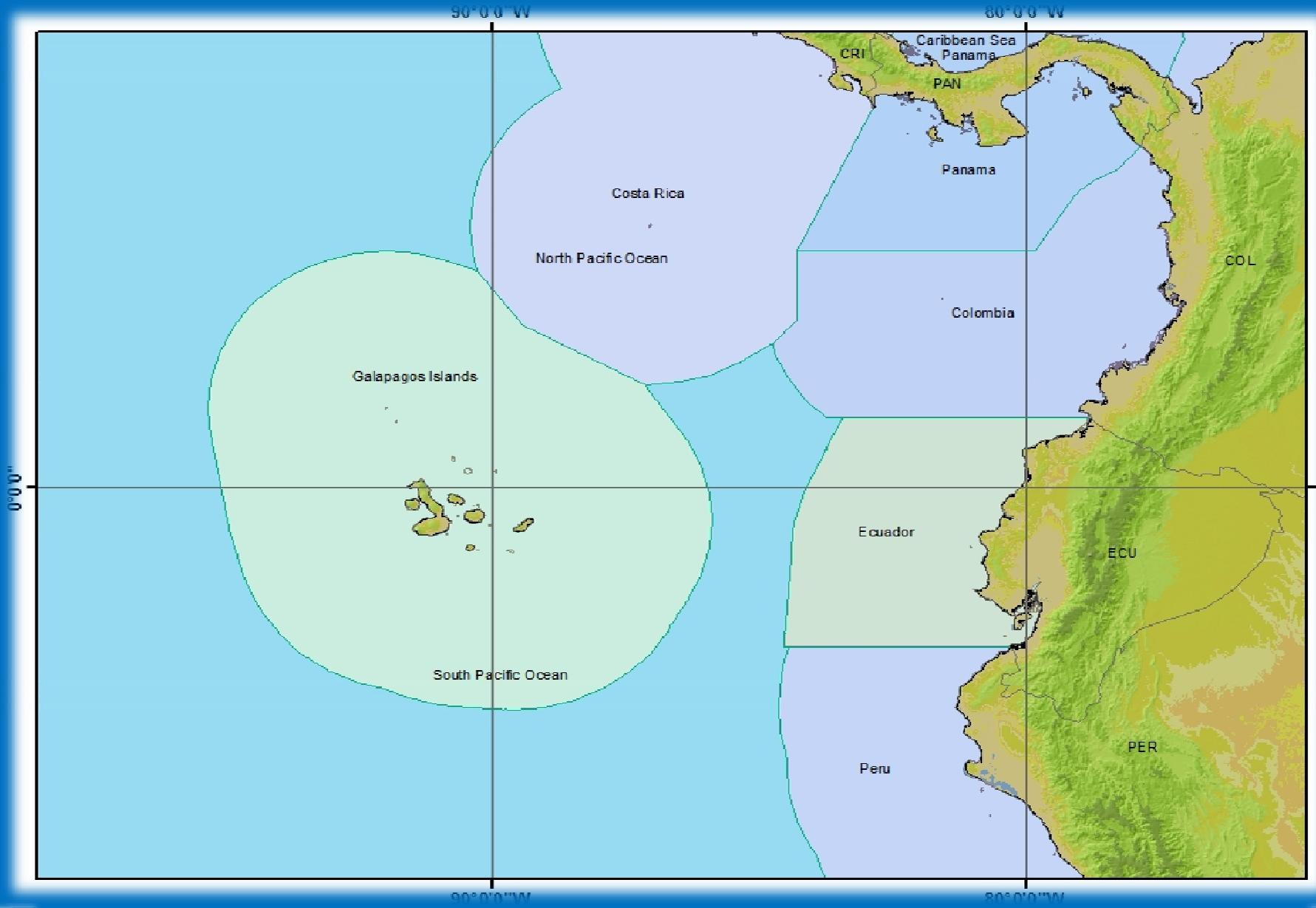
The Galapagos Islands: The rights of the fragile environment in the law of the sea an d their potential outer limits of the continental shelf beyond 200 nautical miles

Pazmino N., Gomez H.
Ecuadorian Chamber of the Law of the Sea

The Galapagos Islands: The rights of the fragile environment in the law of the sea and their potential outer limits of the continental shelf beyond 200 nautical miles



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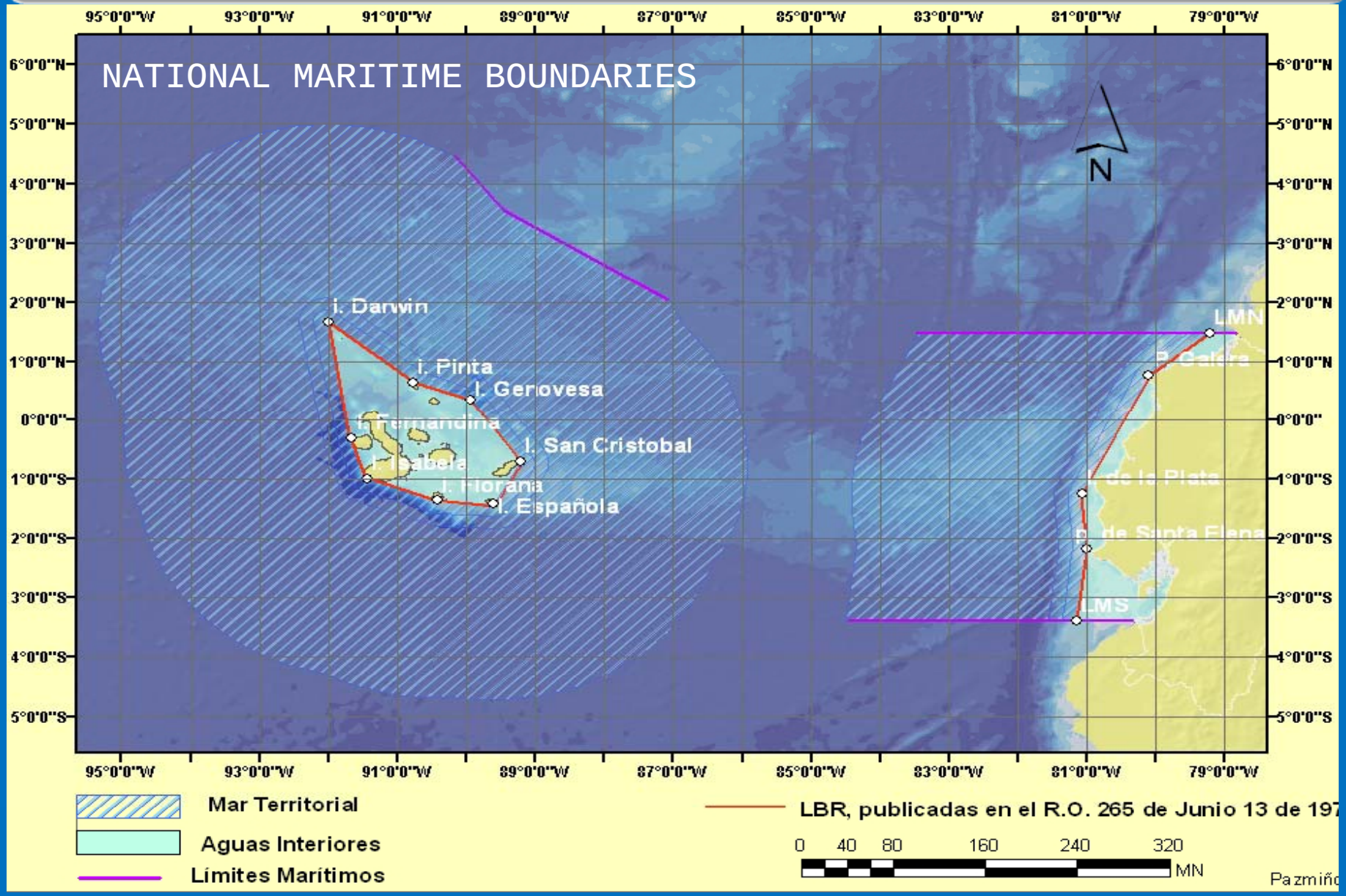

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GALAPAGOS FEATURES

- NATIONAL PARK
- BIOSPHERE RESERVE 1986
- COMMON HERITAGE OF THE HUMANDKIND
- NATIONAL MARINE RESERVE 1986
- WALLES SANCTUARY 1990
- BIOLOGICAL RESERVE
- PSSA(IMO) 24 DIC 2003
- AVOID ZONE
- NATIONAL SPETIAL LAW FOR THE CONSERVANCY

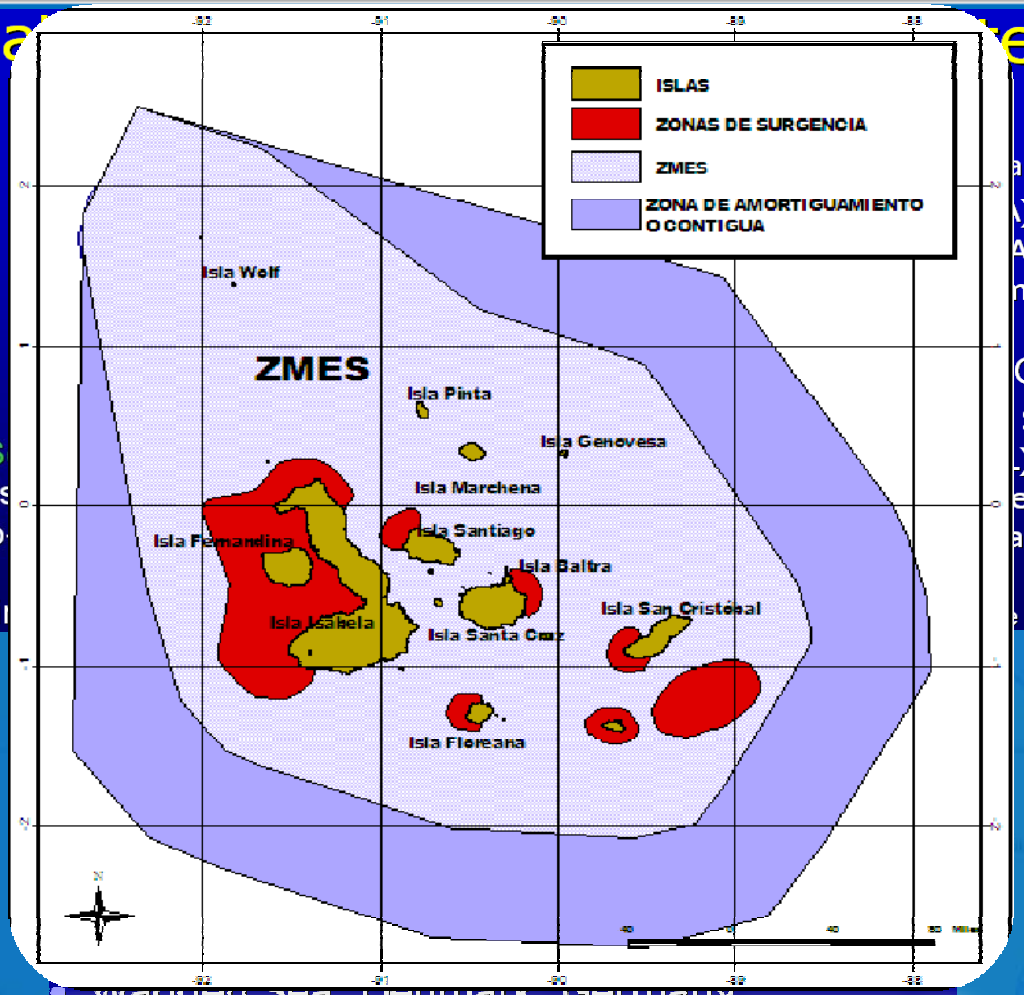
THESE DISTINCTIONS SHOW THE NATIONAL AND INTERNATIONAL INTEREST THAT EXIST IN THE MARINE ENVIROMENT AND ISLAND PRESERRVATION, AND COSTUMARY LAW BASE ON ARTICLE 211 AND UNCLOS CAN SUPPORT THESE ASPECTS.

The Galapagos Islands: The rights of the fragile environment in the law of the sea and their potential outer limits of the continental shelf beyond 200 nautical miles

"Specia… …tection Areas

IMO MARPOL 73/78 defined certain sea areas as "special areas"

Particularly Sensitive S…
- An area that needs… on ecological, socio… reasons
- Has international i…



…, Cuba, Ecuador)
…)
…A)
…ne Zones (ZMES)*
…CN, etc.)
… Sensitive Sea (PSSA)
…)
…ea Area (ESSA)
…as

- Wadden Sea, Denmark, Germany, Netherlands (2002)
- Paracas National Reserve, Peru (2003)
- Baltic Sea, except Russian water(2003)
- Galapagos Archipelago, Ecuador (2004)
- Canary Isles Archipelago, Spain (2005)

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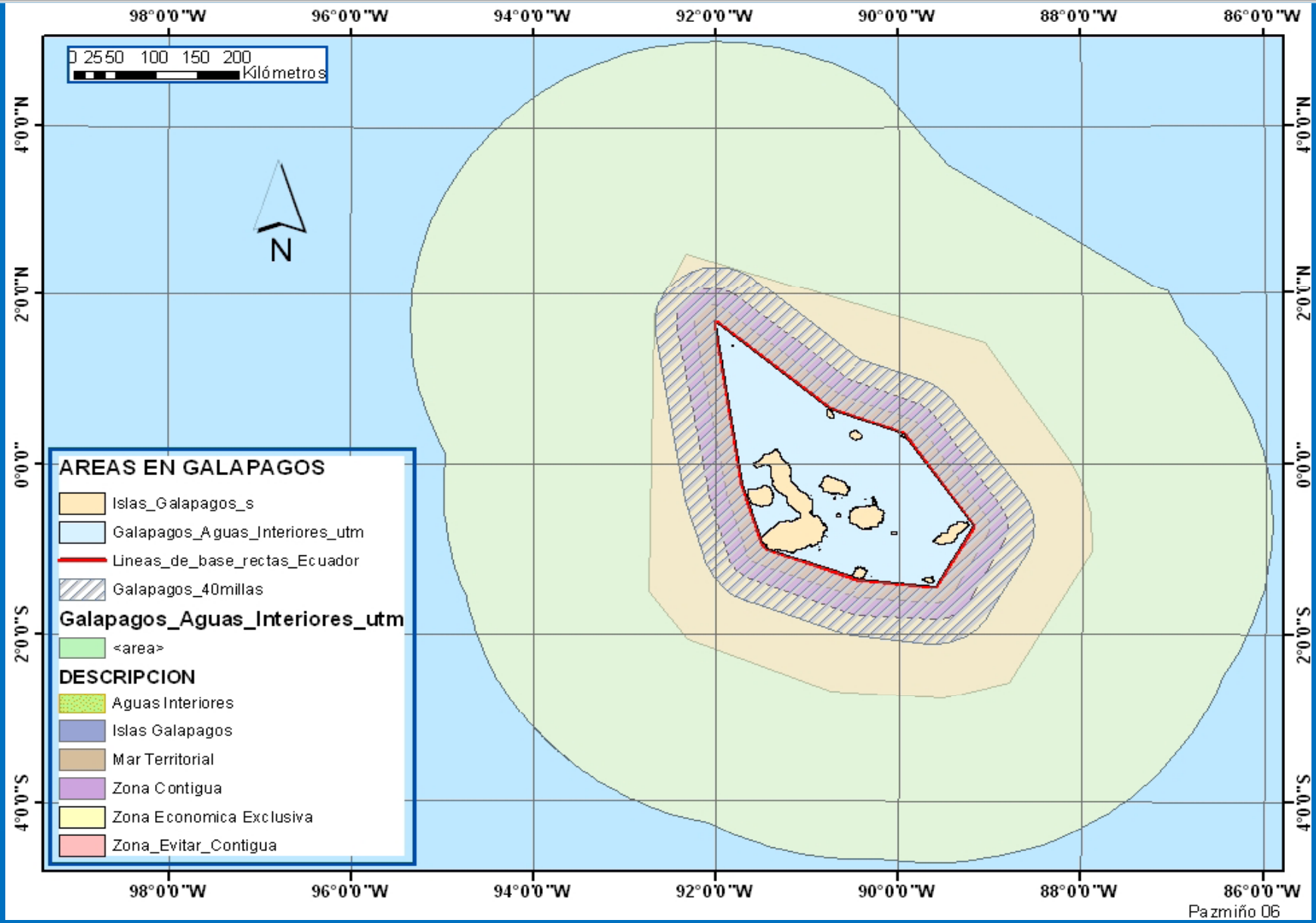

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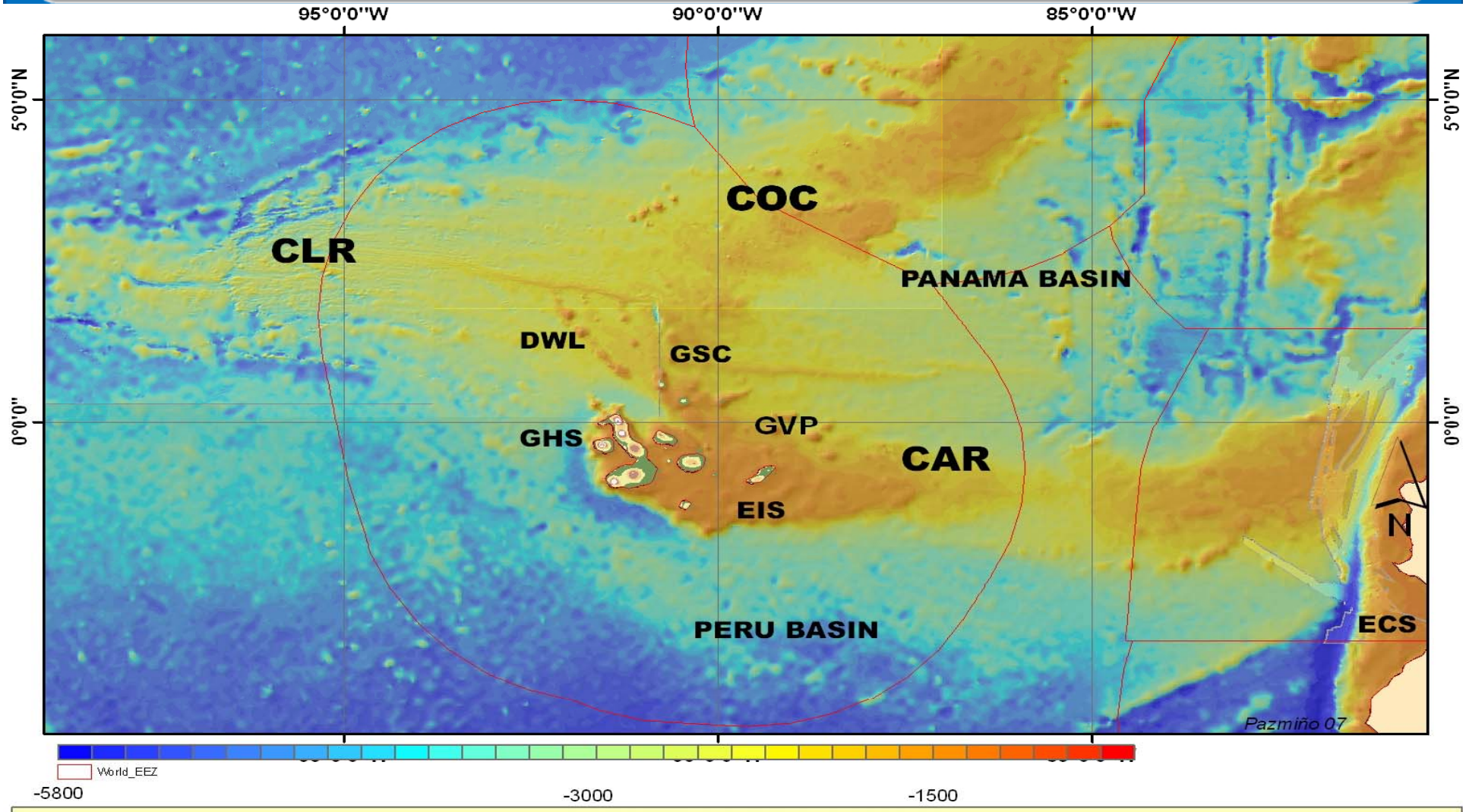

GEOLOGICAL FRAMEWORK

CAR(CARNEGIE RIDGE)
COC (COCOS RIDGE)
CLR (COLON RIDGE)
GVP (GALAPAGOS VOLCANIC PLATFORM)
EIS (ECUADOR INSULAR SHELF)
ECS (ECUADOR CONTINENTAL SHELF)
GSC (GALAPAGOS SPREADING CENTER)
GALAPAGOS (HOT SPOT)
DWL (DARWIN AND WOLF LINEAMENTS)

SCALE 1:9.100.000

120 60 0 120 240 360 480 KM

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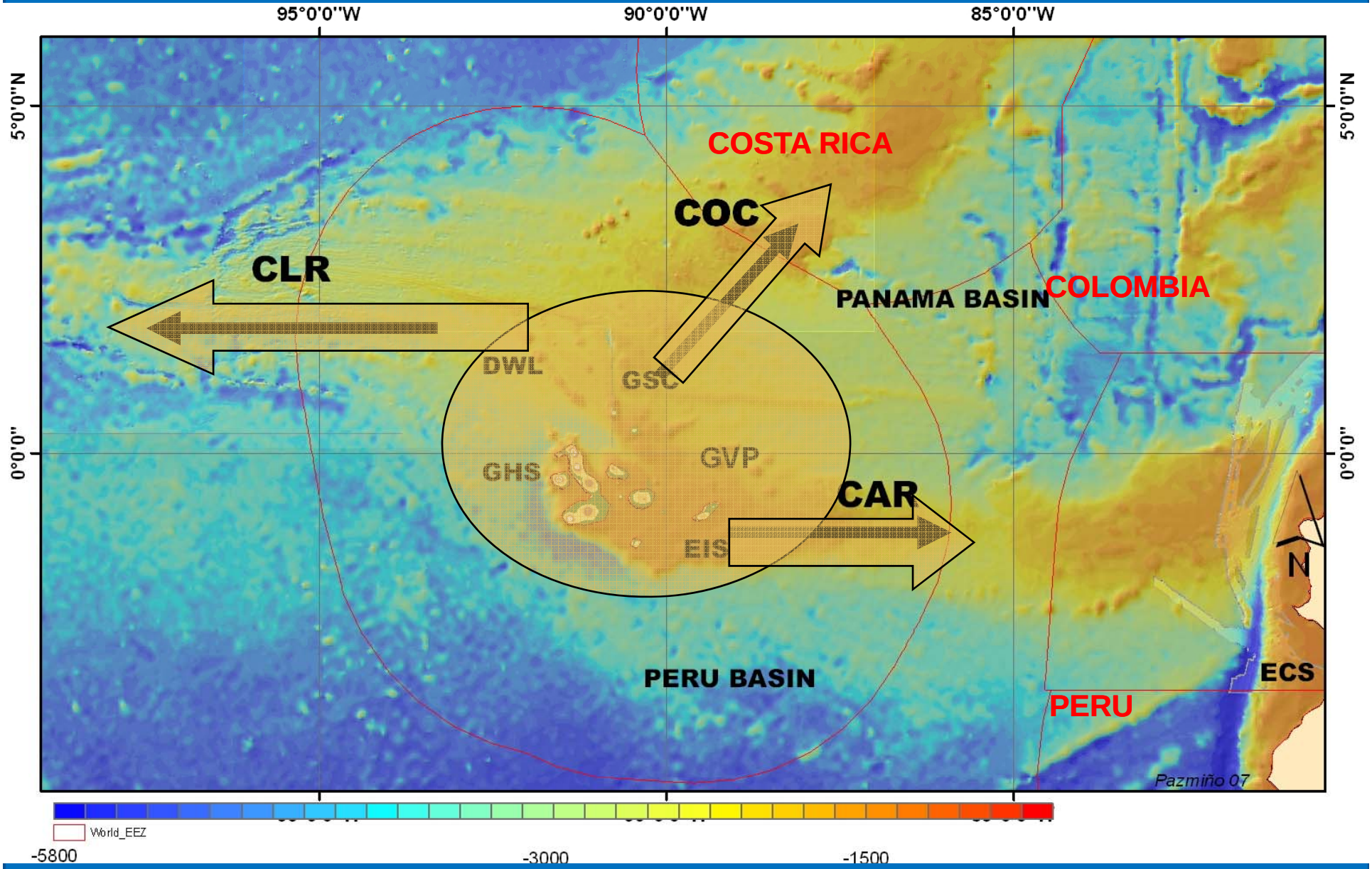

NATURAL PROLONGATION

- **Article 76.1** "The continental shelf of a coastal State comprises the sea-bed and the subsoil of the submarine areas that extend beyond its territorial sea throughout the natural prolongation of its land territory to the outer edge of the continental margin……"

- **Article 76.3**"The continental margin comprises the submerged prolongation of the land mass of the coastal State, and consists of the sea-bed and the subsoil of the shelf, the slope and the rise..."

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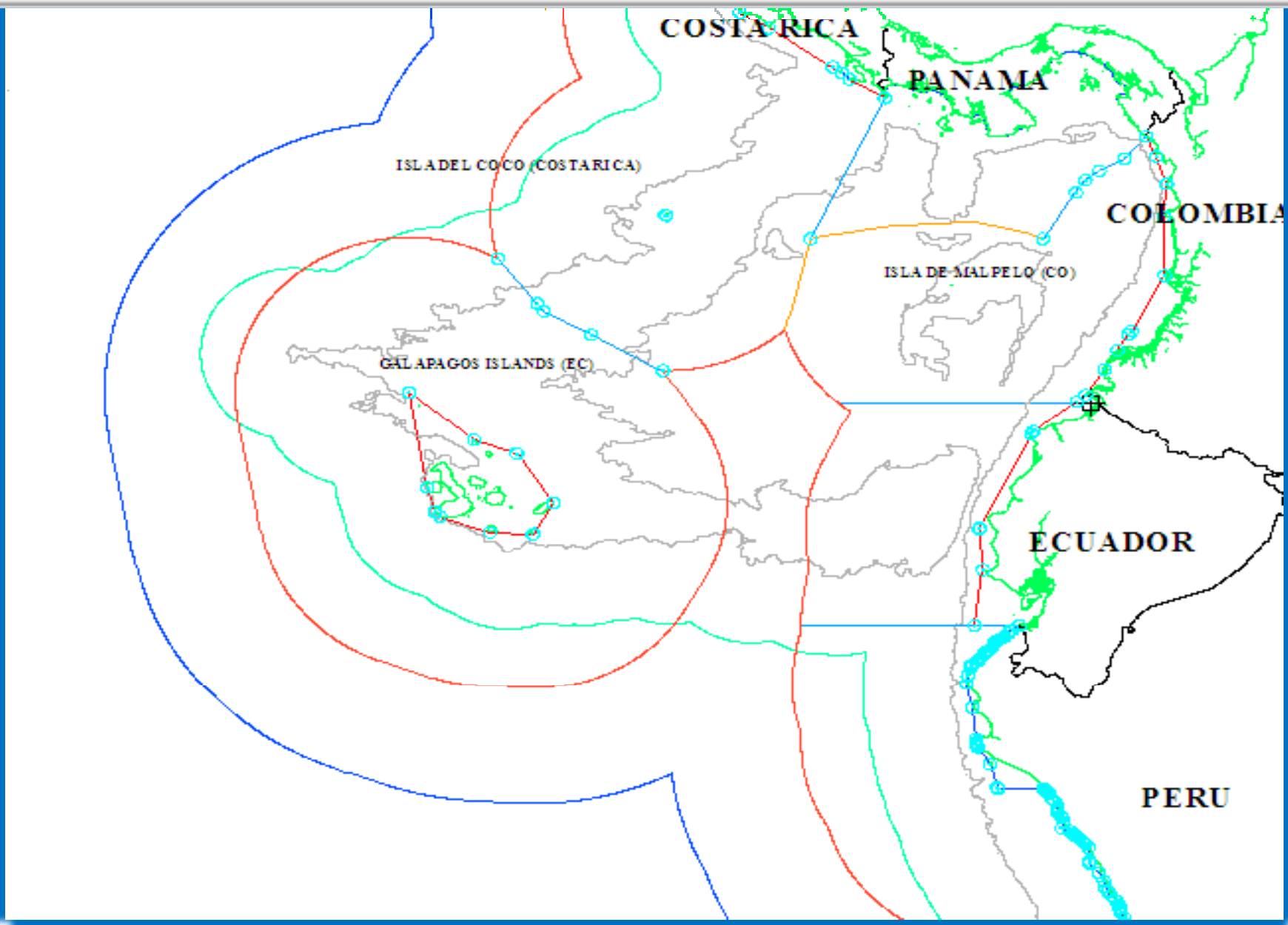
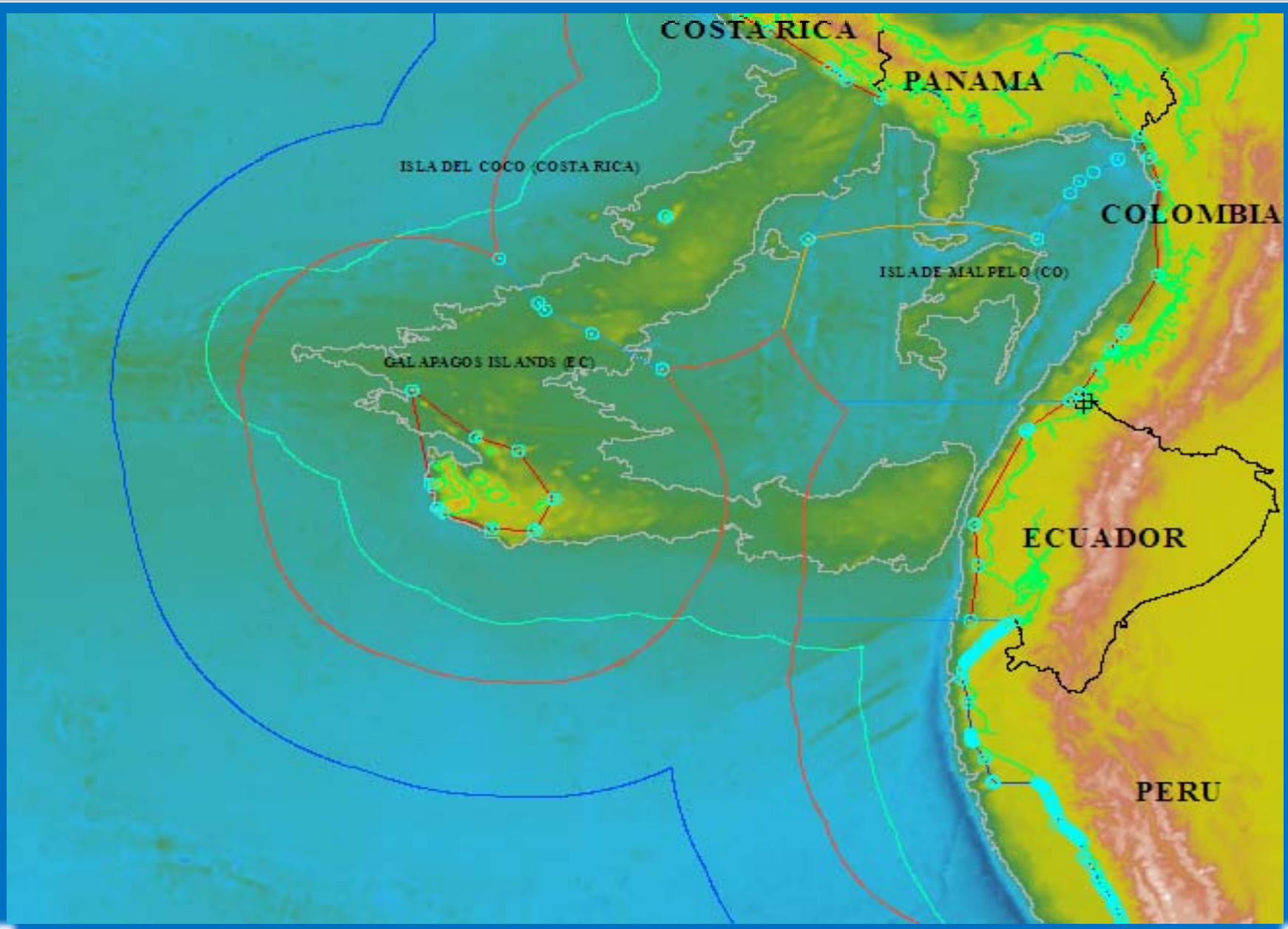
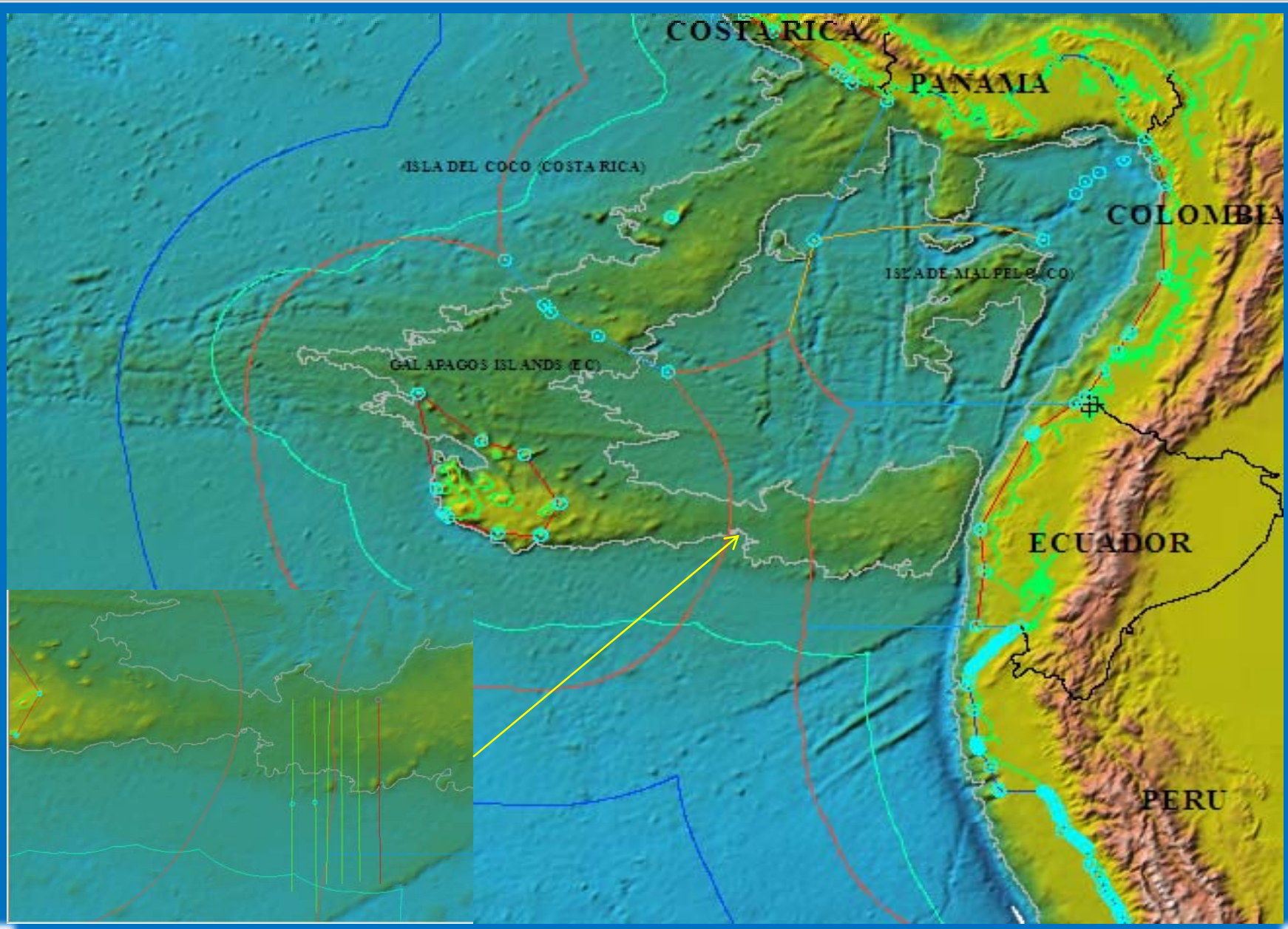


The Galapagos islands: the rights of the fragile environment in the law of the sea and their potential outer limits beyond 200 nautical miles



The Galapagos islands: the rights of the fragile environment in the law of the sea and their potential outer limits beyond 200 nautical miles



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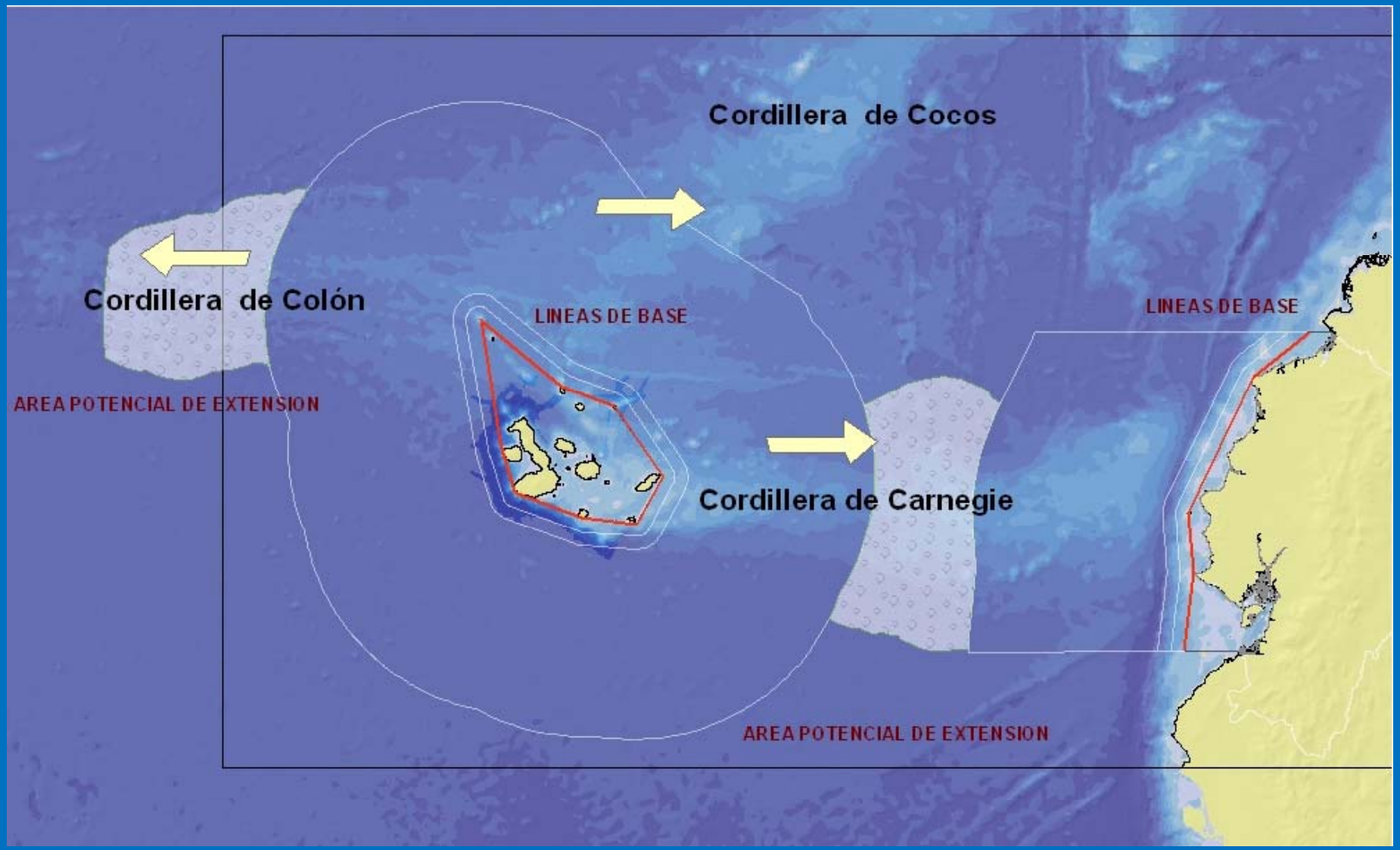
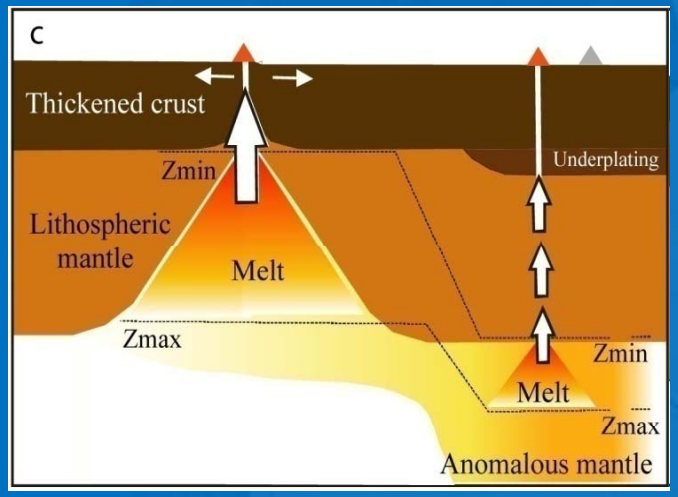
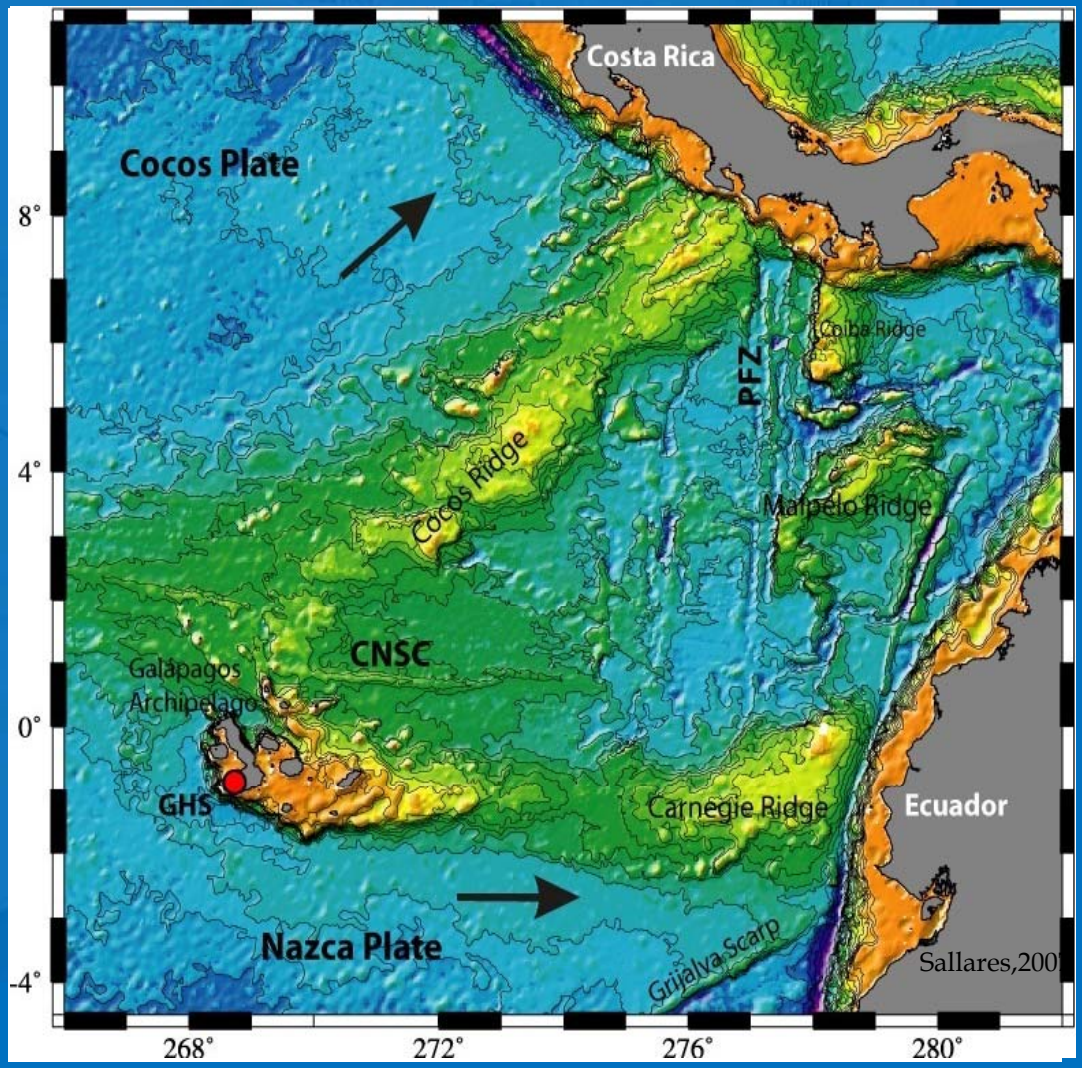


Evolution GVP



Geodynamic history



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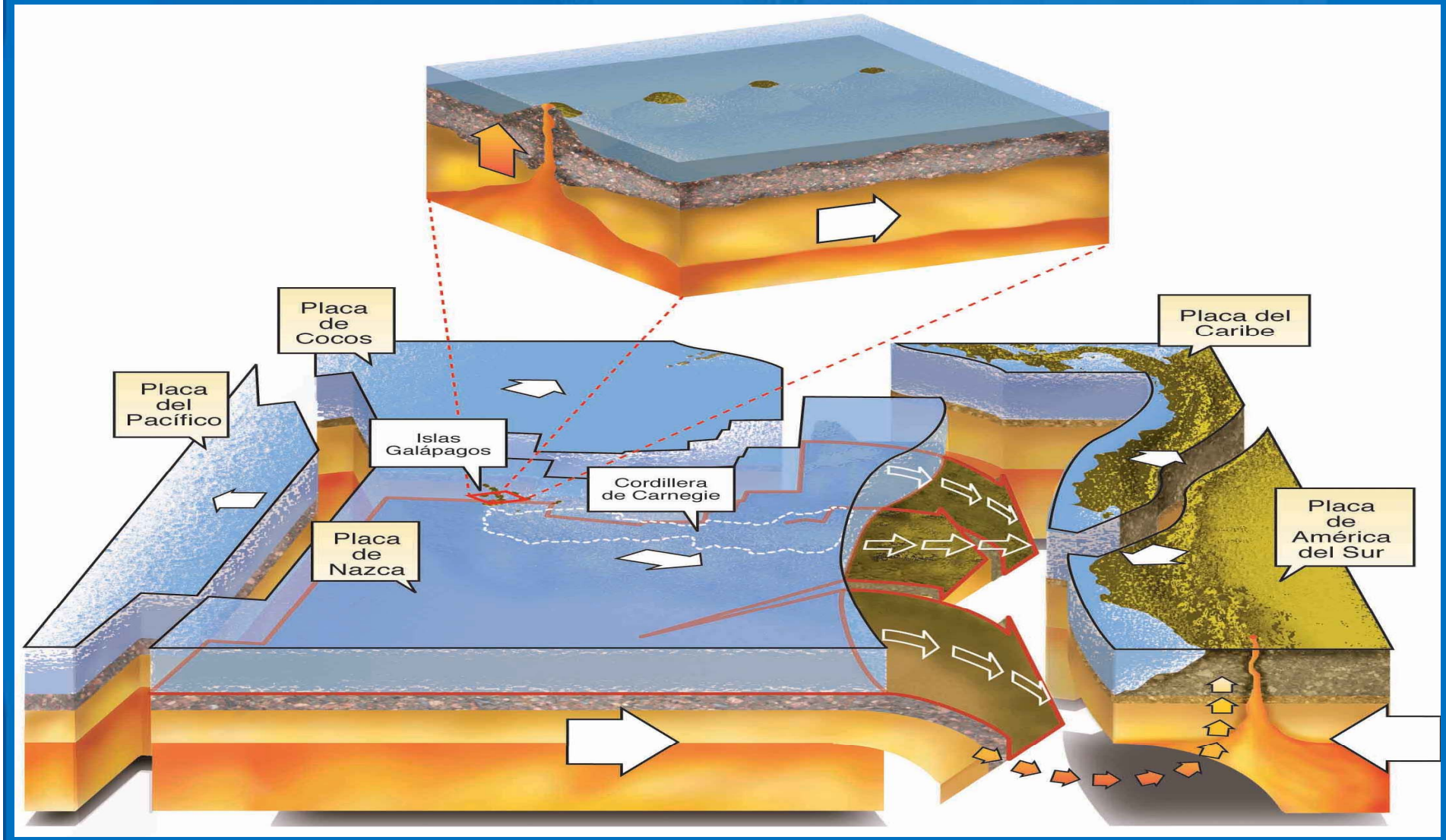
INSULAR PLATFORM GEOLOGICAL FRAMEWORK



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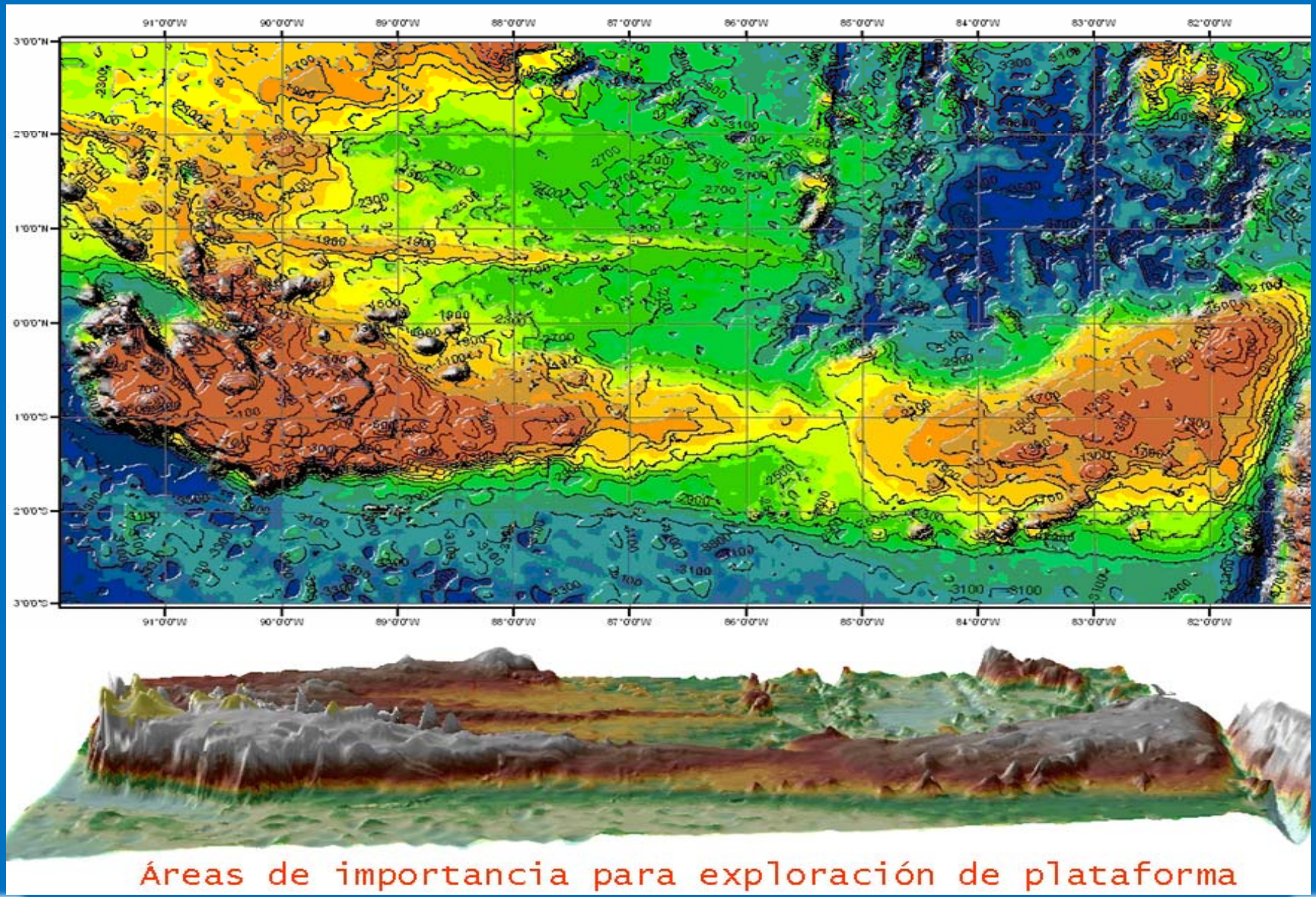

Áreas de importancia para exploración de plataforma

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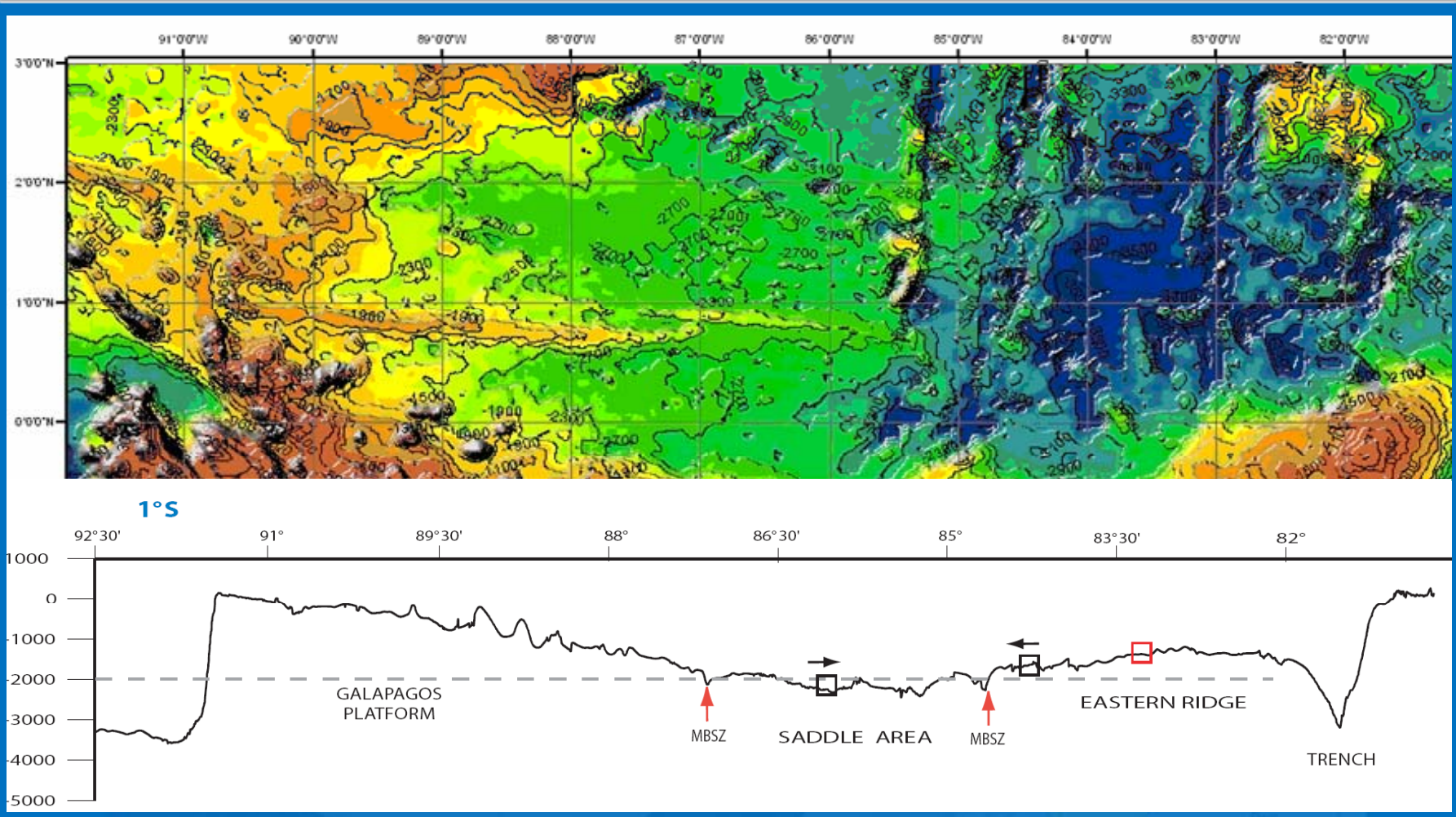

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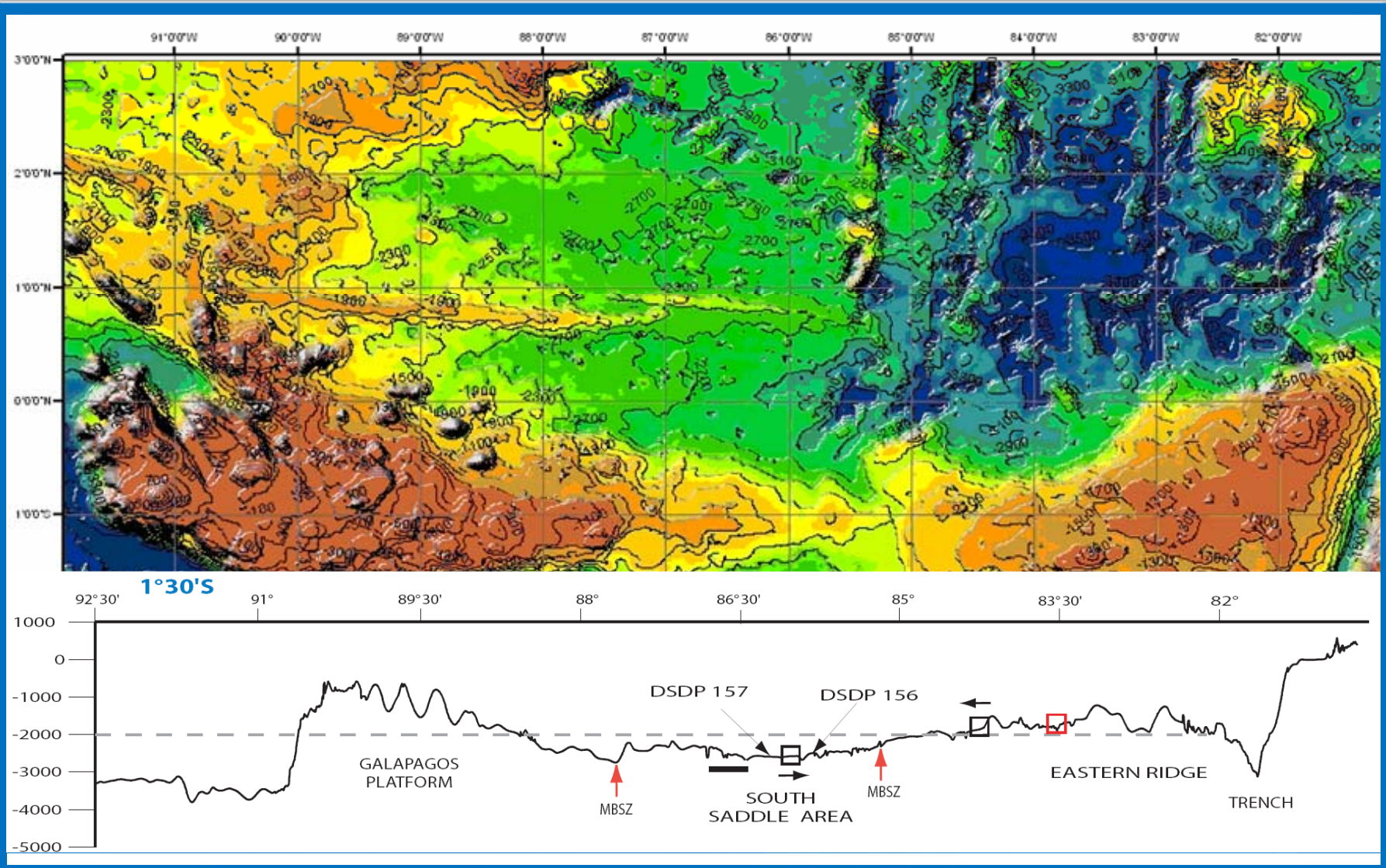
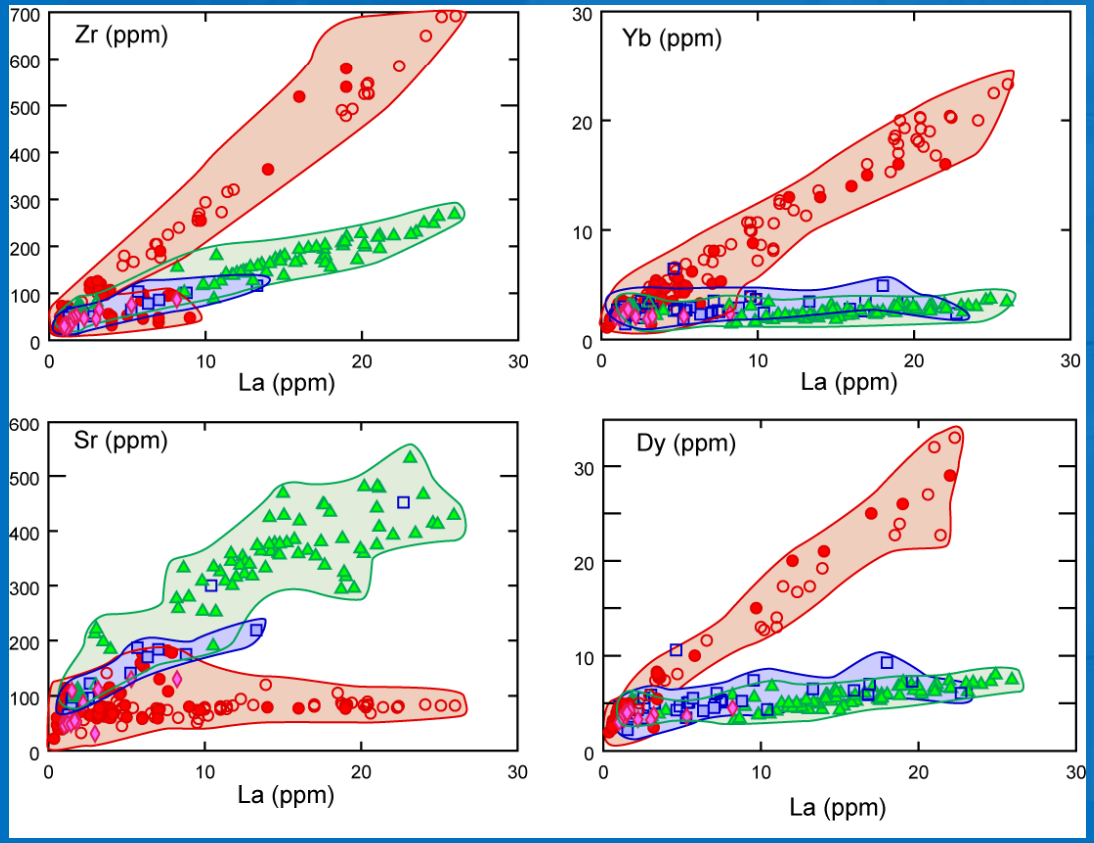


Carnegie Ridge

Geochemical approach

- Element vs. La:

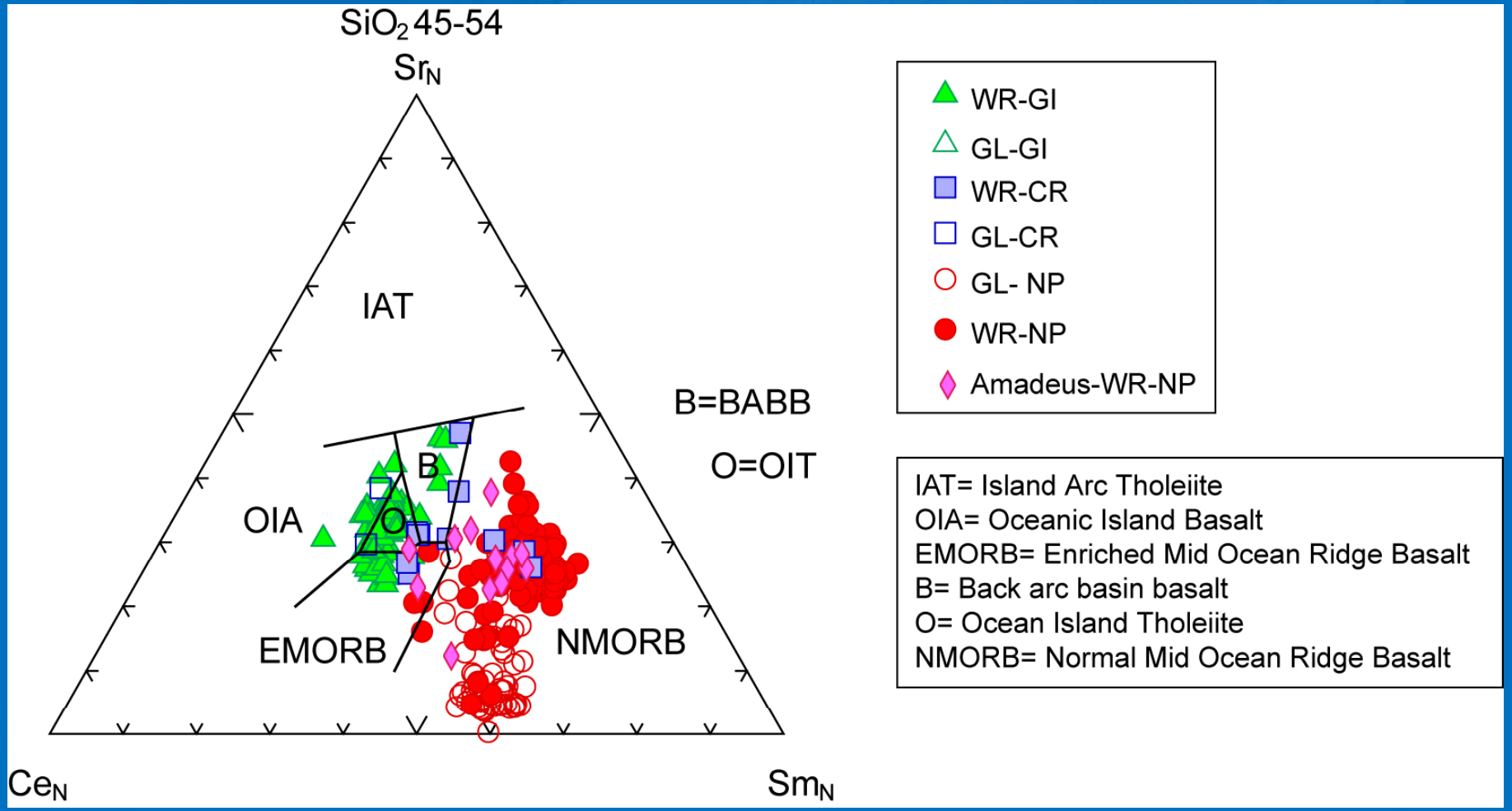


Nazca plate is clearly distinguished from Galapagos island and Carnegie ridge in just one evolutive trend. It can help to establish similar evolution between the islands and the ridge.

Lara, 2007

Sumarize

- Geochemistry similarities:



Geochemical summaries

- Nazca plate show N-MORB composition, and E-MORB can occur in the surrounding area of the Galápagos plume.
- Galapagos island E-MORB and OIB composition.
- Carnegie ridge show N-MORB and E-MORB, and is correlated more to Galapagos island basalt
- Trace elements are good to use in order to distinguished evoluative trend, our analyses show similar origin between the Galapagos island and Carnegie ridge due to interaction between GHS and GSC.

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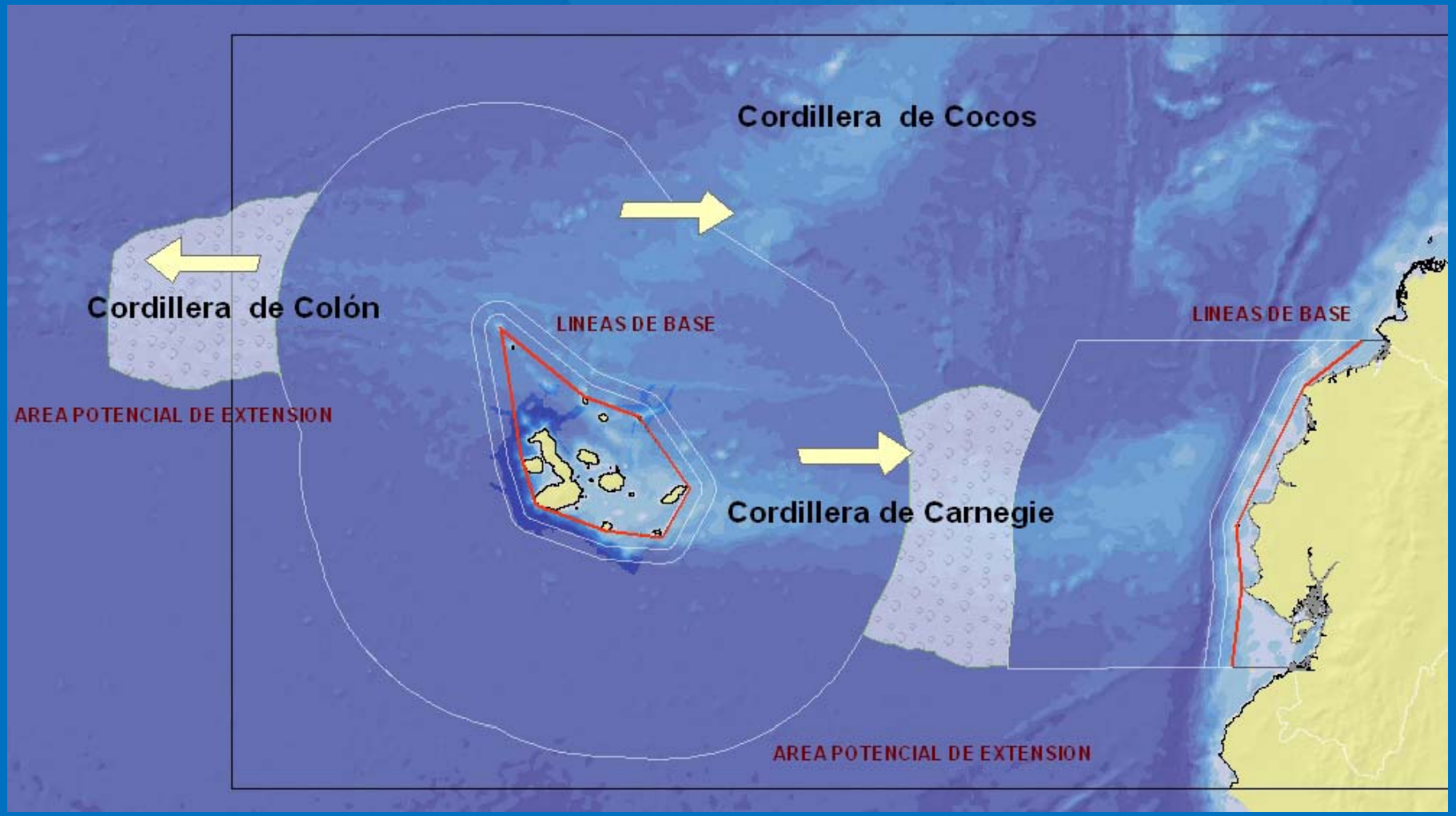
OUTER LIMITS BEYOND 200 MN PARTIAL SUBMISSION



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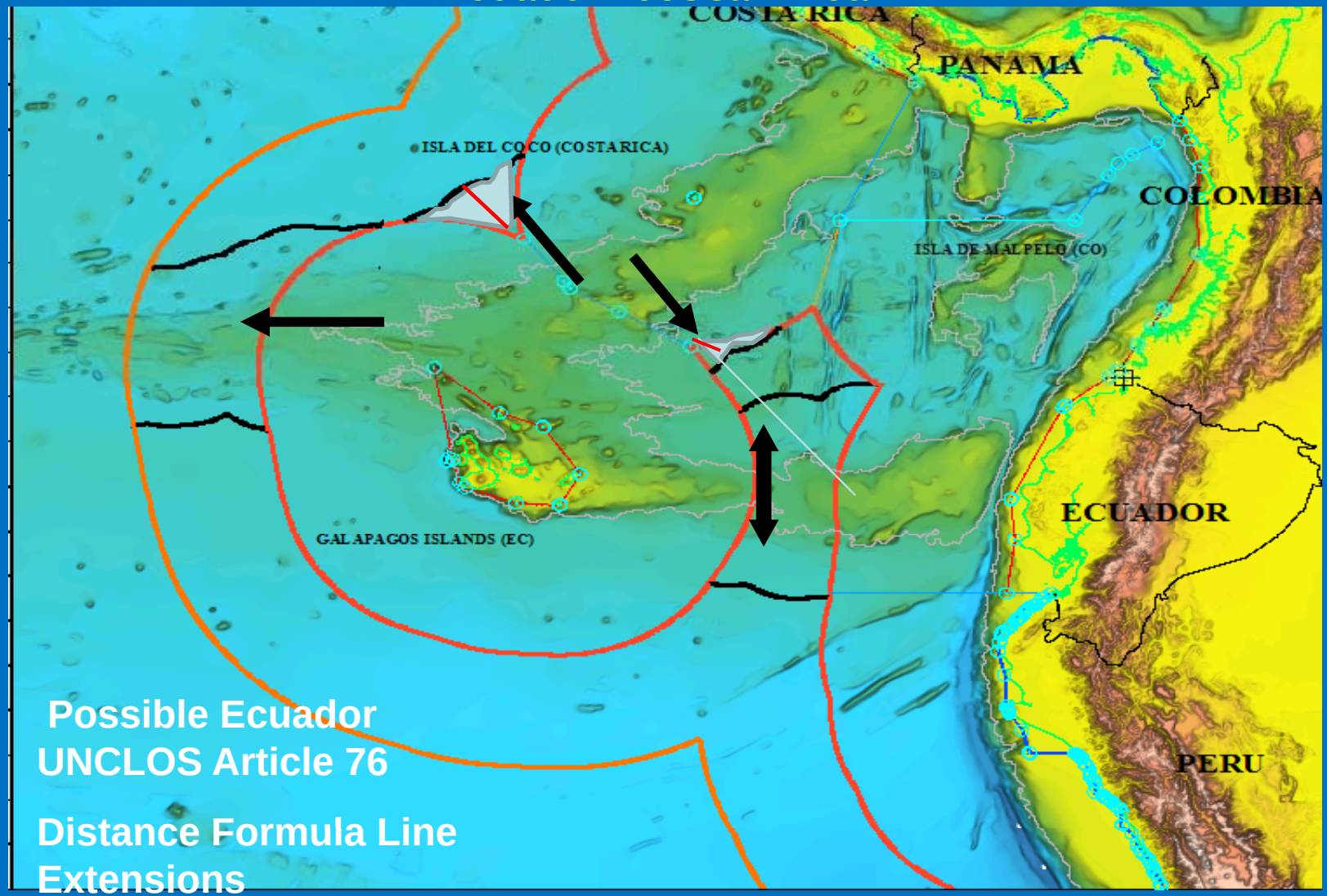
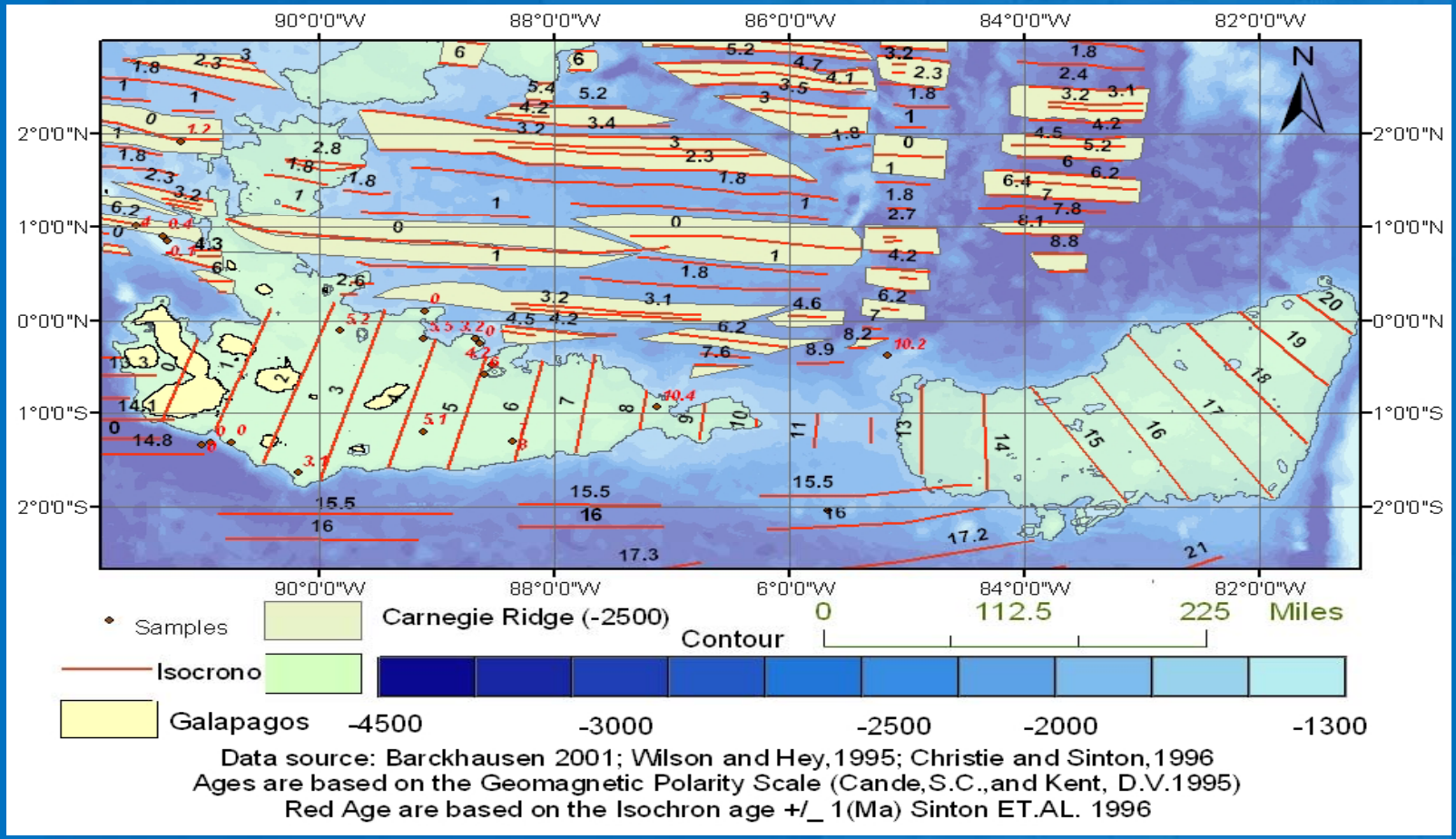
Joint submission Probable Extensions area
Ecuador-Costa Rica



Legal framework

- Ecuador must be demonstrate natural prolongation accordance with the UNCLOS article 76.
- Focus on paragraph 4 of article 76 trough the appurtenance test
- Cocos, Carnegie and Colon ridges are natural prolongation from the Galapagos islands.
- The ridges share morphological continuity, crustal characteristics, geologic origin, and tectonic evolution with the Galapagos Islands. The ridges are natural prolongation but they are not natural component of margin the geological history varies along its length

AGE PALEO RECONSTRUCTION



Carnegie ridge is hot spot track. Age reconstruction is determining by magnetic anomalies (red lines are isochrones), red dots are rock samples (basalts in seamounts). Pazmiño 2005.

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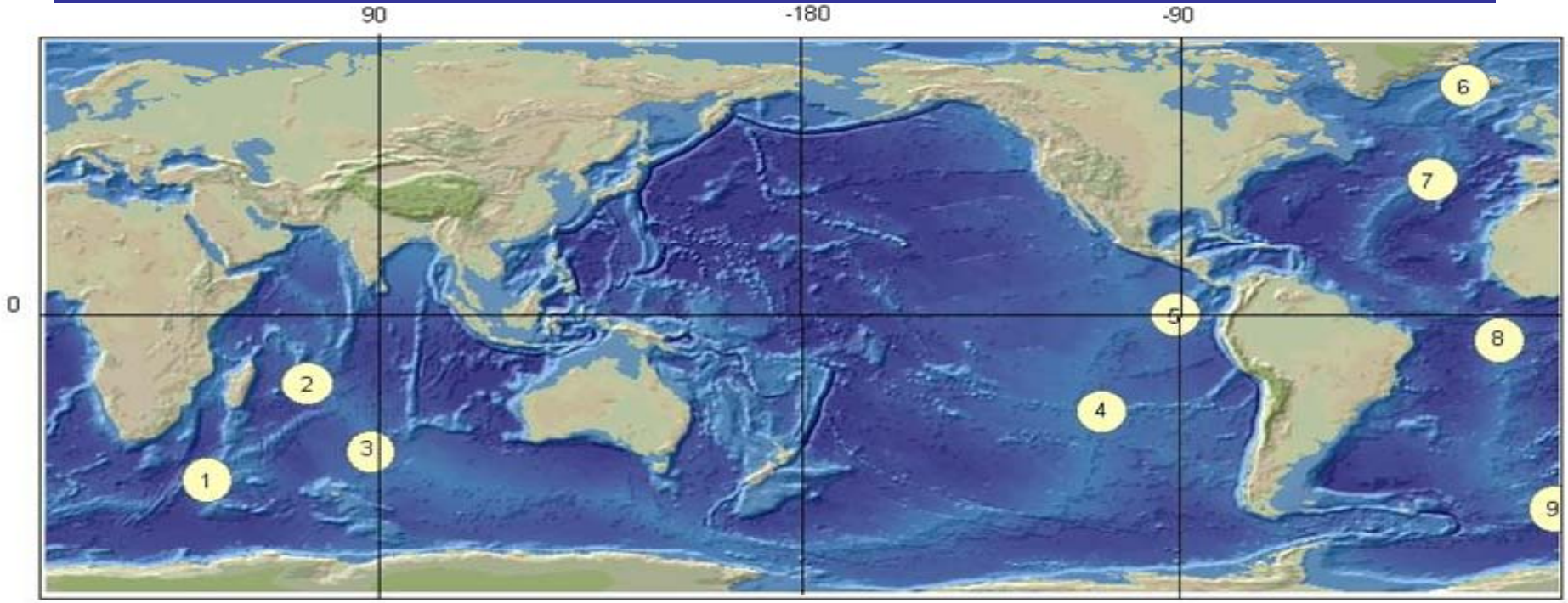
OUTER LIMIT EXTEND BEYOND 200 NM FROM ISLANDS



1. Islas Príncipe Eduardo (Sudáfrica)
2. Islas Rodríguez (Mauricio)
3. Islas Bouvet (Noruega)
4. Isla de Pascua (Chile)
5. Islas Galápagos (Ecuador)
6. Islandia (Islandia)
7. Islas Azores (Portugal)
8. Islas Ascensión (Reino Unido)
9. Isla San Paulus (Francia)

OUTTER LIMITS

Data acquisition

Article 76 application

Natural prolongation

Appurtenance test

Outer limits constrains..

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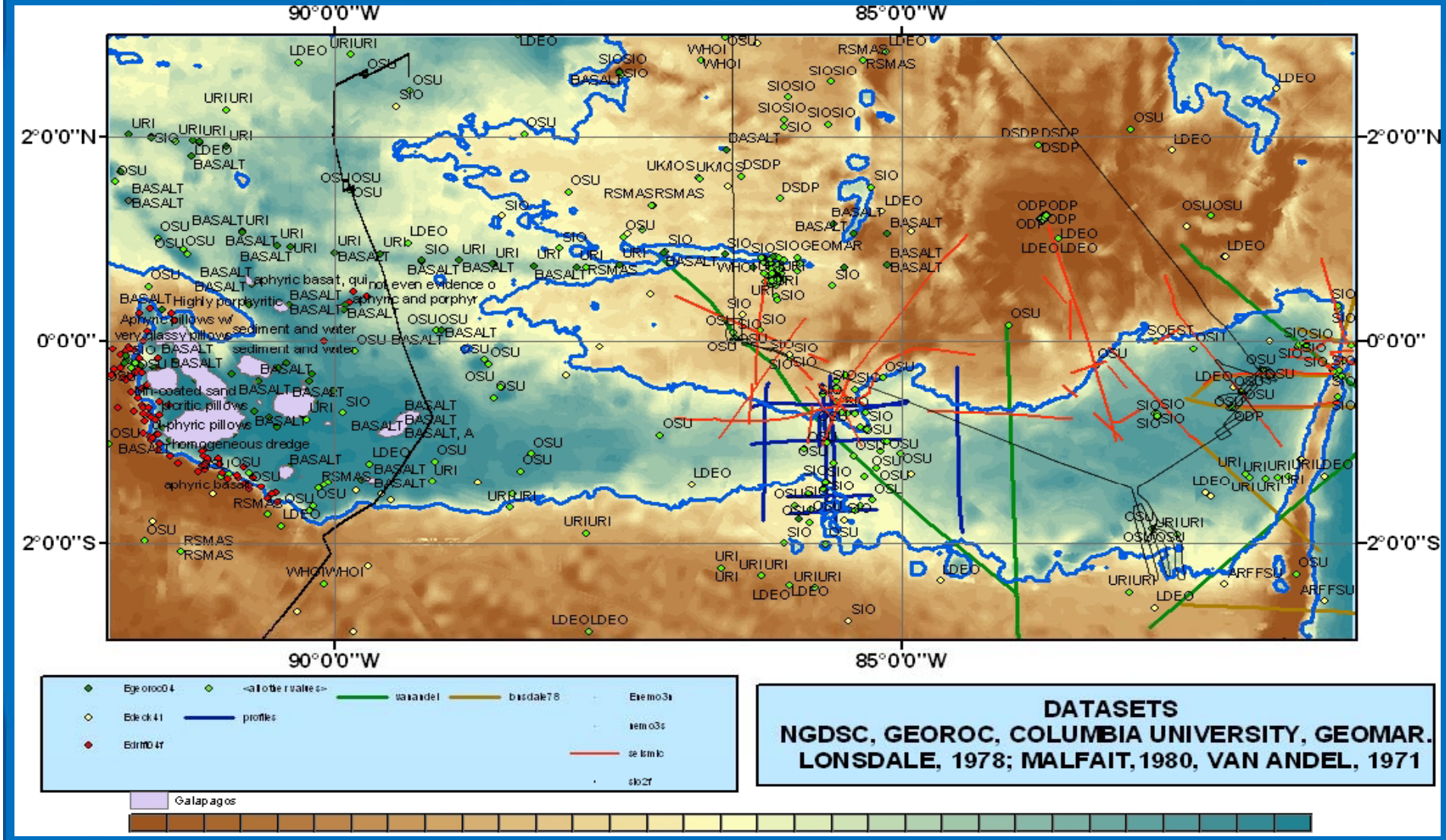
Data seismic, samples, core, and grabs.



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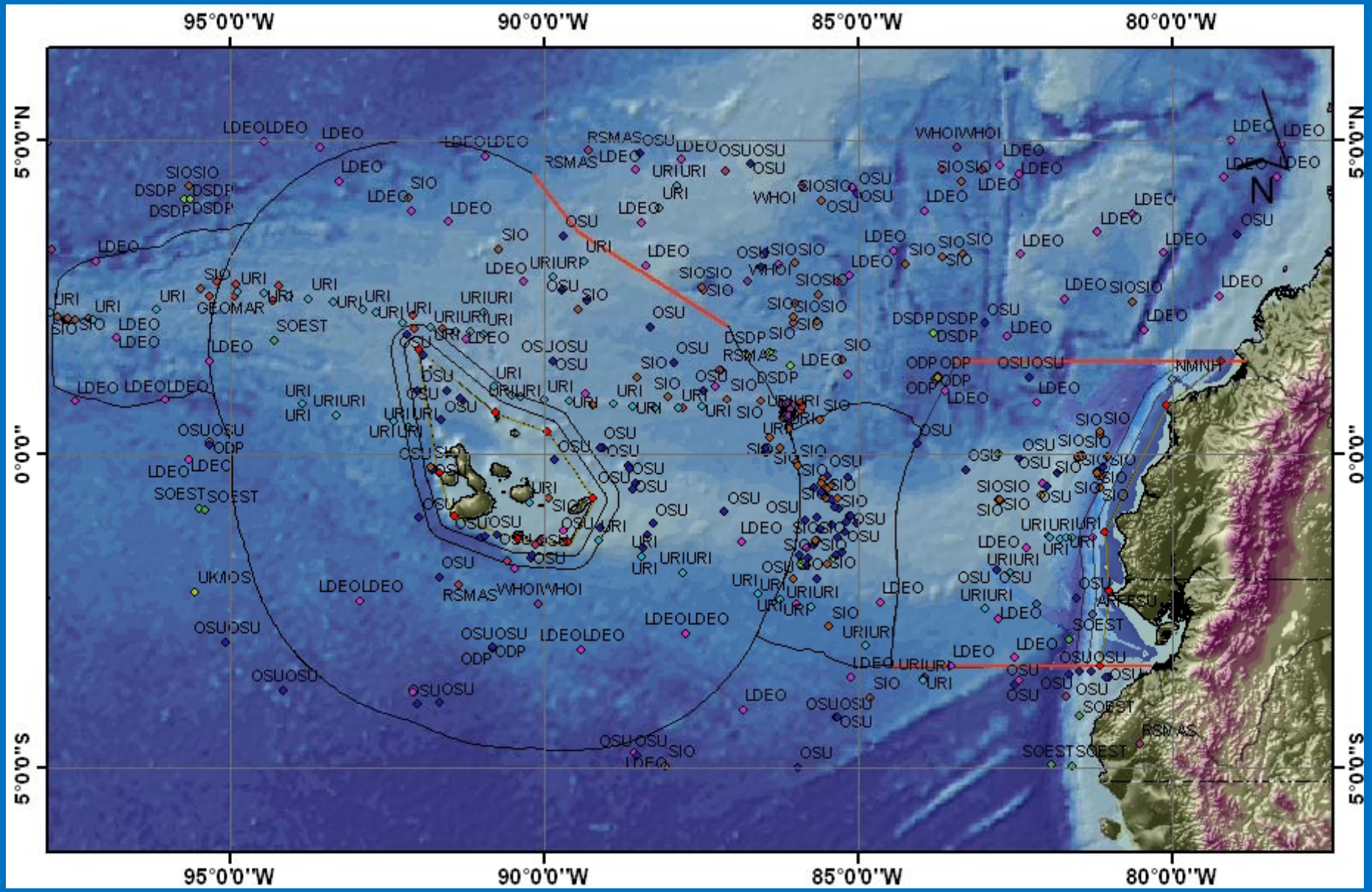

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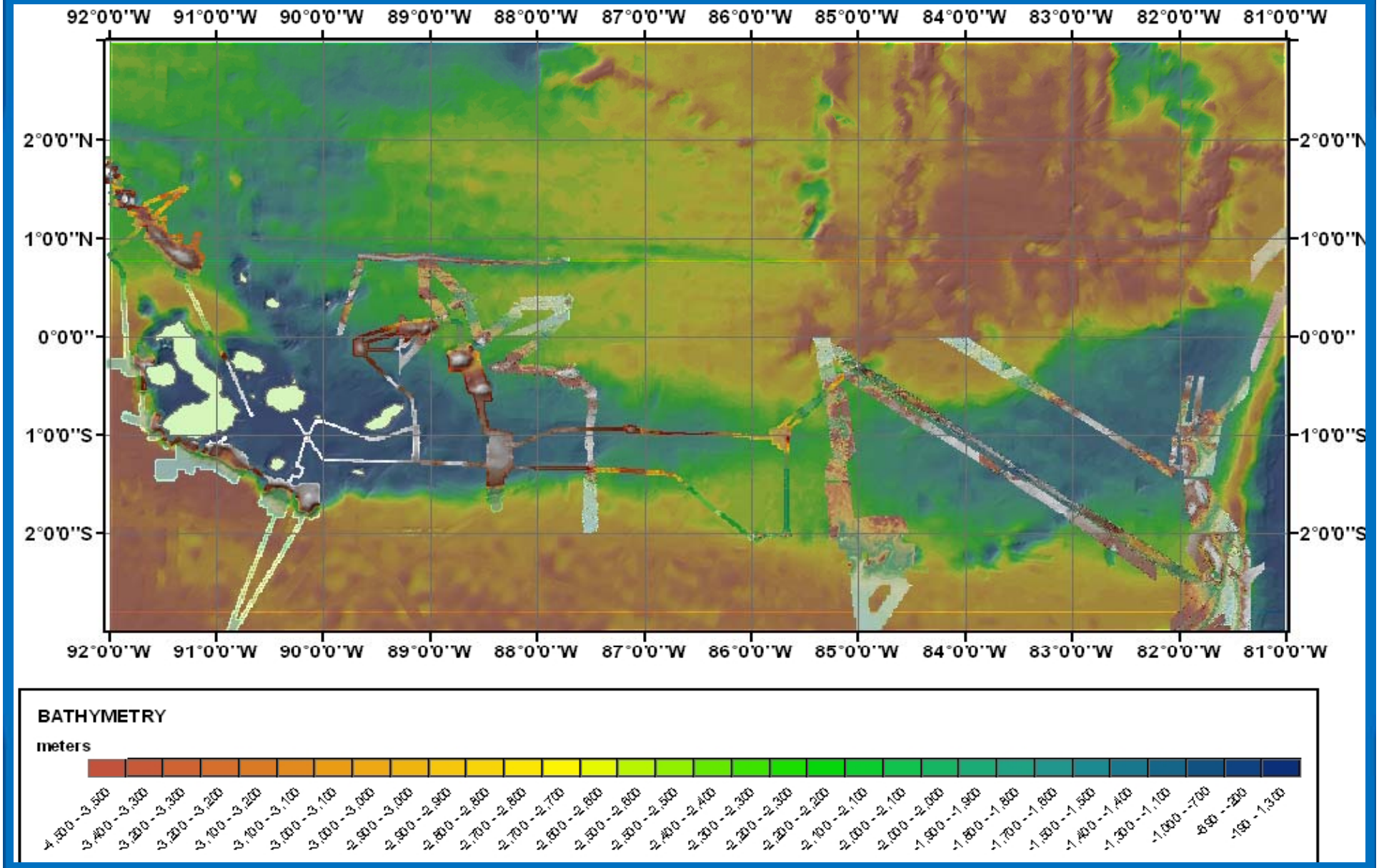

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Natural prolongation

1. Carnegie ridge is a hotspot track.

2. Age progration determine contiguous magmatic source.

3. Paleo-morphologies evidence determine that GI and CAR as same origin.

4. Plate tectonic models Duncan y Agraves, Mescheda y Barckhausen, 2000 have established origin base on la interaction between the Galapagos hot spot and the spreading center.

DESKTOP STUDY

Applying just one constrain considering Carnegie as a submarine ridge

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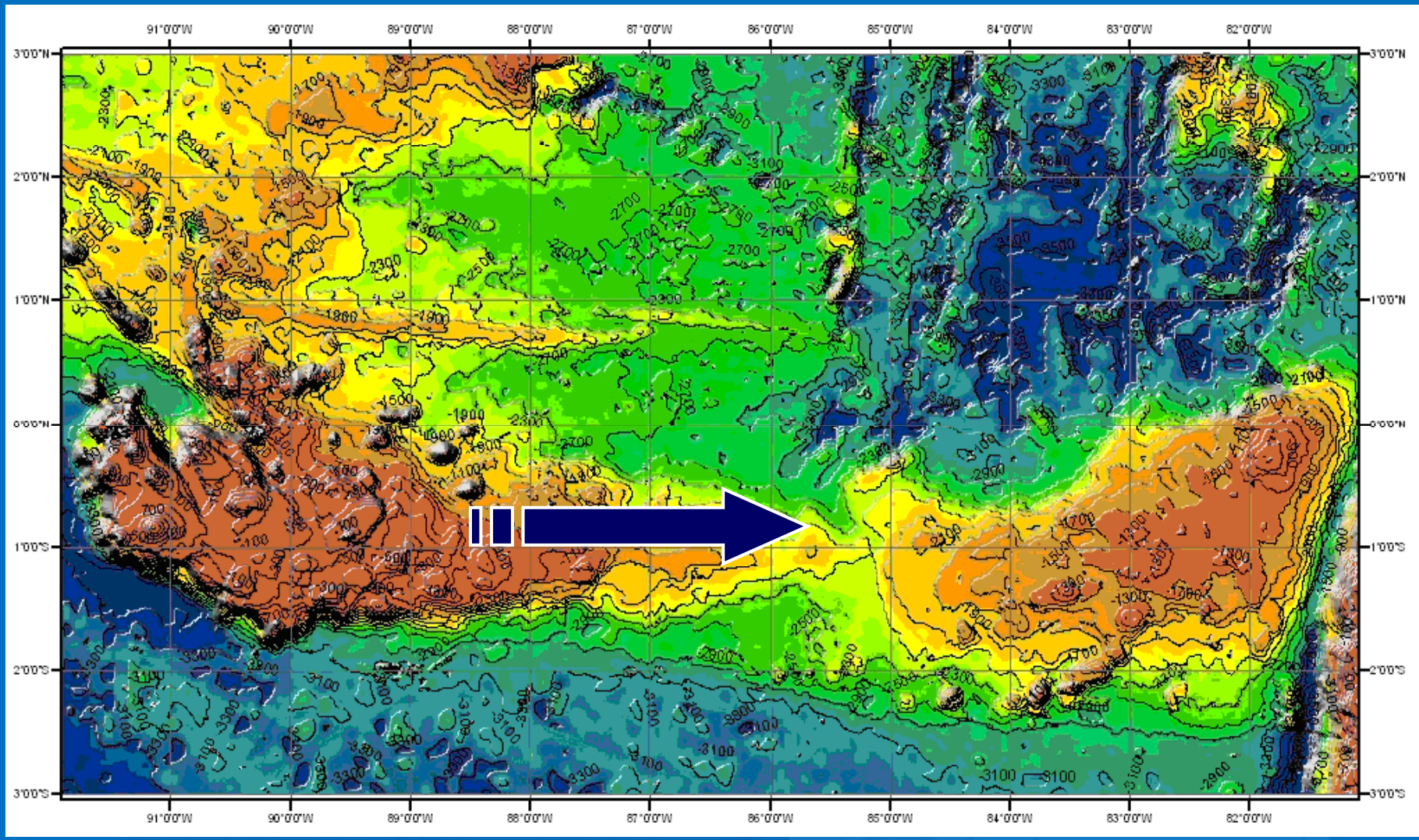
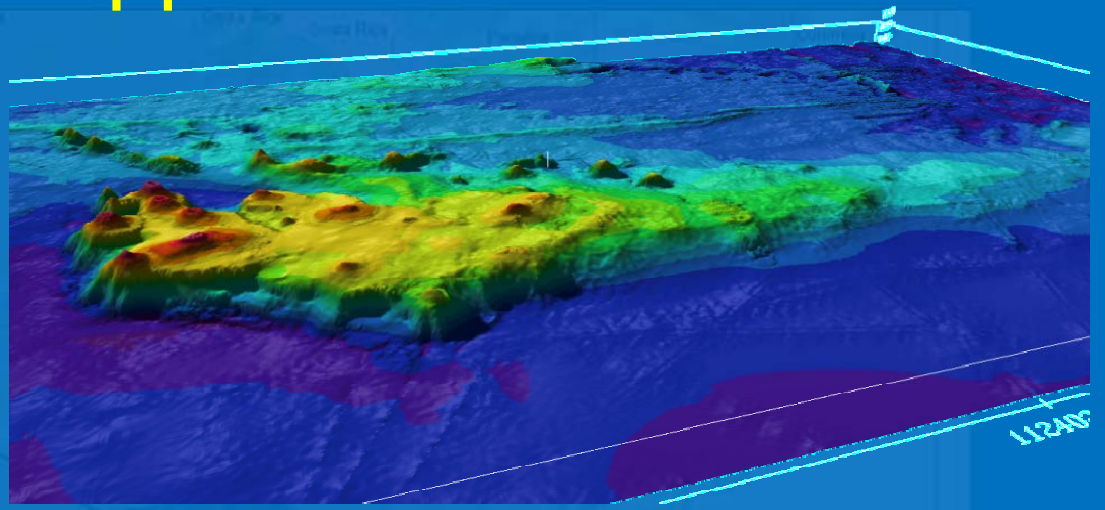
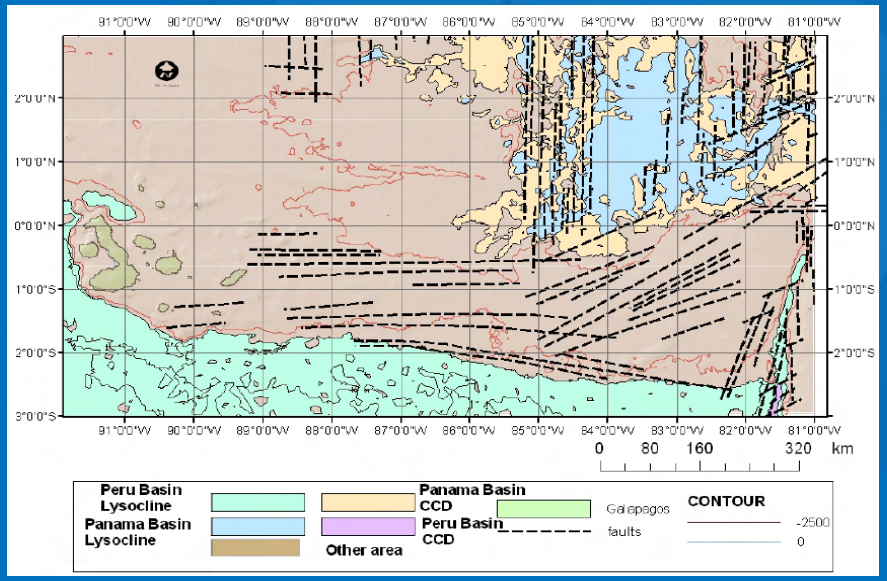


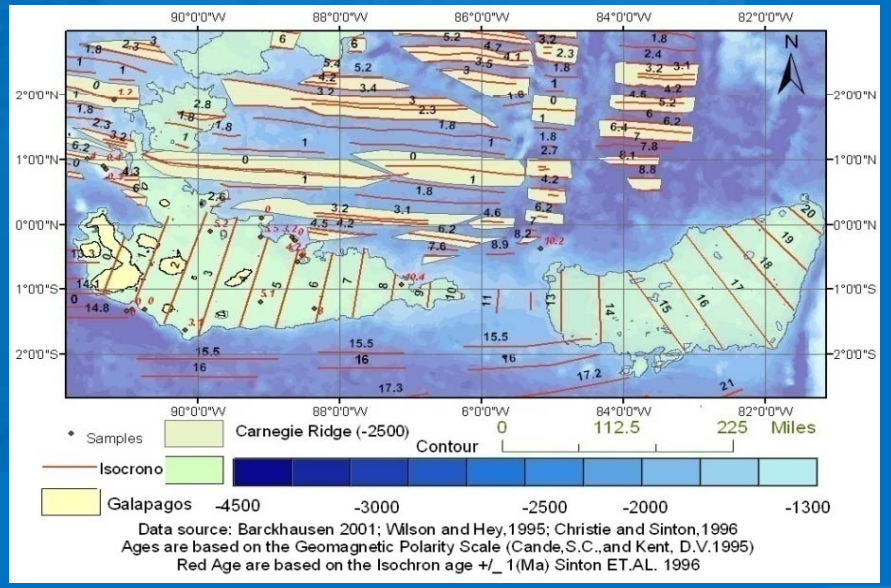
Carnegie ridge: structure, composition, subsidence history, and sediment different than the sorrounding basins.

Test appearance

- Base on:
  - Geological
  - Geophysics
  - Geochemistry
  - Geodynamic







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- The distinction between the “submarine elevations” and “submarine ridges” or “ oceanic ridges” shall be made on the basis of scientific evidence . (7.1.8)

- Oceanic ridges, refers to oceanic spreading ridges only, while in others seems to apply to all ridges composed of oceanic basaltic rocks. (7.2.3).

- *Carnegie, Cocos, and Colon ridges have islands on them. So, it would be difficult to consider that those belong to the deep ocean floor .*(7.2.8)

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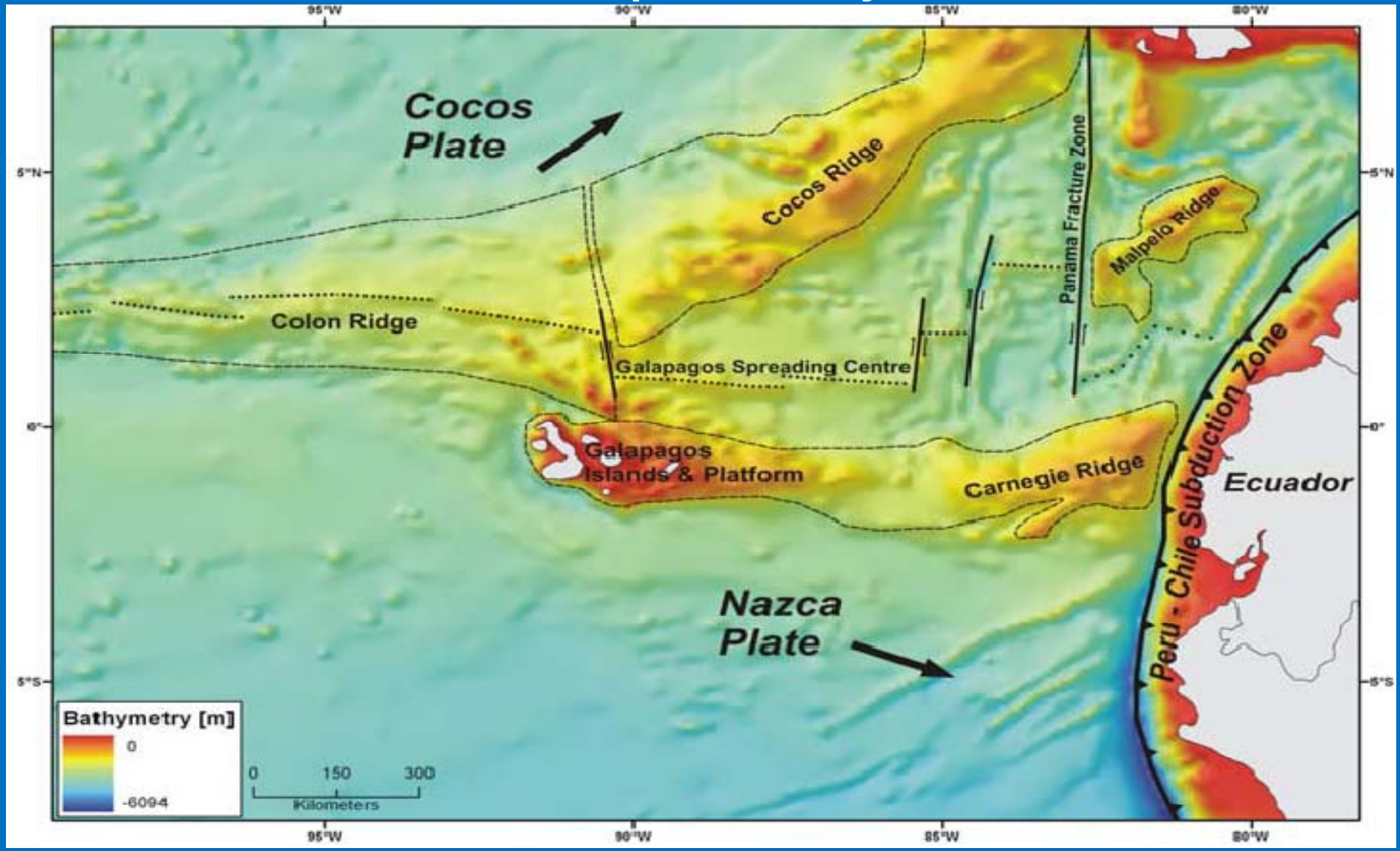
Desktop analysis



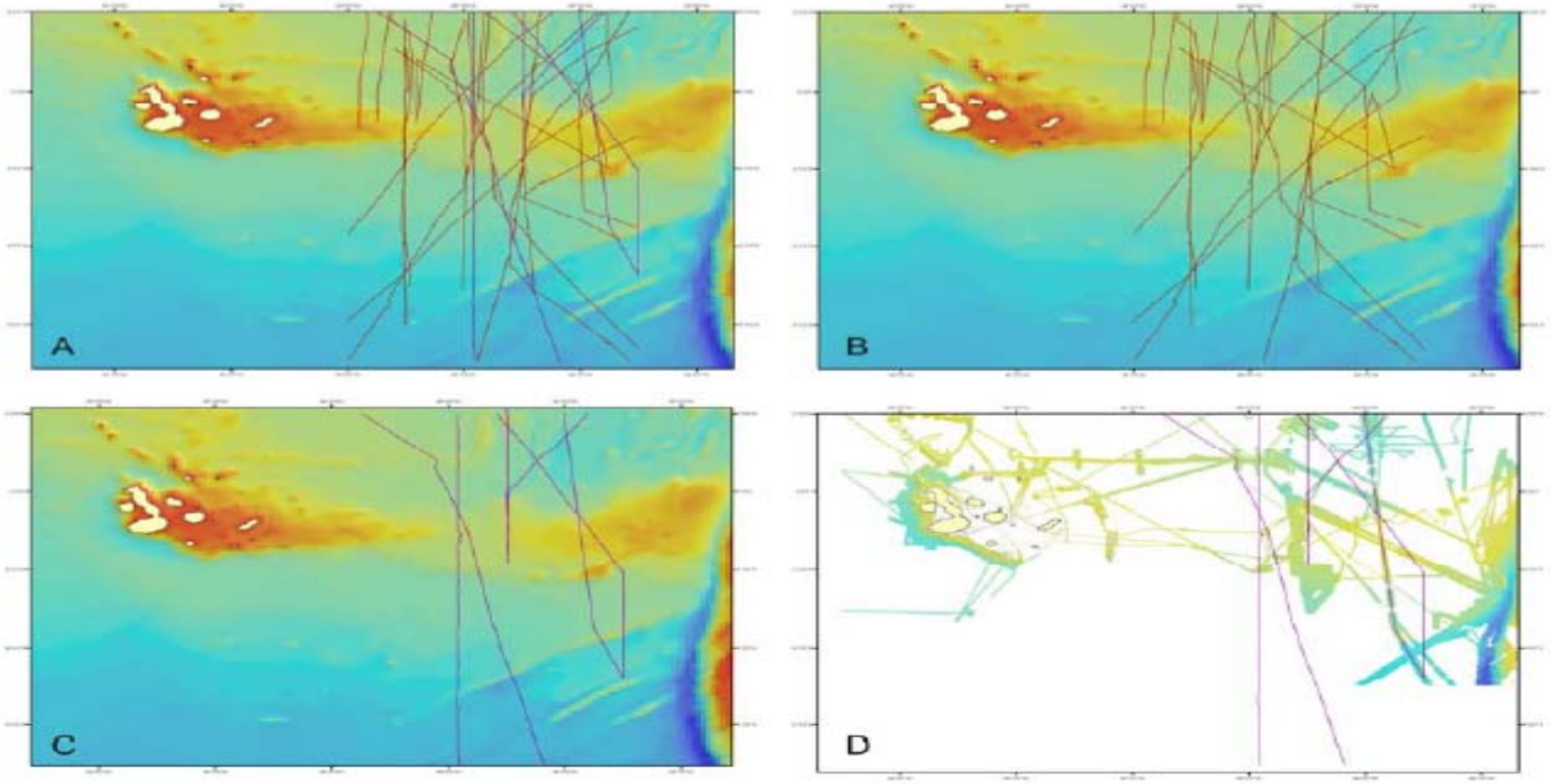


Figure 4.3 Summary illustrative panels of the Carnegie Ridge region, illustrating distribution of bathymetric data used in the assessment of foot of slope position options for Ecuador. (a) shows filtered data based on orientation; (b) shows all data acquired pre-1979 (probably non-satellite); (c) shows all data recorded between 1979 to present (likely to have satellite navigation, and therefore probably acceptable as part of the case; (d) shows all post-1980 data and multibeam.

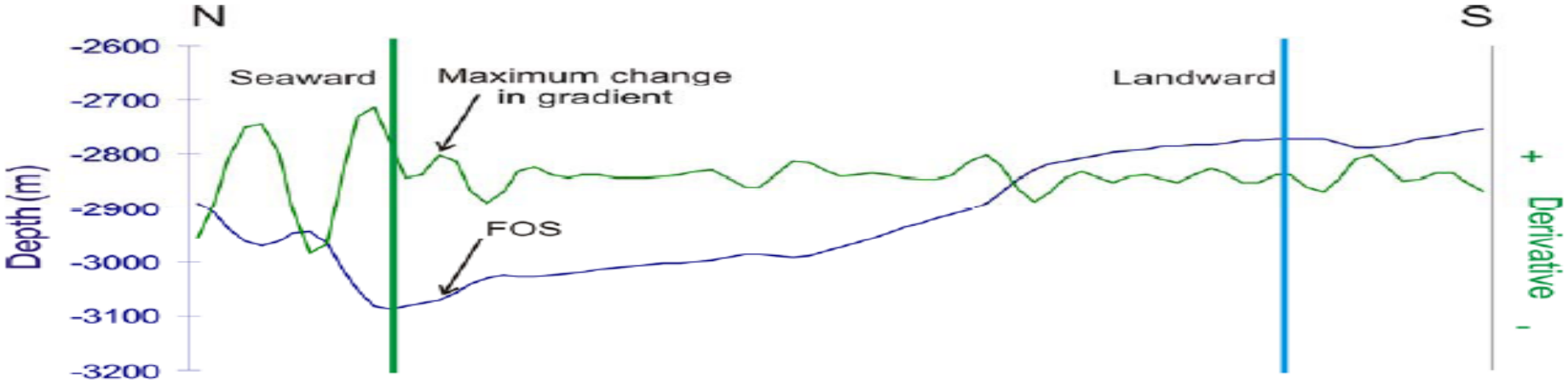
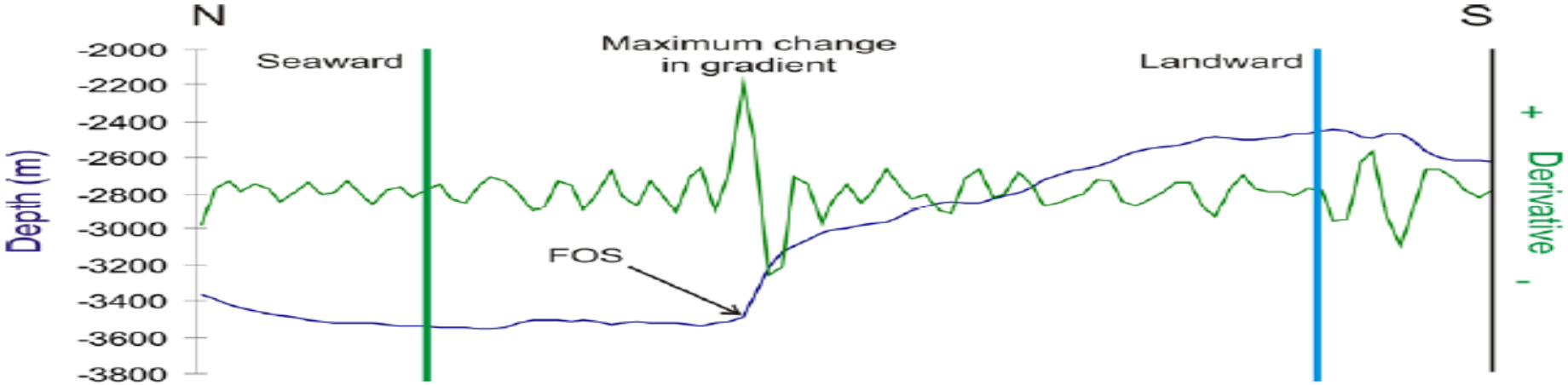

N
S
-2600
-2700
-2800
-2900
-3000
-3100
-3200
Depth (m)
Seaward
Maximum change in gradient
Landward
FOS
+ Derivative -

Figure 4.8.1


N
S
-2000
-2200
-2400
-2600
-2800
-3000
-3200
-3400
-3600
-3800
Depth (m)
Seaward
Maximum change in gradient
Landward
FOS
+ Derivative -

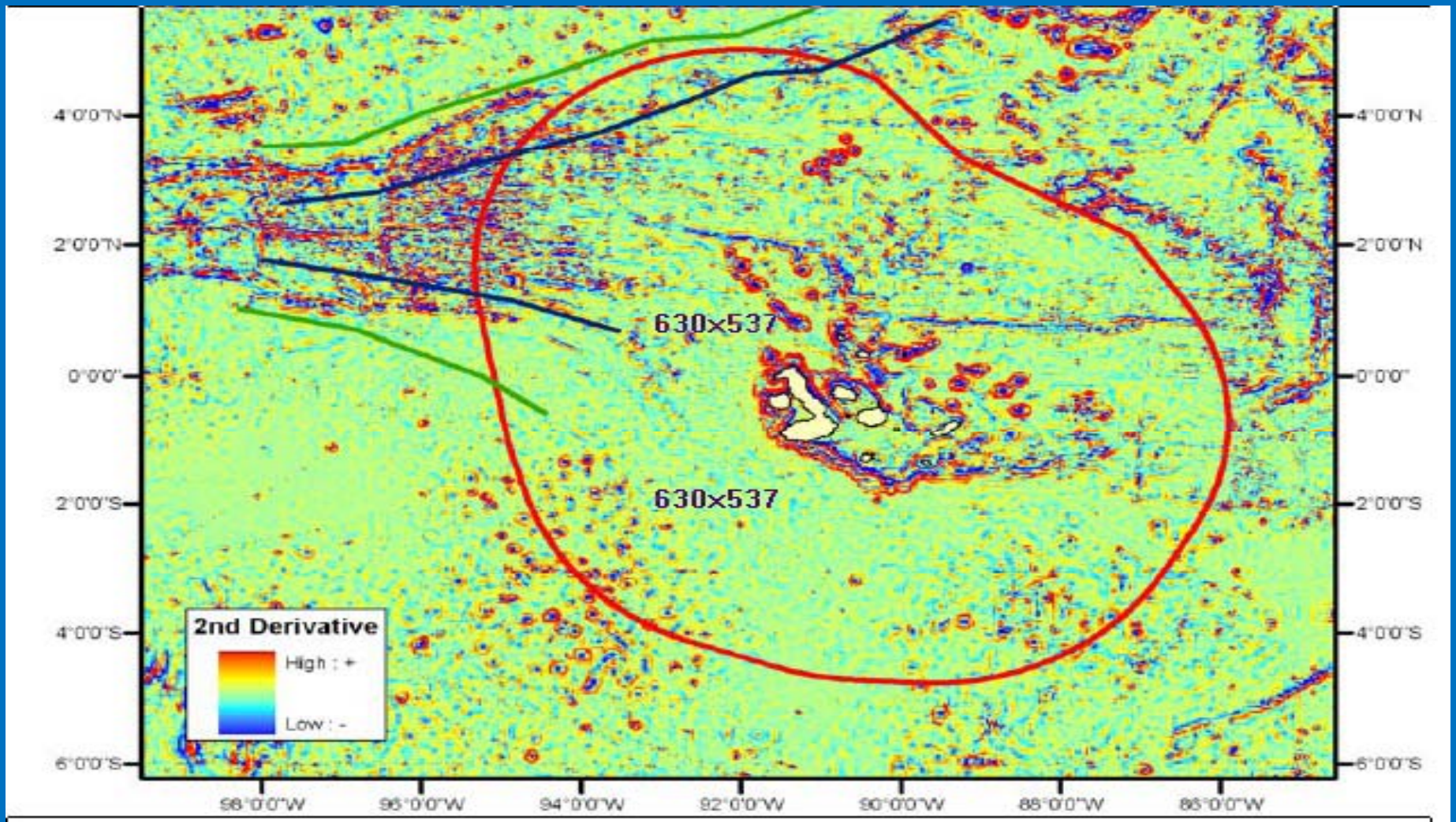


Figure 4.12 Demonstration of how gridded 2nd derivative information can be used to identify concave, convex and flat regions of the seafloor.

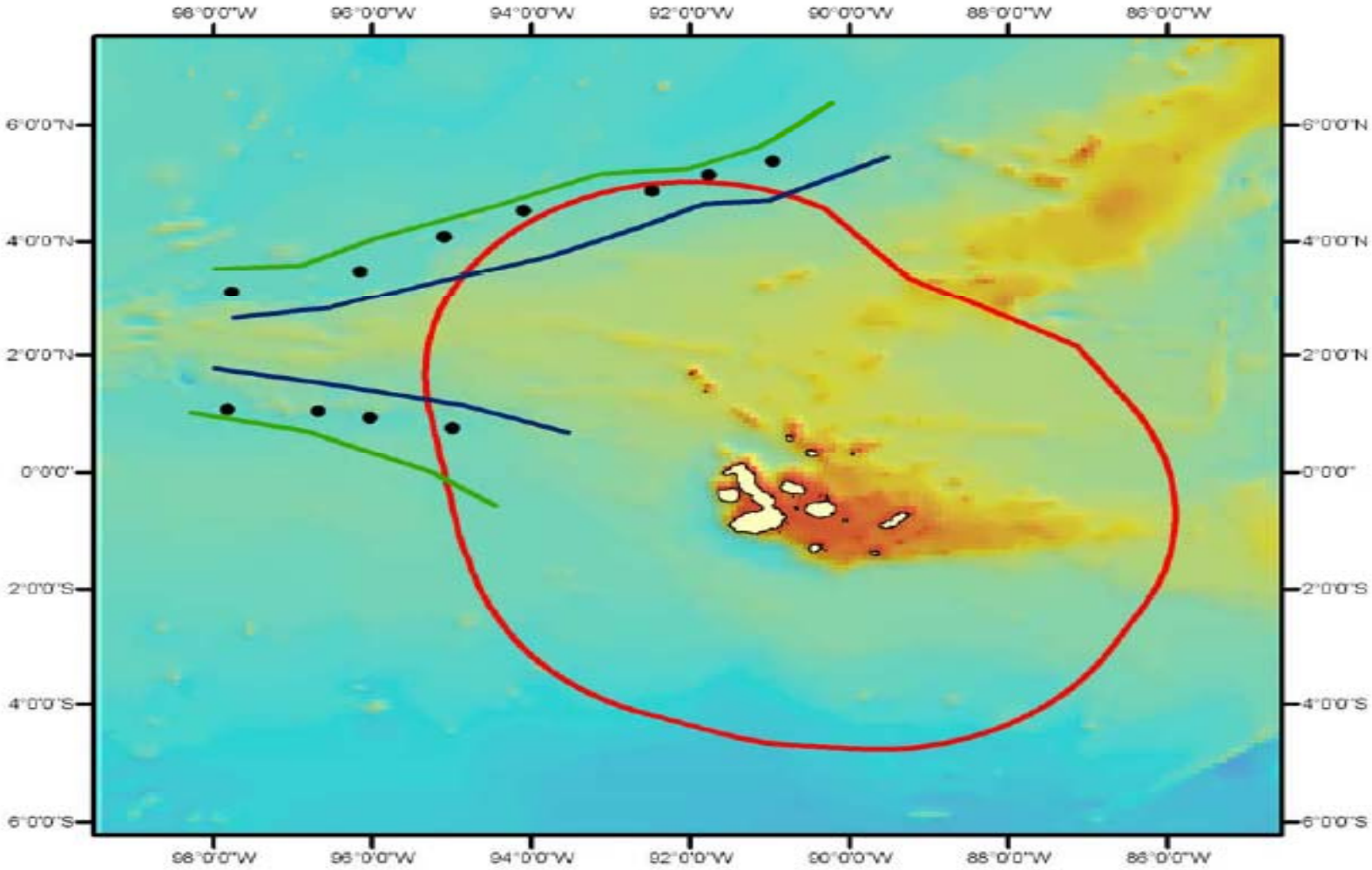


Figure 4.15 Colon Ridge – black dots locate indicative FOS positions. These have been selected using the 2nd derivative information derived from gridded data profile analysis, as discussed in the text.

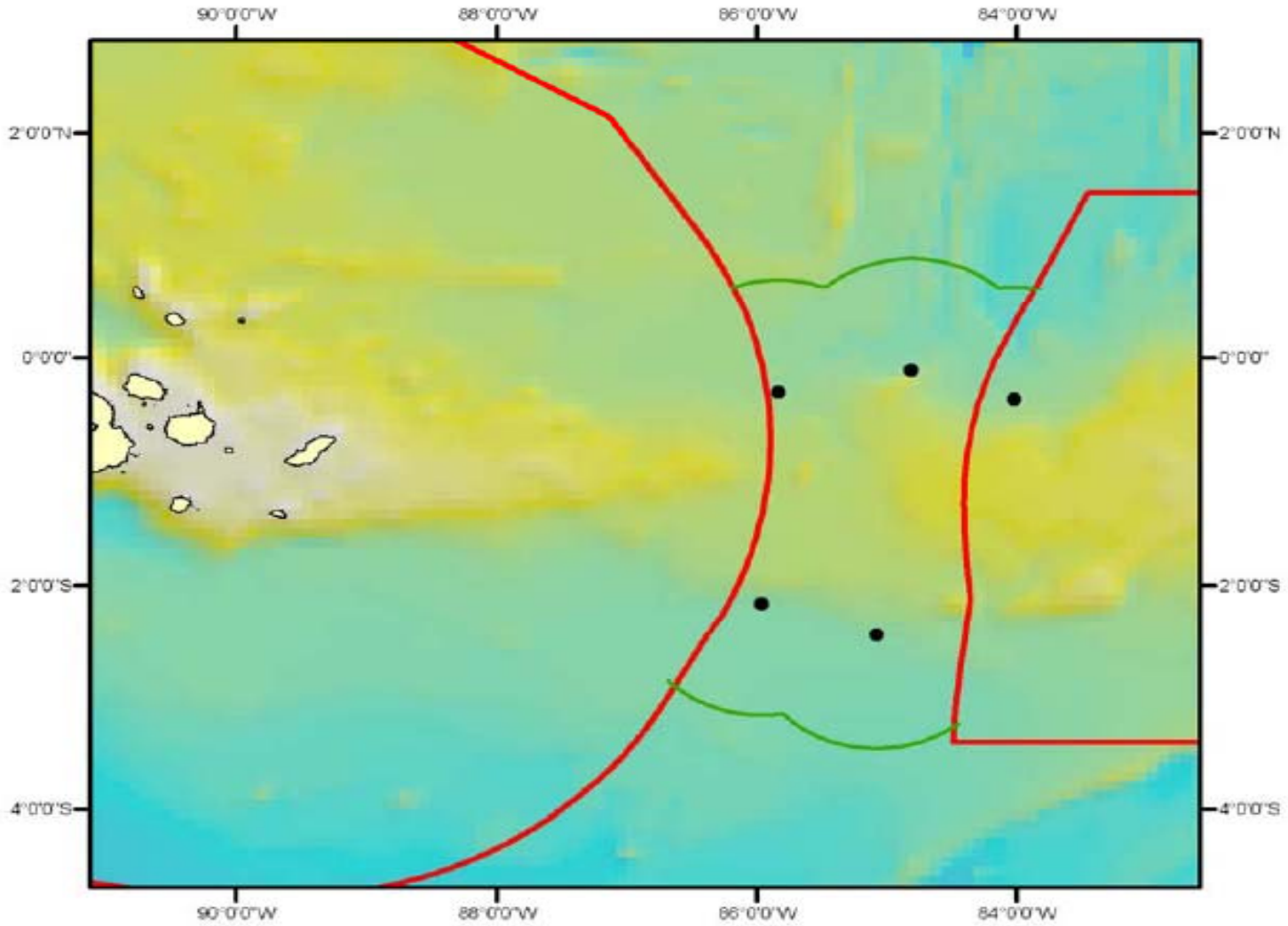


Figure 5.1 Carnegie Ridge – Foot of Slope + 60M arcs, green, measured from the FOS positions, black dots.

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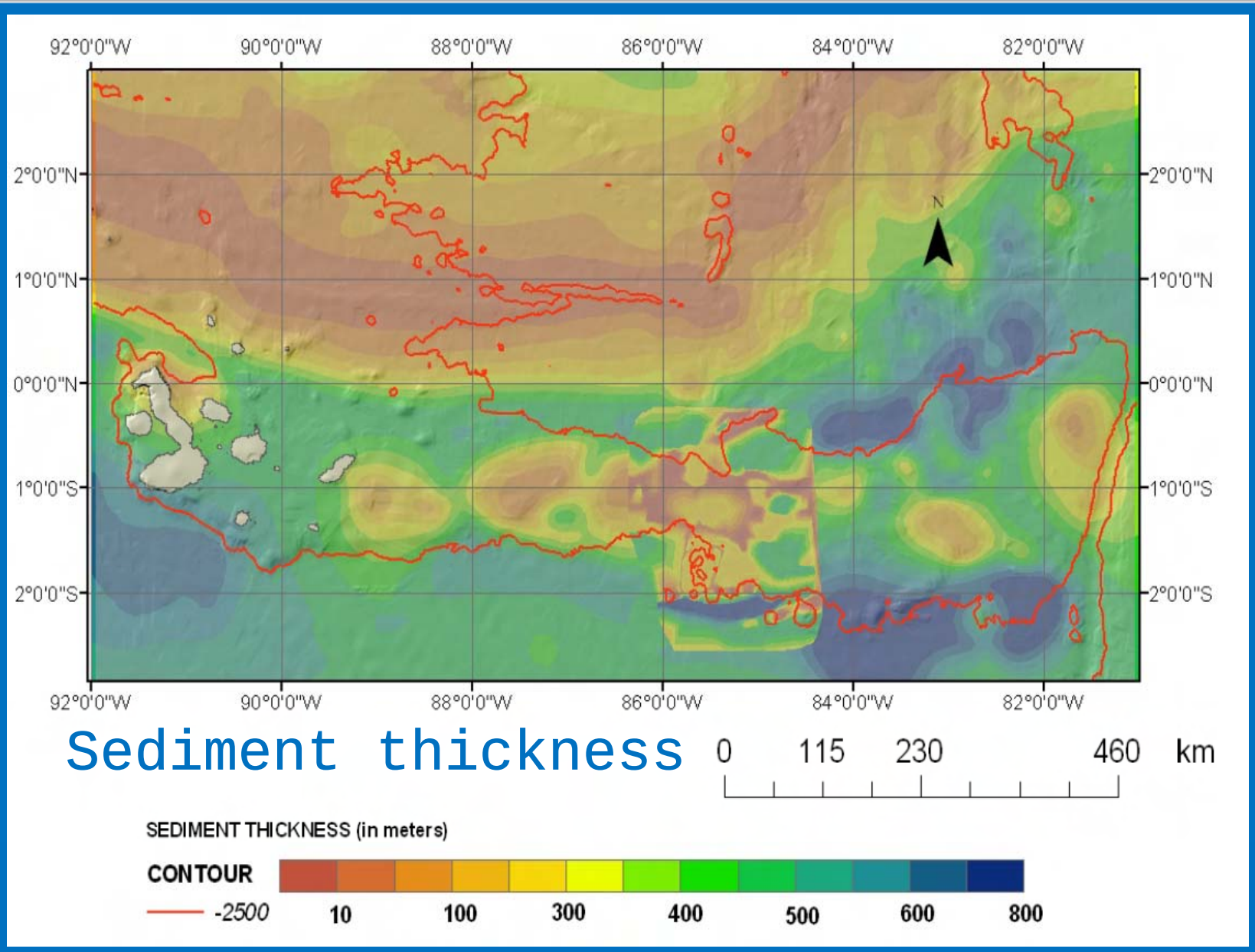

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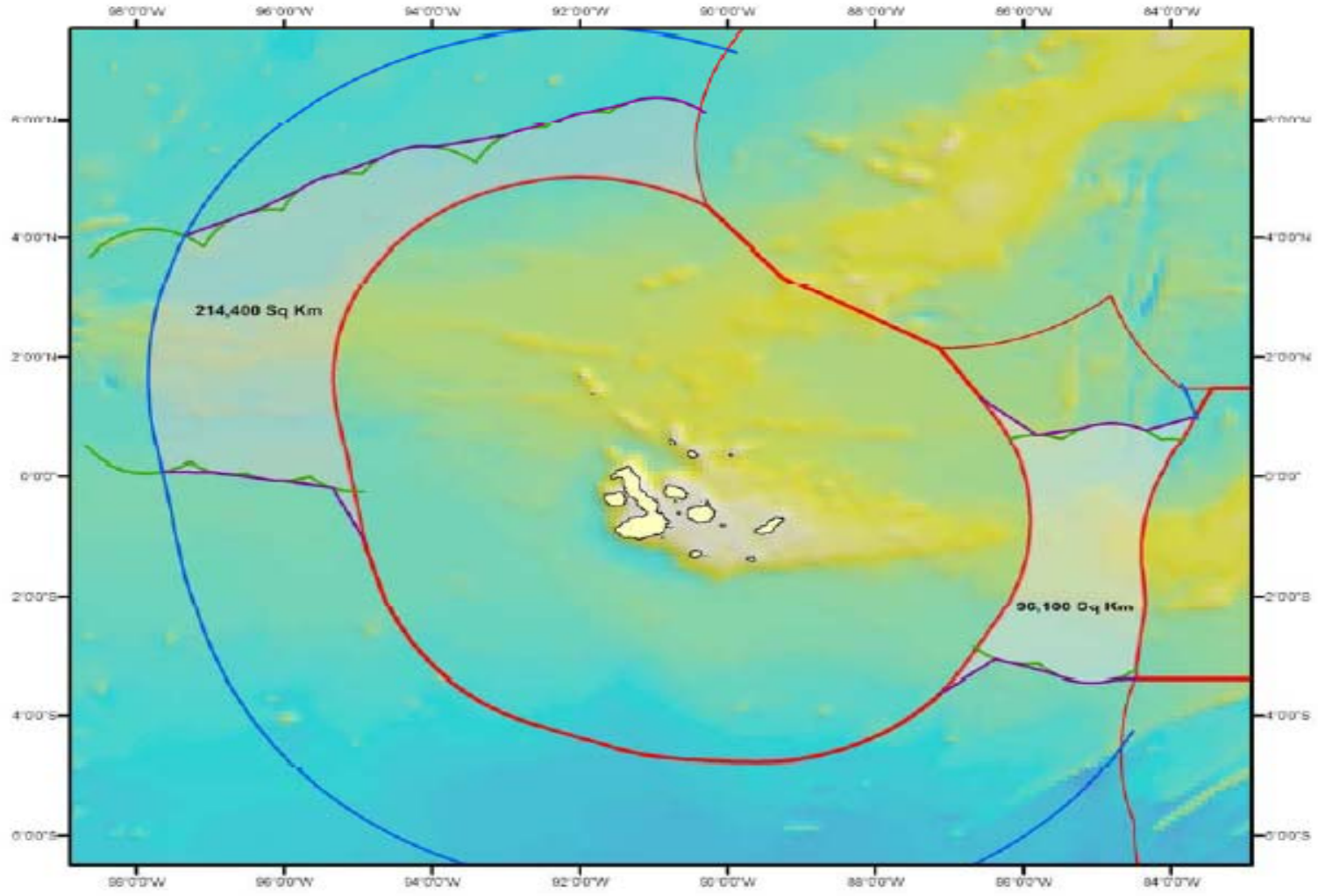
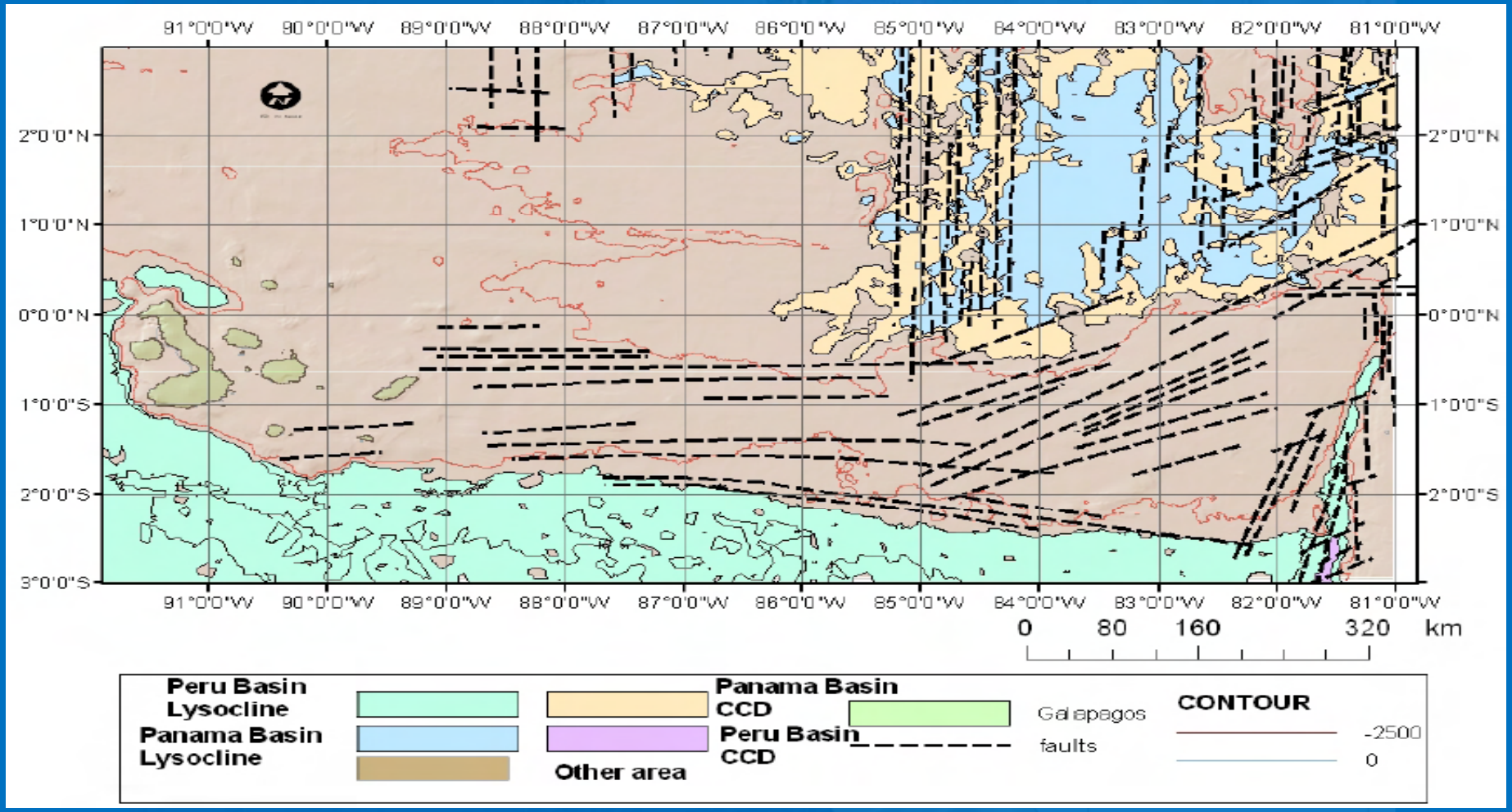


Fig 8.1 Approximate configuration of the eCS area for Ecuador, based on FOS + 60M arcs, the constraints provided in paragraph 5 and paragraph 6 and the outer limit construction provided in paragraph 7.

Carnegie Ridge faults trending



Latitudinal orientation as a hot spot track (Pazmiño, 2005)

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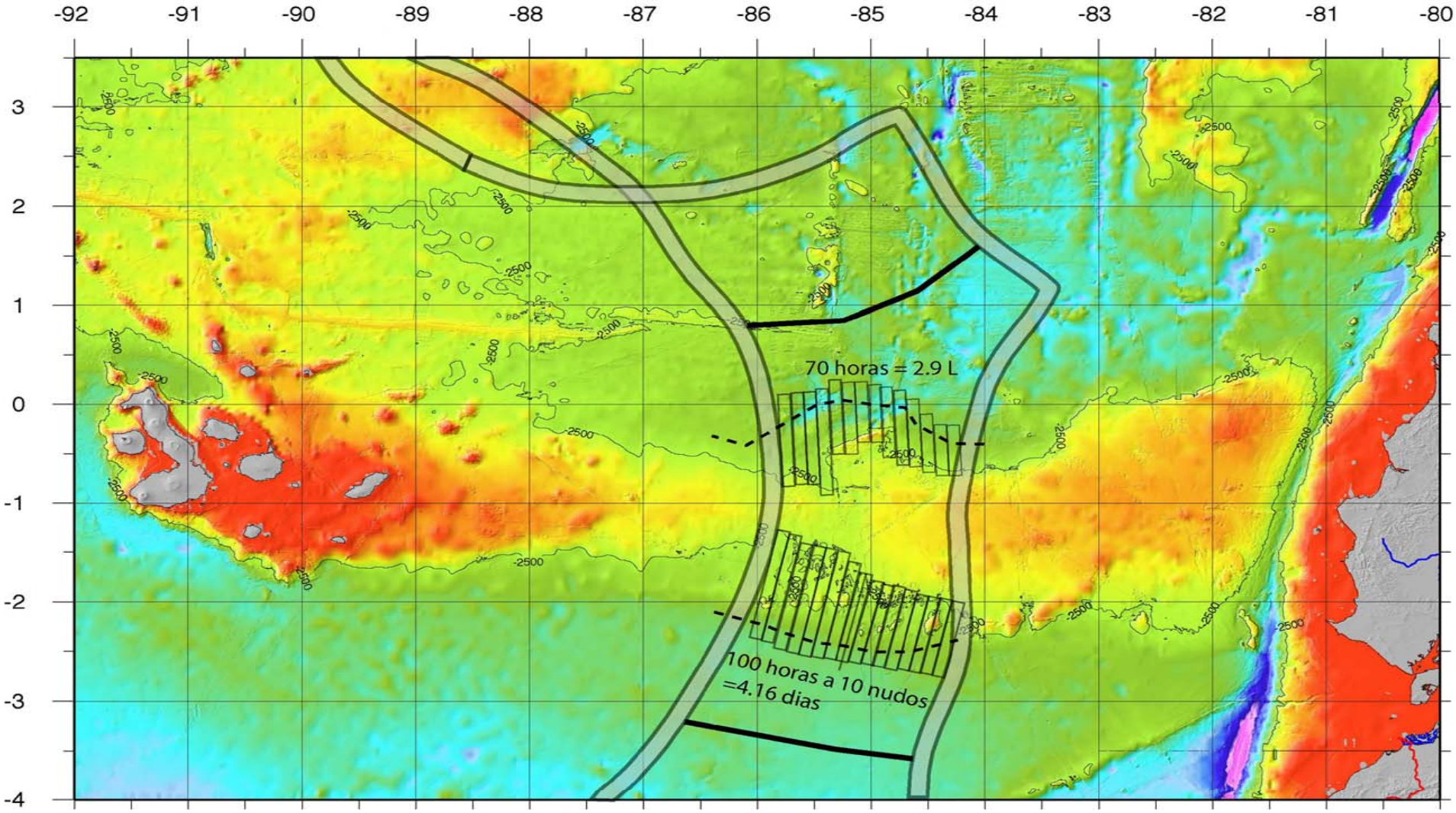

Las zonas rectangularesrepresantan la zona cubierta por un multihaz tipo Atalante o Marion Dufresne. La aproximacion nos da un total de 7 dias mas o menos para cubrir la zona entre el isobatas 2500 m y el pie de talud.

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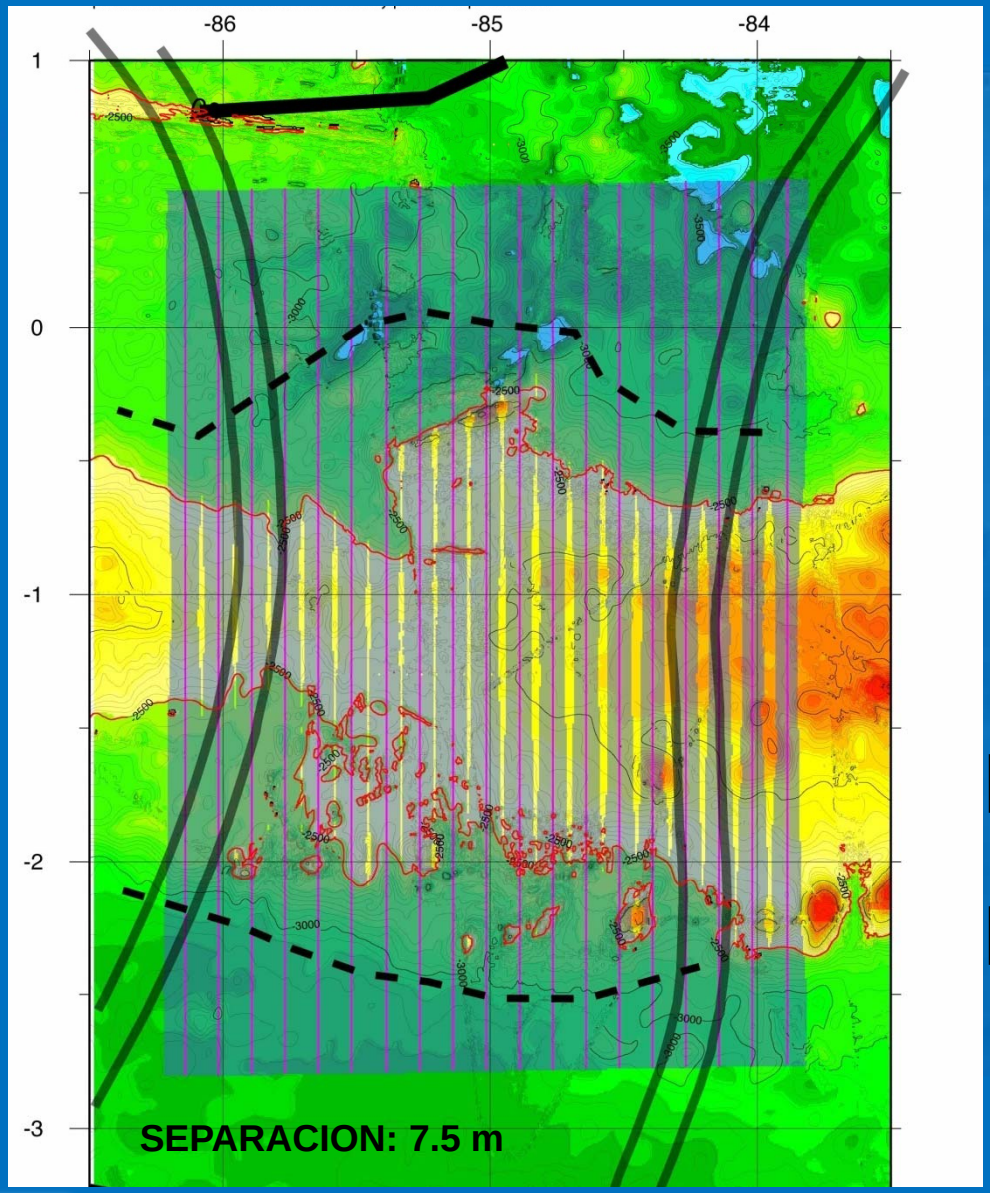

Future goals

Profile1	S	02	48.5469	W	086	9.5588	N 00 30.1649	W 086 09.5602
Profile2	S	02	48.4145	W	086	2.0141	N 00 30.2975	W 086 02.0155
Profile3	S	02	48.2821	W	085	54.4694	N 00 30.4300	W 085 54.4708
Profile4	S	02	48.1496	W	085	46.9247	N 00 30.5626	W 085 46.9261
Profile5	S	02	48.0172	W	085	39.3800	N 00 30.6952	W 085 39.3814
Profile6	S	02	47.8848	W	085	31.8353	N 00 30.8278	W 085 31.8367
Profile7	S	02	47.7524	W	085	24.2906	N 00 30.9603	W 085 24.2920
Profile8	S	02	47.6200	W	085	16.7459	N 00 31.0929	W 085 16.7473
Profile9	S	02	47.4875	W	085	09.2012	N 00 31.2255	W 085 09.2026
Profile10	S	02	47.3551	W	085	01.6565	N 00 31.3581	W 085 01.6579
Profile11	S	02	47.2227	W	084	54.1118	N 00 31.4906	W 084 54.1132
Profile12	S	02	47.0903	W	084	46.5671	N 00 31.6232	W 084 46.5685
Profile13	S	02	46.9578	W	084	39.0225	N 00 31.7558	W 084 39.0238
Profile14	S	02	46.8254	W	084	31.4778	N 00 31.8884	W 084 31.4791
Profile15	S	02	46.6930	W	084	23.9331	N 00 32.0209	W 084 23.9344
Profile16	S	02	46.5606	W	084	16.3884	N 00 32.1535	W 084 16.3897
Profile17	S	02	46.4282	W	084	08.8437	N 00 32.2861	W 084 08.8450
Profile18	S	02	46.2957	W	084	01.2990	N 00 32.4187	W 084 01.3003
Profile19	S	02	46.1633	W	083	53.7543	N 00 32.5512	W 083 53.7556

multi-beam (depth water)

gap(shallow water)

25 days (8 knots)

Conclusions

- Baselines, are supported by several international distinctions such as PSSA, underwater common heritage of the humankind, and national park that can support the outer limit beyond 200 Nm.

- The distinction between submarine ridges and submarine elevations in terms of article 76 is not clearly established in the CLCS Guidelines (1999). But, with right application of the article 76 methodology , and scientific approach Ecuador can get outer limits beyond 200 NM.

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Thank you very much