



NamazuContest 2023-2024

Episode 3

🇬🇧 Enigmas announced on Jan. 12, 2024;
answers before Feb. 09, 2024 to
insight@geoazur.unice.fr

Level of
difficulty



Namazu arrived in Ecuador this month for a scientific oceanographic expedition. New puzzles to discover between earthquakes and volcanoes.

Earthquakes and volcanoes : Ecuador, a land of study for geologists

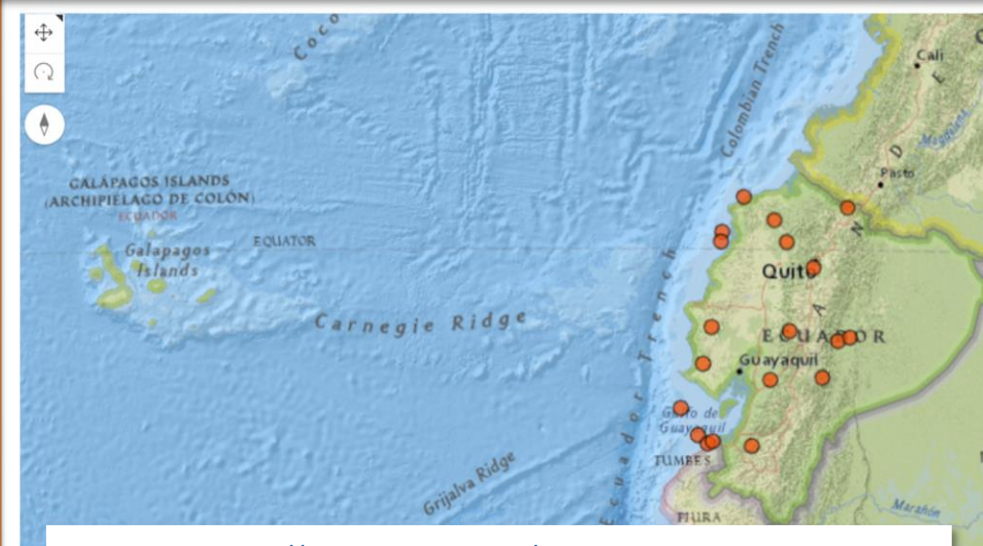
The SUPER MOUV oceanographic campaign, on the deep-sea ship *Pourquoi pas ?*, began last Monday, **January 8** from the port city of Manta (-0.0235°N , -80.6216°E) in Ecuador and will travel the north of this area, up to the Colombian border, during the 3 legs until **February 21**.

Let's take a closer look at the recordings that the InSight scientific team worked on!

Ecuador is a seismically very active region, as shown by the records documented by the Geophysics Institute of Ecuador:

<https://www.igepn.edu.ec/portal/eventos/informes-ultimos-sismos.html>

Map listing the earthquakes (red dots) that occurred during the last month in Ecuador, dated 01/01/2024.

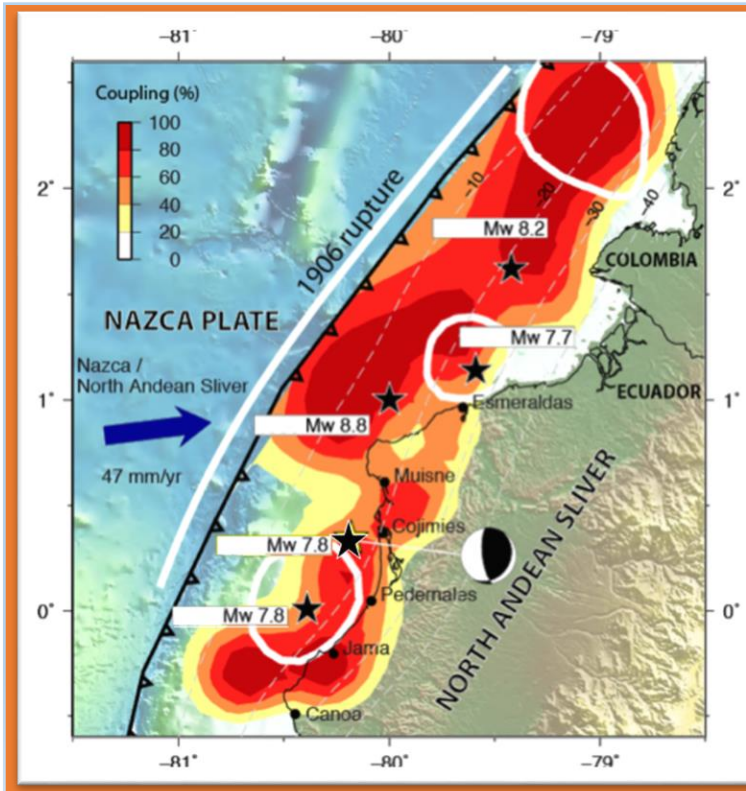


<https://www.igepn.edu.ec/mapa-ultimos-sismos>

Since the beginning of the 20th century, the region located north of the city of Manta has been affected by 5 mega-earthquakes, i. e. earthquakes of magnitude greater than 7,5.

One of these 5 mega-earthquakes, which took place in April 2016, is one of the most powerful earthquakes to hit Ecuador.

https://www.lemonde.fr/planete/article/2016/04/17/puissant-seisme-de-magnitude-7-4-en-equateur-alerte-au-tsunami_4903667_3244.html



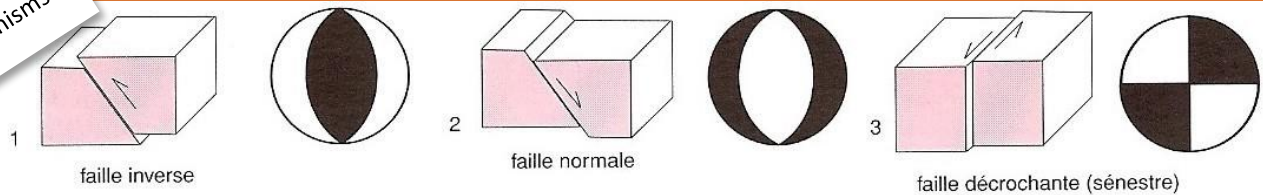
Location of mega-earthquakes (black stars) north of the city of Manta, since the beginning of the 20th century.

Credits : Nocquet et al. Nature Geoscience (2016) et Instituto Geofisico, EPN, Quito (2016)

Legend:

- **Mw**: moment of magnitude of the earthquake.
- **white outlines**: areas of past ruptures.
- **color gradient**: coupling of the subduction interface (determined by GPS). Strong coupling corresponds to high seismic potential.
- **focal mechanisms**: the focal mechanisms of the 5 earthquakes are similar to that presented for one of them.

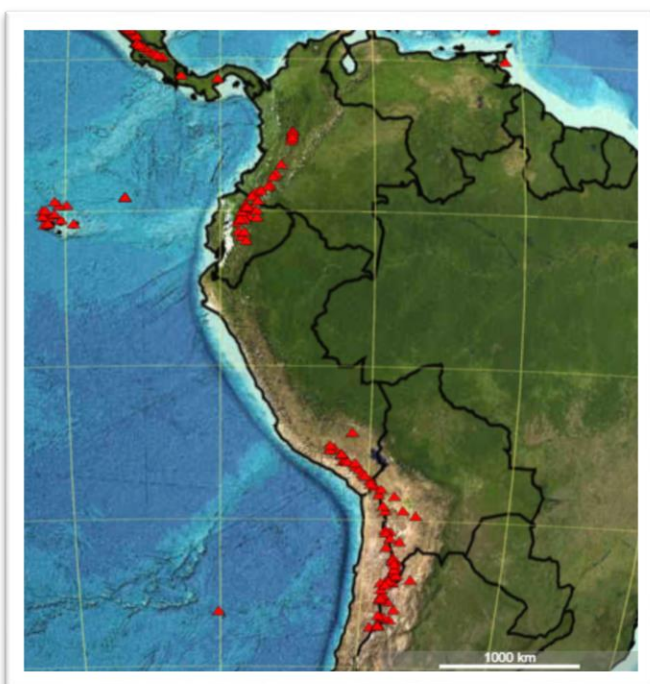
focal mechanisms



The 3 main relative movements:

<https://eduterre.ens-lyon.fr/thematiques/terre/montagnes/extension/meca%20foyer>

Ecuador is also a region known for its numerous volcanoes, just like southern Peru and the Chilean border (while this is not the case for northern Peru...).



Locations of volcanoes in South America.

<https://www.pedagogie.ac-nice.fr/svt/productions/tectoglob3d/>

But why are we witnessing such intense seismic and volcanic activity in Ecuador ?



Junior level:

By explaining your approach, determine which of the mega-earthquakes presented on the map is the one of 2016.

To answer this question, you can rely on the data available in Tectoglob3D:

[https://www.pedagogie.ac-](https://www.pedagogie.ac-nice.fr/svt/productions/tectoglob3d/?urlismo=https://namazu.unice.fr/EDUMEDOBS/seismo/seismogram/20160416_235837_M7.8_PEDERNALES.zip)

[nice.fr/svt/productions/tectoglob3d/?urlismo=https://namazu.unice.fr/EDUMEDOBS/seismo/seismogram/20160416_235837_M7.8_PEDERNALES.zip](https://www.pedagogie.ac-nice.fr/svt/productions/tectoglob3d/?urlismo=https://namazu.unice.fr/EDUMEDOBS/seismo/seismogram/20160416_235837_M7.8_PEDERNALES.zip)

Technical help for triangulation:

- menu « Actions » → « Ajouter/Add » → « Cercles de distances/**Distance circles**»
- Choose a radius corresponding to the « longueur de l'arc/**length of the arc**».

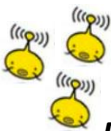


Intermediate level:

Present the tectonic context of Ecuador and explain the reasons for the presence of particularly intense seismic and volcanic activity in this region of the world:

To answer this question, you can rely on the data available in Tectoglob3D:

<https://www.pedagogie.ac-nice.fr/svt/productions/tectoglob3d/>



Expert level:

Propose a hypothesis to explain the presence of numerous volcanoes in Ecuador, and their absence further south, in the northern part of Peru :

To answer this question, you can rely on the data available in Tectoglob3D:

<https://www.pedagogie.ac-nice.fr/svt/productions/tectoglob3d/>

We await for your results and discoveries on:

insight@geoazur.unice.fr

Enjoy the discoveries and until next time for the continuation of the adventure !