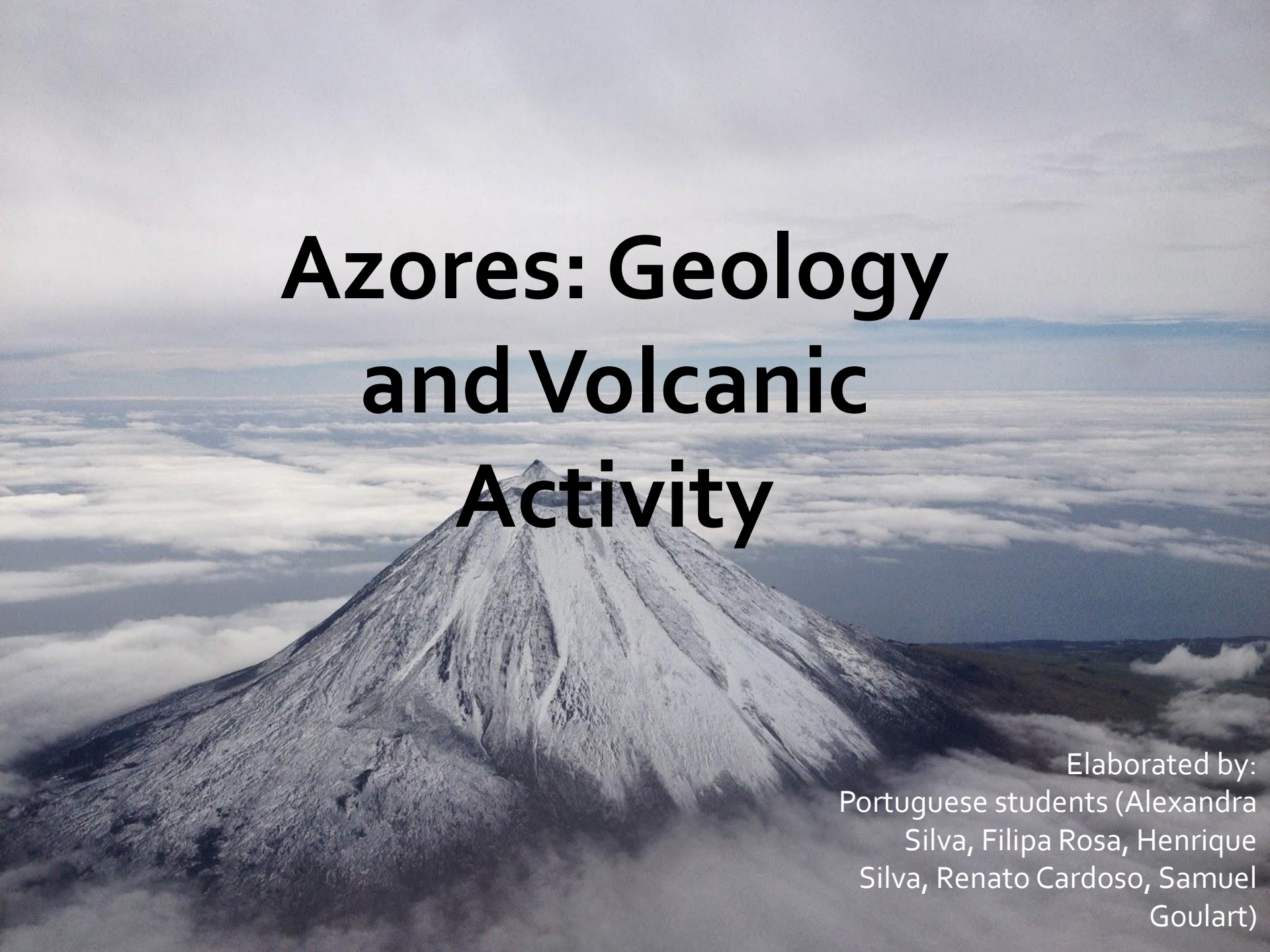

Azores: Geology and Volcanic Activity

Elaborated by:
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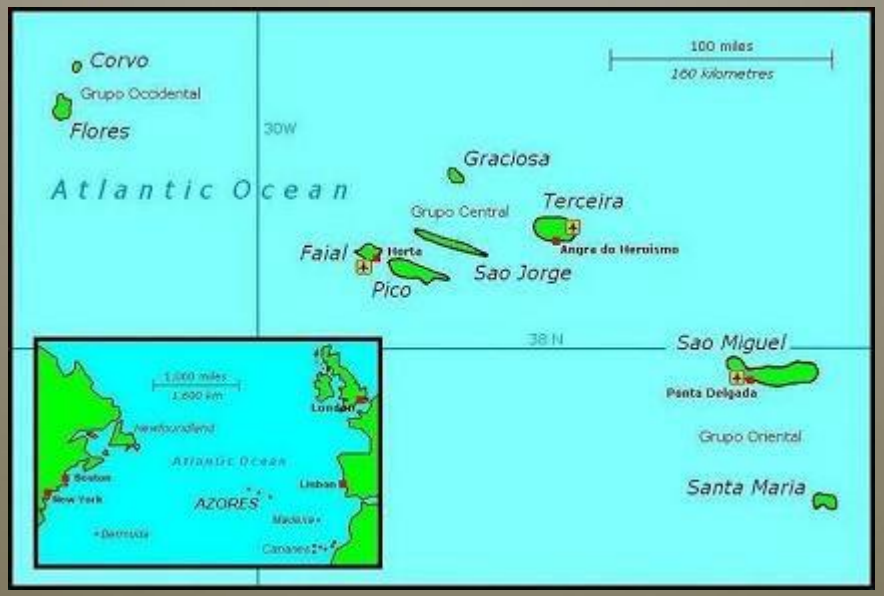
Azores

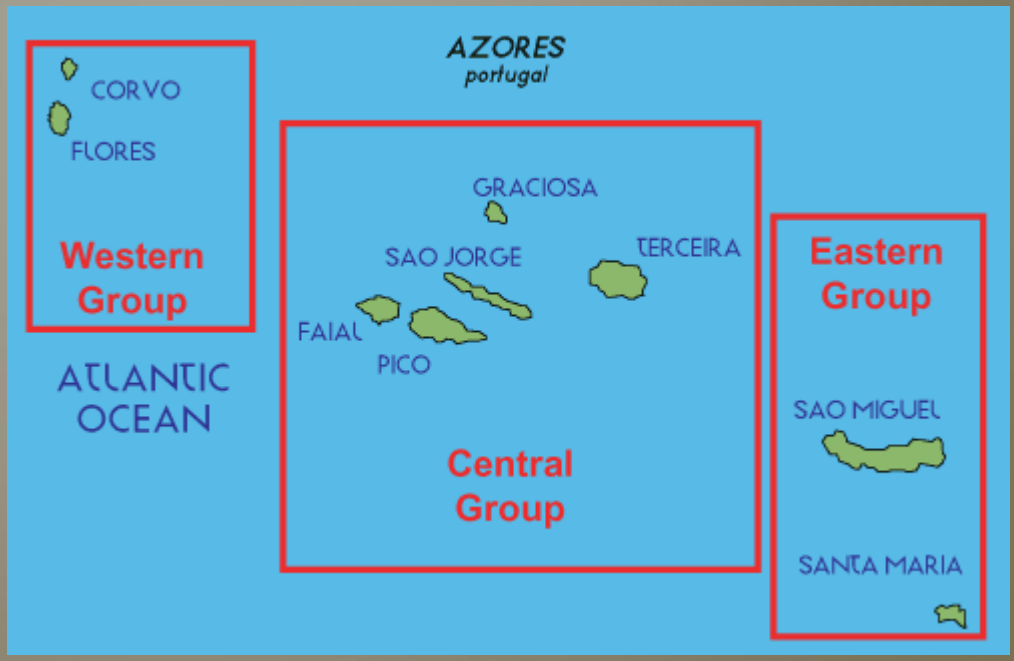
- The *Azores,* officially the **Autonomous Region of the Azores,** is one of the two autonomous regions of Portugal;
- It is composed of nine volcanic islands situated in the North Atlantic Ocean;
- They are located about 1,360 km west of continental Portugal.



Azores

- There are nine major Azorean islands in three main groups;

- These are Flores and Corvo, to the west; Garciosa, Terceira, São Jorge, **Pico** e Faial in the centre; and São Miguel and Santa Maria to the east.



Azores

All the islands have volcanic origins, although some, such as Santa Maria, have had no recorded activity since the islands were settled.

Pico Mountain, on the island of Pico, is the highest point in Portugal, at 2351 meters.

Azores: Volcanic Structures

- Azores landscapes are very diversified from island to island. In all of them we can observe volcanic structures.

  - Capelinhos, Faial Island

- Sete Cidades, São Miguel Island

Azores: Volcanic Structures

- Caldeirão, Corvo Island

- Pico Alto, Terceira Island

Azores: Volcanic Structures

- Pico Mountain, Pico Island

- Central Volcanic Range, São Jorge Island

Azores: Volcanic Structures

- The Furnas Fumarole Field, São Miguel Island

- Iron Cascades, São Miguel Island

Azores: Geology

- Due to the volcanic nature of the islands and the presence of many basaltic lava flows, the azorean archipelago displays a rich and diversified speleological heritage.

- More than 250 natural caves are known in the Azores, corresponding to several tens of kilometers of underground passages.

'Algar Do Carvão',
Terceira Island

'Gruta Das Torres',
Pico Island

'Furna Do Enxofre',
Graciosa Island

Azores: Geology

•These caves are: volcanic tubes and pits, fractures and eresonial caves, and sometimes a combination of all of this.

•The largest number of caves has been identified in Pico Island, with a total of 111.

• The largest lava tubes are the "Gruta das Torres" in Pico island, and the "Gruta dos Balcões" in Terceira island.

Pico Island

Length	46,23 km (west-east)
Width	15,87 km (north-south)
Area	447 km^2
Highest point	Pico Mountain (2351m)
Lowest point	Sea level (0 m)
Population	14806 hab. (2001)
Density	35.3 /km^2
Largest Village	Madalena (6297 hab.)

Pico's Geography

- The island is located 17,5 km south of São Jorge and just 7 km east of Faial, in an area known as "The Triangle".
- Pico is the second largest of the Azorean islands.

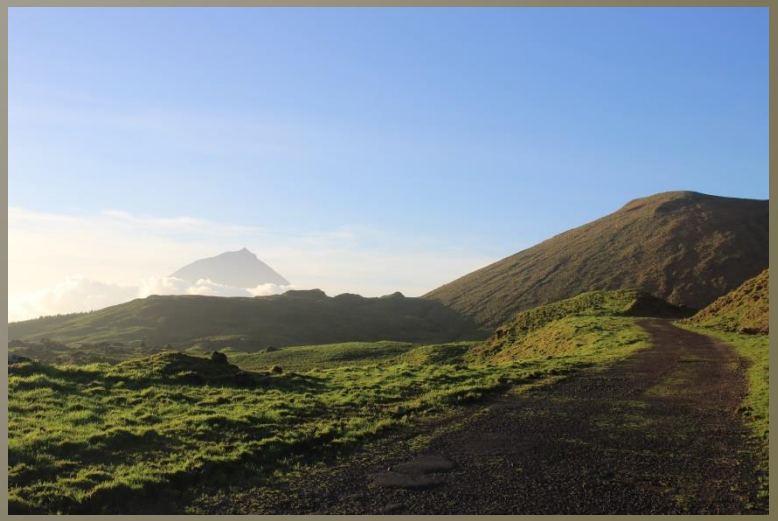
Pico's Geology

Pico island has three main zones:

- a majestic stratovolcano that dominates all western sector of the island (Pico Mountain);

- a second volcanic central edifice with a shield form, limited to a strict area in the southern and central areas of the island (Topo volcano);

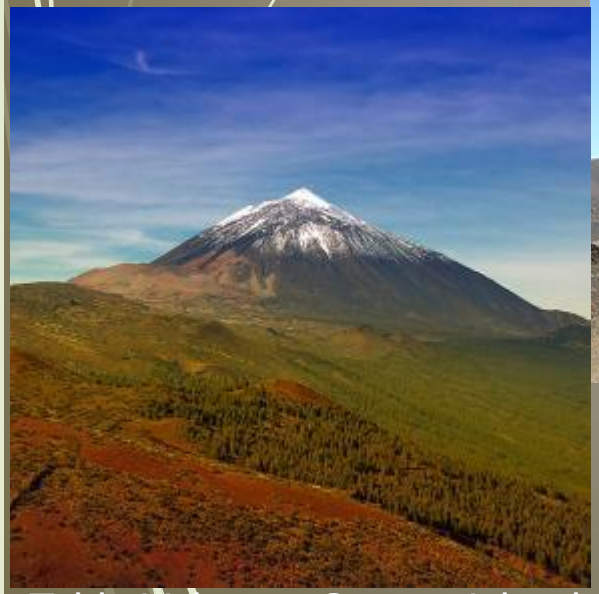
- an extensive flat zone which occuppies the central and eastern areas of the island, designated "Planalto of Achada".



Pico's Geology

Together with **Teide volcano**, in the Canary Islands, **Fogo volcano**, in Cape Verde and **Beerenberg volcano** in Jan Mayen island, **Pico Mountain** stratovolcano is one of the biggest active volcanoes in the Atlantic.

Near its top, at an altitude of 2250 m, there is a pit crater with an average diameter of 550m, an almost circular countour with a maximum gap of 25 m.



Teide Volcano, Canary Island

Fogo Volcano, Cape Verde

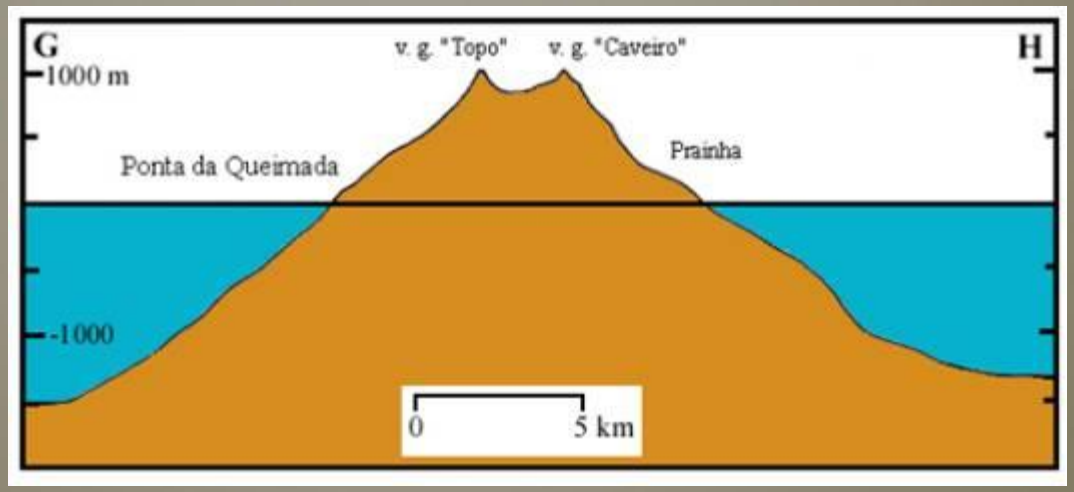
Beerenberg Volcano, Jan Mayen Island

Pico's Geology

The bottom of the crater is filled with *pahoehoe* spills emited from the 'Piquinho' cone that overflowed in different points of the crater, along the east and southeast borders. 'Piquinho' is a very steep lava cone and its crater has about 15 meters of diameter, from which one can observe gas being expelled.

Pico's Geology

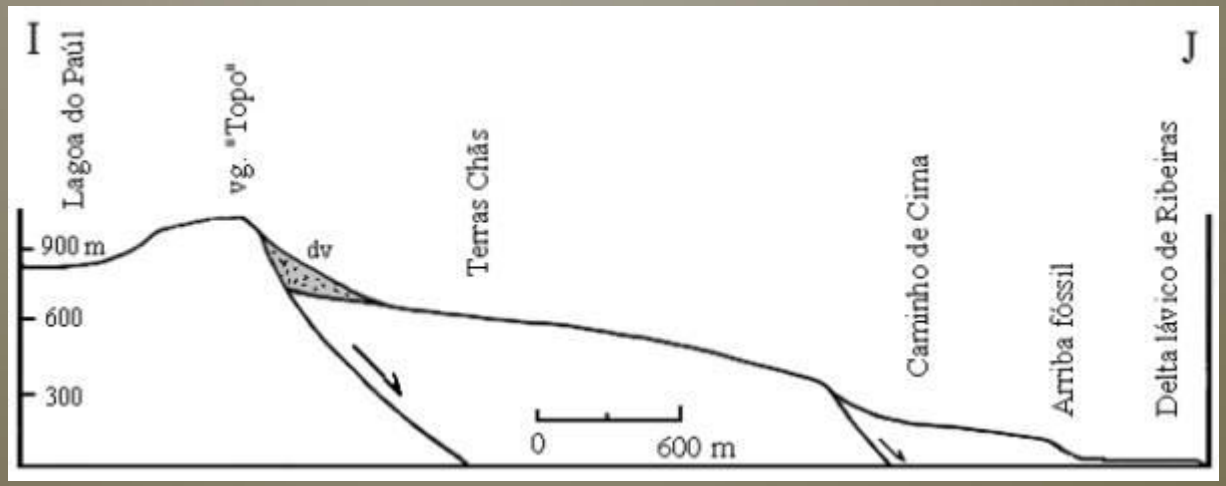
Topo mountain (1022 m) is a shield volcano, composed almost exclusively by very fluid lava flows, where the volume of pyroclastic materials is very reduced (<5-10%).



Pico's Geology

In addition to the features outlined previously, Topo mountain presents two significant differences from the Pico mountain central volcano:

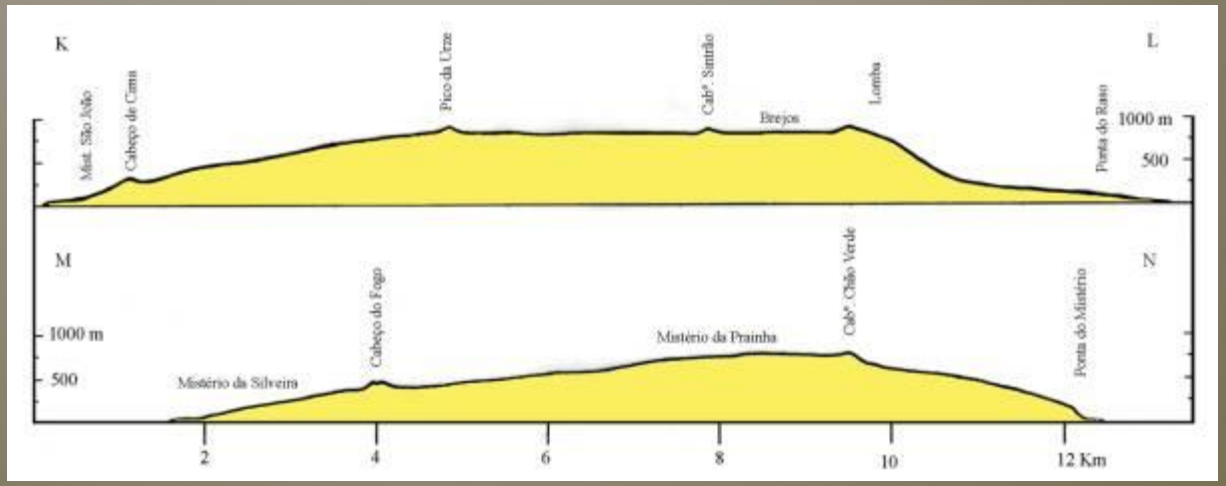
- numerous fault scarps with obvious morphological expression;
- the existence of two large depressed areas: Terras Chãs depression and Caldeira de Santa Bárbara depression, considered by some authors as volcanic calderas.



Pico's Geology

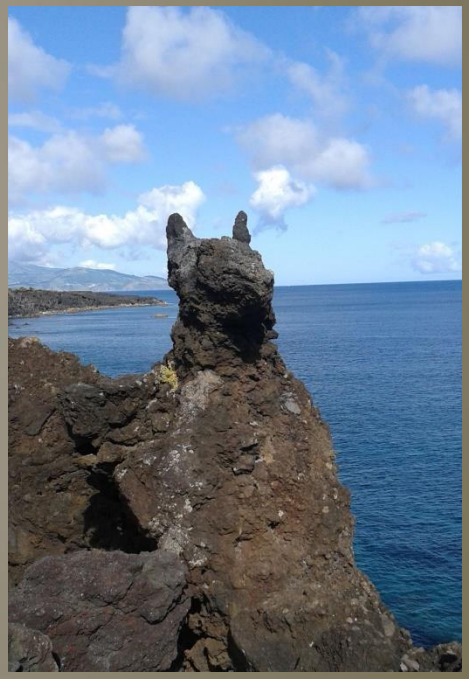
The "Planalto of Achada" corresponds to an elongated plateau area, wider in the west and narrowing progressively towards its eastern end, where it ends in a triangular shaped area, between Piedade and "Ponta da Ilha".

About 170 volcanic cones have been identified in "Planalto of Achada", with varible sizes and shapes. In addition, in this area of Pico island there are about 30 lagoons.



Pico's Geology

The morphology of the coast widely reflects the characteristics of Pico island volcanism, which is namely effusive and recent. The contour of the shoreline proves to be very indented, formed by *aa* lava flows, because of the advanced mechanism of this type of lava flows and erosion phenomena originated, while the coastline formed by pahoehoe lava flows has a more regular contour. In both situations the coastline contour is mostly regular.

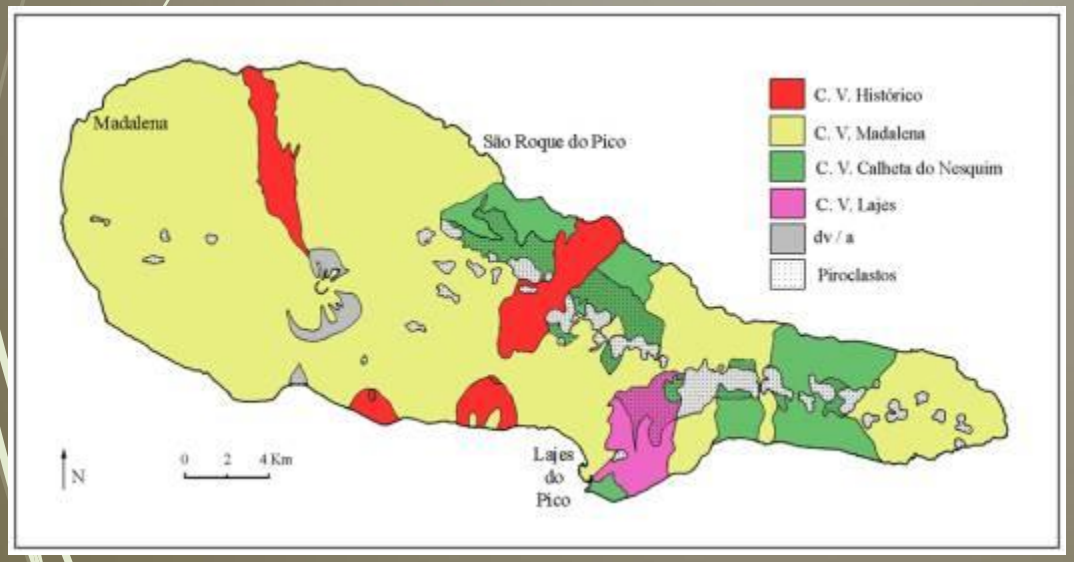


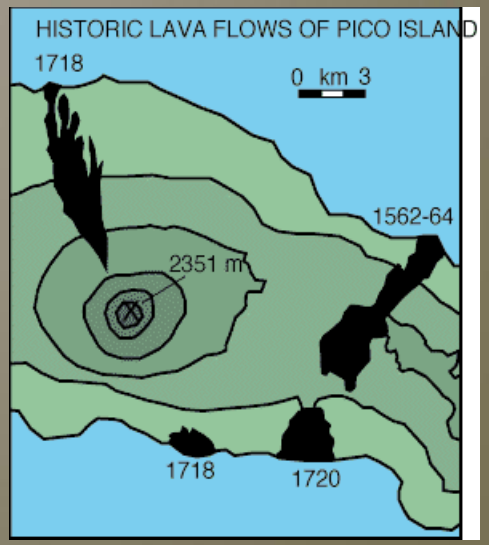
Pico's Geology

The rocks of Pico island have a markedly alkaline nature. Some analysis show the presence of alkaline basalt (about 50%), transitional (about 35%) and subalkaline basalts, which, in general, present undersaturated silica.

Pico's Geology

- The volcanic landforms of Pico have been divided in three: Volcanic Complex of Lajes, Volcanic Complex of Calheta do Nesquim and Volcanic Complex of Madalena.
- The path of the lava flows are still visible.





Pico's main cave: Gruta das Torres

•The Gruta das Torres is located on Criação Velha parish, municipality of Madalena. Due to its importance in terms of natural heritage, namely for its size, beauty, cave fauna and geological formations, it was classified as Regional Naural Monument .

Pico's main cave: Gruta das Torres

This volcanic cave was formed by pahoehoe-type basaltic lava flows, extruded from the Cabeço Bravo cone and it is the largest lava tunnel known in the Azores:

- It has a total length of about 5150m and 15m of maximum height.

- It is formed by one main large-sized tunnel and several secondary lateral and upper tunnels, which are smaller in size but display a greater variety of geological structures.

Pico's main cave: Gruta das Torres

- Geology of the cave:
  - The cave is rich in speleological formations, namely diffrent kinds of lava stalactites and stalagmites, lateral benches, lava balls, grooved walls and ropy lavas.
  - The floor is formed by aa and pahoehoe lavas and is well preserved in most parts of the cave.
  - In some areas, secondary mineral deposits cover the walls.

Pico's main cave: Gruta das Torres

•Turistic exploration of the cave:

- The Regional Government Environmental Office built near the main entrance of the cave, at 285m of altitude, several facilities that allowed opening part of Gruta das Torres as a show cave.
- The Gruta das Torres Visitors Center was open to the public on May 24th, 2005, na the cave is under the management of the speleological society"Os Montanheiros".

Pico's recent seismic activity

- Pico, much like the other islands, is susceptible to seismic events. The strongest earthquake registered in the last thirty years occurred on July 9th 1998 reaching a 5.8 magnitude.
- It was felt on Pico with a maximum intensity level of VII in the Mercalli scale.

Pico's Flora

A range of rare endemic flora and fauna with protected status abounds on the island. Part of the natural habitat of Pico has species endemic in the Azores, such as the *Spergularia azorica,* the heather (*Erica scoparia L. ssp. azorica*) and the cedar (*Juniperus brevifolia*).

Pico's Fauna

On Pico, there are large numbers of passerine birds, as well as birds of prey and seabirds. For the protection of wild birds,15 Special Protection Areas have been created in the Azores, four of which are on the island of Pico.

Pico's History

- The first colonies were formed around 1460 by settlers from the north of Portugal.
- Lajes was its first entitled village, closely followed by São Roque in 1542.
- Its settlers were initialy ocupied with wheat cultivation and the exploration of the woad industry.

Lajes

São Roque

Madalena

Pico's History

- Quickly the viticulture industry developed and expanded the acitivities on the island through the 18th century.
- Pico's famous Verdelho, for more than two centuries was apreciated in many countries.
- In 1723, Madalena was elevated to the status of "town", confirming its economic importance to the island.

Pico's History

The presence of the American whalers in the waters of Azores introduced whaling as the primary industry in the island until the 1970's.

Landscape of the Pico island Vineyard Culture

It is assumed that Franciscan monks brought the first grapes into the lands of Pico during the period of settlement and discovery.

This clerics originally constructed churches and imported wine, after verifying that the climatic conditions were comparable to Sicilly. They began to import various plants and wine castes, in particular Verdelho.

Landscape of the Pico island Vineyard Culture

• The wine began to proliferate easily through out the island and quickly, the wine produced turned famous and began to be exported into Northern Europe and Russia.

• This tradition which first began on Pico and that continues today was behind the designation of Pico´s Vineyard Culture as a UNESCO Heritage Site.

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