Annex 2: Additional Copy of Section B "Geological Heritage" of the Application

GEOLOGICAL SUMMARY

The Azores Archipelago is located in the North Atlantic, on the triple junction between the North American, Eurasian and African-Nubian plates. Volcanic and tectonic activities are well displayed in the geomorphology of the islands; the former includes 26 eruptions since the settlement, in early 15th century.

The Azores Islands are formed by 16 major polygenetic volcanoes, most of them silicic and with summit subsidence calderas: nine of them are still active. Moreover, there are about 1750 monogenetic volcanoes in the archipelago, either dispersed along the flanks and inside the summit depression of the polygenetic volcanoes, either belonging to the 11 basaltic fissural volcanic systems located in different islands. These monogenetic centres include domes and *coulées*, tuff rings, tuff cones, *maars*, scoria and spatter cones, and eruptive fissures that together with other volcanic, tectonic, sedimentary, littoral and deep sea features may be considered as geosites and can embrace outstanding landscapes.

B – Geological Heritage

B1. Location of the proposed Geopark

The Azores archipelago is located in the Atlantic Ocean, between the latitudes 36º56' e 39º44' North and the longitudes 24º47' and 31º16' West (Figure 5), and at the distance of 1815 km from the Mainland Portugal.

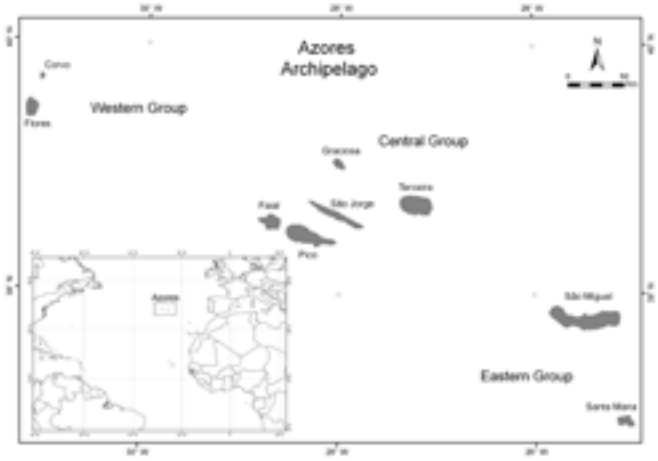


Figure 5 – Geographical location of Azores archipelago.

The archipelago is formed by nine islands and several islets, which are dispersed along a strip with 600 km length and with a WNW-ESE trend. The islands are divided in three groups: the Western Group, (Flores and Corvo islands), the Central Group (Terceira, Graciosa, São Jorge, Pico and Faial islands) and the Eastern Group (São Miguel and Santa Maria islands).

The Azores archipelago is an Autonomous Region of Portugal, with its own parliament and government and it is considered an Outermost Region of the European Continent.

B2. General geological description of the proposed Geopark

The Azores archipelago emerges from the Azores *Plateau* (or Azores Platform), an extensive area of irregular bathymetry, defined by the 2000 meters bathymetric line and which makes the transitions to the surrounding abyssal seafloor. In terms of the global geodynamics, the archipelago is located at the triple junction of the Eurasian, North American and African (or Nubian) lithospheric plates, whose complexity is the basis for eager debate and scientific controversy about the tectonic models, nature and location of the plates boundaries and the dynamic of the Azores triple junction, including the influence that the Azores hot spot has in this region of the Atlantic.

In general terms, the main structures that frame the Azores triple junction (Figure 6) are the Mid-Atlantic Ridge (with an approximately N-S trend) - which corresponds to a pure distensive boundary between the North-American plate, on West, and the Eurasian and African plates, on East - and the GLORIA Fault (with a general W-E trend), that establishes the plate boundary Eurasia-Africa and integrates a major structure, the Azores-Gibraltar Fault. In the Azores *Plateau* area the plate boundary between Eurasia and Africa corresponds to the "Azores Block", a sector with an approximately WNW-ESE trend that includes the islands of the Central Group and São Miguel island. The shape of the islands of the Central and Eastern groups (with a general WNW-ESE trend), and the shape of Corvo and Flores islands (with a general N-S trend), shows a clear insular structural control due to the main tectonic structures that interact at the Azores triple junction and that strongly controls the geomorphology of the archipelago's islands.

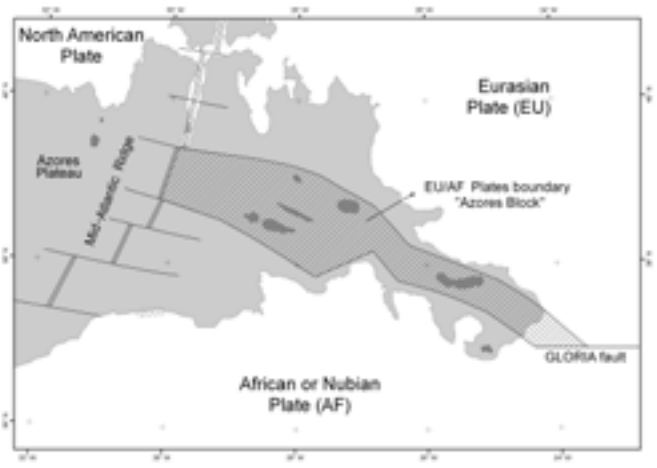


Figure 6 – General geodynamic framework of the Azores archipelago.

From a geological point of view, all the Azores islands are of volcanic origin and are oceanic islands that emerged from the surrounding seafloor due to the progressively piled up of submarine volcanic products, a process that should have started about 36 million years (M.y.). The oldest subaerial volcanism dates back from the Upper Miocene (e.g. 8.12 M.y.) on Santa Maria island, and the youngest island of the archipelago is Pico island, formed about 0.3 M.y.. Though the farthest islands from the Mid-Atlantic Ridge are generically older (Table 7), there is no clear migration to the West of the volcanic activity, whether on a regional scale, or on an insular scale. A better knowledge of the mantle plume underlying the Azores *Plateau* (namely its size and location, if it is fixed or mobile) will, certainly, contribute to clarify the geodynamic framework of the Azores and the characteristics of its volcanism.

Table 7 – Maximum infered ages for each island of the archipelago.

Island	Maximum infered age (years)
Santa Maria	8 500 000 to 10 000 000
São Miguel	4 200 000
Terceira	3 520 000
Graciosa	3 500 000
São Jorge	1 300 000
Pico	300 000
Faial	730 000
Flores	2 160 000
Corvo	1 000 000

On the Azores archipelago there are 27 main volcanic systems, 16 of those are polygenetic volcanoes (most of them silicic volcanoes with summit subsidence calderas) and 11 are basaltic fissural volcanic systems, frequently in the form of more or less extensive volcanic ridges. Of these systems, 9 polygenetic volcanoes and 7 basaltic fissural volcanic zones are considered active (though in a dormant state), located on São Miguel, Terceira, Graciosa, São Jorge, Pico and Faial islands and on the D. João de Castro Bank. Offshore, there are several active submarine volcanic ridges, like the Monaco Bank (South from São Miguel), Princess Alice Bank (SW from Faial) or the submarine volcanic ridge to East of Pico island. There are more than 1750 monogenetic volcanoes dispersed along the 9 islands, either on the polygenetic volcanoes (on the flanks and inside the calderas), either on the basaltic fissural volcanic areas. These monogenetic eruptive centers include scoria and spatter cones, trachytic domes and *coulées,* tuff rings and tuff

cones, *maars* and eruptive fissures, which frequently define local or regional volcanotectonic lineaments. In the Azores islands there is a clear predominance of volcanic rocks. The sedimentary rocks are present especially on Santa Maria island, which frequently display a diversified and important fossiliferous content. The siliceous and explosive nature of several polygenetic volcanoes with caldera in the Azores explain the abundant and thick pumice deposits on many islands, as well as the ignimbrite and *lahars* formations that characterize the subplinian and plinian eruptive styles. The hydromagmatic pattern of some eruptions is shown by common deposits of surtseyan tuffs and associated features.

In general terms, the rocks of the Azores islands belong to the alkaline basalts series, which contrasts with the tholeiitic character of Mid-Atlantic Ridge rocks. From a petrographic point of view, on the islands Santa Maria, São Jorge and Pico the predominance is clearly of basalts or picritic alkaline basalt, while on the other islands there is major variety of lithological terms, which vary from picritic alkaline basalt to trachytes, including hawaiites and mugearites. More evolved rocks are also mentioned, like comenditic trachytes, comendites, pantellerites or rhyolites, on the islands São Miguel, Terceira and Graciosa.

Since the discovery and settlement of the Azores, in the middle of the 15th century, 26 volcanic eruptions have been reported in the Azorean Region. 12 of them being terrestrial (on São Miguel, Terceira, São Jorge, Pico and Faial islands) and 14 submarine (Figure 7). The last most important eruptive events have been submarine and of basaltic s.l. nature, and occurred in Capelinhos, on Faial island, in 1957/58 and 8.5 km to NW of Ponta da Serreta, near Terceira island, in 1998/2000.

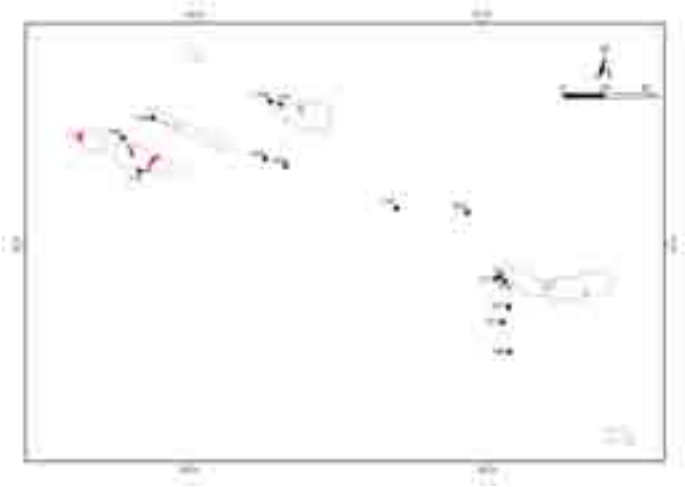


Figure 7 – Historical volcanic eruptions on the Azores archipelago.

Besides the mentioned volcanic episodes, there are permanent secondary manifestations of volcanism on São Miguel, Terceira, Graciosa, Faial, Pico and Flores islands, either as thermal springs, either as fumaroles and diffuse gas emissions on soil. There is also an important fumarolic field located on the D. João de Castro Bank, a submarine polygenetic volcano that was in activity in 1720 A.D., and the deep-sea hydrothermal vent fields Menez Gwen, Lucky Strike, Saldanha and Rainbow.

The Azores archipelago also presents an important seismicity on a global context, related either with the active tectonic activity in the Azores, either to the occurred volcanic activity. The seismic activity of tectonic nature is usually characterized by the high number of microearthquakes annually registered, occasionally as seismic swarms. Periodically, the Azores islands are shaken by more energetic moderate to strong earthquakes, which affect one or more islands of the archipelago and cause significant destructions and socio-economic impacts.

B3. Listing and description of geological sites within the proposed Geopark

The inventory and characterization of the geosites that exist in the territory were based on the knowledge gathered about the geological characteristics of the territory, the eruptive history of each Azorean island and the elements of geological heritage identified in the islands and in the surrounding seafloor. Several researchers of the Region and national and foreigner scientists with assignments about the Azores in several areas have also contributed to this inventory, which have resulted in a sustained and wide approach, although it might be susceptible to improvements.

Thus, the geopark is based on a network of 121 geosites spread over the nine islands and the surrounding seafloor (Figure 8) which ensures the representativeness of the geodiversity of the Azores and reflects its geological and eruptive history of about 10 million years. From these, 57 geosites were selected as priority for the development of geoconservation strategies and for the implementation of valorization actions at the aim of the project Azores Geopark. They are distributed by Santa Maria (5), São Miguel (10), Terceira (7), Graciosa (5), São Jorge (5), Pico (8), Faial (6), Flores (6) and Corvo (3) islands, and the Azores Plateau seafloor (2). Table 8 presents a brief description of each of these 57 main geosites.

Figure 8 – Geosites of the Azores Geopark, in a total of 117 terrestrial geosites spread over the 9 islands and 4 marine geosites. See also Tables 11 and 12.

ISLAND: CORVO

Caldeirão		**COR 1**
Localization: Municipality of Vila do Corvo, Corvo island		
Area: 3.16 sq. Km	Altitude: 397 – 720 m	GPS/WGS84: 39º 42'33"N 31º 06'37"W
Caldeirão" is a collapse caldera emplaced on the top of the polygenetic volcano with the same name, which comprises all the 17 sq. km of the Corvo island. The caldera is about 2.3x1.9 km in diameter, 305 m depth and includes a set of scoria and spatter cones and a lake.		

Vila do Corvo lava delta		**COR 2**
Localization: Municipality of Vila do Corvo, Corvo island		
Area: 0.95 sq. Km	Altitude: 0 – 160 m	GPS/WGS84: 39º 40'26"N 31º 06'57"W
The lava delta (in Azores named as lava "fajã") where the unique village of Corvo is emplaced is the major flatten area of the island, and was formed by lava flows extruded from Morro da Fonte scoria cone. It includes the more recent volcanic episode on Corvo island (aged about 100 thousand years).		

Ponta do Marco		**COR 3**
Localization: Municipality of Vila do Corvo, Corvo island		
Area: 0.53 sq. Km	Altitude: 0 – 160 m	GPS/WGS84: 39º 40'26"N 31º 06'57"W
"Ponta do Marco" is the northwestern point of the island. It is a high sea-cliff, deeply affected by the marine erosion processes that cut deep in the bowels of the Caldeirão polygenetic volcano, revealing its complex volcano-stratigraphic sequence and the intricate basaltic dyke system associated.		

ISLAND: FLORES

Caldeira Negra, Caldeira Comprida, Caldeira Seca and Caldeira Branca		**FLO 1**
Localization: Municipalities of Lajes das Flores and Santa Cruz das Flores, Flores island		
Area: 0.99 sq. Km	Altitude: 479 – 610 m	GPS/WGS84: 39º 26'40"N 31º 13'22"W
These 4 volcanic features are *maar*-type explosion craters related with hydromagmatic eruptions in the central plateau of Flores island. "Caldeira Branca" is surrounded by a low tuff ring, and except for "Caldeira Seca" all the craters have a lake, about 108 m deep in the case of "Caldeira Negra".		

Caldeira Rasa and Caldeira Funda (Lajes)		**FLO 2**
Localization: Municipality of Lajes das Flores, Flores island		
Area: 1.00 sq. Km	Altitude: 333 – 560 m	GPS/WGS84: 39º 24'25"N 31º 13'14"W
These depressions are two other examples of explosion craters associated with hydromagmatic eruptions that occurred in the southern sector of the central plateau. The associated lakes are at different altitudes, even very close to each other, emphasizing its peculiar hydrological characteristics.		

Fajã Grande and Fajãzinha		**FLO 3**
Localization: Municipalities of Lajes das Flores and Santa Cruz das Flores, Flores island		
Area: 8.14 sq. Km	Altitude: 0 – 672 m	GPS/WGS84: 39º 26'54"N 31º 15'15"W
"Fajã Grande" and Fajãzinha are coastal areas of lava deltas and fluvial and scree-slope deposits, contiguous to the central plateau and separated from it through a long and about 300 m high fossil sea cliff. Several streams cascades down the cliff and form impressive falls, and small pools and lakes.		

Pico da Sé		**FLO 4**
Localization: Municipality of Santa Cruz das Flores, Flores island		
Area: 1.42 sq. Km	Altitude: 240 - 722 m	GPS/WGS84: 39º 27'54"N 31º 10'59"W
"Pico da Sé" is a huge trachytic lava dome, with a base diameter of about one kilometer, surrounded by the Badanela and "d'Além da Fazenda" streams valleys, characterized by V-shaped valleys that deeply eroded the dome slopes and increased its verticality.		

Ponta da Rocha Alta and Fajã de Lopo Vaz		**FLO 5**
Localization: Municipality of Lajes das Flores, Flores island		
Area: 1.37 sq. Km	Altitude: 0 – 550 m	GPS/WGS84: 39º 22'37"N 31º 13'02"W
"Ponta da Rocha Alta" and "Fajã de Lopo Vaz" are massive slope deposits accumulated at the base of impressive sea cliffs, whose shoreline were reworked by sea actions. These detritical deposits are named in Azores (and also Madeira and Cape Verde islands) as "fajãs". The former was formed in 1985.		

Rocha dos Bordões		**FLO 6**
Localization: Municipality of Lajes das Flores, Flores island		
Area: 0.16 sq. Km	Altitude: 330 – 494 m	GPS/WGS84: 39º 24'19"N 31º 14'27"W
"Rocha dos Bordões" is a well-defined prismatic jointing on a mugearitic lava flow, about 570,000 years old. The lava front is a few hundred meters long and the well preserved columns display a regular and geometric shape, about 20 m high and decimeter size.		

ISLAND: FAIAL

Caldeira		**FAI 1**
Localization: Municipality of Horta, Faial island		
Area: 3.22 sq. Km	Altitude: 574 – 1037 m	GPS/WGS84: 38º 35'08"N 28º 42'52"W
Caldeira is the summit depression of the Faial central stratovolcano. Several features can be observed inside this 2 km wide caldera, like a pyroclastic cone, a dome and a lake, which have intermittent regime after the 1958 hydromagmatic intra-caldera activity associated with the Capelinhos eruption.		

Pedro Miguel *graben*		**FAI 2**
Localization: Municipality of Horta, Faial island		
Area: 28.04 sq. Km	Altitude: 0 – 544 m	GPS/WGS84: 38º 34'57"N 28º 37'37"W
The "Pedro Miguel" *graben* is the major volcano-tectonic structure of the island, and the most impressive one of the Azores. It presents as a series of distensive fault scarps with a WNW-ESE trend, that confer a step-like topography to the old shield volcano of the eastern part of Faial island.		

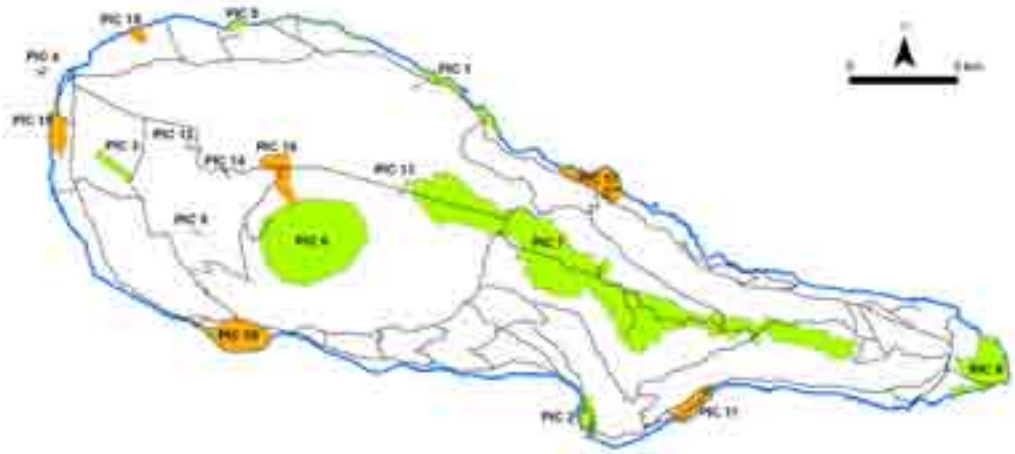
Monte da Guia and Porto Pim		**FAI 3**
Localization: Municipality of Horta, Faial island		
Area: 0.82 sq. Km	Altitude: 0 – 146 m	GPS/WGS84: 38º 31'12"N 28º 37'30"W
"Monte da Guia" is a surtseyan tuff cone, associated with a submarine eruption and with double craters opened to the sea, to south. Nowadays, the cone is connected to the island by an isthmus of a dune system, the associated sand beaches - the "Porto Pim" bay – and the "Monte Queimado" scoria cone.		

Morro do Castelo Branco		**FAI 4**
Localization: Municipality of Horta, Faial island		
Area: 0.16 sq. Km	Altitude: 0 – 149 m	GPS/WGS84: 38º 31'26"N 28º 45'05"W
"Morro do Castelo Branco" is a trachytic dome, mantled by pumice deposits from the Caldeira stratovolcano. The dome is heavily affected by sea erosion (e.g. high, steep and plunging sea cliffs) and its uppermost part shows whitish weathered horizons of clay deposits, thus the name "branco" (white).		

Capelo peninsula		**FAI 5**
Localization: Municipality of Horta, Faial island		
Area: 5.86 sq. Km	Altitude: 130 – 759 m	GPS/WGS84: 38º 35'37"N 28º 46'47"W
The Capelo peninsula is a WNW-ESE trend basaltic volcanic ridge, 8 km long and build-up by about 20 Holocene scoria cones, and associated lava flows. Among them are "Cabeço do Fogo" (the 1672/73 eruptive vent), and "Cabeço Verde", with its 55 m deep "Furna Ruim" volcanic pit.		

Capelinhos volcano and Costado da Nau		**FAI 6**
Localization: Municipality of Horta, Faial island		
Area: 0.64 sq. Km	Altitude: 0 – 152 m	GPS/WGS84: 38º 36'01"N 28º 49'40"W
Capelinhos volcano is the most recent (1957/58) and western monogenetic volcano of the Capelo peninsula. The 13 months basaltic eruption started as submarine and evolved to a terrestrial one, an eruptive sequence also well exposed on the nearby deeply eroded fossil sea cliff of "Costado da Nau".		

ISLAND: PICO



Santo António - São Roque fossil sea cliffs		**PIC 1**
Localization: Municipality of São Roque do Pico, Pico island		
Area: 1.12 sq. Km	Altitude: 0 – 48 m	GPS/WGS84: 38º 31'45"N 28º 19'21"W
Among the "Santo António" and "São Roque" villages extends a 3,500 m fossil sea cliff, cut on old *pahoehoe* or *aa* lava flows that testify the incremental growth of the island. Lava cascades and other *pahoehoe* features (e.g. ropy lava, lava tree molds) and a peculiar ankaramite rock outcrop here.		

Lajes do Pico lava delta		**PIC 2**
Localization: Municipality of Lajes do Pico, Pico island		
Area: 0.92 sq. Km	Altitude: 0 – 160 m	GPS/WGS84: 38º 23'41"N 28º 15'05"W
The village of "Lajes do Pico" is emplaced on a lava delta formed by basaltic lava flows cascading down the SW flanks of Topo shield volcano. Besides other small and older lava deltas and two coastal lagoons, the area includes the volcanic neck of Castelete, an old and deeply eroded scoria cone.		

Gruta das Torres		**PIC 3**
Localization: Municipality of Madalena do Pico, Pico island		
Area: 0.64 sq. Km	Altitude: 150 – 322 m	GPS/WGS84: 38º 29'49"N 28º 30'26"W
"Gruta das Torres" is the largest lava tunnel in the Azores, with 5,150 m total length. It displays a wide diversity of structures, such as *pahoehoe* and *aa* pavements, skylights, lava stalactites and stalagmites, lava balls, flow marks, *levees*, mineral deposits, and also several troglobian species.		

Ilhéus da Madalena		**PIC 4**
Localization: Municipality of Madalena do Pico, Pico island		
Area: 0.03 sq. Km	Altitude: 0 – 60 m	GPS/WGS84: 38º 32'09"N 28º 32'44"W
The two islets of Madalena ("Ilhéu Deitado" and "Ilhéu em Pé") are the remains of a tuff cone built by a submarine basaltic eruption. The islets, with the characteristic coloring and bedding of the surtseyan tuffs, are at a distance of 900 m from the island and reach a maximum altitude of 60 m.		

Lajido de Santa Luzia		**PIC 5**
Localization: Municipalities of Madalena and São Roque do Pico, Pico island		
Area: 0.70 sq. Km	Altitude: 0 – 27 m	GPS/WGS84: 38º 33'38"N 28º 24'51"W
"Lajidos" is a Pico island name applied whenever broad *pahoehoe* lava flow fields exist. It is the case in "Santa Luzia" area, where very fluid lava flows extruded from the Pico Mountain volcano summit exhibits the usual features of *pahoehoe* lavas (e.g. tumuli, pressure ridges, ropy lava, etc.).		

Montanha volcano		**PIC 6**
Localization: Municipalities of Lajes do Pico, Madalena and São Roque do Pico, Pico island		
Area: 15.36 sq. Km	Altitude: 1195 – 2351 m	GPS/WGS84: 38º 28'01"N 28º 24'04"W
Pico Mountain is the highest point of Portugal and the youngest and biggest polygenetic volcano of the Azores, rising about 3,500 m from the surrounding seafloor. At 2,250 m altitude, Piquinho driblet cone is nested inside a 550 m diameter pit crater and both are affected by a late eruptive fissure.		

Achada plateau		**PIC 7**
Localization: Municipalities of Lajes do Pico and São Roque do Pico, Pico island		
Area: 32.14 sq. Km	Altitude: 600 - 1077 m	GPS/WGS84: 38º 26'55"N 28º 14'43"W
The plateau of Achada is a 29 km long WNW-ESE to W-E volcanic ridge¸ with 190 monogenetic volcanoes, such as eruptive fissures and scoria and spatter cones. Their craters are often occupied by small lakes (some ephemeral), like the Capitão, Caiado, Seca and Rosada volcanic lakes.		

Ponta da Ilha		**PIC 8**
Localization: Municipality of Lajes do Pico, Pico island		
Area: 3.78 sq. Km	Altitude: 0 – 227 m	GPS/WGS84: 38º 25'05"N 28º 02'28"W
"Ponta da Ilha" is the easternmost part of the Achada plateau and Pico island. The gentle slopes and altitude decreasing progressively towards east are the result of fluid lava flows extruded from "Cabeço da Hera" cone area, some in very recent times (less than 1,780 years *BP*) and creating *kipukas*.		

ISLAND: SÃO JORGE

Fajã dos Vimes – Fajã de São João sea cliffs		**SJO 1**
Localization: Municipality of Calheta, São Jorge island		
Area: 11.37sq. Km	Altitude: 0 – 724 m	GPS/WGS84: 38º 34'30"N 27º 53'59"W
The cliffs of the southeastern coast of the island are most affected by mass movements giving rise to major flatten detritical areas, like "Fajã de São João", "Fajã dos Vimes" and many other, often fed by heavy rains or under influence of faults, as the nearby 25 km long "Urze-São João" fault.		

Central volcanic ridge		**SJO 2**
Localization: Municipalities of Calheta and Velas, São Jorge island		
Area: 8.64 sq. Km	Altitude: 685 – 1053 m	GPS/WGS84: 38º 39'20"N 28º 05'13"W
The São Jorge island was formed by many basaltic eruptions along WNW-ESE trending tectonic structures. Nowadays that fissural volcanism is best expressed in the central volcanic ridge as volcano-tectonic lineaments of 280 monogenetic centers, such as scoria and spatter cones and eruptive fissures.		

Fajã do Ouvidor and Fajã da Ribeira da Areia		**SJO 3**
Localization: Municipality of Velas, São Jorge island		
Area: 1.57 sq. Km	Altitude: 0 – 280 m	GPS/WGS84: 38º 40'12"N 28º 02'23"W
Both these "fajãs" are lava deltas located on the north coast and formed by basaltic lava flows emitted from the central volcanic ridge, and its shoreline presents prismatic jointing, lava arches and natural swimming pools. The "Fajã do Ouvidor" was formed about 2,530 years, from "Pico do Areeiro",		

Fajã dos Cubres and Fajã da Caldeira do Santo Cristo		**SJO 4**
Localization: Municipality of Calheta, São Jorge island		
Area: 1.31 sq. Km	Altitude: 0 – 150 m	GPS/WGS84: 38º 37'55"N 27º 56'50"W
These detritical "fajãs" are the most important ones in the north coast and on the island since include the only coastal lagoons of Azores. Separated from the ocean by pebble beaches those unique ecosystems are very vulnerable to wave action and continuous mass movements on the nearby steep slopes.		

Morro de Velas and Morro de Lemos		**SJO 5**
Localization: Municipality of Velas, São Jorge island		
Area: 1.82 sq. Km	Altitude: 0 – 279 m	GPS/WGS84: 38º 41'09"N 28º 12'57"W
"Morro de Velas" and "Morro de Lemos" are two surtseyan tuff cones in distinctive erosional stages due to its different ages. Velas village is emplaced on a lava delta formed by "Pico dos Loiros" lava flows, which are covered by tephra from "Morro de Velas", the younger and less eroded tuff cone.		

ISLAND: GRACIOSA

Caldeira and Furna do Enxofre		**GRA 1**
Localization: Municipality of Santa Cruz da Graciosa, Graciosa island		
Area: 1.58 sq. Km	Altitude: 70 – 405 m	GPS/WGS84: 39º 01'34"N 27º 58'25"W
"Caldeira" is a collapse caldera emplaced on the top of the smallest polygenetic volcano of Azores, which occupies de SE sector of Graciosa island. Inside the depression is located "Furna do Enxofre", a 40 m high dome-shaped volcanic cave, unique worldwide, enclosing a mud-poll fumarole and a lake.		

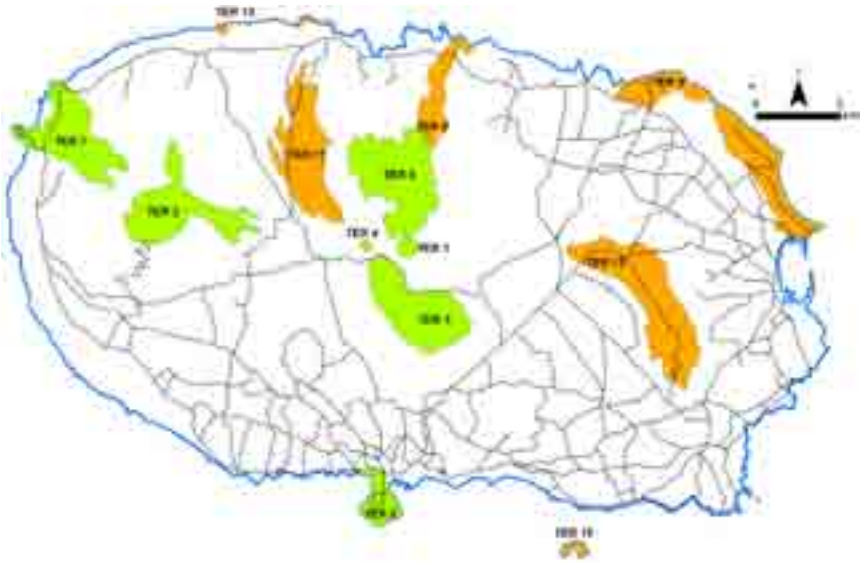
Caldeirinha de Pêro Botelho		**GRA 2**
Localization: Municipality of Santa Cruz da Graciosa, Graciosa island		
Area: 0.09 sq. Km	Altitude: 270 – 362 m	GPS/WGS84: 39º 02'23"N 28º 01'46"W
"Caldeirinha de Pêro Botelho" is a volcanic pit, accessible through the crater of a recent spatter cone, probably of Holocene age. The pit is 25 m deep and has a small chamber of 24.6 x 7.4 m on its bottom. This pit was first explored in 1964 by the speleological society "Os Montanheiros".		

Ponta da Barca and Ilhéu da Baleia		**GRA 3**
Localization: Municipality of Santa Cruz da Graciosa, Graciosa island		
Area: 0.14 sq. Km	Altitude: 0 - 92 m	GPS/WGS84: 39º 05'37"N 28º 02'43"W
On "Ponta da Barca" shoreline the marine erosion has deeply cut into the plumbing system of the existing monogenetic cones exposing dykes and necks to observation. Among them is "Ilhéu da Baleia", a volcanic neck resembling a whale ("baleia"). Off shore the Lighthouse is known a fumarolic field.		

Porto Afonso and Redondo		**GRA 4**
Localization: Municipality of Santa Cruz da Graciosa, Graciosa island		
Area: 0.34 sq. Km	Altitude: 0 – 86 m	GPS/WGS84: 39º 04'02"N 28º 04'03"W
The coastal area between Redondo and "Porto Afonso" includes lava flows sea cliffs and tephra shorelines, respectively. At "Porto Afonso", the marine erosion has reached and exposed the innermost feeding system of the scoria cones, and the tephra display a myriad of colors, thickness and grainsize.		

Ponta do Carapacho, Ponta da Restinga and Ilhéu de Baixo		**GRA 5**
Localization: Municipality of Santa Cruz da Graciosa, Graciosa island		
Area: 0.33 sq. Km	Altitude: 0 – 178 m	GPS/WGS84: 39º 00'50"N 27º 57'01"W
Carapacho and Restinga sea cliffs reveal the early history of Graciosa Caldeira central volcano, namely its initial basaltic submarine phases (e.g. the "Ilhéu de Baixo" islet, relic of a submarine volcano). In Carapacho, its thermal water's (40ºC) therapeutic qualities are well-know and exploited.		

ISLAND: TERCEIRA



Pico Alto, Biscoito Rachado and Biscoito da Ferraria		**TER 6**
Localization: Municipality of Praia da Vitória, Terceira island		
Area: 8.09 sq. Km	Altitude: 460 - 809 m	GPS/WGS84: 38º 45'06"N 27º 13'08"W
"Pico Alto" is a silicious polygenetic volcano with caldera, the youngest of the island. The caldera wall is observed specially at "Rocha do Juncal" and "Serra do Labaçal", since the depression is almost completely filled by domes and *coulées*, like those of "Biscoito Rachado" and "Biscoito da Ferraria".		

Ponta da Serreta trachytic lava flows		**TER 7**
Localization: Municipality of Angra do Heroísmo, Terceira island		
Area: 6.19 sq. Km	Altitude: 0 – 720 m	GPS/WGS84: 38º 45'51"N 27º 21'12"W
The western flanks of "Santa Bárbara" central volcano are dominated by several domes and thick trachytic lava flows (designated as *coulées*), sometimes reaching thicknesses of more than 20 m. It is the case of "Ponta do Raminho" and "Ponta do Queimado" *coulées*, the later with the Serreta Lighthouse.		

Algar do Carvão		**TER 1**
Localization: Municipalities of Praia da Vitória and Angra do Heroísmo, Terceira island		
Area: 0.40 sq. Km	Altitude: 550 – 638 m	GPS/WGS84: 38º 43'42"N 27º 12'52"W
"Algar do Carvão" is a volcanic pit with a peculiar genesis, including both silicic formations and basaltic products dated of 3,200 and 1,730 years ago, respectively. This 90 m depth pit, presents unique features and environmental importance, especially due to its unique speleothems of amorphous silica.		

Santa Bárbara caldera and Mistérios Negros		**TER 2**
Localization: Municipality of Angra do Heroísmo, Terceira island		
Area: 6.35 sq. Km	Altitude: 570 - 1003 m	GPS/WGS84: 38º 44'28"N 27º 18'51"W
The "Santa Bárbara" stratovolcano is truncated by a 2.7x1.9 km collapse calderas complex, the younger being almost filled-up by 7 trachytic domes. On its flanks there are several volcano-tectonic lineaments of *coulées* and domes (often with obsidian), like the "Mistérios Negros" of the 1761 eruption.		

Guilherme Moniz caldera		**TER 3**
Localization: Municipality of Angra do Heroísmo, Terceira island		
Area: 6.67 sq. Km	Altitude: 457 – 631 m	GPS/WGS84: 38º 42'31"N 27º 12'42"W
The "Guilherme Moniz" collapse caldera is a 4.3x2.3 km depression formed about 23,000 years ago. "Serra do Morião" makes the S and W rims, and the N and E borders are absent. The caldera bottom is filled by recent tephra and lava flows, like those extruded from "Algar do Carvão" scoria cone.		

Furnas do Enxofre		**TER 4**
Localization: Municipality of Angra do Heroísmo, Terceira island		
Area: 0.13 sq. Km	Altitude: 570 – 625 m	GPS/WGS84: 38º 43'45"N 27º 13'53"W
"Furnas do Enxofre" is the most important fumarolic field on Terceira island, discharging water steam and volcanic gases from a complex underground system. The gas phase is essentially CO_2 (~98%) and near the fumaroles ground temperatures up to 95-98ºC are measured and sulphur deposits are common.		

Monte Brasil		**TER 5**
Localization: Municipality of Angra do Heroísmo, Terceira island		
Area: 1.70 sq. Km	Altitude: 0 – 206 m	GPS/WGS84: 38º 39'00"N 27º 13'31"W
"Monte Brasil" is a 1.5 km base diameter surtseyan tuff cone, formed by a submarine basaltic eruption and connected to the island through an isthmus. The southern flanks of the cone are eroded by the marine erosion and the deposit display several features, like sag bombs, bedding and plant fossils.		

ISLAND: SÃO MIGUEL

Gruta do Carvão		**SMG 5**
Localization: Municipality of Ponta Delgada, São Miguel island		
Area: 0.17 sq. Km	Altitude: 20 – 104 m	GPS/WGS84: 37º 44'40"N 25º 41'02"W
"Gruta do Carvão" is the largest lava tube cave of the Island, nowadays with a total length of 1,912 m divided into three separate sections. Known since the 16th century, it exhibits a wide diversity of features, like lateral benches, superimposed channels, lava bridges, lava and silica stalactites.		

Ilhéu de Vila Franca		**SMG 6**
Localization: Municipality of Vila Franca do Campo, São Miguel island		
Area: 0.08 sq. Km	Altitude: 0 – 62 m	GPS/WGS84: 37º 42'21"N 25º 26'36"W
The "Vila Franca" islet is a surtseyan tuff cone located at a distance of 600 m from the village shoreline and accessible by boat. Its circular crater is inundated by the ocean and the cone is partially affected by the marine erosion, with outer steeply slopes and cross-cutting cracks named "golas".		

Furnas volcano caldera		**SMG 1**
Localization: Municipalities of Povoação and Vila Franca do Campo, São Miguel island		
Area: 31.95 sq. Km	Altitude: 20 – 780 m	GPS/WGS84: 37º 45'45"N 25º 18'58"W
Furnas volcano is a silicic polygenetic volcano with a summit calderas complex, the older with 8x5.6 km diameter and aged about 34,000 years. The geodiversity associated includes a volcanic lake, domes and tuff rings, and a diversified hydrothermal system, with fumaroles, thermal and mineral waters.		

Sete Cidades volcano caldera		**SMG 2**
Localization: Municipality of Ponta Delgada, São Miguel island		
Area: 19.26 sq. Km	Altitude: 236 – 852 m	GPS/WGS84: 37º 51'32"N 25º 47'12"W
The "Sete Cidades" polygenetic volcano is truncated by an almost circular-shaped collapse caldera with 5.3 km average diameter. Inside the caldera the "Lagoa Azul" and "Lagoa Verde" lakes dominate the landscape, together with pumice cones, tuff rings and domes, and the white painted village buildings.		

Fogo volcano caldera		**SMG 3**
Localization: Municipalities of Ribeira Grande and Vila Franca do Campo, São Miguel island		
Area: 5.07 sq. Km	Altitude: 578 - 947 m	GPS/WGS84: 37º 45'59"N 25º 28'29"W
The Fogo polygenetic volcano caldera is the youngest (15,000 years) and smaller (3.4x2.2 km) collapse caldera of the island. It is also the wildest and less humanized one, being "Lagoa do Fogo" intra-caldera lake a major water resource, historically affected by volcanic eruptions (e.g. 1563 A.D.).		

Caldeira Velha		**SMG 4**
Localization: Municipality of Ribeira Grande, São Miguel island		
Area: 0.09 sq. Km	Altitude: 300 – 400 m	GPS/WGS84: 37º 46'58"N 25º 30'03"W
"Caldeira Velha" is an important fumarolic field on the NW flanks of Fogo volcano: hot springs, steaming grounds, and a thermal water spring make this a unique secondary volcanism area, where a hot water cascade, a narrow fluvial valley, rocky scarps and luxurious vegetation complete the landscape.		

Lagoa do Congro and Lagoa dos Nenúfares		**SMG 7**
Localization: Municipality of Vila Franca do Campo, São Miguel island		
Area: 0.20 sq. Km	Altitude: 401 – 530 m	GPS/WGS84: 37º 45'22"N 25º 24'26"W
The Congro and Nenúfares lakes occupy a *maar*-type explosion crater associated with a hydromagmatic eruption on the "Achada das Furnas" plateau, controlled by NW-SE fractures. The crater, 500 m diameter and 120 m deep, is imprinted in the flat surrounding area, and was formed about 3,900 years ago.		

Ponta da Ferraria and Pico das Camarinhas		**SMG 8**
Localization: Municipality of Ponta Delgada, São Miguel island		
Area: 0.34 sq. Km	Altitude: 0 – 219 m	GPS/WGS84: 37º 51'36"N 25º 51'00"W
"Ponta da Ferraria" is a lava delta formed by basaltic lava flows emitted from "Pico das Camarinhas" scoria cone, 870 years ago. Among the many volcanic features in the geosite, the littoral cone (or pseudocrater), the 62ºC submarine thermal water and the ultramafic xenoliths are worth mentioning.		

Serra Devassa		**SMG 9**
Localization: Municipality of Ponta Delgada, São Miguel island		
Area: 2.47 sq. Km	Altitude: 620 – 873 m	GPS/WGS84: 37º 49'37"N 25º 44'58"W
"Serra Devassa" is a volcanic ridge with a NW-SE trend that develops from the SE border of "Sete Cidades" caldera, as a set of active faults and volcano-tectonic lineaments of monogenetic volcanoes. About 15 small lakes are located in this area, mostly in explosion craters of basaltic scoria cones.		

Ribeira do Faial da Terra valley and Fajã do Calhau		**SMG 10**
Localization: Municipality of Povoação, São Miguel island		
Area: 3.16 sq. Km	Altitude: 0 – 410 m	GPS/WGS84: 37º 44'47"N 25º 11'42"W
The "Faial da Terra" fluvial valley establishes the boundary between the basaltic fissural volcanism of Nordeste complex (East, with dykes and scoria deposits) and the trachytic rocks of Povoação polygenetic volcano (West, with domes and pumice deposits). "Fajã do Calhau" is the major slope deposit of the island.		

ISLAND: SANTA MARIA

Barreiro da Faneca		**SMA 1**
Localization: Municipality of Vila do Porto, Santa Maria island		
Area: 0.17 sq. Km	Altitude: 205 – 226 m	GPS/WGS84: 36º 59'59"N 25º 07'23"W
"Barreiro da Faneca", also known as the Azores Red Desert, is a flat, arid, muddy and red-colored area that corresponds to the weathering horizon of an old basaltic lava flow, and coating ash layer, formed under Pliocene warm and wet climate conditions.		

Pedreira do Campo		**SMA 2**
Localization: Municipality of Vila do Porto, Santa Maria island		
Area: 0.03 sq. Km	Altitude: 90 – 120 m	GPS/WGS84: 36º 56'49"N 25º 08'07"W
"Pedreira do Campo" is an old quarry front that exhibits a full submarine sequence composed by marine sedimentary rocks with rich fossiliferous content at the base, overlaid by submarine basaltic hyaloclastites and pillow lavas: the sequence is aged of about 5 millions years.		

Poço da Pedreira		**SMA 3**
Localization: Municipality of Vila do Porto, Santa Maria island		
Area: 0.01sq. Km	Altitude: 290 – 324 m	GPS/WGS84: 36º58'54"N 25º03'38"W
"Poço da Pedreira" is an abandoned quarry, where old and intensively weathered basaltic scoria was exploited. Given its age and weathering the tephra are agglutinated and red-colored, what explains the steeply slopes of the quarry front and the name "Pico Vermelho" (Red Peak) for the scoria cone.		

Ponta do Castelo		**SMA 4**
Localization: Municipality of Vila do Porto, Santa Maria island		
Area: 0.22 sq. Km	Altitude: 0 – 200 m	GPS/WGS84: 36º 55'51"N 25º 01'06"W
"Ponta do Castelo" is a high and steeply sea cliff in the SE point of the island. It displays a complex stratigraphical sequence that includes marine sedimentary rocks (some with fossils) and submarine and terrestrial volcanic rocks. The sequence also includes several intrusive bodies (e.g. dykes).		

Ribeira do Maloás		**SMA 5**
Localization: Municipality of Vila do Porto, Santa Maria island		
Area: 0.02 sq. Km	Altitude: 0 – 150 m	GPS/WGS84: 36º 55'50"N 25º 03'54"W
At about 220 m from the mouth of the Maloás stream, the fluvial valley is characterized by a 15-20 m high water fall with an impressive columnar jointing on a subaerial basaltic lava flow. The vertical columns, sometimes almost 1 m across, are cut on top and base, resembling the Giant's Causeway.		

MARINE GEOSITES

D. João de Castro bank		**marine 1**
Localization: between the islands of São Miguel and Terceira		
Area: 222.90 sq. Km	Depth: -1600 to -12 m	GPS/WGS84: 38º 13'12"N 26º 36'48"W
"D. João de Castro" bank is a seamount that rises about 1,600 m from the surrounding seafloor. Its summit is 12 m below sea level and corresponds to a 450 m diameter crater, where an impressive low-depth hydrothermal system extends. This active volcano erupted in 1720 building an ephemeral island.		

Mid-Atlantic ridge and hydrothermal fields		**marine 2**
Localization: between the islands of Faial and Flores		
Area: 10123.42 sq. Km	Depth: -3000 to -840 m	GPS/WGS84: 38º 46'19"N 30º07'53"W
The Mid-Atlantic Ridge is the main tectonic feature in the Azores plateau, as a roughly N-S distensive structure, intersected by several E-W transform faults. It extends 120 km East of Flores and Corvo islands and includes several deep-sea hydrothermal fields, like Lucky Strike or Menez Gwen.		

B4. Details on the interest of these sites in terms of their international, national, regional or local value

At first, the analysis of the relevance of the geosites of the Azores was performed using the methodology adopted on Eva Lima Master thesis (Azores University), in 2007, which adapts to the territorial and geological reality of the Azores archipelago the methodology developed in 2005 by José Brilha (Minho University). The analysis predicts the evaluation of three classes of criteria about the geological heritage: (A) criteria intrinsic to the geosite, (B) criteria related to its potential use and (C) the need for protection, whose quantification allows to determine the level of relevance (international/national or regional/local) of geosites.

In addition, there was an evaluation of the scientific value of the 121 geosites in the Azores archipelago and of its degree of vulnerability, taking into account the criteria commonly used in several European countries. This evaluation took place in the context of the research project "Identification, characterization and conservation of geological heritage: a geoconservation strategy for Portugal", funded by the FCT - Foundation for Science and Technology (2007-2010), which sought to implement, in whole Portuguese territory, a methodology for the inventory and the classification of geological heritage, from the perspective of its geoconservation, valorization and dissemination. In tables 9 to 11, conclusions are presented as well as the most relevant data which have resulted from these analyzes and studies, focusing particularly on those of specific interest for the Azores Geopark project.

Table 9 – Elements used in the evaluation of the geosites of the Azores.

Relevance		**Scientific Value**		**Other Values**	
Int	International	**Geom**	Geomorphological	**Arq**	Archeological or similar
Nac	National	**Paleo**	Paleontological	**Cult**	Cultural
Reg	Regional	**Min**	Mineralogical	**Ecol**	Ecological
		Pet	Petrological	**Hist**	Historical
Use		**Estr**	Stratigraphic	**Pvist**	Scenic (Landscape)
Cie	Scientific	**Tect**	Tectonic		
Ec	Economic	**Hidro**	Hydrological		
Ed	Educational	**Hidrot**	Hydrothermal		
Geot	Geotourism	**Vulc**	Volcanic		
		Espeleo	Speleological		
		Sed	Sedimentary		

Table 10 – Geomorphological and volcanological categories of the geosites of the Azores

Geomorphological and volcanological categories	
1	Sea cliffs
2	Calderas
3	Volcanic caves
4	Fields of scoria and spatter cones
5	Surtseyan tuff cones
6	Volcanic ridges
7	Quaternary deposits (e.g. beaches and slope deposits-"fajãs")
8	Prismatic and spheroidal jointing
9	Domes and *coulées*
10	Historical eruptions
11	Sub-volcanic structures (e.g. necks and dykes)
12	Tectonic structures (e.g. faults and *grabens*)
13	Lava deltas (or lava "fajãs")
14	Weathering phenomena/mud deposits-"barreiros"
15	Fossiliferous deposits
16	Volcanic lakes
17	Coastal lagoons
18	*Pahoehoe* lava fields-"lajidos"
19	*Maars*
20	Fluvial valleys
21	Polygenetic volcanoes
22	Areas of hydrothermal activity
23	Others

Table 11 – Evaluation of the relevance, use and value of the geosites of the Azores, with the indication of the respective geomorphological and volcanological categories. The 57 geosites selected in the context of the project Azores Geopark are highlighted in blue.

Island	Geosite		Relevance	Use	Scientific Values	Other Values	Geomorphological and Volcanological Categories
Corvo	Caldeirão	COR 1	Nac	Cie | Ed | Geot	Geom Hidro | Vulc	Cult | Ecol | Pvist	2 | 16 | 21
	Fajã lávica de Vila do Corvo	COR 2	Reg	Cie | Ed	Geom | Estr | Vulc	Cult | Pvist	13
	Ponta do Marco	COR 3	Reg	Cie | Geot	Estr | Vulc	Ecol | Pvist	1 | 11
	Coroínha e arriba de Pingas	COR 4	Reg	Cie | Ec | Ed	Geom | Estr | Vulc		1 | 11
Flores	Caldeiras Negra, Comprida, Seca e Branca	FLO 1	Nac	Cie | Ed | Geot	Geom Hidro | Vulc	Ecol | Pvist	16 | 19
	Caldeiras Rasa e Funda das Lajes	FLO 2	Nac	Cie | Ed | Geot	Geom | Estr | Hidro | Vulc	Ecol | Pvist	16 | 19
	Fajã Grande e Fajãzinha	FLO 3	Nac	Cie | Ed | Geot	Geom | Estr | Tect | Hidro | Vulc | Sed	Cult | Pvist	1 | 7 | 13 | 20
	Pico da Sé	FLO 4	Reg	Cie | Ed | Geot	Geom | Vulc	Pvist	9
	Ponta da Rocha Alta e Fajã de Lopo Vaz	FLO 5	Reg	Cie | Geot	Geom | Estr | Sed	Ecol | Hist | Pvist	1 | 7
	Rocha dos Bordões	FLO 6	Nac	Cie | Ed | Geot	Geom | Vulc	Ecol | Pvist	8
	Costa Nordeste	FLO 7	Nac	Cie | Geot	Estr | Vulc	Pvist	1 | 8 | 11
	Filão dos Frades	FLO 8	Reg	Cie | Ed | Geot	Geom	Pvist	11
	Litoral de Santa Cruz	FLO 9	Reg	Cie | Ed | Geot	Geom | Pet | Vulc	Cult	13
	Ponta do Albarnaz - Ponta Delgada	FLO 10	Reg	Cie | Ed | Geot	Pet | Estr | Tect | Vulc	Cult	1 | 8 | 11 | 14
	Vale da Ribeira da Cruz e Ponta da Caveira	FLO 11	Nac	Cie | Ec | Ed | Geot	Geom | Hidro | Hidrot | Vulc	Pvist	1 | 3 | 11 | 20
	Vale das Ribeiras da Badanela e Além Fazenda	FLO 12	Nac	Cie | Ed | Geot	Geom | Hidro | Vulc	Pvist	11 | 20
	Vale e fajã lávica das Lajes	FLO 13	Reg	Cie | Ec	Geom | Min | Estr | Vulc	Pvist	12 | 13
	Ilhéu de Monchique	FLO 14	Reg		Geom	Pvist	23

Faial	Caldeira	FAI 1	Nac	Cie | Ed | Geot	Geom | Tect | Hidro | Vulc	Ecol | Hist | Pvist	2 | 10 | 21
	Graben de Pedro Miguel	FAI 2	Nac	Cie | Ec | Ed | Geot	Geom | Tect	Cult | Hist | Pvist	1 | 12
	Monte da Guia e Porto Pim	FAI 3	Nac	Cie | Ed | Geot	Geom | Pet | Vulc | Sed	Cult | Pvist	5 | 7
	Morro do Castelo Branco	FAI 4	Nac	Cie | Ed | Geot	Geom | Min | Vulc	Ecol | Pvist	1 | 9 | 14
	Península do Capelo	FAI 5	Reg	Cie | Ec | Ed | Geot	Geom | Tect | Vulc	Hist | Pvist	3 | 4 | 6 | 10 | 12
	Vulcão dos Capelinhos e Costado da Nau	FAI 6	Int	Cie | Ed | Geot	Geom | Pet | Estr | Tect | Vulc	Ecol | Hist | Pvist	1 | 5 | 10 | 11
	Arriba fóssil da Praia do Norte	FAI 7	Reg	Cie | Ec | Ed | Geot	Geom | Estr | Sed	Pvist	1 | 7 | 18
	Arriba fóssil do Varadouro	FAI 8	Reg	Cie | Ed | Geot	Geom | Estr | Hidrot	Cult | Pvist	1 | 22
	Ponta Furada	FAI 9	Nac	Cie	Geom | Vulc		1 | 8 | 18
Pico	Arriba fóssil Sto António - São Roque	PIC 1	Reg	Cie | Ec	Geom | Pet | Estr | Vulc		1 | 13
	Fajã lávica das Lajes do Pico	PIC 2	Reg	Cie | Ed | Geot	Geom | Vulc	Cult | Ecol | Pvist	1 | 11 | 13 | 17
	Gruta das Torres	PIC 3	Reg	Cie | Ec | Ed | Geot	Min | Vulc | Espeleo	Ecol	3
	Ilhéus da Madalena	PIC 4	Nac	Cie | Geot	Geom | Pet | Vulc	Pvist	5
	Lajido de Santa Luzia	PIC 5	Nac	Cie | Ed | Geot	Geom | Vulc	Cult	1 | 10 | 18
	Montanha	PIC 6	Int	Cie | Ed | Geot	Geom | Estr | Tect | Hidrot | Vulc | Sed	Ecol | Hist | Pvist	7 | 12 | 18 | 21 | 22
	Planalto da Achada	PIC 7	Reg	Cie | Ec | Ed | Geot	Geom | Estr | Tect | Hidro | Vulc | Espeleo	Ecol | Hist | Pvist	4 | 6 | 10 | 12 | 16
	Ponta da Ilha	PIC 8	Nac	Cie | Ec | Ed | Geot	Geom | Vulc	Cult | Ecol	1 | 8 | 18
	Algar/Gruta do Canto da Serra	PIC 9	Reg	Cie	Vulc | Espeleo		3
	Fajã lávica de São Mateus	PIC 10	Reg	Cie | Ed	Geom | Vulc		1 | 13
	Fajã lávica das Ribeiras	PIC 11	Reg	Cie | Ed	Geom | Min | Vulc	Pvist	1 | 13
	Furna Vermelha	PIC 12	Reg	Cie	Vulc | Espeleo		3
	Gruta dos Montanheiros	PIC 13	Reg	Cie	Vulc | Espeleo		3
	Hornitos e Furna do Frei Matias	PIC 14	Reg	Cie | Geot	Vulc | Espeleo		3
	Lajido da Criação Velha	PIC 15	Nac	Cie | Ed | Geot	Geom | Vulc	Cult | Pvist	1 | 18
	Lomba do Fogo	PIC 16	Reg	Cie	Geom | Tect | Vulc | Espeleo	Ecol | Hist | Pvist	10 | 12
	Ponta do Mistério	PIC 17	Reg	Cie | Ed | Geot	Geom | Pet | Vulc	Ecol | Hist | Pvist	1 | 10 | 13
	Cabeço Debaixo da Rocha	PIC 18	Nac	Cie | Ed	Pet | Estr | Vulc	Pvist	5
São Jorge	Arriba das Fajãs dos Vimes - São João	SJO 1	Nac	Cie | Ed | Geot	Geom | Tect | Sed	Cult | Ecol | Pvist	1 | 7 | 12 | 20
	Cordilheira vulcânica central	SJO 2	Reg	Cie | Ec | Ed | Geot	Geom | Tect | Hidro | Vulc | Espeleo	Hist | Pvist	3 | 4 | 6 | 10 | 12 | 16
	Fajãs do Ouvidor e da Ribeira da Areia	SJO 3	Reg	Cie | Ed | Geot	Geom | Estr | Vulc	Pvist	1 | 13
	Fajãs dos Cubres e da Caldeira do Sto Cristo	SJO 4	Nac	Cie | Ed | Geot	Geom | Hidro | Sed	Cult | Ecol | Pvist	1 | 7 | 17
	Morro de Velas e Morro de Lemos	SJO 5	Nac	Cie | Ed | Geot	Geom | Paleo | Pet | Vulc	Ecol | Pvist	1 | 5 | 15
	Ponta dos Rosais	SJO 6	Reg	Cie | Geot	Geom | Estr | Vulc	Cult | Pvist	1 | 11
	Mistério da Urzelina	SJO 7	Nac	Cie | Ed | Geot	Vulc	Hist	1 | 10
	Ponta e ilhéu do Topo	SJO 8	Reg	Cie | Ed | Geot	Geom | Pet | Estr | Vulc	Cult | Pvist	1 | 8
Graciosa	Caldeira e Furna do Enxofre	GRA 1	Int	Cie | Ec | Ed | Geot	Geom | Min | Tect | Hidro | Hidrot | Vulc | Espeleo	Cult | Hist | Pvist	2 | 3 | 9 | 16 | 21 | 22
	Caldeirinha de Pêro Botelho	GRA 2	Reg	Cie | Ed | Geot	Vulc | Espeleo	Pvist	3
	Ponta da Barca e Ilhéu da Baleia	GRA 3	Nac	Cie | Ed | Geot	Geom | Estr | Hidrot | Vulc	Cult | Pvist	1 | 11 | 22
	Porto Afonso e Redondo	GRA 4	Nac	Cie | Ed | Geot	Geom | Estr | Vulc	Pvist	1 | 4 | 11
	Ponta do Carapacho, Ponta da Restinga e Ilhéu de Baixo	GRA 5	Nac	Cie | Ec | Ed | Geot	Geom | Estr | Hidrot | Vulc	Cult | Ecol | Pvist	1 | 5 | 11 | 22
	Arribas da Serra Branca e Baía do Filipe	GRA 6	Nac	Cie | Ed | Geot	Geom | Estr | Vulc	Pvist	1 | 9 | 11
	Baía da Vitória	GRA 7	Reg	Cie	Hidro | Hidrot | Vulc		18 | 22
	Erupção do Pico Timão	GRA 8	Reg	Cie | Ec	Geom | Vulc		1 | 4
	Santa Cruz da Graciosa	GRA 9	Reg	Cie | Ed | Geot	Geom | Hidro | Vulc	Cult | Pvist	4 | 13
Terceira	Algar do Carvão	TER 1	Int	Cie | Ec | Ed | Geot	Min | Hidro | Vulc | Espeleo	Ecol	3 | 16
	Caldeira de Santa Bárbara e Mistérios Negros	TER 2	Nac	Cie | Ed | Geot	Geom | Min | Tect | Vulc	Ecol | Hist | Pvist	2 | 9 | 10 12 | 21
	Caldeira de Guilherme Moniz	TER 3	Reg	Cie | Ed	Geom | Tect | Vulc | Espeleo		2 | 3 | 18 | 21
	Furnas do Enxofre	TER 4	Reg	Cie | Ed | Geot	Hidrot	Pvist	14 | 22
	Monte Brasil	TER 5	Nac	Cie | Ed | Geot	Geom | Paleo | Pet | Estr | Tect | Vulc	Cult | Hist | Pvist	1 | 5 | 12 | 15
	Pico Alto, Biscoito Rachado e Biscoito da Ferraria	TER 6	Nac	Cie | Ec | Ed | Geot	Geom | Min | Estr | Tect | Vulc	Ecol | Pvist	2 | 9 | 21
	Ponta da Serreta e escoadas traquíticas	TER 7	Reg	Cie | Ed | Geot	Geom | Pet | Vulc	Ecol	1 | 9 | 12
	Fajã da Alagoa - Biscoito das Calmeiras	TER 8	Reg	Cie | Ed | Geot	Geom | Estr | Vulc | Sed	Pvist	1 | 7 | 9
	Graben das Lajes	TER 9	Nac	Cie | Ed | Geot	Geom | Pet | Tect	Pvist	1 | 12
	Ilhéus das Cabras	TER 10	Nac	Cie | Geot	Geom | Pet | Tect | Vulc	Pvist	5
	Mistério 1761 e sistema cavernícola da Malha Grande - Balcões	TER 11	Reg	Cie | Ec	Min | Vulc | Espeleo	Ecol | Hist	3 | 10
	Serra do Cume	TER 12	Reg	Cie | Ed | Geot	Geom | Vulc	Pvist	2 | 21
	Biscoitos - Matias Simão	TER 13	Reg	Cie	Geom | Vulc	Cult	1 | 18

São Miguel	Caldeira do vulcão das Furnas	SMG 1	Int	Cie | Ec | Ed | Geot	Geom | Min | Estr | Tect | Hidro | Hidrot | Vulc	Cult | Hist | Pvist	2 | 9 | 10 | 14 | 16 | 20 | 21 | 22
	Caldeira do vulcão das Sete Cidades	SMG 2	Nac	Cie | Ed | Geot	Geom | Estr | Hidro | Vulc | Sed	Cult | Pvist	2 | 7 | 10 | 16 | 21
	Caldeira do vulcão do Fogo	SMG 3	Nac	Cie | Ed | Geot	Geom | Min | Hidro | Vulc	Hist | Pvist	2 | 7 | 10 | 16 | 21
	Caldeira Velha	SMG 4	Reg	Cie | Ed | Geot	Tect | Hidro		20 | 22
	Gruta do Carvão	SMG 5	Reg	Cie | Ec | Ed | Geot	Vulc | Espeleo	Cult	3
	Ilhéu de Vila Franca	SMG 6	Nac	Cie | Ed | Geot	Geom | Pet | Vulc	Ecol | Pvist	5
	Lagoas do Congro e dos Nenúfares	SMG 7	Reg	Cie | Ed | Geot	Geom | Hidro | Vulc	Pvist	16 | 19
	Ponta da Ferraria e Pico das Camarinhas	SMG 8	Nac	Cie | Ec | Ed | Geot	Geom | Min | Estr | Tect | Hidrot | Vulc	Cult | Pvist	4 | 13 | 22
	Serra Devassa	SMG 9	Reg	Cie | Ec | Ed | Geot	Geom | Tect | Hidro | Vulc	Cult	4 | 6 | 12 | 16
	Vale da Ribeira do Faial da Terra e Fajã do Calhau	SMG 10	Reg	Cie | Ed | Geot	Geom | Estr | Hidro | Vulc | Sed	Cult	1 | 7 | 9 | 11 | 20
	Caldeira da Povoação	SMG 11	Reg	Cie | Ec | Ed | Geot	Geom | Pet | Hidro | Vulc	Cult | Pvist	2 | 20 | 21
	Coroa da Furna - Arrenquinha	SMG 12	Reg	Cie | Ec | Ed	Geom | Tect | Vulc | Espeleo		3 | 4 | 6
	Fajã lávica e arriba fóssil da Caloura	SMG 13	Reg	Cie | Ec | Ed | Geot	Geom | Estr | Vulc	Cult | Ecol | Pvist	1 | 8 | 11 | 13
	Fajã lávica e ilhéus dos Mosteiros	SMG 14	Nac	Cie | Ec | Ed | Geot	Geom | Pet | Tect | Hidrot | Vulc	Cult | Pvist	1 | 5 | 7 | 12 | 13
	Morro das Capelas	SMG 15	Nac	Cie	Geom | Paleo | Pet | Vulc	Cult	1 | 5 | 15
	Morro de Sta Bárbara, praias e Bandejo	SMG 16	Reg	Cie | Ed | Geot	Geom | Vulc | Sed	Cult	1 | 7 | 9 | 10
	Pico da Vara e Planalto dos Graminhais	SMG 17	Reg	Cie | Geot	Geom | Hidro	Ecol | Pvist	20 | 23
	Pisão - Praia (Água d'Alto)	SMG 18	Nac	Cie | Ed | Geot	Pet | Estr | Sed	Pvist	1 | 7
	Ponta do Cintrão - Ladeira da Velha	SMG 19	Nac	Cie | Ed | Geot	Geom | Estr | Hidrot | Vulc	Cult | Pvist	1 | 9 | 22
	Praias do Pópulo, Milicias e São Roque	SMG 20	Reg	Cie | Ed | Geot	Vulc | Sed	Cult | Pvist	7
	Rocha da Relva	SMG 21	Reg	Cie | Ed	Geom | Estr | Sed	Pvist	1 | 7
	Salto da Farinha	SMG 22	Nac	Cie | Ed | Geot	Geom | Hidro | Vulc	Pvist	8 | 14 | 20
	Salto do Cabrito	SMG 23	Nac	Cie | Ec | Ed | Geot	Tect | Hidro		20
	Vale da Ribeira Quente	SMG 24	Reg	Cie | Ed | Geot	Geom | Estr | Hidro | Hidrot | Vulc | Sed	Hist | Cult	1 | 7 | 20 | 22
	Vale das Lombadas	SMG 25	Reg	Cie | Ec | Ed | Geot	Geom | Min | Hidro | Hidrot	Cult | Pvist	9 | 20 | 22
	Fontanário da Ribeira Seca	SMG 26	Nac	Cie | Ed | Geot	Vulc	Hist | Pvist	10
	Campo Geotérmico do Vulcão do Fogo	SMG 27	Nac	Cie | Ec | Ed | Geot	Hidrot		22
Santa Maria	Barreiro da Faneca	SMA 1	Nac	Cie | Ed | Geot	Geom | Pet | Vulc	Pvist	14
	Pedreira do Campo	SMA 2	Nac	Cie | Ed | Geot	Paleo | Min | Pet | Estr | Vulc	Arq	8 | 15
	Poço da Pedreira	SMA 3	Nac	Cie | Ed | Geot	Geom | Vulc	Arq	11 | 14
	Ponta do Castelo	SMA 4	Nac	Cie | Ed | Geot	Geom | Paleo | Min | Pet | Estr | Vulc	Cult | Pvist	1 | 8 | 11 | 15
	Ribeira do Maloás	SMA 5	Nac	Cie | Ed | Geot	Geom | Vulc	Pvist	8 | 20
	Baía da Cré	SMA 6	Reg	Cie | Ed | Geot	Geom | Paleo | Pet | Estr	Cult	1 | 15
	Baía de São Lourenço	SMA 7	Reg	Cie | Ed | Geot	Geom | Paleo | Sed	Pvist	1 | 7 | 15
	Baía do Raposo	SMA 8	Reg	Cie	Geom | Hidro		1 | 8 | 20
	Baía do Tagarete e Ponta do Norte	SMA 9	Nac	Cie	Geom | Paleo | Hidro | Vulc		1 | 14 | 15 | 20
	Baía dos Cabrestantes	SMA 10	Reg	Cie	Pet | Estr | Vulc		1 | 5
	Barreiro da Malbusca	SMA 11	Nac	Cie | Ed	Min | Estr | Vulc		8 | 14
	Cascata do Aveiro	SMA 12	Reg	Cie | Ed | Geot	Geom | Estr | Hidro	Pvist	8 | 20
	Figueiral	SMA 13	Reg	Cie | Ed | Geot	Paleo | Pet | Estr | Espeleo	Arq	1 | 3 | 8 | 11 | 15
	Porto de Vila do Porto	SMA 14	Nac	Cie | Ed	Estr | Vulc	Pvist	1 | 8 | 11
	Praia Formosa e Prainha	SMA 15	Nac	Cie | Ed | Geot	Geom | Paleo | Pet | Hidro | Sed	Cult | Pvist	1 | 7 | 8 | 15 | 20
Marine Areas	Banco D. João de Castro	Marinha 1	Reg	Cie | Geot	Geom | Tect | Hidrot | Vulc	Hist	10 | 21 | 22
	Dorsal Atlântica e Campos hidrotermais	Marinha 2	Int	Cie	Geom | Min | Tect | Hidrot | Vulc	Ecol	6 | 12 | 22
	Canal Faial-Pico	Marinha 3	Reg	Cie	Geom | Tect | Hidrot | Vulc		5 | 22
	Ilhéus das Formigas e Recife Dollabarat	Marinha 4	Reg	Cie | Geot	Geom | Paleo | Pet | Tect | Vulc	Ecol	11 | 15