Title/Name of the area: Madeira – Tore

Presented by

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Abstract (*in less than 150 words)*

Madeira-Tore EBSA includes a total of 17 seamounts. Seamounts are hotspots of marine life and in general they represent areas of an enhanced productivity, especially when compared with nearby abyssal areas. This EBSA has a total area of 197431 km^2 with depths ranging from 25m (top of Gettysburg seamount) to 4930m (bottom of Tore seamount). The area includes a proposed Site of Community Importance - Gorringe Bank and an OSPAR High Seas Marine Protected Area – Josephine seamount. All structures included in the Madeira-Tore EBSA fulfill four or more out of the seven EBSA scientific criteria. A total of 965 species are present in this EBSA of which 7% are protected under international or regional law.

Introduction

(To include: feature type(s) presented, geographic description, depth range, oceanography, general information data reported, availability of models)

The Madeira-Tore EBSA includes a total of 17 seamounts (Ampere, Ashton, Coral Patch (northern part of), Dragon, Erik, Gago Coutinho, Godzilla, Gorringe Bank (Ormond and Gettysburg seamounts), Hirondelle II, Josephine, Lion, Pico Pia, Tore, Seine, Sponge Bob, and Unicorn). These seamounts present particular features which make this area eligible as an EBSA when assessed against the EBSA scientific criteria.

Benthic biological communities on seamounts are highly vulnerable to human activities. Many benthic species are long-lived and slow-growing, and not resilient to human impacts. Seamounts can act as EBSA (Convention on Biological Diversity, 2008).

Seamounts are defined as isolated topographic features of the seabed that have a limited lateral extent and rise more than 1000m from abyssal depths (Menard, 1964). Large seamounts usually originate as volcanoes and are primarily associated with intraplate hotspots and mid-ocean ridges (Staudigel *et al.*, 2010). Generally, seamounts topography may act as an element to turn the structures in high complexity sites. Due to their more or less isolated location, these structures can be an obstacle to the free circulation of the oceans. This gives rise to different kinds of phenomena and disturbances, including an increase in the speed of sea currents, upwellings, turbulence, Taylor cones, eddies, and even jets in the zones where the seamounts interact with ocean currents (Richardson et al 2000; Kunze & Llewellyn Smith, 2004; White *et al.*, 2007; Pakhorukov, 2008).

Seamounts are hotspots of marine life (*e.g.* Rogers, 1994; Gubbay, 2003; Morato & Pauly, 2004; Pitcher *et al.*, 2007, 2010; Mendonça *et al.*, 2012), and in general represent areas of enhanced productivity in comparison with nearby abyssal areas. In most cases, around the seamounts there is an extensive anticyclonic eddy associated with the lifting of nutrients from the rich deep water, giving rise to high concentrations of nitrates and chlorophyll in shallow waters (Coelho & Santos, 2003), which encourages the development of a wealth of flora and fauna on the structures, leading to exposed hard substrates and improved food conditions for epibenthic suspension feeders (*e.g.* Cartes *et al.*, 2007 a), b); Genin & Dower 2007) such as cold water corals or deep water sponges (*e.g.* Samadi *et al.*, 2007; Sánchez *et al.*, 2008), tunas (*e.g.* Yasui 1986; Morato *et al.*, 2010, Ressurreição & Giacomello, 2013), marine mammals (*e.g.* Hiu 1985; Cañadas *et al.,* 2002; Correia *et al.,* 2015), and other organisms which apparently feed on prey aggregations (*e.g.* Boehler and Sasaki, 1988; Porteiro and Sutton, 2007; Tabachnick & Menchenina, 2007). Seamounts are biologically distinctive habitats of the open ocean exhibiting a number of unique features (Rogers, 1994; Probert, 1999; Morato & Clark, 2007). These structures can host very distinctive biological communities that are different to the communities on nearby soft sediment dominated abyssal plain, and these particular places may attract pelagic fish including larger, commercially valuable species and other marine top predators such as loggerhead sea turtles (*Caretta caretta*) and marine mammals (*e.g.* Holland & Grubbs, 2007, Kaschner, 2007, Santos et. al., 2007).

The Madeira-Tore EBSA is located ∼700 km off the NW African coast and forms a prominent NE trending submarine ridge in the central east Atlantic that rises from ∼5000m water depths to as shallow as 25m below sea level. The complex is bounded by abyssal plains to the east (Tagus and Horseshoe abyssal plains) and south (Madeira abyssal plain) and by a number of large isolated seamounts on its western side (Dragon, Lion, Josephine, Gago Coutinho, Ashton, Sponge Bob and Tore) and the Madeira Islands to the southwest. The northern termination of the Madeira-Tore EBSA is formed by the active Azores Gibraltar Fracture Zone system (“Gloria Fault”) that is part of the Africa-Eurasia plate boundary (Jiménez-Munt *et al.*, 2001). On the basis of morphology, the main fault zone seems to cut the northern part of the EBSA near Josephine Seamount and continues along the Gorringe Bank to the Iberian continental rise. A zone of diffuse seismicity, however, suggests that interaction between the African and Eurasian plates in this region is occurring over a broad zone rather than along a distinct boundary (Peirce and Barton, 1991). South of the Azores-Gibraltar Fracture Zone, the EBSA forms a broad plateau with several large seamounts on its eastern flank (Josephine, Erik, Lion, and Dragon seamounts) (Figure 1).

All structures (Figure 2) included in the Madeira-Tore EBSA fulfill at least one EBSA Criteria. There are differences in the level of knowledge between structures included in the EBSA but all of them have information or potential. For example seamounts like Ampere, Coral Patch, Gorringe Bank and Josephine have more information than others (Table 1) included in the EBSA, due to a greater sampling effort. The majority of the older research was focused on geology.

Table 1 – resume of the Madeira-Tore structures, EBSA scientific criteria fulfilled by each structure (Crit 1 (Uniqueness or rarity), 2 (Special importance for life-history stages of species, 3 (Importance for threatened, endangered or declining species and/or habitats), 4 (Vulnerability, fragility, sensitivity, or slow recovery), 5 (Biological productivity), 6 (Biological diversity) and 7 (Naturalness). Nº sps – total number of species in each structure. Nº refs - total number of references in each structure. n.i. – No information available.

Structures	**Crit 1**	**Crit 2**	**Crit 3**	**Crit 4**	**Crit 5**	**Crit 6**	**Crit 7**	**Nº sps**	**Nº Refs**
Ampere seamount	√	√	√	√	√	√		319	28
Ashton seamount	√		√	√	√	√	√	12	6
Coral Patch seamount	√	√	√	√		√	√	38	12
Dragon seamount	√			√	√	√	√	n.i.	4
Erik seamount	√			√		√	√	n.i.	3
Gago Coutinho seamount	√			√		√	√	n.i.	1
Gorringe bank	√	√	√	√	√	√		656	55
Godzilla seamount	√			√		√	√	n.i.	3
Hirondelle II seamount	√		√	√		√	√	4	1
J-Anomaly ridge	√			√		√	√	n.i.	1
Josephine seamount	√	√	√	√	√	√		207	36
Lion seamount	√	√		√		√	√	23	11
Pico Pia seamount	√			√		√	√	n.i.	2
Seine seamount	√	√	√	√	√	√	√	315	31
Sponge Bob seamount	√			√		√	√	n.i.	1
Toblerone ridge	√			√		√	√	n.i.	1
Tore seamount	√			√	√	√	√	1	6
Unicorn seamount	√	√	√	√	√	√		33	9

In terms of geology the structures of the proposed area have a different composition, location and different ages (Geldmacher *et al.*, 2000, 2001, 2005).

Seine seamount is located 200 km NE of Porto Santo, rising from more than 4000m to less than 200m water depths. This round seamount has steep sides and a characteristic flat top.

Unicorn seamount lies 100 km north of Seine Seamount.

Ampere and Coral Patch seamounts are located 190 km NE of Seine seamount. Bathymetric data show that the shape of Ampere seamount is also similar to a guyot with a summit that extends to 59 m below sea level (Litvin *et al.,* 1982; Marova & Yevsyukov, 1987). Alkaline nepheline basaltoids have been described from two short drill holes on the top of the seamount (Matveyenkov *et al.,* 1994). The neighboring Coral Patch seamount forms an elongated E–W oriented structure rising up to 900 m below sea level.

Gorringe Bank is 250 km long, which lies along the Azores-Gibraltar fracture zone (the Eurasia-African Plate boundary) and belongs to the 'Horseshoe' submarine chain. Contrary to other volcanic seamounts of the chain it consists chiefly of mantle ultrabasic rocks (Ryan *et al.,* 1973). It is dominated by two summits, the Gettysburg (west) and Ormonde (east) seamounts, which almost reach the sea surface. The two summits are separated by a 800m deep saddle and raise until 30–40m from the sea surface. Except for the Ormonde summit, the rest of Gorringe Bank consists primarily of altered tholeiitic basalt and serpentinized peridotite (Auzende *et al.,* 1978; Matveyenkov *et al.,* 1994). This bank represents a notable site where a section of lower oceanic crust and mantle is exposed. Other peculiarity resides in the extremely elevated bathymetric gradient occurring between the summit of the bank and the surrounding Tagus and Horseshoe Abyssal Plains located at 5000m depth (Alteriis *et al.,* 2003).

Josephine seamount can be considered as the first seamount discovered as a direct result of oceanic explorations (Brewin *et al.,* 2007) and has been studied in several scientific expeditions. Josephine seamount is one of Lusitanian seamounts and represents the westernmost point of east-west trending series of banks and seamounts separating the Tagus and Horseshoe Abyssal Plains also known as Horseshoe seamount chain. It is located to the east of the Mid-Atlantic Ridge and is a component of the Azores-Gibraltar complex (Pakhorukov, 2008). It is oval-shaped with a minimum water depth of 170 m at the southern end and almost flat top surface of ~150 km^2 within the 400m depth contour and ~210 km^2 within the 500m depth contour. There are very steep south, south-west and south-east slopes down to water depths of 2000-3700m. Towards the NNW the seamount extends into northward sloping ridge about 1000m deep. The seamount was originated in Middle Tertiary as an island volcano that became extinct approximately 9 million years ago and has a subsidence rate of ~ 2-3 cm/1000 years.

Ampere seamount is part of the Horseshoe Seamounts Chain and it is located between the island of Madeira and the Portuguese southern coast, to the west of the Exclusive Economic Zone of Morocco. Ampere rises from a depth of ca. 4500 to 59 m below the surface. It is separated from the neighboring Coral Patch seamount by a deep valley of 3400m depth. The seamount has a conical shape with an elongated base and a small, rough summit plateau at 110–200m, with a single narrow peak reaching to 59 m. The slopes are steep and rocky with canyon-like structures particularly at the northern, eastern and southern sides (Halbach et al. 1993; Kuhn et al. 1996; Hatzky 2005), but sediment-covered flat areas exist as well.

The Coral Patch seamount was discovered in 1883 during an expedition for laying telegraph cable between Cádiz and the Canary Islands (Buchanan, 1885). Buchanan (1885) remarks that a dredge from 970m water depth revealed many fragments of the crinoid *Neocomatella pulchella* (Pourtales, 1878) and a large quantity of live occurrences of the coldwater coral *Lophelia pertusa*, the latter findings presumably giving the inspiration for the geographic name. Coral Patch is a sub-elliptical ENE-WSW elongated seamount, about 120 km long and 70 km wide (D'Oriano *et al.*, 2010). Bathymetric and seismic data show that Coral Patch is a composite structure as it originates from a pre-existing sedimentary structural high that extends to a water depth of up to 2500m (Zitellini *et al.*, 2009) while on the upper part of the seamount volcanic edifices are emplaced (D'Oriano *et al.*, 2010). Eight distinct coalescent volcanic cones were identified to cluster on the southwestern top of Coral Patch seamount, while in the NE a single isolated cone of 8 km in diameter is developed (called Vince volcano; D'Oriano *et al.*, 2010).

Seamounts are locations for a broad range of current-topography interactions and biophysical coupling, with implications for both phyto and zooplankton. Seamounts appear to support relatively large planktonic and higher consumer biomass when compared to surrounding ocean waters, particularly in oligotrophic oceans. It has been a widely held view that *in situ* enhancement of primary production fuels this phenomenon, but this has recently been challenged (Genin & Dower 2007).

Productivity in oceanic settings depends on light and nutrient availability, while overall production is the result of productivity and accumulation of the phytoplankton. At a seamount, either a seamount-generated, vertical nutrient flux has to be shallow enough to reach the euphotic zone and the ensuing productivity retained over the seamount long enough to allow transfer to higher trophic levels, or the seamount must rely on allochthonous inputs of organic material to provide a trophic subsidy to resident populations (Clark *et al.*, 2010).

In terms of biology, the structures have a relatively small number of studies. A total of 965 species is identified all over the EBSA (see feature description of the proposed area). Although seamounts are ecologically important and abundant features in the world's oceans (Hillier & Watts, 2007), biological research on seamounts has been rare (Consalvey *et al.*, 2010).

Location

(Indicate the geographic location of the area/feature. This should include a location map. It should state if the area is within or outside national jurisdiction, or straddling both.)

The Madeira-Tore EBSA is located in the Atlantic Ocean (Figure 3) and the polygon is defined by 26 points, see Table 2. The datum used is World Geodetic System 1984 (WGS84).

Table 2 – Coordinate (X, Y) and Point (X, Y) corresponding to the vertices of the polygon that defines de Madeira-Tore EBSA area

Vertices	Point (X)	Point (Y)	Coordinate (X)	Coordinate (Y)
1	-10,78412204750	37,41282592230	10° 47' 2,839" W	37° 24' 46,173" N
2	-10,36140031970	37,14775660190	10° 21' 41,041" W	37° 8' 51,924" N
3	-10,30061815410	36,40609631810	10° 18' 2,225" W	36° 24' 21,947" N
4	-11,54178462270	35,82664926560	11° 32' 30,425" W	35° 49' 35,937" N
5	-12,34720852460	35,86752382000	12° 20' 49,951" W	35° 52' 3,086" N
6	-14,09668145850	35,86956765170	14° 5' 48,053" W	35° 52' 10,444" N
7	-14,20440676570	35,46583663810	14° 12' 15,864" W	35° 27' 57,012" N
8	-13,61929025320	35,24920143450	13° 37' 9,445" W	35° 14' 57,125" N
9	-12,45599288130	35,60380569240	12° 27' 21,574" W	35° 36' 13,700" N
10	-11,00669030540	35,48803548040	11° 0' 24,085" W	35° 29' 16,928" N
11	-11,00669030540	34,97245166170	11° 0' 24,085" W	34° 58' 20,826" N
12	-11,66657670000	34,91594670000	11° 39' 59,676" W	34° 54' 57,408" N
13	-12,27663790000	34,94888410000	12° 16' 35,896" W	34° 56' 55,983" N
14	-12,94233128480	34,80178379610	12° 56' 32,393" W	34° 48' 6,422" N
15	-13,93098136950	33,72656498090	13° 55' 51,533" W	33° 43' 35,634" N
16	-14,43292650180	33,52139899400	14° 25' 58,535" W	33° 31' 17,036" N
17	-17,54777045230	34,34262149180	17° 32' 51,974" W	34° 20' 33,437" N
18	-17,56475831490	35,18898118290	17° 33' 53,130" W	35° 11' 20,332" N
19	-16,15598386020	36,37201723670	16° 9' 21,542" W	36° 22' 19,262" N
20	-16,14847475890	36,88215087210	16° 8' 54,509" W	36° 52' 55,743" N
21	-15,15628451950	37,73812613930	15° 9' 22,624" W	37° 44' 17,254" N
22	-14,28645992790	37,97115828810	14° 17' 11,256" W	37° 58' 16,170" N
23	-13,52024533110	39,46788555050	13° 31' 12,883" W	39° 28' 4,388" N
24	-12,66150018240	39,00253692540	12° 39' 41,401" W	39° 0' 9,133" N
25	-13,06745495460	36,85653531250	13° 4' 2,838" W	36° 51' 23,527" N
26	-12,30030626900	36,85415214800	12° 18' 1,103" W	36° 51' 14,948" N

The Madeira-Tore EBSA includes 19 remarkable structures where 17 are seamounts. The EBSA area is totally located under Portuguese national jurisdiction (Figure 4), including the EEZ (seabed and water column) and the extended continental shelf (seabed).

Feature description of the proposed area

(This should include information about the characteristics of the feature to be proposed, e.g. in terms of physical description (water column feature, benthic feature, or both), biological communities, role in ecosystem function, and then refer to the data/information that is available to support the proposal and whether models are available in the absence of data. This needs to be supported where possible with maps, models, reference to analysis, or the level of research in the area)

The knowledge of the Madeira-Tore EBSA area is based on the analysis of 220 scientific articles containing relevant information about the proposed area. Several of the seamounts are well known with a great number of geological and biological studies. The total number of 965 species reported was estimated from scattered taxonomical literature and the species number is probably underestimated. The knowledge of each structure is not even and it is possible to observe these differences in table 1. In the same table it is also possible to evaluate how many EBSA scientific criteria each structure meet.

Around of 7% of the 965 species identified in all seamounts on this EBSA, are under some type of legal protection or threatened status from CITES, IUCN Red List, European Union Habitats and Birds Directives, VMEs, Bern Convention and OSPAR Convention. For example OSPAR identified as endangered or declining the reptiles *Dermochelys coriacea* and *Caretta caretta* (turtles), bone fish orange roughy, *Hoplostethus atlanticus*, the cetaceans *Balaenoptera musculus*, *Delphinus delphis*, *Tursiopsis truncatus*, the deep water sharks, *Centroscymus coeleopsis*, *Centrophorus granulosus*, *Centrophorus niaukang*, *Centrophorus squamosus*, *Rostroraja alba*, *Lamna nasus* and the seabirds *Calonectris diomedea*, *Puffinus gravis*, *Puffinus griseus*, *Puffinus puffinus*, *Puffinus mauretanicus*, *Hydrobates pelagicus*, *Oceanodroma castro*, *Oceanodroma leucorhoa*, *Stercorarius parasiticus*, *Stercorarius skua*, *Uria aalge* and *Phalaropus fulicarius*. Other examples of species with legal protection (CITES Appendix II) are the corals *Antipathes dichotoma*, *Caryophyllia smithii*, *Caryophyllia abyssorum*, *Caryophyllia cyathus*, *Caryophyllia sarsiae*, *Coenosmilia fecunda*, *Deltocyanthus eccentricus*, *Deltocyanthus moseleyi*, *Paracyathus arcuatus*, *Paracyathus pulchellus*, *Pennatula phosphorea*, *Pteroeides griseum*, *Lophelia pertusa*, *Balabophyllia cellulosa*, *Dendrophyllia cornigera*, *Flabellum alabastrum*, *Flabellum chunii*, *Fungiacyathus crispus*, *Funiculina quadrangularis*, *Stenocyathus vermiformi*s, *Deltocyathoides stimpsonii*, *Peponocyathus folliculus* e *Peponocyathus stimpsoni*, among others. *Centrostephanus longispinus*, *Scyllarides latus*, *Chelonia mydas* and *Caretta caretta* are protected by the EU Habitats Directive and *Ranella olearia* and *Tonna galea* are protected by Annex II of the Bern Convention.

The species studied in the EBSA belong to several phylum, class or order (figure 5). The category “others” includes acari, ctenophore, nudibranchia, reptilia, sea-birds, Sipuncula and scyphora.

The Madeira-Tore EBSA includes various species of scleractinians and gorgonians. In some seamounts the gorgonian and sponge species were reported to form dense gorgonian coral habitat-forming aggregations of *Callogorgia verticillata* and *Elisella flagellum* which may represent important feeding and sheltering grounds for seamount fishes and also potential shark nurseries (WWF, 2001; Etnoyer & Warrenchuk, 2007; OSPAR, 2011). Cold water, deep, habitat forming corals can shelter higher megafauna in association to the corals than other habitats without corals community (Roberts et al, 2006; Mortensen et al, 2008, Rogers et al, 2008). Seamounts also harbour large aggregations of demersal or benthopelagic fish (Koslow, 1997; Morato and Pauly, 2004; Pitcher *et al.*, 2007; Morato *et al.*, 2009, 2010).

Feature condition and future outlook of the proposed area

(Description of the current condition of the area – is this static, declining, improving, what are the particular vulnerabilities? Any planned research/programmes/investigations?)

The unique ecosystems of seamounts are highly vulnerable and sensitive to external actions. Most of the fauna found on seamounts are long-lived, slow-growing organisms with low fecundity and natural mortality, so called K-selected species (Brewin *et al.*, 2007). Recruitment events of long-lived seamount fauna seem to be episodic and rare (Brewin *et al.*, 2007). The type of gear (usually rock-hopper trawls) used to fish over the rough and rocky substrata that can be found on seamounts is particularly destructive of benthic habitat, destroying the very long lived and slow-growing sessile suspension feeding organisms that dominate these habitats (Brewin *et al.*, 2007). Benthic seamount communities are highly vulnerable to the impacts of fishing because of their limited habitat, the extreme longevity of many species, apparently limited recruitment between seamounts and the highly localized distribution of many species (Richer de Forges *et al.*, 2000; Samadi *et al.*, 2006; Samadi *et al.*, 2007).

In a few decades, fishermen attention has been drawn to the high abundances of commercially valuable fish species in many seamounts (Koslow, 1997). The reasons for the fish aggregations can be explained by the hypotheses that seamount areas can be ‘‘meeting points’’ of usually dispersed fishstocks, for example to aggregate for spawning, or that an enhanced food supply caused by special current conditions is the basis for locally maintaining large fish stocks. The importance of seamounts for fisheries is very well documented (Boehlert & Sasaki, 1988, Koslow, 1997, Morato *et al.*, 2006). The fishery for horse mackerel (Trachurus trachurus, Carangidae), mackerel (Scomber sp., Scombridae), and scabbardfish (family Trichiuridae) and orange roughy (*H. atlanticus*) has been operating in the seamounts of the EBSA. There are some types of fishing techniques that can trawl corals out of the ocean and their age can be estimated over the 300 – 500 years (Tracey *et al.*, 2003; Samadi *et al*., 2007). Structural deep-sea sponge habitat is also vulnerable to bottom fishing and has been shown to suffer immediate declines in populations through the physical removal of sponges, which then reduces the reproductive potential of the population, thereby reducing recovery capacity or even causing further declines (Freese, 2001). Experimental trawling over sponge communities in Alaska showed that one year after the experiment, individuals within the community showed no sign of repair or growth and there was no indication of the recovery of the community (Freese *et al.*, 1999).

In 2010 the Ministerial Meeting of the OSPAR Commission adopted the OSPAR Decision 2010/5 to establish a High Seas Marine Protected Area (MPA) in the water column above Josephine seamount. Latter, in 2015, Portugal designated Gorringe Bank as a national site and is about to propose it as an European Union Site of Community Importance.

Assessment of the area against CBD EBSA Criteria

(Discuss the area in relation to each of the CBD criteria and relate the best available science. Note that a proposed area for EBSA description may qualify on the basis of one or more of the criteria, and that the polygons of the EBSA need not be defined with exact precision. And modeling may be used to estimate the presence of EBSA attributes. Please note where there are significant information gaps)

<table>
<tr><td rowspan="2">CBD EBSA Criteria
(Annex I to decision IX/20)</td><td rowspan="2">Description
(Annex I to decision IX/20)</td><td colspan="4">Ranking of criterion relevance
(please mark one column with an X)</td></tr>
<tr><td>No information</td><td>Low</td><td>Medium</td><td>High</td></tr>
<tr><td>Uniqueness or rarity</td><td>Area contains either (i) unique (“the only one of its kind”), rare (occurs only in few locations) or endemic species, populations or communities, and/or (ii) unique, rare or distinct, habitats or ecosystems; and/or (iii) unique or unusual geomorphological or oceanographic features.</td><td></td><td></td><td></td><td>X</td></tr>
<tr><td colspan="6">The Madeira-Tore EBSA includes 17 seamounts. Seamounts are defined as isolated topographic features of the seabed. They present different genesis and ages.
Large seamounts usually originate as volcanoes and are primarily associated with intraplate hotspots and mid-ocean ridges, being singular and rare in the middle of the ocean. The seamounts are considered to support a relative higher biomass and a higher biodiversity than surrounding open ocean ecosystems and are recognized as “hotspots” of marine life (see introduction). The seamounts have an important role in the colonization and dissemination of species. Seamounts have been considered as stepping stones, vicariant pathways, and points of endemic isolation (Lea and Bouchet, 1991; Keppel, 2009).
The Gorringe Bank lies along the Azores-Gibraltar fracture zone (the Eurasia-African Plate boundary) and belongs to the ‘Horseshoe’ submarine chain. Contrary to other volcanic seamounts of the chain it consists chiefly of mantle ultrabasic rocks (Alteriis et al., 2003).
Coral Patch have a unique composite structure as it originates from a pre-existing sedimentary structural high that extends to a water depth of up to 2500m, while on the upper part of the seamount volcanic edifices are emplaced (Wienberg et al., 2013).
Josephine seamount is one of Lusitanian seamounts and represents the westernmost point of east-west trending series of banks and seamounts separating the Tagus and Horseshoe Abyssal Plains also known as Horseshoe seamount chain. It is located to the east of the Mid-Atlantic Ridge and is a component of the Azores-Gibraltar complex (Laughton & Whitmarsh, 1974; Gente et al., 2003).
Ampere, Gorringe, Josephine and Seine house two particular habitats: hard substrata at depths where the mainland slope is usually covered by silt and clay from the continent, and bioclastic sand formed by the shells of pelagic organisms on the seamount plateau (Surugiu et al., 2008).
The seamounts Ampere and Gorringe Bank have small peaks, reaching the photic zone at depths of 60 and ca. 25–40 m. The photic zone habitat is very unique in the middle of the ocean (Rowden et al., 2010).</td></tr>
<tr><td>Special importance for life-history stages of species</td><td>Areas that are required for a population to survive and thrive.</td><td></td><td></td><td>x</td><td></td></tr>
</table>

The area of Madeira-Tore contains a high number of species associated to the structures, particularly to the seamounts (see Feature description of the proposed area). Species present different characteristics. A number of species present are considered as a local aggregation and are classified as resident or transient. The former type indicates an aggregation of individuals that have lived for a long time (> week) at the same site, while the latter refers to ephemeral (< week) accumulations that disperse once the accumulation mechanism ceases to operate. A special case of transient accumulation is that of highly mobile animals (*e.g.*, birds, marine mammals) that follow accumulations (resident or transient) of planktonic prey. Most noteworthy trends are: many seamounts harbor resident aggregations of demersal fish, open-ocean, migrating species (Genin & Dower, 2007).

The tremendous productivity of these EBSA seamount structures features means that they can be used by migratory species (highly mobile animals) or those with a wide area of distribution as places for feeding or spending key periods in their lifecycles, such as mating and reproduction. For example in the Coral Patch, Gorringe bank, Josephine and Unicorn are a vital stopping point for certain migratory species of whales and cetaceans, including sperm whales (*e.g. Physeter microcephalus*), fin whales (*e.g. Balaenoptera acutorostrata*), striped (*e.g. Stenella coeruleoalba*) and bottlenose dolphins (*e.g. Tursiops truncates*). The Ashton, Gorringe bbank, Seine and other seamounts receive many species of seabirds that use these places to alimentation (*e.g. Calonectris diomedea*, *Oceanodroma castro*, *Puffinus gravis*).

Various species at different biological phases (larva, juvenile, adult or reproductive) may visit these marine oases, guided by one of the oceanic currents that cross them. Indeed, it is known that the long–living orange roughy (*Hoplostethus atlanticus*) undertakes migrations of thousands of kilometers to lay its eggs on seamounts Ampere, Coral Patch, Gorringe bank, and Josephine.

Another relevant characteristic to these criteria is the fact that seamounts are very relevant to the aggregation of commercially important fish and shellfish species which use this ecosystem for spawning and as nursery grounds (*e.g.* toothed rock crab (*Cancer bellianus*), devil crab (*Necora puber*) and slipper lobster (*Scyllarides latus*) in the Gorringe bank; spider crab (*Maja brachydactyla*) in Ampere and Gorringe bank. All of the 17 seamounts are "house" for some corals (*e.g. Antipathella wollastoni*, *Antipathes furcate*), molluscs (*e.g. Calliostoma leptophyma*, *Charonia lampas*) and fish species (*Aphanopus carbo*, *Beryx decadactylus*). (see Feature description of the proposed area).

Importance for threatened, endangered or declining species and/or habitats	Area containing habitat for the survival and recovery of endangered, threatened, declining species or area with significant assemblages of such species.				x

Around 7% of the species identified in Madeira-Tore are under some type of legal protection or threatened status from different sources: CITES (*e.g. Balaenoptera acutorostrata* (Cetacean), *Antipathes furcate* (Anthozoa)), IUCN Red List (*e.g. Balaenoptera musculus* (Cetacean)), European Union Habitats (*e.g. Caretta caretta* (Reptilia), *Delphinus delphis* (Cetacean), *Centrostephanus longispinus* (Echinoderms), *Lithothamnion corallioides* (Algae Red), *Scyllarides latus* (Crustacean))

and Birds (*e.g. Calonectris diomedea*) Directives, VMEs (*e.g. Geodia atlantica* (Porifera), *Callogorgia verticillata* (Anthozoa)), Bern Convention (*e.g. Ranella olearium* (Molluscs)) and OSPAR Convention (see Feature description of the proposed area).					
Vulnerability, fragility, sensitivity, or slow recovery	Areas that contain a relatively high proportion of sensitive habitats, biotopes or species that are functionally fragile (highly susceptible to degradation or depletion by human activity or by natural events) or with slow recovery.				x
Benthic biological communities on seamounts are highly vulnerable to human activities. Many benthic species are long-lived and slow-growing, and not resilient to human impacts. Concerns have developed about the vulnerability of the EBSA seamount communities to human impacts, especially with the development of large-scale bottom trawl fisheries in the deep sea in recent decades and the future prospect of seabed mining. The EBSA Madeira Tore polygon contains 68 species of cold-water corals (*e.g. Antipathella wollastoni*; *Caryophyllia smithii*; *Flabellum macandrewi*).These corals are particularly fragile and recover very slowly (Rogers *et al.,* 2007). Other species with some legal protection have characteristic features particularly attending to biological factors such as longevity, low fecundity, and slow growth rates (*e.g.* sharks and rays) (*e.g.*, Clark 2001, Morato et al. 2008). In the EBSA area there are present 28 species of sharks and rays (*e.g. Prionace glauca* (shark), *Manta birostris* (ray)). Nine of the 17 seamount have the presence of anthozoa and elasmobranchii species: Ampere (4 anthozoa and 10 elasmobranchii); Coral Patch (16 anthozoa); Gorringe bank (50 anthozoa and 17 elasmobranchii); Hirondelle II (4 anthozoa); Josephine (24 anthozoa and 15 elasmobranchii); Lion (1 anthozoa and 8 elasmobranchii); Seine (1 anthozoa and 17 elasmobranchii); Unicorn (1 anthozoa and 12 elasmobranchii). In total (%) the EBSA Madeira-Tore contain 12.1 % of the total species as a potential vulnerable, fragile, sensitive and slow recovery Class Anthozoa (7.6%), Subclass Elasmobranchii (2,9%) and Order Cetacea (1.6%) (see Figure 5). There is a high number of threats to the biodiversity of seamounts *e.g.* Rogers (1994), Gubbay (1999), Butler *et al.,* (2001); Koslow *et al.,* (2001). The most significant threat in terms of this EBSA is the geographic spread and scale of impact is undoubtedly commercial fishing. The recovery of vulnerable species, and the assemblages which they form, from human impacts is predicted to be very slow in the deep sea (*e.g.* Roark, *et al.,* 2006; Probert *et al.,* 2007), and the recruitment can be intermittent as a consequence of the also intermittent dispersal between seamount populations (Rogers *et al.,* 2007; Shank, 2010). In the area a big number of commercial species is recognized (fish: *Acantholabrus palloni* - Scale-rayed, *Alepocephalus bairdii* - Baird's slickhead, *Ammodytes tobianus* - Small sandeel, *Antigonia capros* - Deepbody boarfish, *Aphanopus carbo* - Black scabbardfish, *Arnoglossus imperialis* - Imperial scaldfish, *Aulopus filamentosus* - Royal flagfin, *Balistes capriscus* - Grey triggerfish, *Beryx decadactylus* – Alfonsino, *Beryx splendens* - Splendid alfonsino, *Boops boops* – Bogue, *Callanthias ruber* - Parrot seaperch, *Centracanthus cirrus* - Curled picarel, *Centrolabrus trutta* - Emerald wrasse, *Chelidonichthys cuculus* - Red gurnard, *Chlorophthalmus agassizi* - Shortnose greeneye, *Chromis limbata* - Azores chromis, *Coelorinchus caelorhincus* - Hollowsnout grenadier, *Conger conger* - European conger, *Ctenolabrus rupestris* - Goldsinny-wrasse, *Cyttopsis rosea* - Rosy dory, *Epigonus telescopus* - Black cardinal fish, *Gephyroberyx darwinii* - Darwin's slimehead, *Helicolenus dactylopterus* - Blackbelly rosefish, *Hoplostethus atlanticus* - Orange roughy, *Labrus bergylta* - Ballan wrasse, *Lepidopus caudatus* - Silver scabbardfish, *Lepidorhombus whiffiagonis* – Megrim, *Lophius budegassa* - Blackbellied angler, *Lophius piscatorius* - Angler, *Macroramphosus scolopax* - Longspine					

snipefish, *Pagellus bogaraveo* - Blackspot seabream, *Phycis phycis* - Forkbeard, *Pseudocaranx dentex* - White trevally, *Sarda sarda* – Atlantic fish, *Scorpaena maderensis* - Madeira rockfish. The fishing impacts in this area, attending to the biology characteristics can have a slow recovery (*e.g.*, Clark, 2001, Morato *et al.*, 2008) with unknown possibility to total ecosystem recovery. (See Feature condition and future outlook of the proposed area).					
Biological productivity	Area containing species, populations or communities with comparatively higher natural biological productivity.				X
Seamounts are obstacles to the free circulation of the oceans. This gives rise to different kinds of phenomena and a disturbance, including increased speed of sea currents, upwelling, turbulence, Taylor cones, eddies, and even jets in zones where seamounts interact with ocean currents. These oceanographic effects promote the production of food. Nutrients like nitrates and phosphates, which are critical to the growth of phytoplankton, are lifted from the deep to the sunlit surface waters. These nutrients fuel an explosion of planktonic plant and animal growth – biological productivity. Biological production on seamounts is often manifested in dense aggregations of benthopelagic and demersal fish that represent concentrations of high biomass for these species (Genin and Dower, 2007; Pitcher & Bulman, 2007). (See Introduction). Studies with plankton prove that Ampere (Gibson *et al.,* 1993; Martin & Christiansen, 2009; Denda & Christiansen, 2014) Ashton (Paiva *et al.,* 2010; Pingree, 2010), Dragon (Martin & Christiansen, 2009), Gorringe bank (Bett, 1999; Coelho & Santos, 2000; White *et al.,* 2007), Josephine (Hesthagen, 1970; Synnes, 2007; Paiva *et al.,* 2010), Seine (Christiansen *et al.,* 2009; Martin & Christiansen, 2009; Hirch & Christiansen, 2010; Mendonca *et al.,* 2010) Tore (Lebreiro *et al.,* 1997) and Unicorn (Correia *et al.,* 2015) have an high biological productivity.					
Biological diversity	Area contains comparatively higher diversity of ecosystems, habitats, communities, or species, or has higher genetic diversity.				X
These are poorly known environments, like much of the deep sea, in terms of their biodiversity. Like other seamounts, these EBSA structures have been conceptualized as habitat 'islands' in the deep-sea because of their elevated topographies and high biomass and biodiversity compared to surrounding benthic and pelagic habitats (McClain, 2007). It is well known that the EBSA structures are hotspots of biodiversity and the EBSA Madeira-Tore structures have a high species diversity, with 965 different species registered with some of them new to science. The likelihood that the number of species present is far greater than the number currently recorded (Gubbay, 2003; Clark & Bowden, 2015). Records tell us that most of the structures included in the EBSA (see Table 1) harbor a rich benthic fauna typically dominated by suspension-feeding organisms, of which cold-water corals and sponges are the dominant elements. The structures host also large aggregations of demersal or benthopelagic fish. In the Ampere, Gorringe bank, Josephine and Seine there are evidence of a great diversity, with record of midwater fish as major predators of zooplankton, For example, the hatchetfish *Argyropelecus aculeatus* is equally abundant over the slopes of Ampere, Gorringe bank, Josephine and Seine seamounts (Pusch *et al.,* 2004), which probably form an important trophic link to higher predators (*e.g. Seriola rivoliana* almaco jack), including squids (*e.g. Taningia danae* Dana octopus squid), piscivorous fishes (*e.g. Thunnus thynnus* Atlantic bluefin tuna), seabirds (*e.g. Calonectris diomedea* Cory's shearwater), and marine mammals (*Physeter microcephalus* Sperm whale) present in the most of the structures in Madeira-Tore EBSA area. (see Introduction and Feature description of the proposed area).					

<table>
<tr><td>Naturalness</td><td>Area with a comparatively higher degree of naturalness as a result of the lack of or low level of human-induced disturbance or degradation.</td><td></td><td>X</td><td></td><td></td></tr>
<tr><td colspan="6">Naturalness was evaluated as lack of known bottom-contact fishing for individual seamounts. Data on the distribution of bottom trawling was sourced from a number of national databases, and from scientists that had access to unpublished data (Clark et al., 2007; Bensch et al., 2008). Where it was not possible to resolve catches to individual seamounts, data were amalgamated for 1° latitude/longitude cells (Clark & Tittensor, 2010).
From a total of 17 seamounts structures, 5 have an active fishing activity (Ampere, Gorringe bank (Gettysburg and Gorringe), Josephine and Unicorn), while the remaining structures do not have official information about fishing (See Table 1). Seamount fisheries have typically proven difficult to research and manage sustainably. Many deep-sea commercial species have characteristics that generally make them more vulnerable to fishing pressure than shallower shelf species. They can form large and stable aggregations over seamounts for spawning or feeding, which enables very large catches and rapid depletion of stock size (Clark et al., 2010).</td></tr>
</table>

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(e.g. relevant documents and publications, including URL where available; relevant data sets, including where these are located; information pertaining to relevant audio/visual material, video, models, etc.)

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Maps and Figures

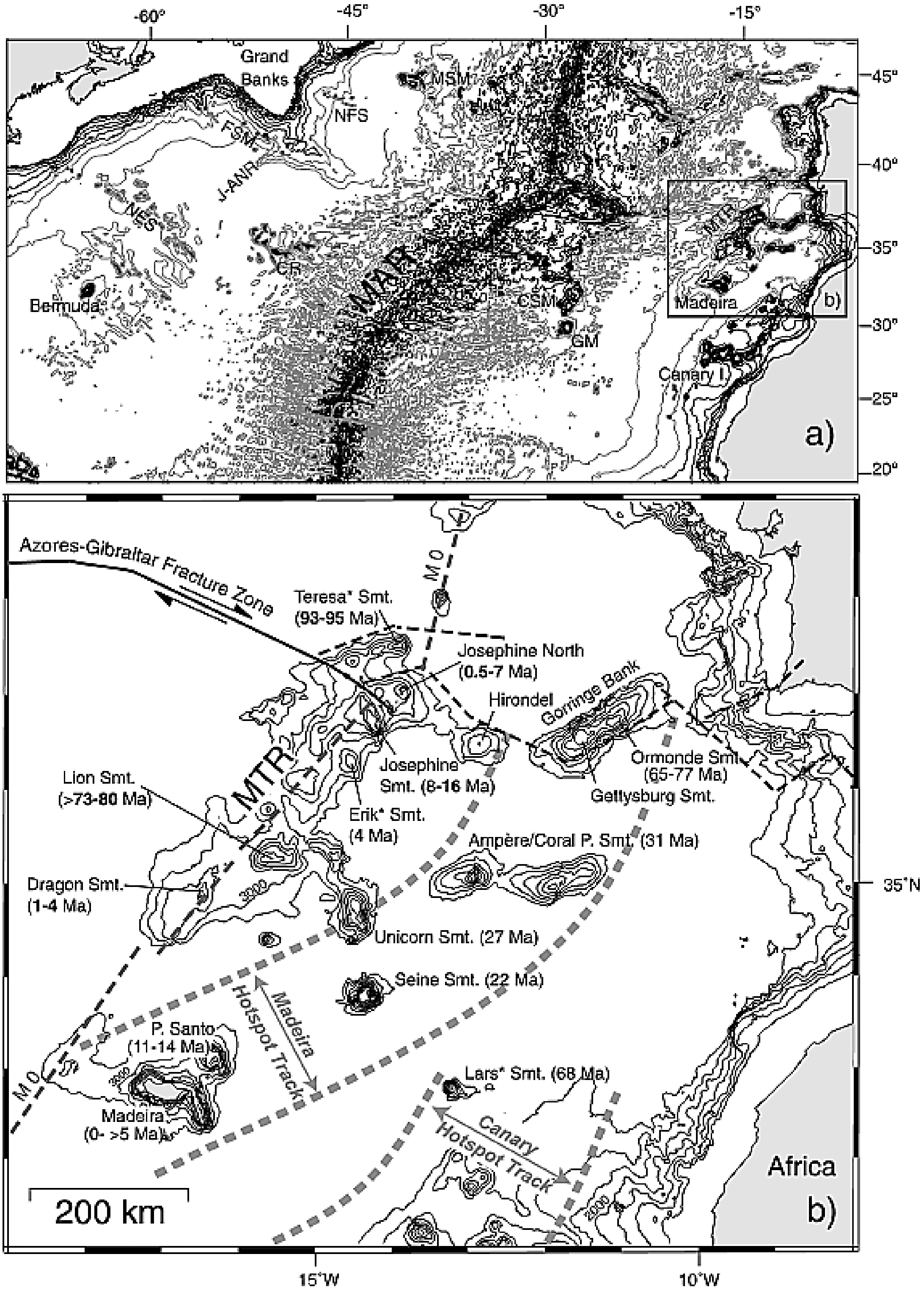

Figure 1 - Adapted from Geldmacher *et al.*, 2006. (a) Bathymetric map of the central Atlantic. MAR, Mid-Atlantic Ridge; NFS, Newfoundland seamounts; MSM, Milne seamounts; FSM, Fogo seamounts; J-ANR, J-Anomaly Ridge; NES, New England seamounts; CR, Corner Rise; CSM, Cruiser seamounts; GM, Great Meteor Seamount; MTR, Madeira-Tore Rise. Source is GEBCO (Intergovernmental Oceanographic Commission *et al.*, 1994), 500 m depth intervals, to highlight prominent structures depths contours below 3500 m are shown in gray). (b) Bathymetric map of the Madeira-Tore Rise (MTR) and neighboring seamounts of the Madeira and Canary hot spot track (framed with heavy gray dashed lines) from TOPEX (Smith and Sandwell, 1997). Only depth contours

above 3500 m are shown for clarity. Ages determined in this study for individual MTR seamounts are shown in bold. For all other age data, see Geldmacher et al. (2005) for reference.

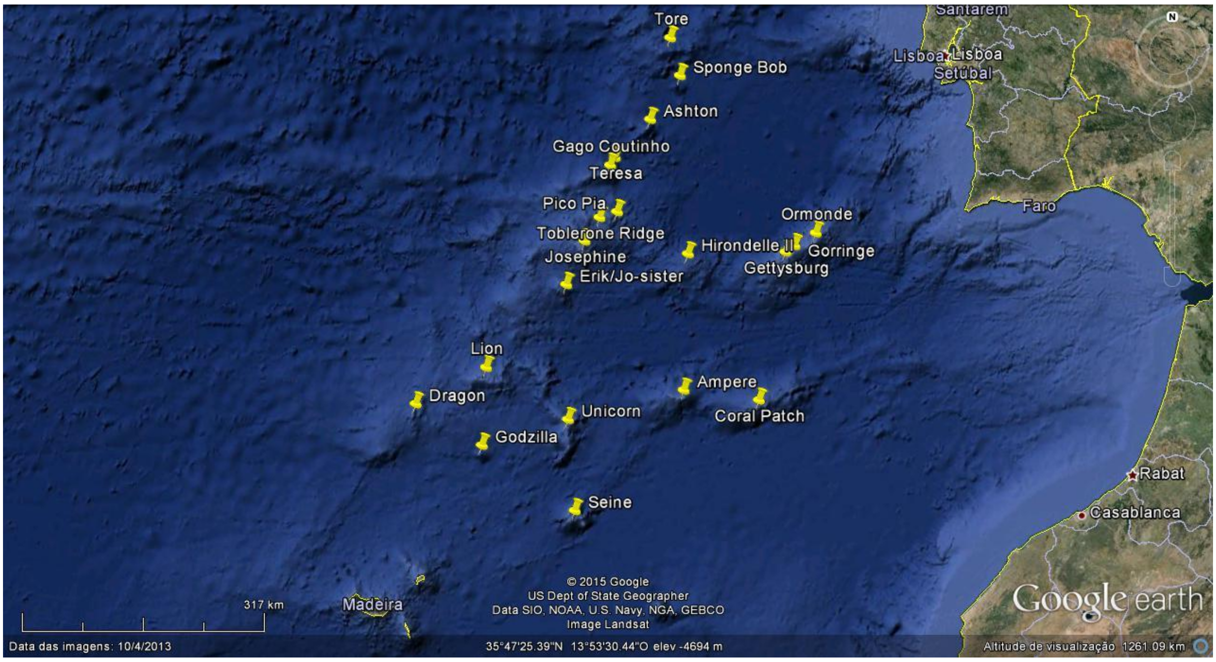

Figure 2 – Structures included in Madeira-Tore EBSA area

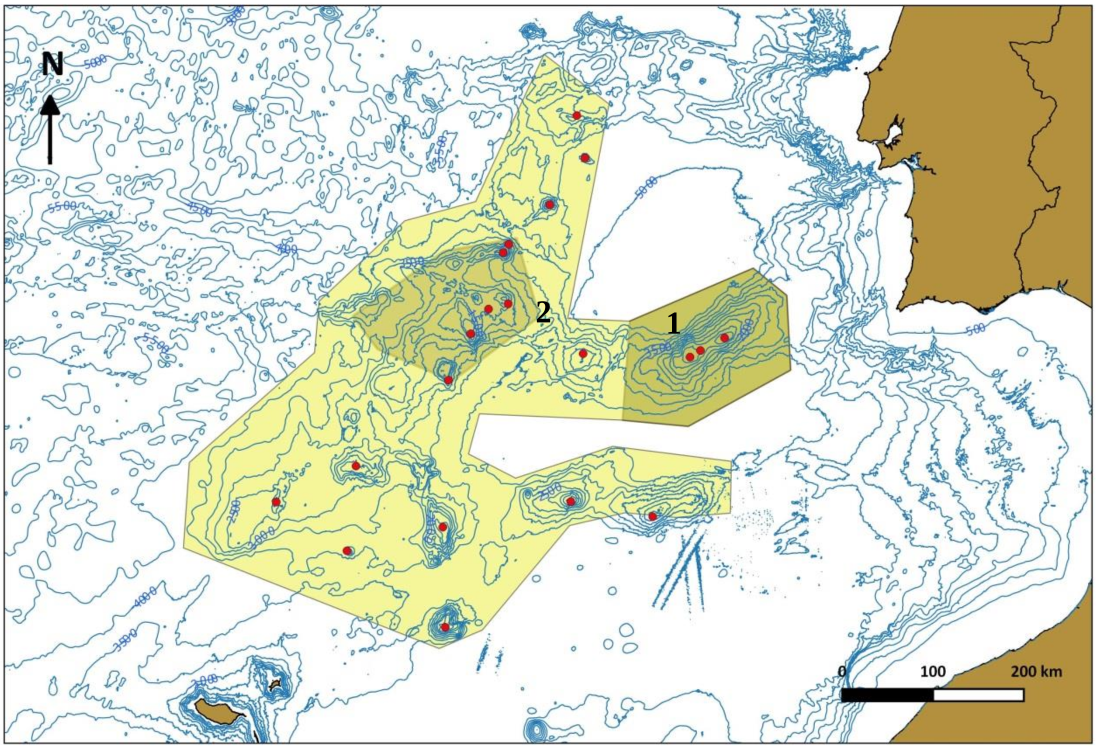

Figure 3 - Madeira-Tore EBSA. Yellow shadow - EBSA area. Light brown shadows 1 - pSCI - Gorringe Bank; 2 - OSPAR High Seas MPA - Josephine seamount (only water column.

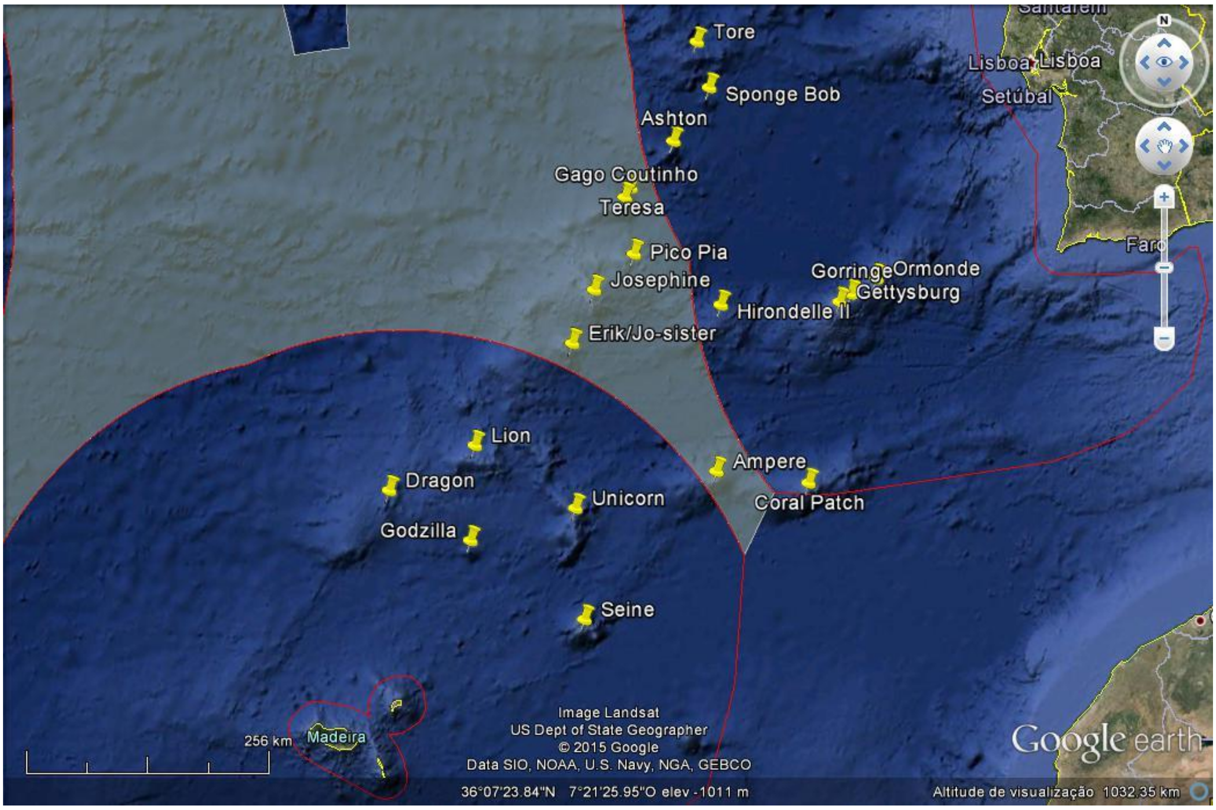

Figure 4 – Structures included in the Madeira-Tore EBSA. The grey area inside the red lines show the extended continental shelf while the blue area, red the lines show the exclusive economic zone.

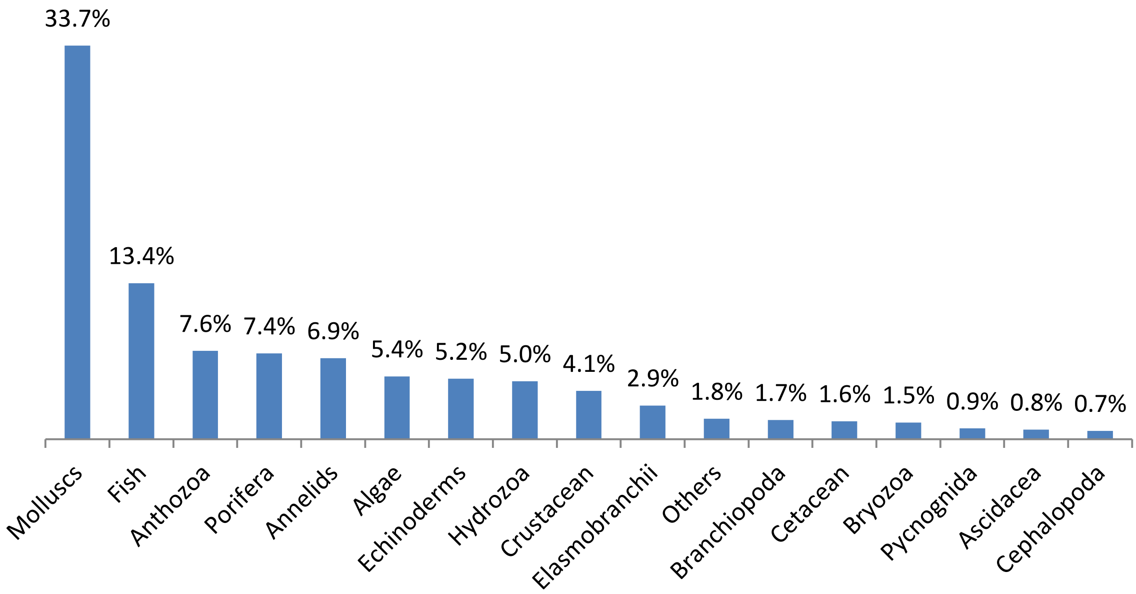

Figure 5 - Relative frequency (%) of the different phylum/class/order of the species identified in the Madeira-Tore EBSA.

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