Devonian-Lower Carboniferous period, is formed from sedimentary rocks (siliceous schists, wine-coloured schists, shales with nodules and black shales, cherts and jaspers), acid volcanic rocks (lavas, felsic-volcanic breccias and dykes) and basic volcanic rocks (lavas, breccias and dykes). The sulphide deposits (mass and vein mineralisation) occur in felsic-volcanic rocks and black shales affected by hydrothermal alteration.

**Fossils and microfossils from the Iberian Pyrite Belt Devonian and Carboniferous periods**
The study of fossils and microfossils of a region, opens a window in the geological time, making it possible to date sedimentary rocks accurately. Fossils are important for establishing palaeogeographical, palaeoclimatic and palaeoenvironmental reconstructions. It is possible to correlate sediments over distances of several kilometres and discover more about how continents were previously positioned and the type of climate that existed on Earth.

In the Pyrite Belt, the most common and abundant fossils are the cephalopods (goniatites) and ancient bivalves (Posidonia becheri) from the Carboniferous period. Microfossils, especially the group of palynomorphs, include microscopic-organic remains of aquatic living beings, algae and acritarchs, as well as spores and pollens from primitive plants that gradually colonised the land. These microfossils are very common in rocks as black shales type, which are rich in organic matter, such as those that can be found interbedded in the ore deposits, of the Pyrite Belt, providing detailed ages.

**How to explore such a vast mining region!**
The rich geological heritage of the Pyrite Belt is visible in its mining areas, but also in well-known regions such as the valleys of the Guadiana, Chanza and Sado rivers and the south-west coast of the Alentejo. Several routes are recommended to the South Alentejo, where geology complements the landscape and where nature and the industrial and archaeological mining heritage are integrated into the urban architecture of the mining towns and villages.

**Region of Lousal and Caveira, Grândola and Sado river valley**
Visit should begin at the Lousal mine, where the Ciência Viva Centre and the Mining Museum are the must see highlights. The open pit with its acid water spring, the mining village and the singing miners in the Central House, the mineworkers’ houses, the hotel (the former home of James Mason), the Cinema-Theatre, the English cemetery, the ruins of the railway workshops and the power plant, as well as the dams and reservoirs of Tapada Pequena and Tapada Grande (with its fluvial beach).

The geological sequence of the South Portuguese Zone of the Iberian Pyrite Belt Devonian and Lower Carboniferous periods includes the Posidonia becheri microfossils, which are typical of this type of ecosystem. At the village of São Domingos, you should make sure to visit the Miner’s House, the mineworkers’ houses, the hotel (the former home of James Mason), the Cinema-Theatre, the English cemetery, the ruins of the railway workshops and the power plant, as well as the dams and reservoirs of Tapada Pequena and Tapada Grande (with its fluvial beach).

The geological sequence of the South Portuguese Zone of the Iberian Pyrite Belt is visible in the valleys of the Guadiana and Chanza rivers. The main rocks can be seen next to the port of Pomarão, while further upstream, along the Guadiana river, there are also a series of mills and weirs and the waterfall of Pulo do Lobo.

**Region of Aljustrel and Castro Verde**
At the Aljustrel Museum and in the Algarve iron cap, next to the Compressed Air Plant, it is possible to find some of the best remains of the Roman Vipasca mine. The Aljustrel landscape is marked by the mining activity, e.g. the Vipasca, Viana and São João main shafts, the Translaguna chimney and the Algarve copper cementation tanks. From the Senhora do Castelo chapel, it is possible to observe manganese mines and the Messejana fault. The plains of Campo Branco connects Aljustrel to Castro Verde. Around six kilometres to the south east of the mine, is Pedras Brancas, where the pyrite from the Aljustrel mine was roasted. The Rural Life Museum (Entradas) and the Oil Lamp Museum (Castro Verde) offer visitors an interesting ethnographic background to this region of the Alentejo, where you can find the special protection areas for the bustard, a bird that inhabits the plains.

**Region between Neves Corvo and Alcoutim**
In the region to the south east of Neves Corvo, between Almodóvar and the border region of Alcoutim, several old copper vein mines occurred. These mines are almost always reached by footpaths. At the Covas dos Mouros Mining Park, located between Martinlongo and Vaqueiros (Alcoutim), it is possible to visit some shafts and galleries, as well as to see replicas alluding to the old mining methods.

**Region of São Domingos and Guadiana and Chança river valleys**
The landscape between the open pit of the São Domingos mine and the mining port of Pomarão (Guadiana) reflects the dramatic impact that mining activity had on the environment. Along the valley of the São Domingos stream, it is possible to see acid water lagoons and a large area covered by mining wastes. Some plant species, such as the variety of heather known as Erica andevalensis are typical of this type of ecosystem. Around six kilometres to the south east of the mine, is Pedras Brancas, where the pyrite from the Aljustrel mine was roasted. The Rural Life Museum (Entradas) and the Oil Lamp Museum (Castro Verde) offer visitors an interesting ethnographic background to this region of the Alentejo, where you can find the special protection areas for the bustard, a bird that inhabits the plains.

**Region of Alcoutim and Castro Verde**
In the region to the south east of Neves Corvo, between Almodóvar and the border region of Alcoutim, several old copper vein mines occurred. These mines are almost always reached by footpaths. At the Covas dos Mouros Mining Park, located between Martinlongo and Vaqueiros (Alcoutim), it is possible to visit some shafts and galleries, as well as to see replicas alluding to the old mining methods.

**5 places not to miss!**
- Lousal Ciência Viva Centre
- Aljustrel Museum
- Miner’s House at São Domingos
- Mining port of Pomarão
- Rural Life and Oil Lamp museums of Castro Verde

**Iberian Pyrite Belt**
Following the Pyrite Route in the Alentejo mining region

**MINING ARCHAEOLOGY**
**Visit the mines**

**USEFUL CONTACTS**
- São Domingos (Miner’s House) – T +351 286 647 534 – www.cm-santamaria.pt
- Lousal (Ciência Viva Centre) – T +351 286 327 414 – www.cm-lousal.pt
- Castro Verde (Oil Lamp Museum) – T +351 286 327 414 – www.cm-castroverde.pt

Funding: Atlantterra – INTERREG IVB Espaço Atlântico project
Over 2000 years of mining

The copper mines of Neves Corvo (in the region of Castro Verde and Almodôvár) and Las Cruces (Seville) are considered to be the most important mining operations of this kind in the Iberian Pyrite Belt. In the first case, underground exploitation takes place down to a depth of 900 metres, while, in the second example, such work takes place on the surface, in an open pit 250 metres deep. The current working conditions are very safe, and special care is also taken in environment protection.

Mining activity in the Pyrite Belt dates back to the Chalcolithic period. The first large-scale exploitations began during the Roman Empire, e.g. at the Portuguese mines of Aljustrel (the Roman Vipasca mine), São Domingos and Caveira. All of these mines were served by Roman roads. The Guadiana river was one of the outlets for the distribution of the ores mined here.

The massive sulphide modern mining began in Portugal in the mid-19th century and has continued until the present day. Neves Corvo has been mined since 1867 and Aljustrel since 1849, while the other mines in operation were São Domingos (1854-1966), Caveira (1854-1970s), Lousal (1900-1988), Chança (1877-1930s) and Montinho (1885-1900s). The main manganese mines were: Cercal, Ferragudo, Balança, Aljustrel (Malpique and Feitais) and Lagos da Poço. Copper veins old exploitations can be found in the region of Martinlongo/Odeleite (Martinlongo, Ferrarias, ALCARIA Queimada, Fumazinhos, Fortes) and Almodôvár (Brancones, Porteirinhos, Barrigão). The small baryte and galena mines were located in Castro Verde and Mértola regions and the antimony mine of Cortes Pereiras is located close to Alcoutim.

A region of prospectors

The presence of ores of great economic value deposits in the Pyrite Belt has justified large-scale investment in exploration. The National Laboratory of Energy and Geology (LNEG) supports the activity of companies by collaborating in geological, geophysical (gravimetric, magnetic, electrical methods and radiometry) and geochemical surveys (rocks, soils and sediments). After an area has been studied and specific targets have been selected with high mining potential, these are further investigated through methods and radiometry) and geochemical surveys (rocks, soils and sediments). After an area has been studied and specific targets have been selected with high mining potential, these are further investigated through methods and radiometry) and geochemical surveys (rocks, soils and sediments). After an area has been studied and specific targets have been selected with high mining potential, these are further investigated through methods and radiometry) and geochemical surveys (rocks, soils and sediments). After an area has been studied and specific targets have been selected with high mining potential, these are further investigated through methods and radiometry) and geochemical surveys (rocks, soils and sediments). After an area has been studied and specific targets have been selected with high mining potential, these are further investigated through methods and radiometry) and geochemical surveys (rocks, soils and sediments). After an area has been studied and specific targets have been selected with high mining potential, these are further investigated through methods and radiometry) and geochemical surveys (rocks, soils and sediments). After an area has been studied and specific targets have been selected with high mining potential, these are further investigated through methods and radiometry) and geochemical surveys (rocks, soils and sediments). After an area has been studied and specific targets have been selected with high mining potential, these are further investigated through methods and radiometry) and geochemical surveys (rocks, soils and sediments). After an area has been studied and specific targets have been selected with high mining potential, these are further investigated through methods and radiometry) and geochemical surveys (rocks, soils and sediments). After an area has been studied and specific targets have been selected with high mining potential, these are further investigated through methods and radiometry) and geochemical surveys (rocks, soils and sediments). After an area has been studied and specific targets have been selected with high mining potential, these are further investigated through methods and radiometry) and geochemical surveys (rocks, soils and sediments).

Volcanoes and seas of the Upper Palaeozoic period

The sulphide-rich ores of the Pyrite Belt were formed in the Upper Devonian and Lower Carboniferous periods (the geological age stretching from 362 million years to 346 million years before the present day) in a submarine volcanic and sedimentary environment, similar to the hydrothermal springs that are to be found today at the bottom of the oceans. The Pyrite Belt is included in the southern Portuguese zone of the Variscan geological chain and is represented by two main units: the Phyllite-Quartzite Group, represented by schists and quartzites (Devonian) and the Volcano-Sedimentary Complex. This complex, dating from the Upper