

# VII Reunião do Quaternário Ibérico

VII Reunión del  
Cuaternario Ibérico

## FIELD GUIDE



G.T.P.E.Q.



**O futuro do ambiente da Península Ibérica:  
as lições do passado geológico recente**

**El futuro del ambiente de la Península Ibérica:  
lecciones del pasado geológico reciente**

**Universidade do Algarve  
5 a 9 de Outubro de 2009**

**CIMA**

**Centro de Investigação Marinha e Ambiental  
Universidade do Algarve, Faro, Portugal**

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## **VII Iberian Quaternary Meeting**

*“The future of the Iberian environment – lessons from the recent geological past”*

**Faro, Portugal  
5<sup>th</sup> – 9<sup>th</sup> October 2009**

# **FIELD GUIDE**

**Editorial board:**

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**CIMA – Centro de Investigação Marinha e Ambiental  
Universidade do Algarve**

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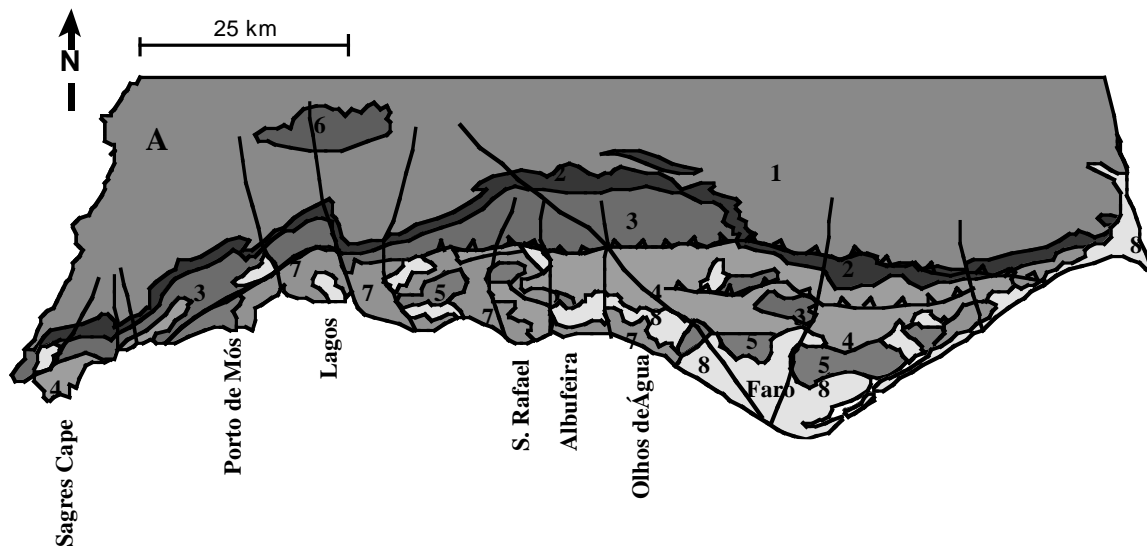
## DAY 2

## STOP I - Olhos de Água

*D. Moura & T. Boski*

### 1. Regional Geology

The occurrence of rocky and sandy cliffs on the south coast of the Algarve is a consequence of tectonic movement since the Upper Miocene. The Algarve Basin was affected by uplift west of Olhos de Água and subsidence to the east. This process created local sedimentary basins in the easternmost part of the Algarve which filled with sediment throughout the Pliocene and Pleistocene (Moura & Boski, 1999). In contrast to the carbonate sediments formed on the continental shelf during the Miocene, the Pliocene and Pleistocene sediments are mostly siliclastic, deposited in littoral and continental environments. Rapid uplift and consequent erosion produced abundant clastic sediments, which were carried into the regional sedimentary basins. These processes are reflected in lithological differences between cliffs on the west and east coast of the Algarve (Fig.1).



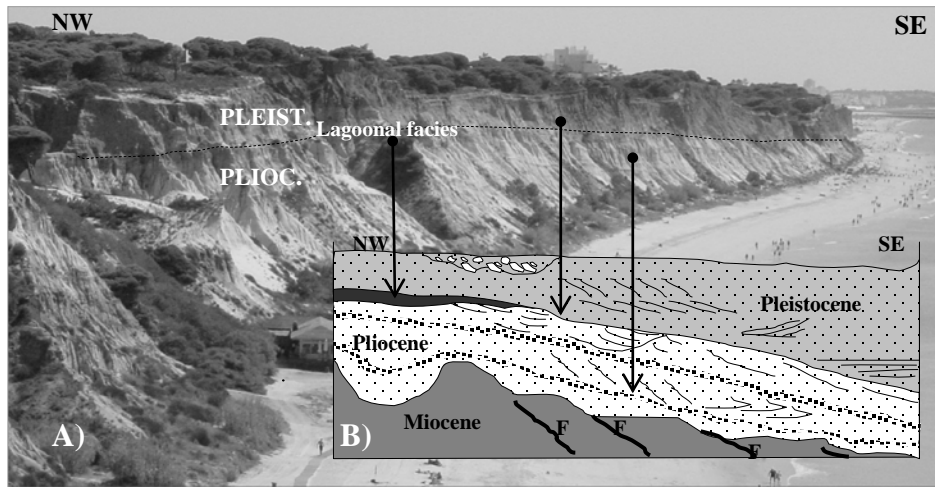
**Figure 1.** Geological setting of the Algarve region. 1- Carboniferous basement; 2- Lower Jurassic & Upper Triassic; 3- Lower & Middle Jurassic; 4- Upper Jurassic; 5- Lower Cretaceous; 6- Upper Cretaceous; 7- Miocene; 8- Pliocene and Pleistocene

## 2. Local Geological setting

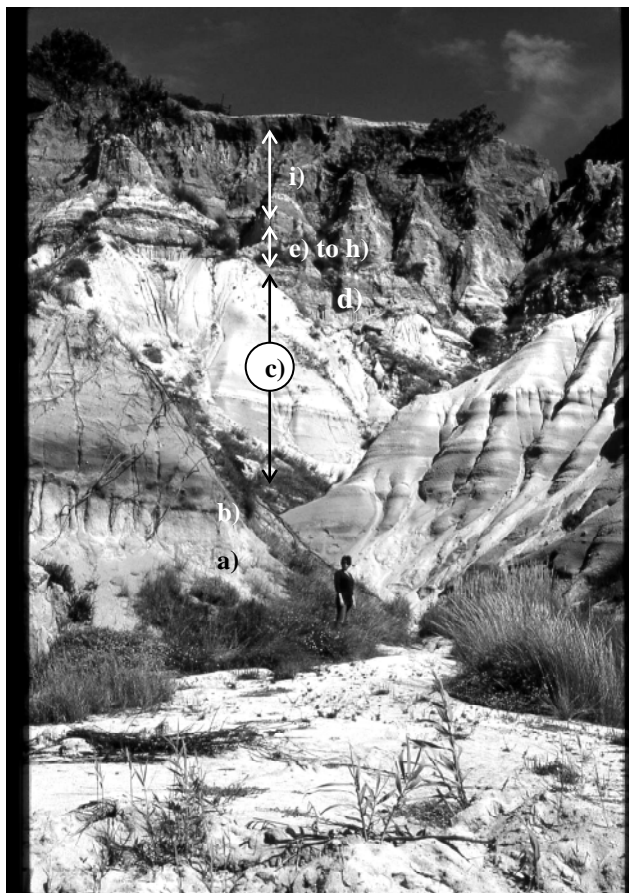
The Olhos de Água site is located right on the border between the Algarve's windward coastal sector (barlavento algarvio) and the leeward coastal sector (sotavento algarvio). Olhos de Água means "water eyes", which comes from the freshwater seepage points that occur in the intertidal zone. The shoreline, roughly oriented W-E between Galé and Olhos de Água, changes to NW-SE after this location (Figs. 1 and 2A).

The cliffs at Olhos de Água expose mainly detrital sediments, which preserve a karstic morphology on Miocene calcarenites. The sequence's thickness increases eastward, infilling sedimentary basins faulted in a demi-graben pattern (Silva, 1988). The geometry of these infills was determined during the Lower Pliocene by the budget between small basins, sea-level rise and a large amount of sediment coming from the hinterland. The basins were rapidly filled with clastic sediments eroded from Cretaceous and Triassic formations, surplus sediment being exported to neighbouring basins. Sedimentary structures point to a south-eastward migration of the sedimentary bodies, inducing shoreline rotation from EW to NW-SE, as we can currently observe (Figs. 1 and 2A).

The most remarkable features of the exposed sequence are fauna-rich carbonate layers within the ca. 40m of siliclastic sediments (Fig. 2A,B, Fig. 3 and Table 1).



**Figure 2.** General view of the Olhos de Água cliff (A) and a schematic profile showing the relationships between the sedimentary facies on a NW-SE profile (B)



**Figure 3.** The Praia do Barranco outcrop showing the vertical distribution of the sediment facies, the attributes of which are summarized in Table 1.

**Table 1.** Attributes of sedimentological facies and paleoenvironmental interpretation of the Barranco outcrop (Fig.3)

Sedimentary facies	Fossil content	Geopolarity	Environment
a) Micaceous yellow sandy silt. Vestigial biotite in the clay fraction.		Inverse	Shallow marine
b) Conglomerate with well rounded pebbles of quartzite and greywacke with occasional schist and dolerite pebbles.		?	Erosional episode
e) Coarse to very coarse white sand with cross stratification. Fe and Mn oxides. Conglomerate layers.		?	Littoral complex
d) Fossiliferous conglomerate with quartzite pebbles and frequent dolerite clasts.	Bones of marine mammals, well preserved teeth of <i>Isurus sp.</i> and <i>Carcharacles megalodon</i> teeth (adult specimens), showing aeolian abrasion;	?	Erosional episode
e) Bioturbated sandstone	Foraminifera fauna: <i>Elphidium crispum</i> , <i>Cibicides spp.</i> , <i>Ammonia becarri</i> , <i>Nonion boueanum</i> , <i>Rosalina sp.</i> , <i>Bulimina spp.</i> , <i>Textularia sp.</i> , <i>Globigerina sp.</i> , <i>Lagena sp.</i> , <i>Asterononion sp.</i> , <i>Trifarina sp.</i> , <i>Trifarina anulata</i> .	Normal	Coastal lagoon
f) Bioclastic sandstone	Well preserved shells of <i>Ostrea gr. Lamelosa</i> . Well preserved shells of <i>Pecten</i> , particularly the species <i>Palliolum excisum</i> which is not known after the Pliocene on the Iberian Peninsula nor in France. Remains of cirripedes and echinoids. Microfauna is composed of a few foraminifera species: <i>Ammonia becarri</i> , <i>Lobatula lobatula</i> , <i>Nonion boueanum</i> , <i>Elphidium sp.</i> and <i>Neoeponides sp.</i>	Normal	Coastal lagoon
g) 3m of micaceous fine sand with MN oxides and inter layered coarse sand- 3m.		Inverse	Fluvial
h) Ca. 2m of Clayey silt and micaceous fine sand.		Inverse	Fluvial
i) Feldspathic reddish medium sand with vestigial ilite, silt with pedogenetic processes, very coarse sand with pebbles.		Normal	Fluvial and other continental environments

Two major sedimentary disjunctions are observed within the Praia do Barranco profile:

- One between sedimentary units b) and c) on the Miocene-Pliocene boundary, where the environment changes from a continental shelf to more littoral one (Table 1);
- Another between sedimentary units h) and i), corresponding to the transition from a littoral to continental environment (Table 1). This is marked by a sudden increase in feldspar to 15% of total volume (Unit i). As well as kaolinite, which dominates the whole sequence, this unit contains illite. The mineralogical change may relate to mainland uplift and/or climatic change. We propose that the Pliocene-Pleistocene boundary (Fig. 1A) is located at the paleopolarity reversal observed slightly below Unit i (Moura et al. in the abstract book of the current meeting).

### References

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