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Discussions

Interactive comment on "Tracking climate variability in the western Mediterranean during the Late Holocene: a multiproxy approach" *by* V. Nieto-Moreno et al.

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Reply to review #1 on "Tracking climate variability in the western Mediterranean during the Late Holocene: a multiproxy approach" (Clim. Past Discuss., 7, 635-675, 2011):

We acknowledge the constructive comments from Reviewer #1, which will significantly improve the revised version of the manuscript. Below, we explain point by point how the comments or suggestions will be addressed. We also provide three figures and three tables as supplementary material.

1.- Despite trying very hard, I cannot convince myself that the cores show the same histories. Fig. 3 is moderately convincing but Fig. 4 shows two completely different sets of curves. In Fig. 5 TOC shows a moderately similar signal, U/Th is quite different and Br/Al and Cu/Al are both completely different between the two core records. The data in figure 6 do not show even rudimentary similarity, and there are important differences in Fig. 7.

Geochemical profiles from the two cores are not expected to be exactly the same. Differences in the location of these sites may have resulted in diverse processes controlling sediment deposition. As can be seen in Figure 4, which shows grain size distribution of both cores, clay is the most abundant particle size at site 306G, whereas fine silt is the most abundant one at site 305G (Page 658, Lines 5-8). This fits well with site 305G being more affected by oxygenation fluctuations (bottom water oxygen conditions and paleocurrents); site 306G, which is located on a small high, is relatively more affected by fine-grained detrital input and marine productivity oscillations (Page 647, Lines 1-5). Thus, site 306G, located in the abyssal plain, in a more distal position regarding the influx of the terrigenous components, would receive a finer fraction (Figs. 1a, 1b, and Fig. III below). Site 305G is located at the continental slope and is more affected by bottom currents, hence coarser sediments will settle, whereas fine clays will be advected.

Bearing in mind these premises, we observed that during dry periods (LBA-IA and MCA), coarser grain size sediments deposited at both sites suggest faster bottom currents (Fig. 4). This is also supported by higher quartz content and lower redox-sensitive element contents, which indicate oxygenated bottom waters (oxygen-rich waters percolating through the sediment, which is also favoured by coarser grain size) (Fig. 6). During the LBA-IA, site 306G shows opposite paleoceanographic conditions (finer grain size, lower quartz content and precipitation of redox-sensitive elements), suggesting less intense bottom currents. This is most likely due its location on a higher topography at this site (Page 647, Lines 1-5).

In Figure 7, post-depositional proxies are shown for both cores. Post-depositional oxidation does not have to be coeval in the two cores. To further clarify this, we will slightly extend this section in the revised version of the manuscript. The precipitation of Mn is found deeper in core 305G, probably due to the coarser grain size distribution, which allows for a farther downward progression of the oxidation front; and as stated above, this site is more affected by bottom water conditions (redox-sensitive elements group; Figs. 2e, f). In this way, Masqué et al. (2003) reported post-depositional oxidation fronts evidenced by precipitation of Mn oxides ranging from 1 to 8.5 cm and even reaching 15 cm in this sedimentary environment. Mn enrichments in our records coincide with Co/Al and Mo/Al enrichments at both sites, since they co-precipitated together with Mn oxy-hydroxides.

Additionally, diverse diagenetic processes at both sites may have resulted in different geochemical profiles. Identical contents of TOC-related elements are not expected when oxidation affected the two sites differently, and TOC preservation is not the same. Chemical elements such as Cu are particularly sensitive to this kind of process and are subjected to diagenetic remobilization (Fig. 5) (Trivovillard et al., 2006). Regarding U/Th, uranium can be remobilized in sediments if oxygen penetrates up to the core depth where authigenic U has accumulated (McManus et al., 2005), so the post-depositional precipitation of Mn reaching 9 cm in core 305G may be the process responsible for remobilization of the former element (Figs. 7, 5). Concerning Br/Al ratios, Price et al. (1970) noted a gradual decrease with depth of the Br/Corg ratio in sediments deposited under oxidizing conditions, which suggests a loss of Br during the early stages of diagenesis. Such decreases are usually ascribed to preferential degradation of Br-containing compounds, meaning a different diagenetic remobilization can be expected as well.

1.1.- As the authors are presenting these signals as coherent records of regional climate signals, this poses us a very significant problem. Either the proxies are all very unreliable - in which case they should not be used! - or the cores show different histories that need to be interpreted separately. I am inclined to the first view, as even when digested into a statistical assessment of the variability in complete datasets (Fig. 8)

major differences remain. Is the correlation between these datasets significant? If not, how can we believe the climate changes inferred from them?

Figure 8 is not intended to present an assessment of the variability of the complete data sets. It merely shows the first eigenvector extracted from the Principal Component Analysis of both cores. This eigenvector represents the detrital input into the basin plus marine productivity, and accounts for 47% and 57% of the total variance at sites 305G and 306G, respectively. Actually, an eigenvector is not a variable, but a linear combination of the variables from the dataset, and could thus be considered an “artificial variable” that accounts for most of the variance observed in the actual variables. In our case, the first two eigenvectors explain 70% and 73% of the total variance in cores 305G and 306G, respectively. Statistical analyses of the mineralogical and geochemical data sets is approached through normalized matrix clustering and Principal Component Analysis of the geochemical data, and redundancy analyses of the geochemical and the mineralogical data (Fig. 2). The figure illustrates how these proxies appear in three identical groups, comprising the same geochemical and mineralogical proxies in both cores in terms of their correlation and origin (Figs. 2a, b, c, d). Furthermore, the dominant climatic signals, compiled in Fig. 3, are coherent in the two cores, as stated above by the reviewer. Differences arise when comparing paleoceanographic factors (Figs. 4, 6, 7) -mainly bottom currents and related oxygenation conditions- related to the topography and the geographic setting of the two sites. The new version of the manuscript will separate the interpretation of these signals (climate/ocean dynamics) more clearly. On the other hand, all these proxies have been previously and successfully applied in this region to reconstruct climate variability (section 3), and the reliability of these geochemical proxies has been reported in many previous papers on geochemical proxies and paleoenvironmental reconstructions. Therefore, taking into account our statistical results and previous paleoclimate work done in this setting based on the same proxies, we consider that despite local differences and some minor inconsistencies, the correlation between the data sets is quite consistent, as are the climate fluctuations inferred from them.

1.2.- If we are to believe that these two cores show the same climate signal, the authors MUST demonstrate their histories are the same! I am aware the authors make some effort to explain away some of these differences (Page 647, Line 7) but this is not enough. A rigorous analysis of covariance is required if the argument of climate control on these datasets can be accepted.

An analysis of covariance would not make sense here because such statistical analysis is a measure of linear association between two variables. It is commonly applied to instrumental datasets, but not to datasets from natural systems (such as that obtained from sediments) because sample points are measured at the same time (you do not need to resample both variables in order to obtain the temporal point pairs). Furthermore, the obtained covariance must be interpreted according to the sampling interval frequency of both series, and variables obtained from natural systems have clearly associated multiple time frequencies (or natural variability) owing to multiple external forcings triggering them. Therefore, a low covariance value at one frequency does not imply that the two variables do not display a coeval behaviour at lower sampling intervals.

2.- Why do the authors not follow Moreno in interpreting the grainsize variability as eolian dust supply? If that idea was true 6 years ago, it is true now! They at least need to demonstrate why eolian supply is NOT capable of driving the variability they ascribe to bottom velocity.

Moreno et al (2002) define “the eolian sortable silt (ESS) fraction as the percentage of the sediment in the 7- to 63-μm size range which represents the sediment fraction susceptible to be transported by wind whereas the size fraction below 7μm is influenced by particle scavenging through rainfall without measurable size dependence (McCave et al., 1995)”. The latter reference clarifies that “The silt coarser than 10 μm responds largely as single particles to hydrodynamic forces on erosion and deposition because of the breakage of aggregates and is therefore size-sorted according to shear stress. Thus the size of the $>$10μm silt is a useful current strength indicator. Because deposition of coarser material under faster currents also involves suppression of deposition of finer sediments, the percentage of $>$10μm silt in the fine fraction ($<$63μm) is also an indicator of current strength at a point, but variability of sediment focussing poses problems when comparing time series of percentage data from different topographic settings.” Thus, we have used the percentage of sortable silt or coarse silt (SS, 10–63μm) as a proxy of relative paleocurrent speed as defined by McCave et al (1995), revised by McCave and Hall (2006), and applied by Hall and McCave (2000) in the Atlantic Iberian margin, and by Frigola et al. (2007) and Rogerson et al. (2008) in the westernmost Mediterranean in subsequent studies.

3.- We need to see more detail (graphically) on the chronology. It would be very helpful to show some kind of time-depth plot laying out the dating errors at different levels clearly.

We agree with this, an important point that indeed should be improved. To this end, we will provide two figures in the revised version of the manuscript drawing radiocarbon ages and total ^{210}Pb activity profiles with error bars (see below new additional Figures I and II). A new table, including ^{210}Pb inventories for both cores, will be attached as well (see below Table I). Furthermore, we will specify that these sedimentation rates (page 645, line 10) and ^{210}Pb inventories (see below Table I) are similar to those reported in other deep Mediterranean areas by previous authors (1-13 cm.kyr^{-1}) (García-Orellana et al, 2009). Additionally, at the baseline of the rest of the multiproxy figures in the manuscript (Figs. 3-7), we will add marking points including ^{14}C dates and error bars.

4.- The data, proxy-relationships, interpretations and causality are very confused throughout the paper. The authors use the balance of illites and kaolinites as an indicator of the balance of fluvial and eolian input on the basis that a previous study showed that the former was sourced from the north and the latter from the south. I am not convinced that ALL the palygorksite is derived from the south, but much more importantly I utterly refute that this is a fluvial/eolian proxy! It is a PROVENANCE proxy! What if the southern margin experiences high fluvial input or the northern margin eolian input during some period? Why in their statistical analysis did they find that the fluvial and eolian proxies are both in the first group, when they should be more or less independent (unless they are perfectly opposed, in which case the authors need to tell us!)?

Clay mineralogy has been used as a tracer of provenance and transport mechanisms in studies of the world oceans in which the mineralogy of the fine detrital fraction generally reflects the intensity of continental weathering in the source areas. Variations in downcore clay mineral distribution in deep-sea sediments have been interpreted in terms of changes in the climatic conditions prevailing in the continental source area of the detrital clay minerals and have been widely used to reconstruct paleoclimates (e.g., Bout-Roumazeilles et al., 2007; Fagel, 2007).

The chemical composition and morphology of both illite and chlorite indicate proximal sources from Betic Cordilleras and Nevado-Filáride complexes, respectively (Martínez-Ruiz et al., 1999). Similarly, morphological analyses of smectite suggest a soil-derived provenance (Martínez-Ruiz et al., 2003). In contrast, the occurrence of elongated fibres of palygorskite within sediments is characteristic of a wind-driven transport. Illite, chlorite and smectite are partly transported via rivers toward the Alboran Sea, but may also be supplied through eolian processes together with palygorskite. Illite generally represents the relative contribution of physical weathering to sedimentation, because this mineral is resistant to degradation and to transport. Palygorskite is of special interest because the only significant source area for this mineral, in this part of the Mediterranean region, is Africa. Besides, palygorkite is a very fragile and unstable mineral. Its appearance on marine sediment can only be explained by eolian transport, since it would not resist fluvial transport (Chamley, 1989). The illite-to-kaolinite (I/K) ratio gives a rough estimation of the respective contribution of eolian versus riverine supplies (Martinez-Ruiz et al., 2003; Bout-Roumazeilles et al., 2007).

The contribution and deposition of terrigenous sediments in the Alboran Sea is closely linked with the regional meteorological patterns. Primary routes for the transportation of lithogenic particles to the Alboran Sea are through fluvial sediment transport and air-

borne dust. Supply of fluvial particles from the southern Iberian Peninsula is favoured by torrential local rainfalls and a scarce vegetation cover that supports surficial erosion, while fluvial sediment transport from the northern African margin seems to be negligible (Fabrés et al., 2002). Eolian transport of dust from the Sahara is well known as an important contributor to marine sediments. Saharan dust deposition over the western Mediterranean has been estimated at 9-25 $t.km^{-2}.yr^{-1}$, representing 10–20% of the recent deep-sea sedimentation (Guerzoni et al., 1997), whereas an eolian sedimentation rate of 23 $g.m^{-2}.yr^{-1}$ has been reported for continental southeastern Iberia (Díaz-Hernández and Miranda Hernández, 1997).

On the southern side of the Mediterranean, a weakening of rainfall increases the aridity of the Sahara, resulting in reduced and scattered vegetation in peri-Saharan areas. Consequently, soils and outcropping rocks are far more vulnerable to wind erosion, which lead to an increased wind transportation of minerals from these areas into the Mediterranean. On the northern side of the Mediterranean, a decrease in rainfall results in a decrease not only in the river discharge, but also in the sediment load, because fluvial erosion loses its efficiency. Consequently, the detrital material supplied by rivers decreases and the concentration of wind-transported material in the sediment increases. During these periods, sediments show the highest contents in palygorskite and related minerals (kaolinite, dolomite, quartz, and feldspar) and the lowest in smectite and chlorite. On the southern side of the Mediterranean, an increase in rainfall allows the vegetation to extend northward over the Saharan and peri-Saharan areas, protecting soils and significantly reducing, or even preventing eolian erosion. On the northern margin of the Mediterranean, an increase in rainfall does not significantly modify the density of pre-existent vegetation, but it results in an increase in fluvial erosion, providing greater terrigenous supply to marine sedimentation. During these periods, sediments show the highest content in smectite and chlorite (Foucault, 2000).

Statistical analyses show fluvial and eolian geochemical proxies in the first group because they are both detrital proxies (Figs. 2a, b, e, f). In Figs. 2b and 2d, we can see that the mineralogical proxies are bound to the first group of geochemical detrital proxies. Fluvial-derived illite, smectite, feldspar and dolomite are opposed to eolian-derived kaolinite. Quartz is settled in an intermediate position because it could come from both sources. Although we identified elongated fibers of palygorskite using Transmission Electron Microscopy (Page 647, lines 17-19) and Scanning Electron Microscopy, its content quantified via X-Ray Diffraction ranges below instrumental error (< 5

5.- The authors need to be far more realistic in reporting exactly what they can diagnose from their data, and I am therefore not convinced that their ultimate interpretations are robust. I recommend the authors expand Section 3, giving much more convincing arguments for why they are able to interpret the various data in the way they do.

We will strengthen and extend the information in the third section of the revised version of the manuscript, though as briefly as possible in view of Referee #2's suggestion that we reduce or merely reference the essential concepts.

6.- I also recommend that the authors go through the text and remove the sections where causality is confused. For example in Section 9 line 22 they state: "A decreasing trend of fluvial derived-elements .... would suggest a riverine input decline into the basin and subsequent dryness." I think they mean that they think the reduced fluvial input is DUE TO dryness, but I am not sure.

We totally accept this remark and will rewrite this statement. We mean that the decrease of fluvial-derived elements suggests a riverine input decline and thus evidences the Late Bronze Age-Iron Age (LBA-IA) as a dry period in this region.

6.2.- Another example (Section 9.2, Line 19): "Such an influx of fresh water from a large flood may have enhanced stratification of the water column, in turn increasing organic matter preservation." Do they really mean this was a FLOOD - i.e. a single, high-magnitude event? Or do they mean enhanced ongoing diffuse addition of freshwater? I am not sure.

In this case we meant an ongoing addition of fresh water. We agree that this needs to be clarified; the sentence will be reworked accordingly.

6.3.- A final example (Section 9.2, line 1): "The decrease of fluvial derived elements that took place during the LBA became a relatively steady pattern during this period, leading to a progressive establishment of wetter conditions." How can a change in fluvial derived elements in a marine sediment record LEAD TO (i.e. cause) establishment of wetter or dryer conditions? The causality here is simply impossible! Moreover, why is a DECREASE in fluvial activity being interpreted as establishment of WETTER conditions? Surely, this is backwards!

Though poorly stated in the original manuscript, what was meant is that the LBA-IA is characterized by a decrease of fluvial derived elements, which suggests this a dry period, whereas the RHP points to progressively wetter conditions in view of the relatively flat pattern shown by these elements. We will rephrase this paragraph so as to be clearer.

6.4.- Overall, these ambiguous and incorrect statements make the paper far more confusing than it needs to be. The English is fine; but it all needs a really thorough edit for internal logic!

We agree that some of the interpretations can indeed result ambiguous or confusing. We will carefully revise and rework the discussion in particular, with the aim to produce a more precise dialogue and to cite the appropriate literature. The English will also undergo a final edit for grammar and style by a native speaker.

Concerning the minor remarks,

Page 639, line 7. This sentence does not make sense "North Atlantic cold events have been the framework of abrupt decreases of paleo-sea surface temperatures and salinities....".

The revised manuscript will present that paragraph as follows (Page 639, lines 7-15):

Abrupt decreases of paleo-sea surface temperatures and salinities in the Alboran basin [...] have been correlated with cold spells taking place in the North Atlantic realm (Heinrich and D/O events). Such findings support the linkage of the westernmost Mediterranean with the North Atlantic coupled ocean-atmosphere system.

Page 639, line 9. Concept of freshwater incursions into the Mediterranean are described in (Sierro et al. 2005) and (Rogerson et al. 2010).

We will include Rogerson et al. (2010) as a reference to evidence fresh polar water incursions into the Mediterranean Sea through the Strait of Gibraltar in this paragraph. Sierro et al. (2005) is already included as a reference in this context (Page 639, line 11).

Page 640, lines 1-10. There are insufficient references in this section.

We will include Bolle (2003) and Lionello et al. (2006) to the paragraph (Page 640, lines 1-10). Furthermore, according to Reviewer #2's suggestions, this section will be rewritten more synoptically.

Page 640, lines 11-19. There are insufficient references in this section.

We will include Trigo et al. (2002, 2004) and Wanner et al. (2001) in the paragraph (Page 640, lines 11-19). Furthermore, according to Reviewer #2's suggestions, this section will be rewritten more synoptically.

Page 641, lines 11-17. There are insufficient references in this section.

We will include Chamley (1989) and Fagel (2007) in the paragraph (Page 641, lines 11-17).

Page 642, lines 4-7. This sentence does not make sense at this point in the paper.

We will remove that sentence (Page 642, lines 4-7) and include the reference in the previous paragraph (Page 641, lines 24-27 and Page 642, lines 1-7), as follows:

Element/Al ratios (such as Rb/Al, Mg/Al, K/Al, Si/Al, Ti/Al and Zr/Al) have also been studied to infer fluctuations in terrestrial run-off, erosional processes and riverine and eolian input to the Alboran basin (Moreno et al., 2005; Jiménez-Espejo et al., 2008; Martín-Puertas et al., 2010). Ba/Al and biogenic barite are widely used as paleoproductivity proxies in the western Mediterranean Sea in relation to episodes of enhanced productivity such as the Heinrich events (Moreno et al., 2004; Jiménez-Espejo et al., 2008). Aluminum-normalization is commonly used to envisage fluctuations in detrital alumino-silicate source material (e.g., Van der Weijden, 2002).

Page 644, lines 13. We need durations of exposure to these wash solutions.

By treatment with acetic acid (three times for 24 hours each, 5mL.L^{-1} the first time and then 10mL.L^{-1}) and hydrogen peroxide (one week).

Page 645, line 3. bulloides should not be capitalised.

It will be changed to Globigerina bulloides instead.

Page 647, line 1. I thought that eigenvectors were orthogonal? In which case, the sum of all eigenvectors should explain no more than 100

Yes, by definition, eigenvectors from Principal Component Analysis are orthogonal and the sum of all eigenvectors (in this case 24 eigenvectors in each core) explains 100% of variability (see tables below). We chose the first two eigenvectors in each core because they explain 70% of the total variability.

Page 647, line 20. Please define "beidellites-type".

We will redefine smectites as follows:

Page 647, lines 19-20. These analyses verify that the smectite composition corresponds to Al-rich beidellites, which in turn indicate a detrital origin (chemical weathering) and a provenance from soils in the source areas.

Page 647, lines 23-25. There are insufficient references in this section.

Due to the fact that some of these periods are previously mentioned, we will incorporate references for them earlier, in the introduction of the manuscript, such as Van Geel et al. (1996) for the LBA-IA, Issar (2003) for the RHP and Berglun (2003) for the DA.

Page 649, line 22. There are insufficient references in this section.

We will include Wanner et al. (2008) in this sentence.

Page 650, line 6. Why does bottom ventilation have to reflect dryness? It could reflect stronger cooling, or even a change in the eastern Mediterranean being transmitted to western bottom water flow via the activity of the LIW?

The referee is right; this sentence is misplaced. Low values of redox-sensitive trace elements and coarser grain size suggest faster flows and better oxygenated bottom waters and thus more energetic hydrodynamic bottom conditions. We do not have enough evidence to claim for stronger cooling or changes of the LIW. We will avoid the statement “also supports this dryness” (Page 650, lines 4-5).

Page 654, line 16-18. Why are you invoking a thermal effect here when 1) you ignored it 4 pages previously?

In this case, we mean that coinciding with abrupt cold events, an intensification of the atmospheric circulation took place, which produced stronger than normal northerly winds that promoted a strengthening of the WMDW production rate and thus of the Mediterranean thermohaline circulation.

We hope that the above modifications will prove sufficient in addressing your concerns and accounting for all your suggestions in the revised version of the manuscript.

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- Table I. Total ^{210}Pb inventories for cores 305G and 306G.

Laboratory Code	**Core**	**Core depth (cm)**	**$^{210}Pb_{total}$ (Bq*kg^{-1})**
305G05	305G	0.50	264±9
305G15	305G	1.50	183±9
305G25	305G	2.50	88±4
305G35	305G	3.50	71±5
305G45	305G	4.50	55±3
305G65	305G	6.50	65±3
305G85	305G	8.50	49±3
306G05	306G	0.50	332±9
306G15	306G	1.50	169±9
306G25	306G	2.50	86±4
306G35	306G	3.50	58±4
306G45	306G	4.50	63±3
306G65	306G	6.50	61±3
306G85	306G	8.50	41±2
$^{210}Pb_{base}$	305G		57±8
^{210}Pb (Bq*m^{-2})	305G		1912±106
$^{210}Pb_{base}$	306G		56±10
^{210}Pb (Bq*m^{-2})	306G		2691±84

Fig. 1.

- Table II. Principal components for cores 305G and 306G.

305G:

	Comp.1	Comp.2	Comp.3	Comp.4	Comp.5	Comp.6	Comp.7	Comp.8
Standard Deviation	3.3664907	2.3512285	1.29297896	1.16652044	0.99657078	0.85128093	0.7709272	0.66414285
Proportion of Variance	0.4722191	0.2303448	0.06965811	0.05669875	0.04138139	0.03019497	0.0247637	0.01837857
Cumulative Proportion	0.4722191	0.702564	0.77222206	0.82892081	0.8703022	0.90049716	0.9252609	0.94363943

	Comp.9	Comp.10	Comp.11	Comp.12	Comp.13	Comp.14	Comp.15	Comp.16
Standard Deviation	0.63564237	0.56939702	0.427656681	0.323800072	0.267662399	0.251451638	0.224727299	0.215043608
Proportion of Variance	0.01683505	0.01350887	0.007620427	0.004368604	0.002985132	0.002634497	0.002104265	0.001926823
Cumulative Proportion	0.96047449	0.97398336	0.981603786	0.985972389	0.988957521	0.991592018	0.993696283	0.995623106

	Comp.17	Comp.18	Comp.19	Comp.20	Comp.21	Comp.22	Comp.23	Comp.24
Standard Deviation	0.185223381	0.153090042	0.122712535	0.118645109	0.08541139	0.075283733	0.064886174	3.15E-02
Proportion of Variance	0.001429488	0.000976523	0.000627432	0.000586528	0.000303963	0.000236152	0.000175426	4.14E-05
Cumulative Proportion	0.997052594	0.998029117	0.998656549	0.999243077	0.999547039	0.999783191	0.999958617	1.00E+00

306G:

	Comp.1	Comp.2	Comp.3	Comp.4	Comp.5	Comp.6	Comp.7	Comp.8
Standard Deviation	3.6938358	1.995269	1.46606586	1.2133709	0.99229845	0.67489793	0.59563451	0.52153239
Proportion of Variance	0.5685176	0.1658791	0.08955621	0.06134454	0.04102734	0.01897863	0.01478252	0.01133317
Cumulative Proportion	0.5685176	0.7343967	0.82395294	0.88529748	0.92632482	0.94530345	0.96008597	0.97141914

	Comp.9	Comp.10	Comp.11	Comp.12	Comp.13	Comp.14	Comp.15	Comp.16
Standard Deviation	0.44027436	0.4009799	0.29556488	0.2427023	0.22336003	0.19927322	0.17036216	0.14297527
Proportion of Variance	0.00807673	0.00669937	0.00363994	0.00245435	0.00207873	0.00165457	0.00120930	0.00085174
Cumulative Proportion	0.97949587	0.98619524	0.98983518	0.99228953	0.99436827	0.99602284	0.99723215	0.99808389

	Comp.17	Comp.18	Comp.19	Comp.20	Comp.21	Comp.22	Comp.23	Comp.24
Standard Deviation	0.13330214	0.08290215	0.07891580	0.06690862	0.05740212	0.05492834	0.05228497	3.99E-02
Proportion of Variance	0.00074039	0.00028636	0.00025948	0.00018653	0.00013729	0.00012571	0.00011390	6.64E-05
Cumulative Proportion	0.99882429	0.99911065	0.99937014	0.99955667	0.99969396	0.99981968	0.99993358	1.00E+00

Fig. 2.

- Figure I. ^{14}C dates for core 305G (blue diamonds) and 306G (red squares) with error bars representing 2σ uncertainties.

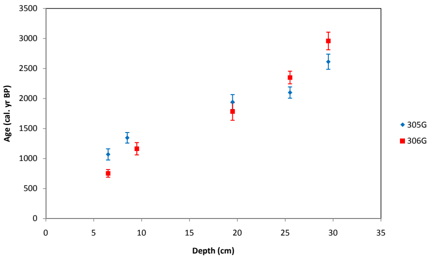

Fig. 3.

- Figure II. Activity profiles of $^{210}Pb_{total}$ (Bq·kg^{-1}) for cores 305G (blue diamonds) and 306G (red squares) with error bars representing 1σ uncertainties.

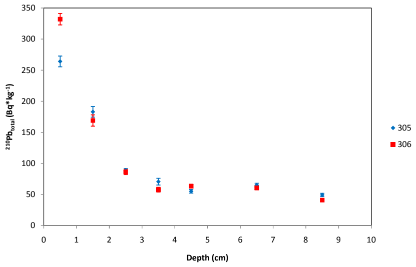

Fig. 4.

- Figure III. Topographic profile showing the main physiographic features of the area under study.

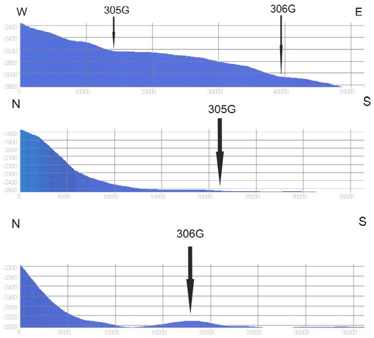

Fig. 5.