is controlled by water fluxes between the Atlantic Ocean and the Mediterranean Sea including an intermediate current, the Atlantic inflow, and an energetic bottom current, the Mediterranean Outflow Water (MOW). The sedimentation on the Iberian and Portuguese continental slopes results from the activity of this warm (13 C) and saline (36.5 ‰) MOW. Just passed the Strait of Gibraltar westward, the MOW captures the particles that are carried by Spanish rivers and transported toward the strait by along-shelf shallow hydrodynamic processes. These particles are redistributed along the slope by the MOW. In the more distal part of Gibraltar, the high MOW velocity (> 2.5 m/s) forms a coarse-grained lag deposit (gravels to sands). Both the velocity and competence of the MOW decrease along the pathway. This leads to the formation of varied sedimentary bedforms and the construction of fine-grained contourite drifts. Off the Cape San Vicente, the low velocity (< 0.1 m/s) reduces the competence of the MOW and only silty-clays are transported here. New high resolution acoustic data (EM 300 and SAR) were collected during the CADISAR cruise in August 2001 on the R/V "Le Suroît" in an area located between 35°35' N / 36°40' N and 6°35' W / 8°20' W, at water depths ranging from 600 m to 1900 m. These data allow a better understanding of the flows dynamic in this area, and improve the recognition and mapping of sedimentary bedforms. The study area includes also the divergence zone between a geostrophic along-slope current (upper MOW core) and an ageostrophic downslope current (lower MOW core). Before this divergence, the flow spills over a giant contourite levee. After the divergence, the two cores can be channelled by major or minor NNE/SSW submarines valleys. One of these valleys, the Gil Eanes channel, is longer than 40 km and wider than 2.5 km to 1 km in its eastern and western parts, respectively. The existence of overspread instabilities on the north side of the Gil Eanes channel, sediment waves along its floor and of small sandy lobes at its mouth are morphologic convergences with channel-levee complexes formed by turbidity current activity. However, the major difference is that here, the main process for particle transport is an energetic contour current.

64-19 Poster Hanquiez, Vincent

AN UNUSUAL SEDIMENTARY SYSTEM: THE GIL EANES CHANNEL, GULF OF CADIZ

HANQUIEZ Vincent[1], MULDER Thierry[1], LECROART Pascal[1], GONTHIER Eliane[1], FAUGERES Jean-Claude[1], LE DREZEN Eliane[2], VOISSET Michel[2]
1 - DGO, UMR5805-EPOC, Université Bordeaux 1, 33405 Talence, France
2 - IFREMER, DRO/GM, centre de Brest, BP70, 29280 Plouzané, France

Keywords: Gulf of Cadiz; Mediterranean Outflow Water; contouritic channel-levee complex; sandy lobe

The Gulf of Cadiz is located in the eastern part of the North Atlantic Ocean, close to the Strait of Gibraltar. The Gulf of Cadiz undergoes the influence of a strong, warm, and saline current called the Mediterranean Outflow Water (MOW). The MOW comes out of the Mediterranean and spreads in the North Atlantic at water depths ranging from 600 to 1300 m. At present, the MOW controls the sedimentation on the Iberian and Portuguese continental slopes. Westward of the Strait of Gibraltar, the MOW captures the particles that are supplied by Spanish rivers and from the shelf. The sedimentary features observed downflow from Gibraltar show the progressive decrease of the MOW energy. Close to Gibraltar, the high MOW velocity (> 2.5 m/s) forms a coarse-grained lag deposit (gravels to sand). Conversely, around the Cape San Vicente, the deposits associated to this current are fine-grained sediments (silts to clays), due to the low velocity of the MOW (< 1 m/s). A new high resolution data set from the EM 300 multibeam echosounder, deep-towed sonar SAR, Chirp and Sparker profiles, and piston cores were collected during the CADISAR cruise in 2001, in an area located between 35°35' N / 36°40' N and 6°35' W / 8°20' W, at water depths ranging from 600 m to 1900 m. In this area, due to the sea-floor morphology, a part of the MOW is deflected southward and is channelled by major or minor downslope submarines valleys. One of these valleys, the Gil Eanes channel, formed probably by retrogressive erosion, is longer than 40 km and wider than 2.5 km to 1 km in its eastern and western parts, respectively. It is a primary conduit for sand transport towards the slope and deep basin as attested by sandy sediment waves along its course and small sandy lobes at its outlet. These lobes are formed by the stack of several depositional events. They can form due to the expansion of three depositional processes: the channelled MOW, debris flows or turbidity currents. Overspread instabilities characterized the north side of the Gil Eanes channel. These instabilities affect also the top of the flanks of the Gil Eanes. This suggests that a recent sedimentation due to flow spilling occurs here. These observations suggest similarities between the Gulf of Cadiz and classical deep-sea channel-levee complexes formed by turbidity current activity. However, in the Gulf of Cadiz, the main process for particle transport and deposit is an energetic contour current.

64-20 Poster Hernandez Molina, Francisco Javier

CONTOURITE DEPOSITS RELATED TO THE UPPER CORE OF THE MEDITERRANEAN OUTFLOW WATER IN THE GULF OF CADIZ

LLAVE Estefania[1], HERNANDEZ MOLINA Francisco Javier[2], STOW Dorrik[3], SOMOZA Luis[1], DIAZ-DEL-RIO Victor[4]
1 - Instituto Geológico y Minero de España, Ríos Rosas, 23, 28003 Madrid, Spain
2 - Facultad de Ciencias del Mar, Universidad de Vigo, 36200 Vigo, Spain
3 - Southampton Oceanography Centre. University of Southampton, Waterfront Campus. Southampton SO14 3ZH, UK
4 - Instituto Español de Oceanografía, C/ Puerto Pesquero s/n, 29640 Fuengirola, Spain

Keywords: Gulf of Cadiz; Continental slope; Mediterranean Outflow Water; Contourite Deposits; Seismic Stratigraphy

Several studies have been based on the description of contourite sedimentation along the northern margin of the Gulf of Cadiz. These studies have mainly focussed on the Faro drift, which developed on the middle slope under the influence of the Mediterranean Outflow Water (MOW). Recently, a detailed morphologic and stratigraphic research programme has been carried out over a broader region of the middle slope with new bathymetric and seismic reflection profile data. This study has allowed us to identify new types of contourite drifts between the middle and upper slope. Four main different contourite deposits have been characterized related to the upper core of the MOW, which are from SE to NW: a) A mixed drift located in the southeastern area, composed of sheeted drift alternating with mounded and separated drift. b) A plastered drift located between the middle slope and the distal part of the upper slope, between the mixed drift and the mounded and separated Faro-Albufeira drift. These deposits are characterized by an aggradational stacking pattern and lens shape. c) The elongate mounded and separated drift of Faro-Albufeira, which is bounded against the upper slope by the Alvarez Cabral Moat. These deposits have a sigmoid progradational stacking pattern migrating upslope, with lenticular convex-upward depositional units overlying major erosive discontinuities. d) Sheeted drift deposits. The sedimentary facies of the mixed, plastered and mounded drifts change laterally seaward to sheeted drift facies. They are also identified in the western area between Albufeira and San Vicente Cape. These deposits comprise layers of more or less constant thickness with aggradational stacking pattern.The occurrence of these different contourite deposits are directly related to the changes in the Upper Mediterranean Outflow Water Core (MU), which flows as a laminar water mass in the southeastern area until the Faro-Albufeira area, where a more turbulent core generates the mounded drift. The MU water mass returns to more laminar behaviour between Albufeira and San Vicente Cape area. The major Quaternary stratigraphic changes identified in the various drifts are indicative of paleoceanographic changes of the MU, controlled by climatic and eustatic variability, local tectonic changes (especially movements of diapiric bodies) and variation in sediment supply.This work was supported by the projects CICYT MAR-98-02-0209 (TASYO), REN2002-04117-C03-01 (GADES) and IGCP-432.

64-21 Poster Hernandez Molina, Francisco Javier

THE CONTOURITE DEPOSITIONAL SYSTEMS OF THE MIDDLE SLOPE OF THE GULF OF CADIZ

HERNANDEZ MOLINA Francisco Javier[1], et al.
1 - Facultad de Ciencias del Mar, Universidad de Vigo, 36200 Vigo, Spain

Keywords: Gulf of Cadiz; Contourites deposits; Morphology; Sedimentology; Seismic Stratigraphy

A detailed study of the Contourite Depositional System (CDS) of the Gulf of Cadiz has been carried out using a broad database collected since 1989, obtained during several cruises and projects supported by the Spanish Research Council and the US Research Loboratory. The database we used includes: a) bathymetric data; b) side-scan sonar imagery; c) seismic reflection data from low-resolution MCS profiles, medium-resolution seismic profiles from Sparker and Airgun systems, high-resolution seismic profiles using Geopulse and 3.5-kHz systems, and ultra-high resolution seismic profiles using TOPAS system; and d) sediment core data. These data have enabled us to draw up a regional morphology and stratigraphic stacking pattern of the Quaternary deposits of the upper and middle slope, identifying key discontinuities, evolution of the sedimentary processes involved, and documenting the principal paleoceanographic changes.The CDS of the Gulf of Cadiz is composed of both depositional and erosive features. The main depositional features are characterized by sedimentary waves fields, sedimentary lobes, mixed drifts, plastered drifts, elongate mounded and separated drifts and sheeted drifts. The main erosive features are contourite channels, furrows, marginal valleys, and moats. Both depositional and erosive features are essential to understand the regional interaction of the Mediterranean Outflow Water (MOW) with the middle slope. The interplay between climatic, eustatic and tectonic controls has determined the genesis and evolution of the CDS.Although the Gulf of Cadiz slope region has been influenced by both downslope and alongslope processes, there appears to be a marked separation between the two. Contourite processes of the CDS are dominant on the middle slope, whereas downslope processes dominate the lower slope and continental rise. For the most part, these processes appear not interact simultaneously, as has been found common along other margins (eg the North Atlantic margin model).This work was supported by the projects CICYT MAR-98-02-0209 (TASYO), REN2002-04117-C03-01 (GADES) and IGCP-432.

64-22 Poster Veiga-Pires, Cristina Carvalho

STUDYING THE PAST OF MEDITERRANEAN OUTFLOW BASED ON 230TH EXCESS INVENTORIES AND CONTOURITES

VEIGA-PIRES Cristina Carvalho[1], GHALEB Bassam[2], VOELKER Antje[3], ABRANTES Fátima[3]
1 - Universidade do Algarve - CIMA
2 - GEOTOP Research Center
3 - Instituto Geológica e Mineiro - IGM

Keywords: thorium 230; contourites; paleoceanography; MOW

The Mediterranean Outflow water (MOW) comes out from the Mediterranean Sea and then contours the northern slope of the Cadiz Gulf. Along its way to the southern Portuguese Margin, it divides itself into three levels flowing at different depths, 400 m, 800 m and 1200 m, respectively. These different pathways induce a series of contourites along the Cadiz slope as well as some sedimentary drifts, such as the Faro Drift. Based on the assumption that the sedimentologic characteristics of these contourites should give some light on the history of MOW velocity and intensity variability, two long sedimentary cores collected during the Marion Dufresnes 114/Images cruise in 1999 have been studied. The sampling sites of these two cores, MD99-2336 and MD99-2339, located in the Cadiz Gulf at 690 and 1177 m water column depths respectively, are thus, actually, below the first level and in the main core of the MOW third level. Along time, variations in these current levels, parallel to the slope, should then influence the existence and characteristics of contourites in both sedimentary records. For this purpose, thorium-230 (230Th) as well as granulometric and micropaleontologic analysis have been undergone at high resolution on the 4 uppermost meters spanning MIS1 to LGM times. The referred current prints can be detected by analysing surface and down core sediment for its 230Th content. This radioisotope is produced by the radioactive decay of uranium-234 which content in oceanic waters is known. Therefore, its production rate in the water column can be estimated as a linear function of the water depth (~ 2.6 dpm/cm2.ka for 1 km water depth). As 230Th is almost insoluble, it will sink to the oceanic floor together with the settling particles. This vertical flux to the underlying sediment is considered, in a first order approximation, equal to its production rate in the water column. On this basis, the 230Th excess in the sediment becomes a proxy for sedimentation versus erosion processes accordingly to the sign of the difference between the total and the vertical 230Th flux, i.e. if it is, respectively, positive or negative. With this method it is then possible to extrapolate on the location of the high velocity core area and whether its intensity changed or not looking at the inventory of excess 230Th in the contourite units. We acknowledge FEDER and OE that financed this study through the Portuguese Foundation for Science and Technology (PDCTM/PP/MAR/15297/1999).

64-23 Poster Van Rooij, David

SMALL MOUNDED CONTOURITE DRIFTS ASSOCIATED WITH CORAL BANKS, PORCUPINE SEABIGHT, NE ATLANTIC OCEAN

VAN ROOIJ David[1], BLAMART Dominique[2], RICHTER Thomas[3], WHEELER Andy[4], KOZACHENKO Max[4], HENRIET Jean-Pierre[1]
1 - Renard Centre of Marine Geology, Belgium
2 - Laboratoire des Sciences de Climat et de l'Environnement, France
3 - Royal NIOZ, the Netherlands
4 - University College Cork, Ireland

Keywords: Deep-water corals; Contourite; Seismic stratigraphy; British-Irish Ice Sheet; Heinrich Events

Numerous investigations on contourite drift systems have demonstrated they are dependant of a close interaction of topography, oceanography, sediment supply and climate. Most of these contourites have been reported in areas along the ocean margins directly influenced by the large oceanographic deep-water currents from the global conveyor belt. Here, we report on smaller-scale

AN UNUSUAL SEDIMENTARY SYSTEM: THE GIL EANES CHANNEL, GULF OF CADIZ

Vincent Hanquiez [(1)], Thierry Mulder [(1)], Pascal Lecroart [(1)], Eliane Gonthier [(1)], Jean-Claude Faugères [(1)], Eliane Le Drezen [(2)] and Michel Voisset [(2)]

[(1)] DGO, UMR5805-EPOC, Bordeaux I University, France ; [(2)] DRO/GM, IFREMER Brest, France ; corresponding author: *v.hanquiez@epoc.u-bordeaux1.fr*

The Gulf of Cadiz is located in the eastern part of the North Atlantic Ocean, close to the Strait of Gibraltar. The Gulf of Cadiz undergoes the influence of a strong, warm, and saline current called the Mediterranean Outflow Water (MOW; red arrows in *figure 1*).

The MOW comes out of the Mediterranean and spreads in the North Atlantic at water depths ranging from 600 to 1300 m. At present, the MOW controls the sedimentation on the Iberian and Portuguese continental slopes. Westward of the Strait of Gibraltar, the MOW captures the particles that are supplied by Spanish rivers and from the shelf.

The sedimentary features observed downflow from Gibraltar show the progressive decrease of the MOW energy. Close to Gibraltar, the high MOW velocity (> 2.5 m/s) forms a coarse-grained lag deposit (gravels to sand). Conversely, around the Cape San Vicente, the deposits associated to this current are fine-grained sediments (silts to clays), due to the low velocity of the MOW (< 1 m/s).

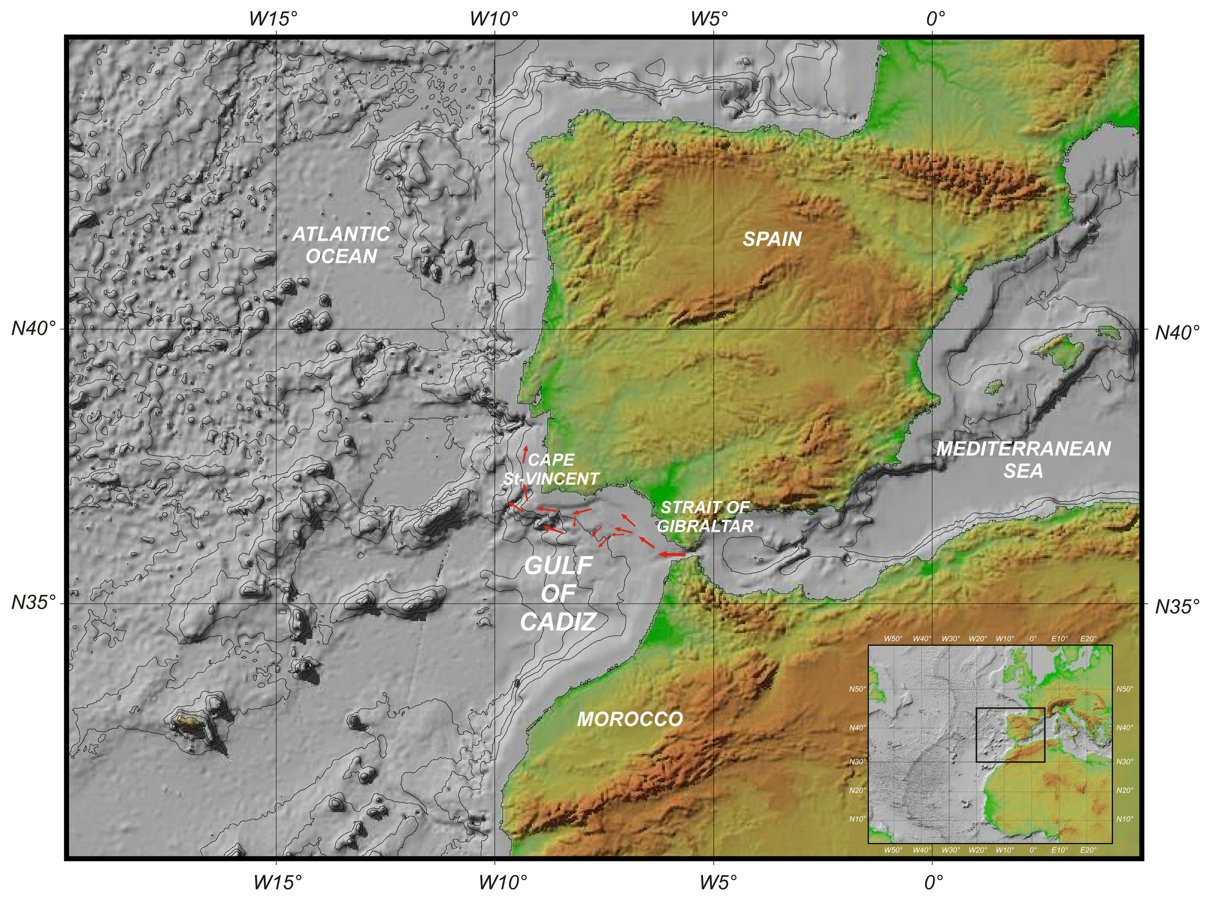


Figure 1: Gulf of Cadiz and MOW location (*after Madelain, 1970*).

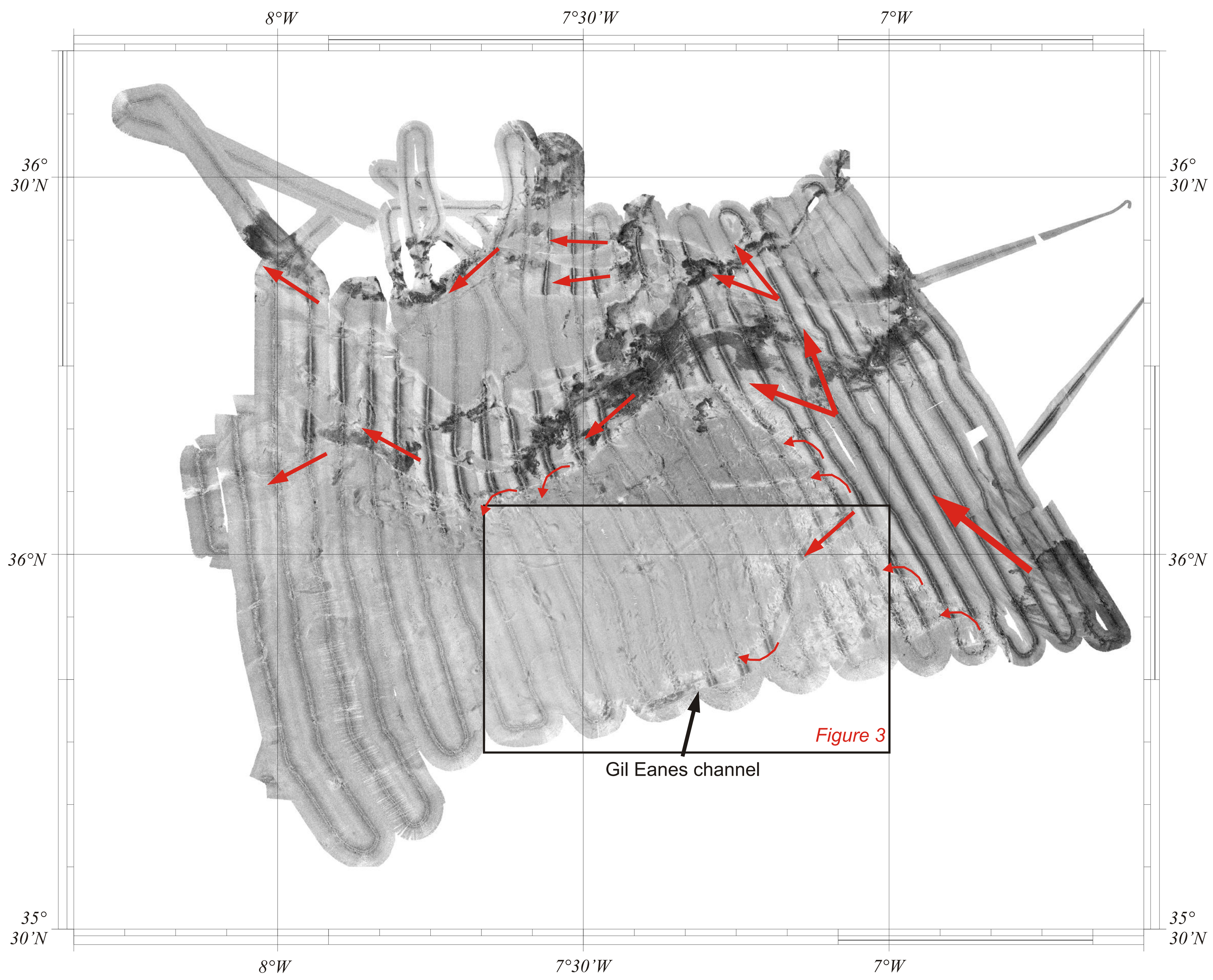


Figure 2: high resolution EM300 acoustic imagery map of the study area. The red arrows represent the MOW pathway.

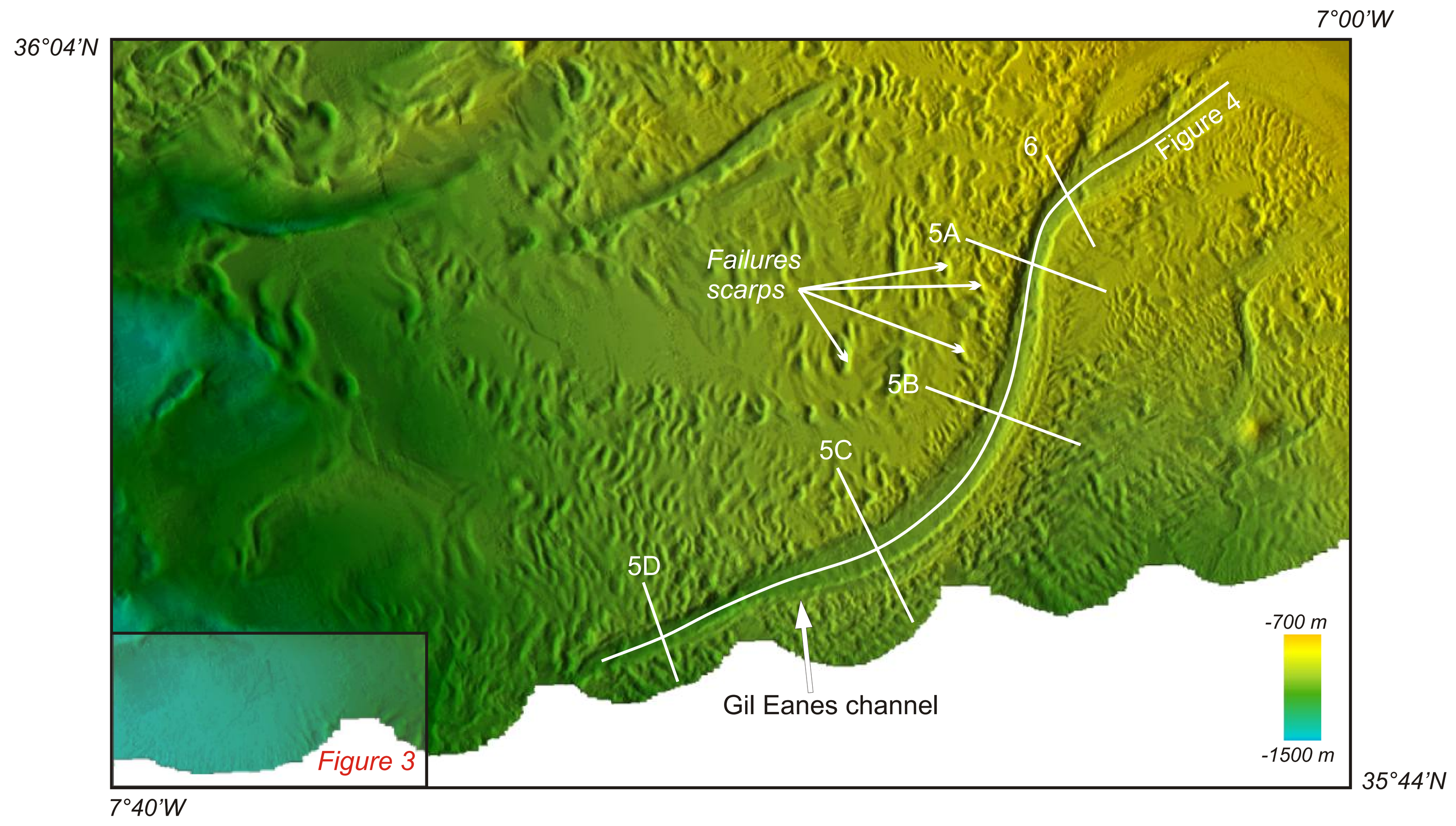


Figure 3: bathymetry detail of the Gil Eanes channel (see location in *figure 2*).

A new high resolution data set from the EM300 multibeam echosounder, deep-towed sonar SAR, Chirp and Sparker profiles, and piston cores were collected during the CADISAR cruise in 2001, in an area located between 35°35' N / 36°40' N and 6°35' W / 8°20' W (*figure 2*) , at water depths ranging from 600 m to 1900 m.

In this area, due to the sea-floor morphology, a part of the MOW is deflected southward and is channelled by major or minor downslope submarines valleys (see high backscatter in *figure 2*).

The Gil Eanes channel (*figure 2 and 3*), one of the submarine valley channelling the MOW, formed probably by retrogressive erosion. This channel is longer than 40 km and wider than 2.5 km to 1 km in its eastern and western parts, respectively.

The Gil Eanes channel is not steady state. It is both erosive and constructive (*figure 4*). This is attested, in one hand, by the "V" morphology and the high incision of the channel in the eosive parts (*figure 5A*) and, in the other hand, by the "U" morphology of the channel in the depositive parts (*figures 5B, 5C, 5D*).

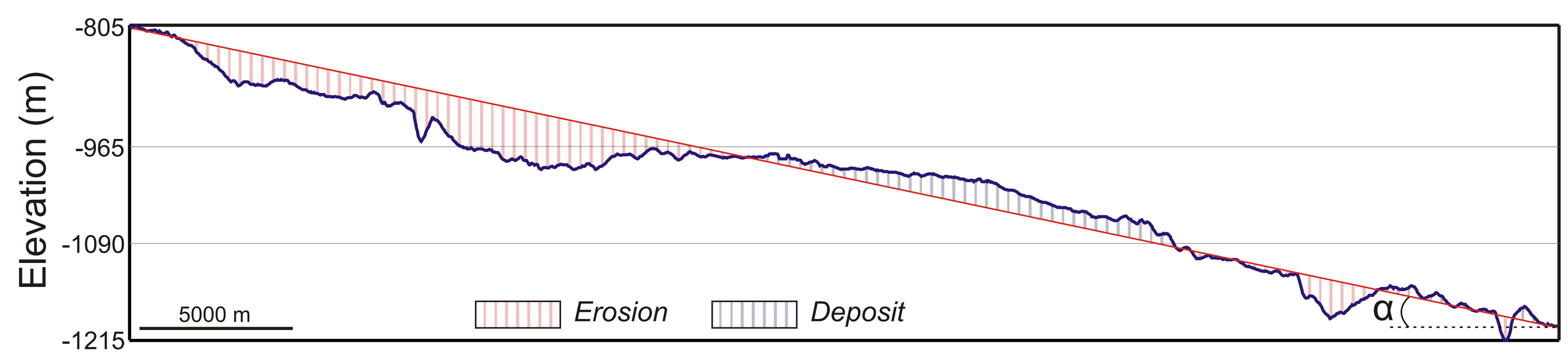


Figure 4: longitudinal profile of the Gil Eanes channel (see location on *figure 3*). The red line represents the theorical steady profile of the channel.

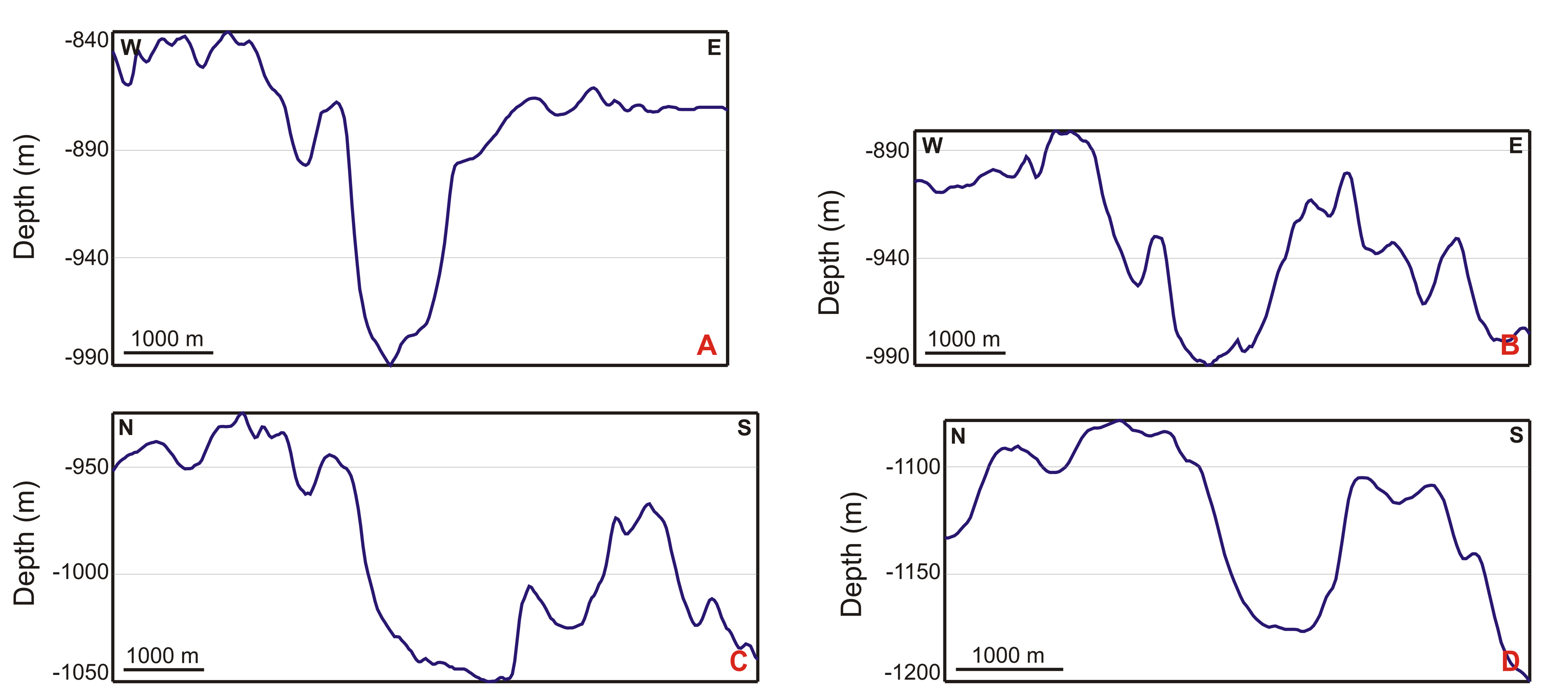


Figure 5: transversal profiles of the Gil Eanes channel (see location on *figure 3*).

The Gil Eanes channel is a straight channel as attested its low curve index (S=1.1). This is due to the relatively local steep slope (α=1.55 degree; *figure 4*) and the coarse sedimentary material which crosses it (high backscatter in *figure 2*; lack of the acoustic signal penetration in *figure 6*).

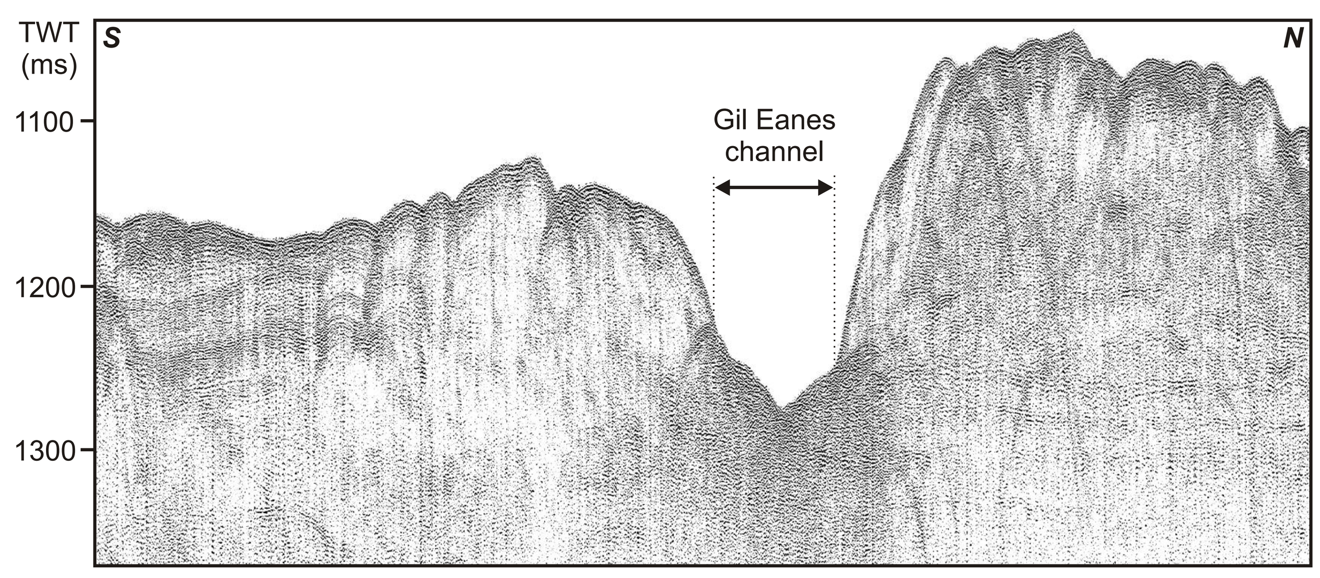


Figure 6: transversal HR seismic profile of the Gil Eanes channel (see location on *figure 3*).

The Gil Eanes channel is a primary conduit for sand transport towards the slope and deep basin as attested by sandy sediment waves along its course and small sandy lobes at its outlet (*figure 7*). These lobes are formed by the stack of several depositional events. They can form due to the expansion of three depositional processes: the channelled MOW, debris flows or turbidity currents. This suggests that a recent sedimentation due to flow spilling occurs here.

Overspread instabilities characterized the north side of the Gil Eanes channel (low backscatter in *figure 2*). These instabilities affect also the top of the flanks of the Gil Eanes (failures scarps in *figure 3*).

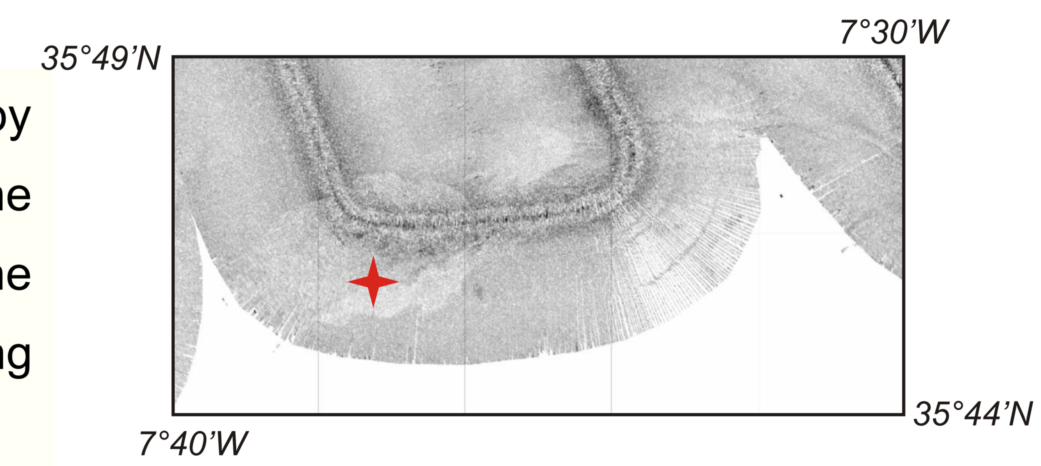
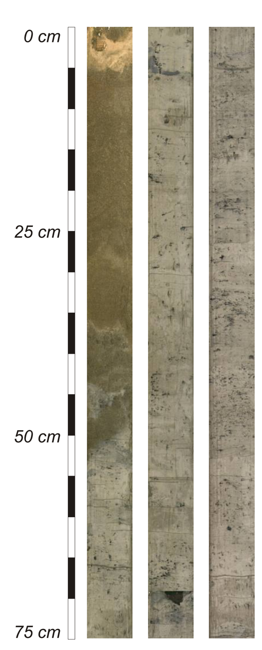


Figure 7: EM300 imagery detail of the terminal lobe of the Gil Eanes channel. The red star represents the location of the MD042810 core.



These observations suggest similarities between the Gil Eanes channel and classical deep-sea channel-levee complexes formed by turbidity current activity. However, in the Gulf of Cadiz, the main process for particle transport and deposit is an energetic contour current.