CRUISE REPORT

ROBERT D. CONRAD 2505

Gulf of Valencia - Western Mediterranean

Introduction

Cruise RC 2505 was conducted aboard the research vessel Robert D. Conrad in collaboration with scientists and students from Insituto Jaime Almeria, Columbia University and the U. S. Geological Survey. The leg began on April 1 in Barcelona, Spain and ended on April 11 in Nice, France. Primary tools used were the Sea MARC I and SeaBeam swathmapping system. The principal objective was to investigate the subsea sediment distributary system consisting of the Ebro Fan, the Valencia channel and the Valencia Fan.

REGIONAL SETTING

The Ebro/Valencia Fan system is located in the northwestern Mediterranean Sea between the mainland of Spain and the Balearic Islands. The system differs from most deep sea fans in that the proximal part of the depositional system (the Ebro Fan) is separated from the distal part of the depositional system (the Valencia Fan) by an intervening erosional channel (the Valencia Valley). The Ebro Fan is made up of a series of subparallel channels and associated fan lobes which decrease roughly in age from north to south. This geometry allowed us to examine the surface morphology of fan lobes and channels of differing ages; these observations would have been impossible in most deep sea fans where successive fan lobes are superimposed upon one another. The goal of these surveys was to use the Sea MARC I and SeaBeam swathmapping system to define the three-dimensional facies relationships and develop a growth model for this unusual fan. In addition, a short tow was made on the Rhone Fan to provide a comparison with a more conventional deep sea fan.

PERSONNEL

1.	Belen Alonso Martinez	Spain	"Jaime Almera"	Watch Stander
2.	Jose Ignacio Diaz Guerrero	Spain	"Jaime Almera"	Watch Stander
3.	Alberto Palenques Monteys	Spain	"Jaime Almera"	Watch Stander
4.	Bill Ryan	U.S.A.	L-DGO	Chief Scientist
5.	Kim Kastens	U.S.A.	L-DGO	Watch Leader
6.	Dale Chayes	U.S.A.	L-DGO	Sea MARC Engineer
7.	Bernie Gallagher	U.S.A.	L-DGO	Sea MARC E.T.
8.	John DiBernardo	U.S.A.	L-DGO	Winch Tech.
9.	Michele Henrion	U.S.A.	L-DGO	Fish Flyer
10.	A. Malinverno	Italy	L-DGO	Watchleader
11.	S. O'Connell	U.S.A.	L-DGO	Fish Flyer
12.	Dan Chayes	U.S.A.	U.R.I.	SeaBeam, Engineer
13.	John Freitag	U.S.A.	U.R.I.	SeaBeam, Engineer
14.	H. Nelson	U.S.A.	USGS	Fish Flyer
15.	Jim Smith	U.S.A.	L-DGO	Science Officer
16.	Kevin Little	U.S.A.	L-DGO	Ship's Technician
17.	Juan Lorenzo	Spain	L-DGO	Fish Flyer

Personnel were on board for cruise leg, from Barcelona to Nice

CHRONOLOGY

On March 30, two days before the Conrad sailed, Dr. Andrés Maldonado hosted a meeting of the scientific party at the Instituto "Jaime Almera" in Barcelona. At this meeting, the Spanish scientists and Hans Nelson summarized

their latest results from the Ebro and Valencia survey areas. A preliminary strategy for the cruise and data workup were outlined.

The CONRAD sailed at 1030L on April 1, after a 2 hour delay to wait for a missing crew member. SeaBeam data were collected during the transit along the continental margin.

We arrived in the Ebro Fan survey area on the evening of April 1. We decided to delay Sea MARC launch until the following morning to allow the watchstanders to become familiar with the SeaBeam routine, and to make our first launch in daylight. The night of April 1/2 was spent in a SeaBeam survey of the Ebro Fan. During this survey it first became apparent that the Loran C navigation in this area is unuseable from approximately 2130L each night until 0700L the following morning. Furthermore, the SeaBeam software for plotting contours on the flatbed plotter is unfortunately dependent upon high quality Loran C navigation. We arrived at the compromise procedure of plotting the ship's position by hand from the Magnvox satellite/dead reckoning system, which produced a smooth and fairly accurate track.

Sea MARC Lowering #1 began at 0715 on April 2, on the continental shelf adjacent to the "ponded" fan lobe. We towed down the continental slope and approximately half way across the "ponded lobed" following a generally eastward course. The data from the latter half of the lowering were marred by intermittent data drop outs. All data from this lowering were collected at a 4 sec repetition rate, giving a 5 km wide side scan swath. At 2145Z/2 April, all signals from the vehicle were lost and the lowering was terminated. Upon recovery, we found that water had leaked into the pressure case through one of the Burton connecors.

We continued to survey with SeaBeam, while Sea MARC was checked out and prepared for another launch. This SeaBeam survey focused on defining the path

of the most recently active fan channel, and the nature of the intersection between the fan channels and the Valencia Valley.

Sea MARC Lowering #2 began at 1345Z/3 April. We towed southwest along Valencia Valley, northwest along the most recently active fan channel, northeast along the continental slope at approximately the 1500 m contour, southwest along the slope/rise transition, and ended during a southeast tow along the relict fan channel (Channel "B). All data are 5 km swath width. The data quality deteriorated throughout this lowering. At 0615Z/5 April we lost all signal from the vehicle, and again were forced to terminate the lowering. On recovery, we found that the connectors at the slip rings at the cable termination had been bent and chafted.

We left the Ebro Fan area and proceeded northeastwards along Valencia Valley, zigzagging to define the nature of the Valley and its tributary canyons. At approximately 2°30'E we conducted a SeaBeam survey to define an unusually abrupt bend in the Trough, the confluence of Valencia Valley and Foix Canyon, and a nearby seamount (Cresques Seamount).

Sea MARC Lowering #3 began at 0700Z/6 April at the southeastern end of the volcanic cluster mapped as Cresques Seamount. We towed WNW across the volcanic cluster, along Valencia Valley, across the intersection of Valencia Valley and Foix Canyon; then laid in a second swath trending ESE parallel to the first. The data quality throughout this lowering was excellent. All side scan data are 5 km swath. We recovered Sea MARC at 1650Z/7 April.

We proceeded eastward along the Valencia Valley towards the Valencia fan, and during the night of April 7/8 conducted a detailed SeaBeam survey of the intersection of two slope canyons and the Valencia Valley. Sea MARC was launched for lowering #4 at 0740/8 April. We towed downchannel along the main fan channel, along the southern flank of Spartacus Seamount, and then rejoined

the fan channel. The data quality throughout this tow was excellent; again, all data were collected at 5 km swath width. We terminated the tow at approximately longitude 4°20E, where the fan chanels became too small to resolve with confidence using Sea MARC. Lowering #4 ended at 1430Z/ 9 April.

We then transited straight to the Rhone Fan. Sea MARC was launched for lowering #5 at 2310Z 9 April. This tow followed the meandering channel of the Rhone Fan, proceeding upchannel from approximately 2100 m water depth to 1800 m water depth. Both 5 km and 2 km swath width data, all of excellent quality, were collected. We ended this tow at 1520Z/ 10 April.

We then transitted to Nice, France, arriving at 0900L/ 11 April. SeaBeam data were collected on the transit. Three Spanish scientists disembarked in Nice and five French scientists and engineers boarded. We left Nice at 1130L/11 April and transitted to the Nice Canyon survey area.

PRELIMINARY RESULTS

Ebro Fan Area:

* The continental slope adjacent to the Ebro Fan is dissected by numerous canyons with local relief of up to 200m. The canyons are fed by side canyons in a pinnate drainage pattern. In plan view, the slope canyons are straight rather than sinuous.

* In contrast to the canyons on the east coast of the United States, these slope canyons have not coalesced to form knife edge divides between adjacent canyons. Instead there is generally a region of undissected terrain with conformably bedded sediment between canyons.

* There does not appear to be a one to one correspondence between slope canyons and fan lobes. Instead, within the survey area, there appear to be more slope canyons than fan channel/lobe complexes.

* The most recently active channel in the survey area was observed to narrow down fan, from a width of nearly one kilometer near the slope break to less than 200 m near the intersection with Valencia Valley.

* Several of the channels make a right angle turn towards the northeast as they approach Valencia Valley. They run parallel to Valencia Valley for a distance of several kilometers before entering it as hanging valleys.

* The so-called "ponded lobe", which had been interpreted as a mass flow deposit, was observed to have a hummock surface on side scan sonar records, which is consistent with the mass flow interpretation.

Valencia Valley and Fan:

* Valencia Valley is fed by tributaries from both the mainland and Balearic side. Most tributaries appear to enter the Valley as hanging valleys.

* At longitude 2°35'E Valencia Valley makes an abrupt bend from flowing eastward to flowing northward. The bend is structurally controlled and a volcanic seamount mapped as Cresques Seamount lies immediately southeast of the bend. Valencia fragments and sediments were recovered from this location during DSDP Leg 13 (Site 121). SeaBeam revealed that this seamount is actually a cluster of more than two dozen more volcanic cones.

* At longitude 3°, a major tributary, called Tarragona Canyon enters the Valley from the north. The SeaBeam survey determined that this tributrary enters as a hanging valley.

STATUS OF DATA

The SeaBeam swath plots were hand carried to Barcelona directly from Nice on April 12 where they were photocopied. Originals were returned to L-DGO and copies will remain in Barcelona at Instituto "Jaime Almera". The Sea MARC I

side-scan records were photographed onboard R. D. CONRAD and the film was hand carried to Barcelona for permanent archival there. The navigation track was edited at seas but additional editing needs to be accomplished at L-DGO during July. A mosaic of each of the three Sea MARC I side scan sonar studies will be created at L-DGO in August at a map scale of 1:40,000. The mosaics are the principal scientific product and will be hand caried from L-DGO to Instiuto "Jaime Almera" by William B. F. Ryan in September. Copies of the mosaics and finalized SeaBeam maps will also be sent to Madrid for Spanish National Archives.

Analysis of the data has already begun by both Spanish and American scientists. Papers and reports have been outlined and participants have been given specific reporting assignments. We expect to have preliminary scientific manuscripts completed in September. They will be co-authored by members of the shipboard scientific parties.