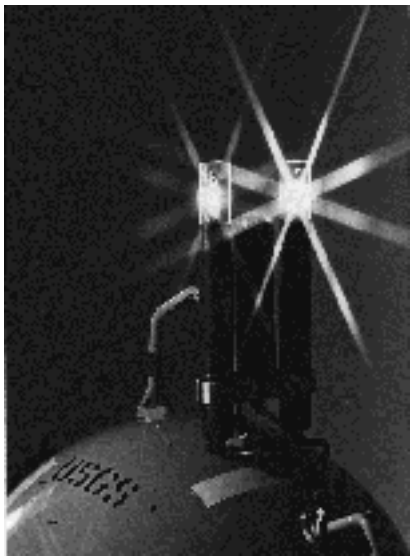
Seismic Images of of the Mendocino Triple Junction Region

Cruise Report for RV WECOMA 9406A

Summary
Cruise Participants
Cruise Data



Related sites

- *Pulling the Rug out From Under California: Seismic Images of the Mendocino Triple Junction Region*
- *Gravity and the MTJ*

Summary

This cruise represents part of a two-year onshore/offshore seismic acquisition program to image the crest and upper mantle of northern Califomia. The primary objective is to place constraints on how the northward migration of the Mendocino triple junction affects the crustal architecture of the Califomia continental margin, which is undergoing a transition from a compressive to a transpressive tectonic regime. A better understanding of the processes associated with triple junction migration in this region will contribute to our understanding of the geological history of western California and of the seismic and volcanic hazards associated with the San Andreas fault system and the Cascadia subduction zone. During the cruise described in this document, we deployed and retrieved ocean bottom seismographs (OBS) operated by the U. S. Geologicai Survey and ocean bottom hydrophones (OBH) operated by the Woods Hole Oceanographic Institution in order to record airgun shots from from a 8385 in3 (137.5 liter) tuned airgun array deployed by the RV Ewing, thus providing large-aperture seismic data for derivation of. crustal velocity and structure. This information complements the multichannel seismic reflection information obtained simultaneously by the RV Ewing. Additional seismographs were deployed on land to record the shots. This field effort builds on an onshore seismic refraction/reflection program conducted during August, 1993, using approximately

600 seismometers and large explosive sources. The need to coordinate the efforts of two ships and a large onshore field crew during the 1994 field experiment placed unusual constraints on the timing of the OBS/OBH operations that were conducted from the RV WECOMA. A secondary objective of the cruise was to obtain high-resolution subsurface images around sites that have been proposed to the Ocean Drilling Program (ODP) as part of a major effort to constrain the paleo-oceanographic effects of the California current through acquisition of a series of long cores recording the sedimentary history of the Califomia continental margin. Logistically, this program complemented the OBS/OBH effort because several proposed drilling sites fall within the boundaries of the OBS/OBH experiment, and time for surveying was available between OBH/OBS deployments. Digital 3.5 and 12 kHz echo-sounding data and digital single channel seismic reflection data using an 80 in3 water gun as a source were acquired on grids surrounding 4 of the proposed drilling sites. Finally, during the transit to and from Newport, we acquired several Acoustic Doppler Current Profiles (ADCP) to map currents offshore Cape Blanco.

Cruise Narrative for RV WECOMA 9406A

date	time (local)	summary of activity	est./actual time needed
6/8/94	0905	Leave Newport for the seaward end of MCS line 2	~ 36 hours
-	1633	Start ADCP survey, plan A.	-
6/9/94	0345	ADCP survey completed.	-
-	0809	Start WHOI release tests.	8/9
-	1700	Finish WHOI release tests.	-
6/10/94	0600	Arrive at site 1 to begin GROUP 1 deployment (6 0BH, 5 OBS).	21/17.3
-	-	2320	Finish deployment at site 11 of GROUP I. Underway to beginning Of GROUP H.
6/11/94	0055	Start SCS survey at CA-7. Because of problems with the water gun and streamer, this is primarily a 3.5 and 12 kHz survey site	?/26
6/12/94	0247	Stop survey at CA-7.	-
-	0545	Arrive at site 12 of GROUP H deployment (40BH; 3 OBS). Deployment includes approx 200 nm of transit.	20.5/12.7
-	1828	Finish deployment at site 18 of GROUP II. Stay on site to fix articulated crane.	-
-	1945	Crane fixed. Underway to SCS CA-2 survey site.	-
-	2326	Deploy SCS for CA-2 survey.	?/24
6/13/94	2357	Finish CA-2 SCS survey.	-
6/14/94	0704	Start GROUP I recovery at site 1.	30/31
-	1253	Finish recovery of site 3 in rough seas. Stop recovery ofthe rest of GROUP I to wait for seas to calm down.	(this includes 6.5 hrs waiting for calmer seas)
-	1930	Resume recovery of GROUP I at site 10. Sites recovered in the following order: 10, 11, 9, 8, 7, 5, 4, 6. OBS at site 6 was not recovered.	-
6/15/94	1400	Abandon search for OBS. Start SCS survey at site CA-7.	-
-	2130	Finish SCS survey at CA-7.	?/7.5
6/16/94	0045	Recover OBH at site 12 (first deployment of GROUP II).	-
-	0600	Start GROUP III deployment at sites 19-26 (50BH and 3 OBS on the seaward end of line 6 and along line 5)	20/11
-	1715	Finish GROUP III deployment. Head to SCS survey site CA-4	-

-	2027	Arrive at SCS survey site CA-4 and begin survey	?/9.5
6/17/94	0600	Leave CA4 and head to seaward end of line 8	-
-	1030	Start deployment of 20BH and 10BS on line 8 (GROUP 4)	6/4.3
-	1149	Go to SCS site CA1	-
-	1700	SCS profiling at CA1	?/13
6/18/94	0600	Leave CA 1 and head for north end of line 3 (56 nm)	-
-	0953	Pick up 30BH and 30BS from line 3 (82 nm transit).	20/13
6/18/94	2300	Finish pickup of instruments and get underway to OBS site 30 on line 8	-
6/19/94	0934	At OBS station 30	-
-	0959	Underway to SCS site CA-1	-
-	1223	Start SCS survey at CA-1	?/9.75
-	2212	Finish SCS. Underway to east end of line 6.	-
6/20/94	eta 0300	Redeploy 30BH and 20BS line 6 (GROUP 5)	8
-	1100	Finish redeployment. Transit to CA-4 for SCS survey (60 nm)	6
-	1700	Arrive at CA-4. Survey for 15 hrs	15
6/21/94	0800	Transit to OBS site 27 (55 nm)	5.5
-	1330	Start pickup of 4 instruments on line 8.(10.5 hrs)	10.5
6/22/94	0000	Finish pickup of line 8. Start transit to site 23 (68 nm)	7
-	0700	Arrive at site 23. Pick up 23 to 19, heading south.	14.5
6/22/94	2130	Finish line 5 pickup. Spend 12 hours at CA-2 doing SCS. If them are delays earlier in the program, SCS time here will be decreased accordingly.	12
6/23/94	0930	Finish SCS and transit toward west end of line 6.(60 nm)	6
-	1530	Start line 6 pickup of 5 instmments.	-
-	2214	Finish line 6 pickup.	12/6.75
-	2300	Deploy SCS system for high-resolution survey of the deformation front between MCS3 and MCS6	-
6/24/94	0248	Abandon SCS survey because of equipment problem. Continue with a 3.5 KHz survey.	-
-	1120	Head for Eureka.	-
-	1400	Tie up at the Sierra Pacific dock in Eureka. Start packing and unloading ship.	-
6/25/94	1220	Leave Eureka. Trehu, Lendl, and WHOI and USGS personnel remain on shore. Lyle and Chambers ride back to Newport.	-
6/26/94	1530	Arrive Newport.	-
6/27/94	-	Finish unloading.	-

Cruise Participants

RV Wecoma

- **Anne Trehu** - Oregon State University - Chief Scientist
- **Mitch Lyle** - Boise State University - co-Chief Scientist
- Christof Lendl - Oregon State University
- John Chambers - Boise State University
- Vee-Ann Cross - US Geological Survey
- Jim Dolan -Woods Hole Oceanographic Institution
- David Dubois - Woods Hole Oceanographic Institution
- Tim Holt -Oregon State University
- Don Michaelson - Oregon State University
- Greg Miller - US Geological Survey
- Ken Peal - Woods Hole Oceanographic Institution
- Brian Wendler - Oregon State University
- F. Beecher Wooding - Woods Hole Oceanographic Institution

Cruise Data

Lines MCS1b and WA1 Data

Lines MCS1c and MCS7 Data

Lines MCS7a and MCS3 Data

Lines MCS5 and MCS8 Data

Lines WA6 and MCS6 Data