





W. Steven Holbrook Graham Kent Katie Keranen Paul Johnson Anne Trehu Harold Tobin Jeff Beeson Jackie Caplan-Auerbach Ashton Flinders The COAST 2012 Team





Talk Outline

- 1. Cruise Overview
- 2. Open Participation & Shipboard Education: Newbies ahoy!
- 3. Data Acquired
 - Multibeam bathymetry & backscatter
 - Gravity & magnetic
 - Seismic
- 4. Preliminary Findings
- 5. Challenges & Recommendations
- 6. Open Access: Data availability

R/V Langseth cruise MGL1212

Astoria, Oregon - Astoria, Oregon July 12-24, 2012

Vital Statistics:

- ~1100 km MCS data acquired
- Full coverage multibeam bathymetry in deeper water (>2 km)
- Gravity, magnetic data acquired
- No 3.5 kHz data (mech failure)

Seismic Acquisition:

- 8-km, 636-channel streamer (2D)
- 36-gun, 6600 cu. in. array
- Two tow depths for guns and streamer: 9 m and 15 m (data comparison)
- Onshore Reftek piggyback conducted (Trehu/Abers)

R/V Langseth cruise MGL1212

Scientific & Operational Goals:

- Locate the offshore plate boundary
- Identify downdip variations in plate boundary structure
- Determine the nature of the plate boundary interface (subducting sediment, etc.)
- Quantify upstream inputs to ETS zone (porosity, fluid pressure, etc.)
- Image offshore methane system
- Produce data in support of future 2D and 3D seismic surveys of Cascadia margin

Education & Outreach Goals:

- 1. Conduct an Open-Access cruise:
 - All geophysical data immediately available
 - Raw data: <u>www.marine-geo.org/tools/search/entry.php?id=MGL1212</u> Migrated stacks: <u>www.ig.utexas.edu/sdc/cruise.php?cruiseIn=mgl1212</u>
- 2. Conduct an Open-Participation cruise:
 - Shipboard party selected from ~60 applicants
 - Every available berth filled

R/V Langseth cruise MGL1212: Open-Participation







R/V Langseth cruise MGL1212: Open-Participation

<u>Pl's</u>:

W. Steven Holbrook, Univ. of Wyoming Graham Kent, Univ. of Nevada Katie Keranen, Univ. of Oklahoma

<u>Honorary Pl's</u>: Harold Tobin, Univ. of Wisconsin Jackie Caplan-Auerbach, WWU

<u>Postdocs</u>: Emily Roland, USGS-Anchorage Danielle Sumy, USGS-Pasadena

<u>Students</u>:

Kate Allstadt, Univ. of Washington Robert Anthony, New Mexico Tech Shahar Barak, Stanford Univ. Jeff Beeson, Oregon State Univ. Janine Buehler, Scripps Inst. of Oceanography Brian Covellone, Univ. of Rhode Island Brady Flinchum, Univ. of Nevada Ashton Flinders, Univ. of New Hampshire Will Fortin, Univ. of Wyoming Dalton Hawkins, Univ. of Oklahoma Annie Kell, Univ. of Nevada Dara Merz, Western Washington Univ. Marie Salmi, Univ. of Washington

20 Participants: 5 faculty, 2 postdocs, 13 grad students
14 institutions represented
13 "newbies":
8 people had never been to sea
5 others had never participated in an MCS cruise



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Deck Operatio

b Instruction

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Lab Ops/Wate





Cruise Overview



Free-air Gravity Data



See poster by Caplan-Auerbach et al., T23E-2722

Magnetic Data



Multibeam Bathymetry Data



Backscatter Intensity Data



126°W

125°W

Preliminary Findings: A Brief Tour

- 1. Slope failures
- 2. Methane hydrate system
- 3. Active normal faults
- 4. Accretionary wedge structure
 - Landward vergence
 - Undeformed zones
- 5. Plate boundary structure
 - Landward weakening of oceanic crust reflection
 - Where is the décollement?



Slope Failures

126°W

Slope Failures

Line 5 PSDM



Abundant BSR's



Abundant BSR's

Line 4 PSDM



Active Normal Faults



Landward-Vergent Structures



Landward-Vergent Structures

Line 4 PSDM



Landward-Vergent Structures



Line 6

Undeformed "Oases"



Undeformed "Oases"



Landward-Weakening Top of Oceanic Crust Reflection







Plate Boundary Structure Where is the Décollement?



MacKay et al., 1995, Tectonics

Plate Boundary Structure Where is the Décollement?



Line 5

Plate Boundary Structure Where is the Décollement?



Line 7







Challenges: The Usual Suspects

Mechanical/Electrical Difficulties



Fishing Gear



Protected Species



Challenges: The Usual Suspects



Challenges: A Bit More Troubling...



Challenges: Noisy Streamer Sections



80 out of 636 channels — more than 12% of the streamer — had to be killed in processing due to noise issues.

Challenges: A Bit More Troubling...

Propulsion problems:

Partial loss of propulsion in port engine limited us to 50% power and threatened to shut down cruise

Level wind problem:

Complete breakdown of level wind on streamer reel #3 (delayed mid-cruise recovery and repair after encounter with fishing gear)

Recommendations

- Improved shipboard processing capabilities
 - Make a "processing alcove" in the main lab: Four workstations, new table
 - Procure and maintain ample licenses for Paradigm & Landmark software
- Improve streamer data quality
- Engine room: stabilize clean lab power & propulsion
- Repair Knudsen 3.5 kHz
- Improve shipboard networking
 - ...cruise-specific folders can't be smb-mounted

Open Access: Download "our" Data!

Migrated stacks: <u>www.ig.utexas.edu/sdc/cruise.php?cruiseIn=mgl1212</u>

Program Summary Information											
NGDC Number Platform Marcus G. Langseth Platform Operator Lamont-Doherty Earth Observatory Beginning Date 2012-07-12 Ending Date 2012-07-23 Start Port Astoria, Oregon End Port Astoria, Oregon Line Names MCS: 01_6-40HZ, 02_6-70HZ, 03_6-70HZ, 03_6-40HZ, 04_6-70HZ, 05_6-40HZ, 06_6-70HZ, 07_6-40HZ, 08_09_6-70HZ, 10_6-70HZ Navigation Field Cruise Report PDF Links Comments								HZ, 08_6-40⊦	łZ,		
Scientific References											
Seismic Acquisition Parameters											
- ▼General Processing Description											
Seismic Section Images											
▼Available SEG-Y Data - Processed Click on a file link (segy, nav, gif, hst) to add the file to your cart or click 'view' to view it. Ordered by Data Type, Line Name. Processing Level											
UniqueID	Line Name	Data Type	Process	SEG-Y	Nav	Image	Processing	Data Provider	Start Date	Start Time	End Da
ar55.7329	01_6-40hz	mcs	migration	segy	nav	gif (view)	hst (view)	Holbrook	2012-07-14	13:10:27	2012-07
ar55.7330	02_6-70hz	mcs	migration	segy	nav	gif (view)	hst (view)	Holbrook	2012-07-20	17:08:53	2012-07
ar55.7332	03_6-40hz	mcs	migration	segy	nav	gif (view)	hst (view)	Holbrook	2012-07-15	05:15:14	2012-07
ar55.7331	03_6-70hz	mcs	migration	segy	nav	gif (view)	hst (view)	Holbrook	2012-07-21	05:08:45	2012-07
ar55.7333	04_6-70hz	mcs	migration	segy	nav	gif (view)	hst (view)	Holbrook	2012-07-20	00:18:41	2012-07
ar55.7334	05_6-40hz	mcs	migration	segy	nav	gif (view)	hst (view)	Holbrook	2012-07-16	01:06:14	2012-07
ar55.7335	06_6-70hz	mcs	migration	segy	nav	gif (view)	hst (view)	Holbrook	2012-07-19	07:44:32	2012-07
ar55.7336	07_6-40hz	mcs	migration	segy	nav	gif (view)	hst (view)	Holbrook	2012-07-16	21:02:05	2012-07
ar55.7337	08_6-40hz	mcs	migration	segy	nav	gif (view)	hst (view)	Holbrook	2012-07-18	22:33:39	2012-07
ar55.7338	09_6-70hz	mcs	migration	segy	nav	gif (view)	hst (view)	Holbrook	2012-07-22	15:25:40	2012-07
ar55.7339	10_6-70hz	mcs	migration	segy	nav	gif (view)	hst (view)	Holbrook	2012-07-22	00:19:41	2012-07

Open Access: Download "our" Data!

Raw data: www.marine-geo.org/tools/search/entry.php?id=MGL1212

MGL1212.005.MCS03.001.tar	2012-09- 17	19116.1	Line:MCS03	SEGD ^I (TAR ^(?))	2012- 07-15 05:15:14	2012- 07-15 11:13:39	- 124.82745	46.93184	-125.4522	46.88023
MGL1212.005.MCS03.002.tar	2012-09- 17	19116.1	Line:MCS03	SEGD ^I (TAR [?])	2012- 07-15 11:14:01	2012- 07-15 17:16:52	- 125.45283	46.88016	- 126.07644	46.82513
MGL1212.005.MCS03.003.tar	2012-09- 17	3863.0	Line:MCS03	SEGD ^I (TAR ^①)	2012- 07-15 17:17:14	2012- 07-15 18:37:34	- 126.07711	46.82508	- 126.20246	46.81338
MGL1212.006.MCS05.001.tar	2012-09- 17	15850.4	Line:MCS05	SEGD ^I (TAR ^①)	2012- 07-16 01:04:15	2012- 07-16 06:08:31	- 126.38456	46.65374	- 125.85753	46.69956
MGL1212.006.MCS05.002.tar	2012-09- 17	19116.1	Line:MCS05	SEGD ^I (TAR ^(?))	2012- 07-16 06:08:53	2012- 07-16 12:02:35	- 125.85687	46.6996	- 125.23464	46.75404
MGL1212.006.MCS05.003.tar	2012-09- 17	17801.9	Line:MCS05	SEGD ^I (TAR ⁽²⁾)	2012- 07-16 12:02:57	2012- 07-16 17:30:38	- 125.23399	46.75409	-124.6539	46.80077
MGL1212.007.MCST02.001.tar	2012-09- 17	5754.7	Line:MCST02	SEGD ^I (TAR ⁽⁾)	2012- 07-16 17:39:10	2012- 07-16 19:38:56	- 124.64114	46.7974	- 124.60577	46.6708
MGL1212.008.MCS07.001.tar	2012-09- 17	1911 <mark>6.1</mark>	Line:MCS07	SEGD ^I (TAR ^①)	2012- 07-16 21:02:05	2012- 07-17 03:35:28	- 124.72822	46.65119	- 125.34979	46.59954
MGL1212.008.MCS07.002.tar	2012-09- 17	11429.8	Line:MCS07	SEGD ^I (TAR ^①)	2012- 07-17 03:35:51	2012- 07-17 07:30:46	- 125.35044	46.59949	- 125.73484	46.56572
MGL1212.008.MCS07.003.tar	2012-09- 17	9418.7	Line:MCS07	SEGD ^I (TAR ^(?))	2012- 07-17 07:31:11	2012- 07-17 10:38:15	- 125.73549	46.56566	- 126.04051	46.53725

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