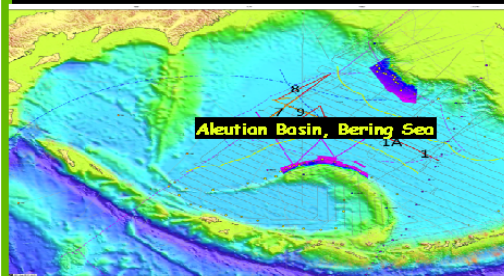
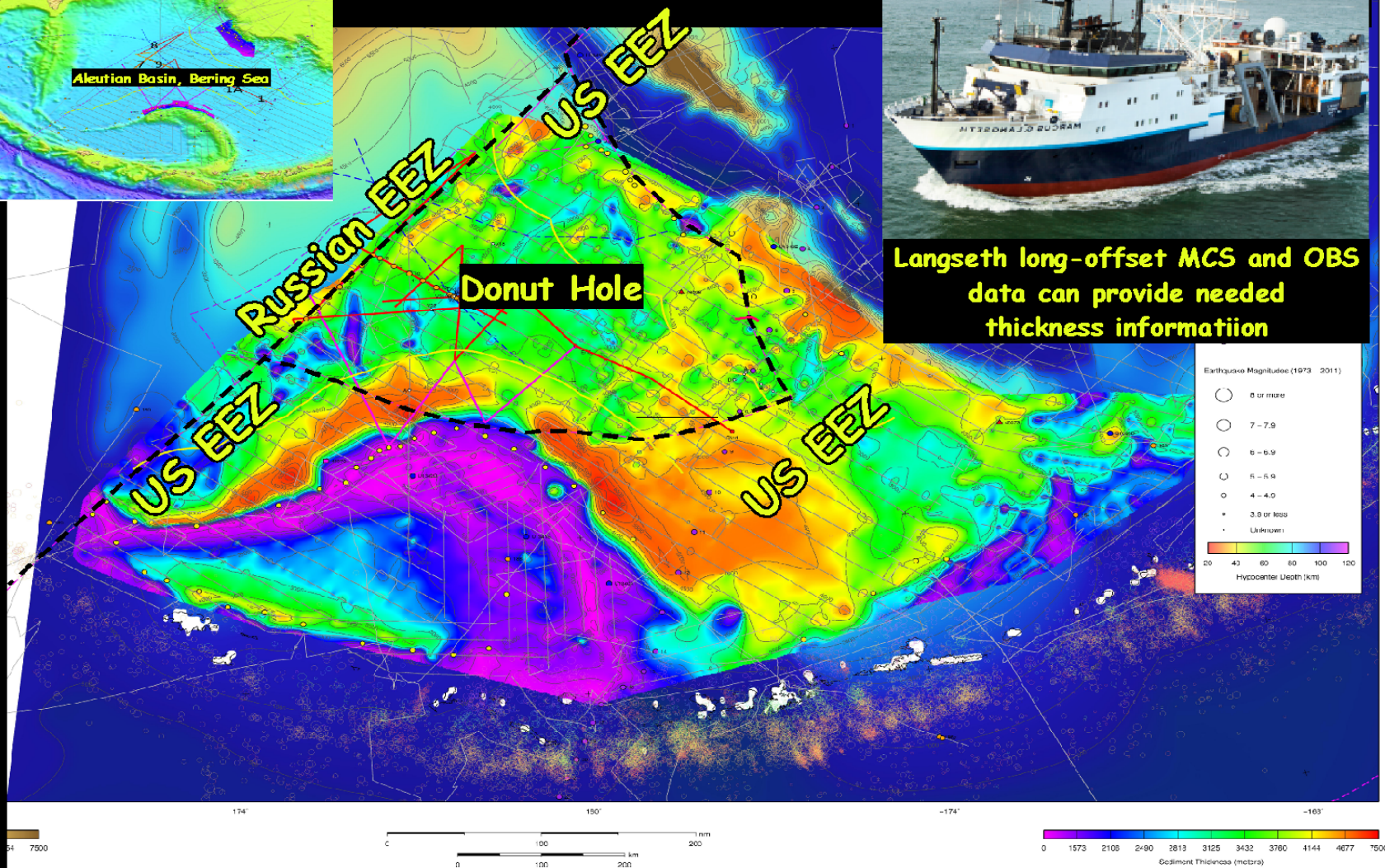


# Sediment Thickness Inside in the Aleutian Basin of the Bering Sea Was Generally Known, But Not Accurate Enough for the US to Claim Economic Dominion over the "EEZ Donut Hole"



Langseth long-offset MCS and OBS data can provide needed thickness information



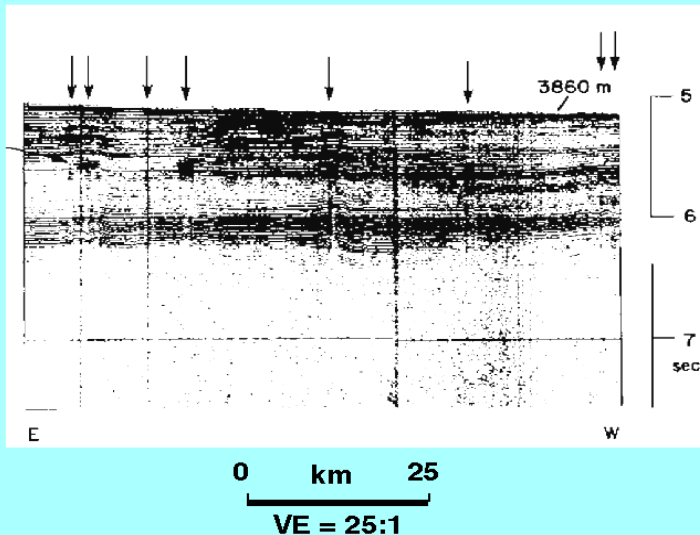
# IN THE BERING SEA, USGS WANTED TO KNOW WHAT VAMP STRUCTURES (Velocity Amplitude Anomalies) ARE



LANGSETH TO THE RESCUE

1971,  
Silas Bent Records  
Strange Acoustic Images  
Below the Floor of  
the Deep Bering Sea

BN-204



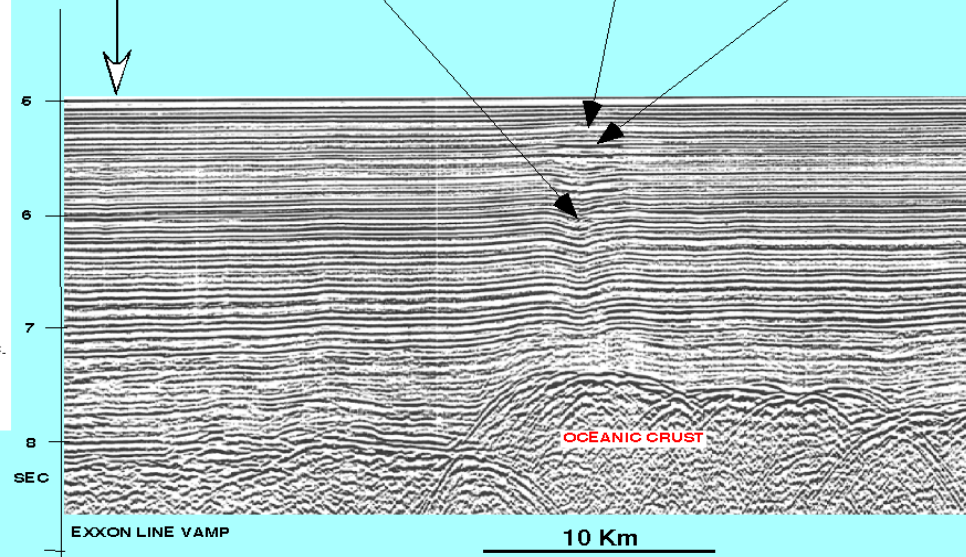
## Velocity-Amplitude Anomaly (VAMP)

~ 3800 m

Down-flexed  
Reflection  
Horizons

Up-flexed  
Reflection  
Horizons

High-amplitude  
Reflection  
Horizons





# USGS Submitted a Science Plan and Contract to UNOLS-NSF Requesting Langseth-supported, Long-offset MCS and OBS Velocity Studies in the Aleutian Basin, A corresponding Science Support Plan was prepared

Lamont-Doherty Earth Observatory  
COLUMBIA UNIVERSITY | EARTH INSTITUTE

## Science Support Plan R/V *Marcus G. Langseth*



USGS Leg 2 – Bering Sea  
August 7<sup>th</sup> 2011 – September 4<sup>th</sup> 2011  
Cruise no. MGL11-11  
For  
Ginger Barth

Date:	August 1, 2011 (Rev. 5)
Compiled By:	Robert Steinhaus
	David Martinson
	Anthony Johnson
	Jeff Rupert

### Distribution list:

Copy no.:	Receiver:	Date
1	Chief Scientist	15 July 2011
2	NSF Ship Operations Program Manager	15 July 2011
3	NSF Technical Services Program Manager	15 July 2011
4	Vessel, Chief Science Officer	15 July 2011
5	Vessel, Captain/Chief Engineer	15 July 2011

# Dutch Harbor, Aleutian Islands, August 2011,





# R/V MARCUS G. LANGSETH

MARCUS GERHARDT LANGSETH (1932-1997)

MARCUS G. LANGSETH (MARK TO HIS FRIENDS) STARTED AT LAMONT GEOLOGICAL OBSERVATORY IN 1953 AS A SUMMER HIRED HAND. HE HAD GROWN UP MOSTLY IN ORPHANAGES, BUT WOUND UP EARNING A BACHELOR'S DEGREE FROM WAYNESBURG COLLEGE, AND PHD FROM COLUMBIA. ONLY TWELVE MEN HAVE WALKED ON THE MOON, SIX OF THEM BROUGHT MARK'S EQUIPMENT ALONG.

AT LAMONT IN THE LATE 1950'S AND EARLY 1960'S, HE DEVELOPED ONE OF THE FIRST INSTRUMENTS TO MEASURE THE HEAT FLUX BETWEEN THE INTERIOR OF THE EARTH AND THE DEEP OCEAN BASINS, WORKING WITH DICK VON HERZEN OF THE WOODS HOLE OCEANOGRAPHIC INSTITUTION. HE COMPILED THE FIRST GLOBAL HEAT FLOW MAP, A MAP THAT WAS INSTRUMENTAL IN ESTABLISHING THE EMERGING PARADIGMS OF PLATE TECTONICS AND SEA FLOOR SPREADING.



AS CHIEF SCIENTIST OF THE APOLLO HEAT FLOW EXPERIMENT, HIS MEASUREMENTS SHOWED THAT THE MOON HAD LOST MUCH OF ITS INTERNAL HEAT LONG AGO, AND THAT IT LACKED THE EARTH'S MECHANISMS FOR CREATING NEW HEAT. IN RECOGNITION OF THIS IMPORTANT CONTRIBUTION TO OUR UNDERSTANDING OF THE MOON, HE RECEIVED NASA'S SPECIAL ACHIEVEMENT AWARD.

MARK PLAYED A KEY LEADERSHIP ROLE IN THE OCEAN DRILLING PROGRAM, AND CHAIRED NATIONAL COMMITTEES THAT OVERSEE THE ACADEMIC RESEARCH VESSEL FLEET. IN THE 1990'S HE WAS THE SCIENTIFIC LEADER THAT ENABLED THE FIRST UNCLASSIFIED SCIENTIFIC MISSION ABOARD A U.S. NAVY NUCLEAR-POWERED SUBMARINE OPERATING BENEATH THE ARCTIC ICE CAP. THE RESULTING DATA HAVE REVOLUTIONIZED OUR UNDERSTANDING OF THE ARCTIC OCEAN.

BEYOND THESE AND OTHER SCIENTIFIC CONTRIBUTIONS TOO NUMEROUS TO LIST HERE, MARK WAS A KIND AND GENTLE PERSON, AND A BELOVED MENTOR TO MANY LAMONT STAFF AND STUDENTS. WE ARE PROUD THAT LAMONT'S NEW RESEARCH VESSEL BEARS THE NAME "MARCUS G. LANGSETH."

LAMONT-DOHERTY EARTH OBSERVATORY 2007



LAMONT-DOHERTY  
EARTH OBSERVATORY  
THE EARTH INSTITUTE AT COLUMBIA UNIVERSITY

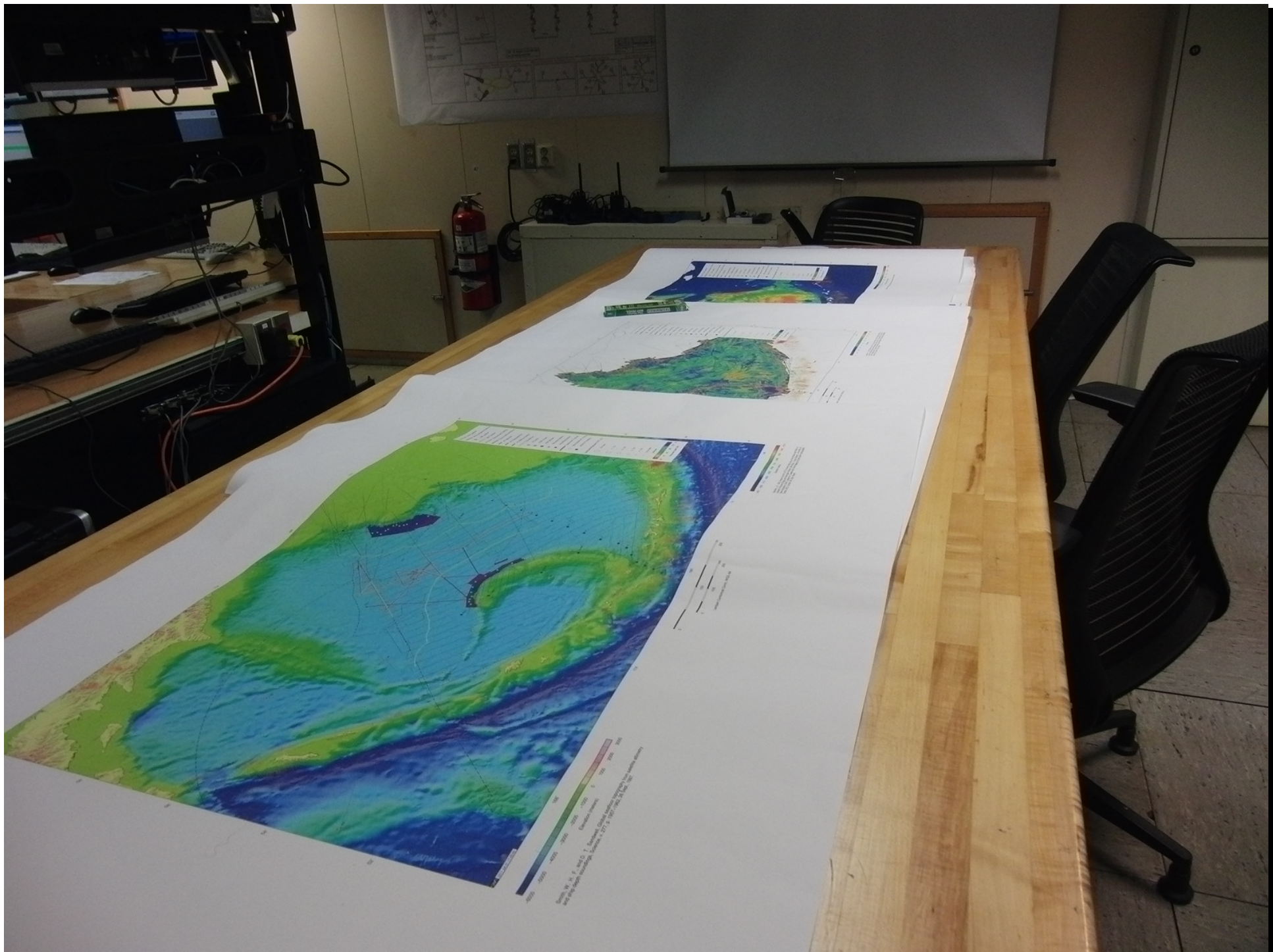




# Departing Dutch for the Bering Sea















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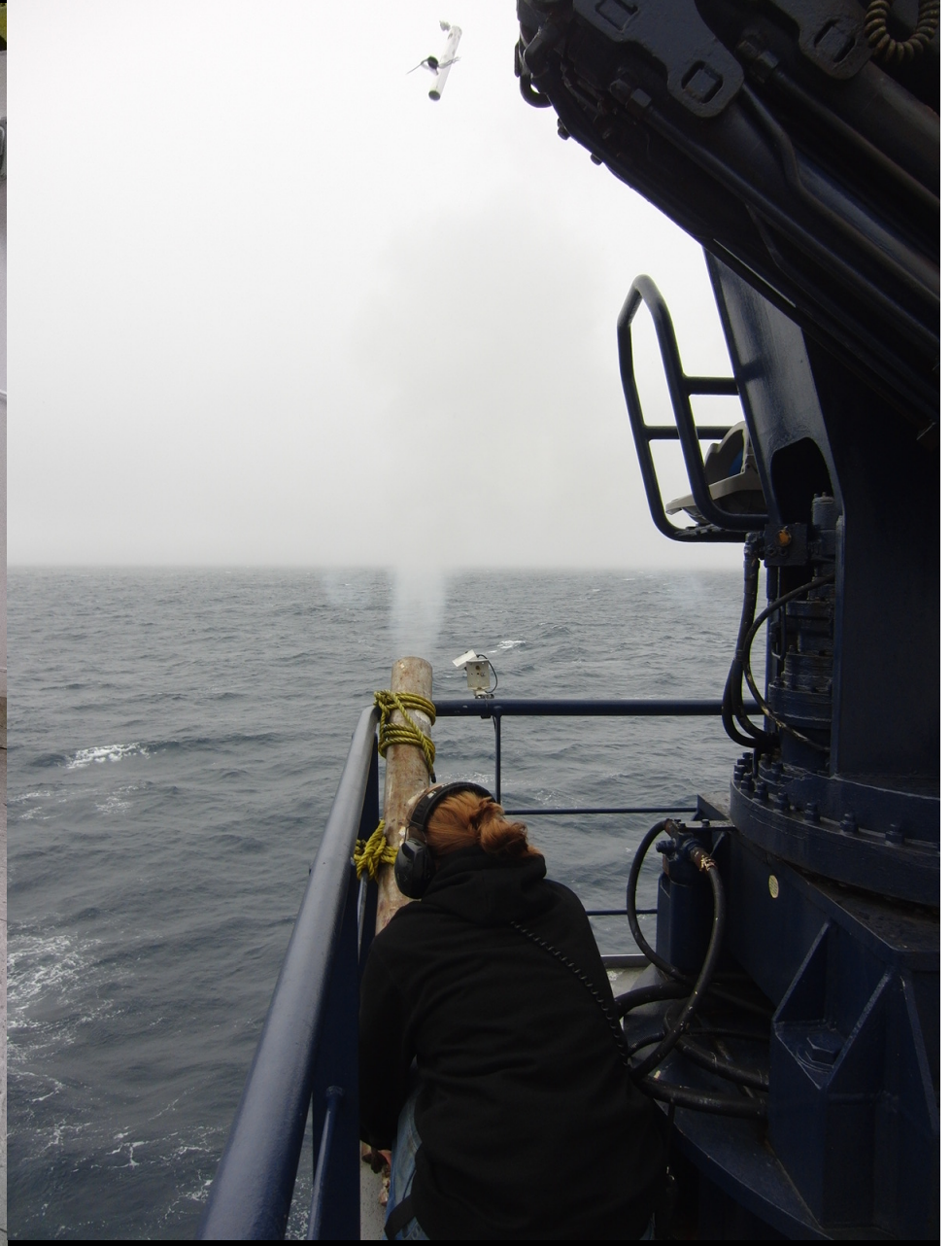








## Sonobuoys are Launched





OBS are Launched



8/21/2010 13:53

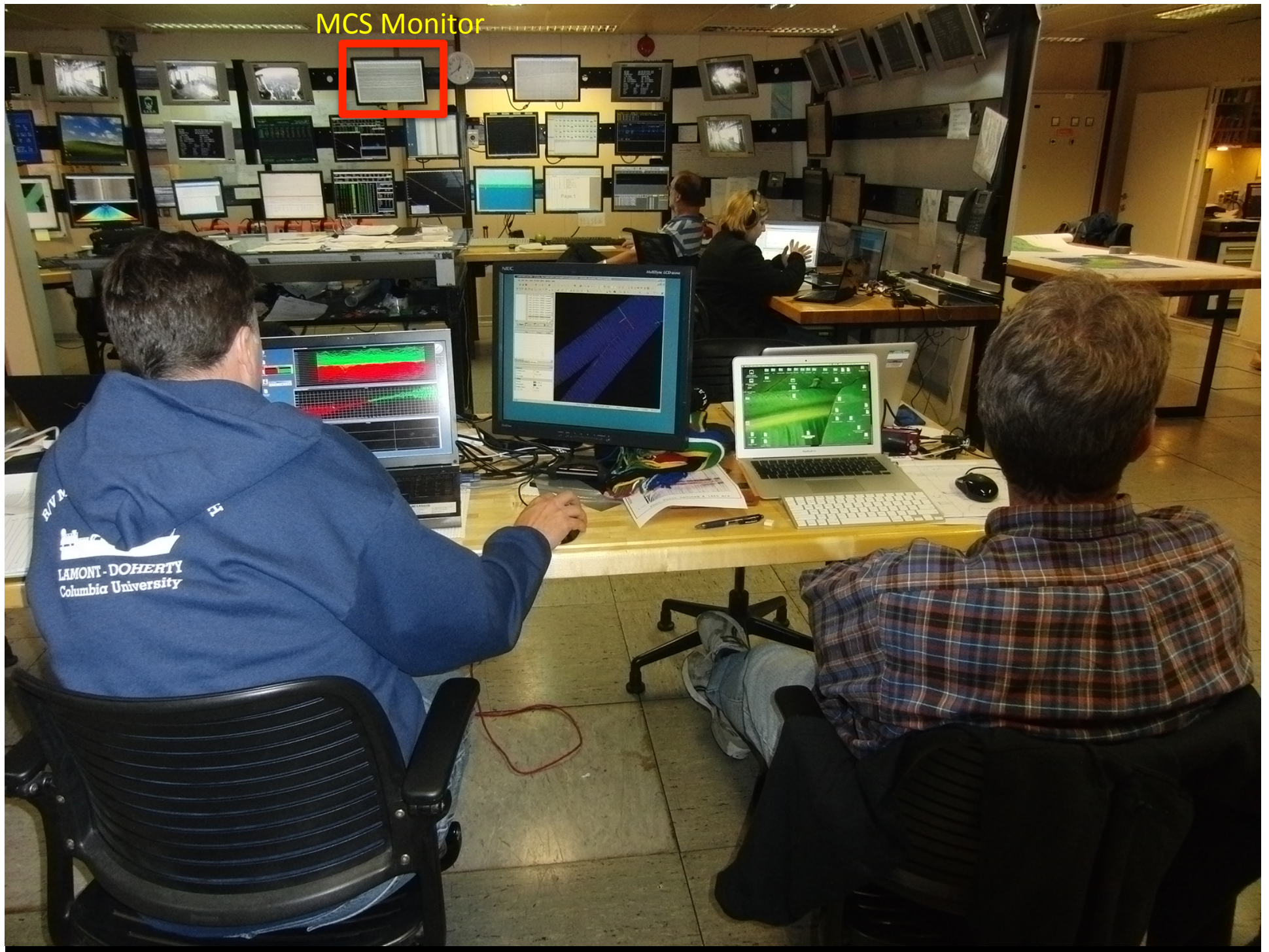


# CTDs are lowered





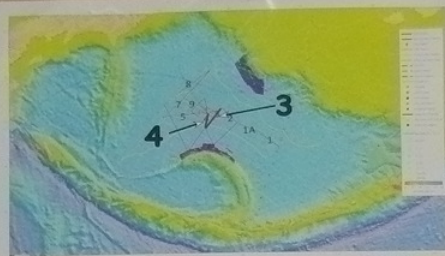
MCS Monitor



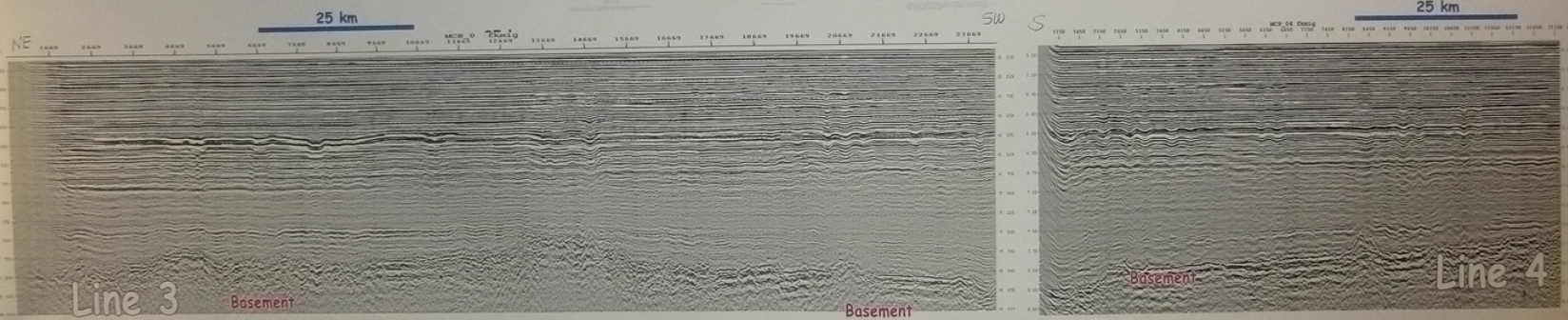




GENERAL ALARM  
WHEN BELL R  
GO TO YOUR ST



25 km  
3968 = 25 km  
25 km=3968 cdp at 6.3m/cdp  
1 SEC RT



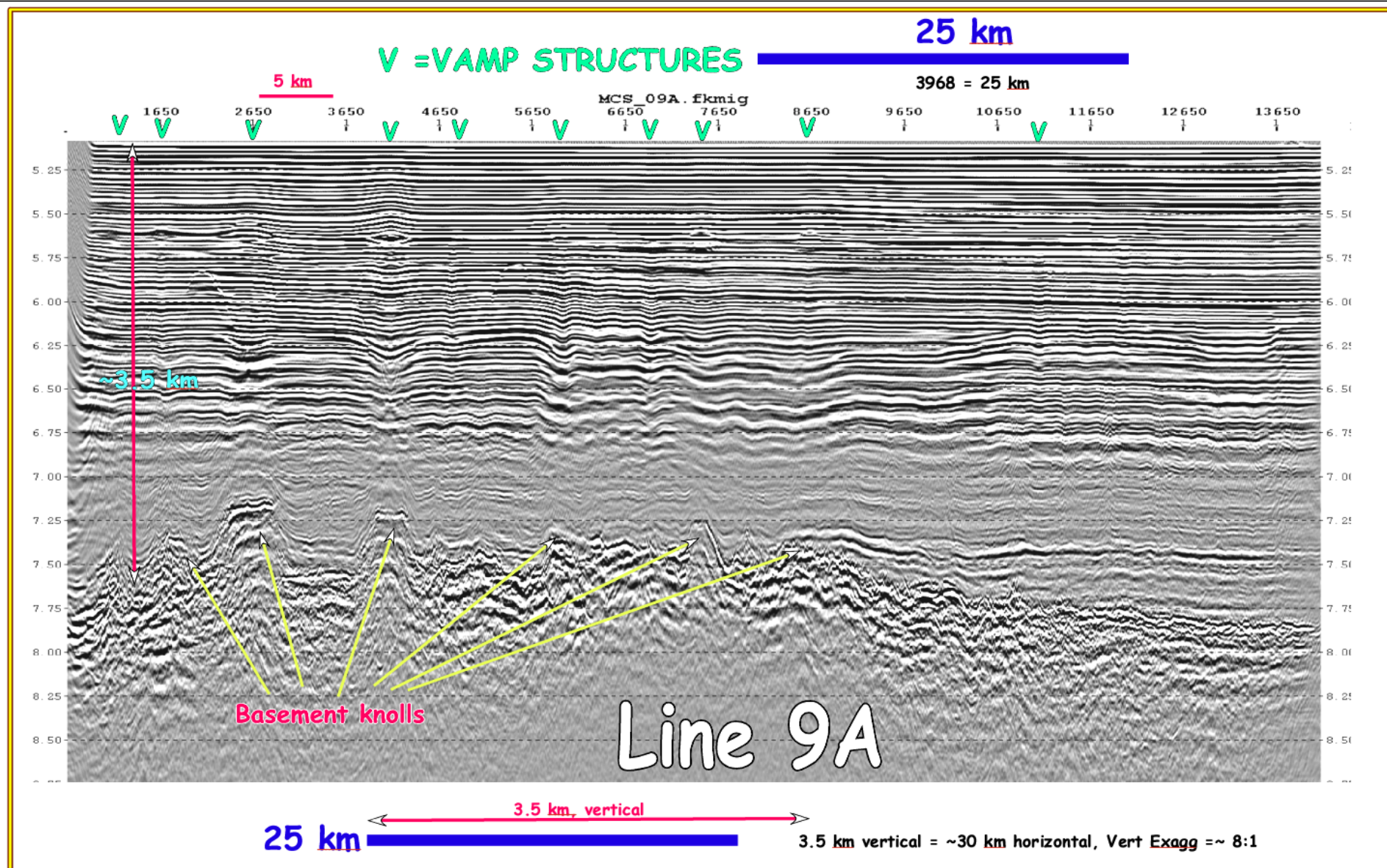




High-Res, Knudsen 3.5 kHz Chirp Seismic

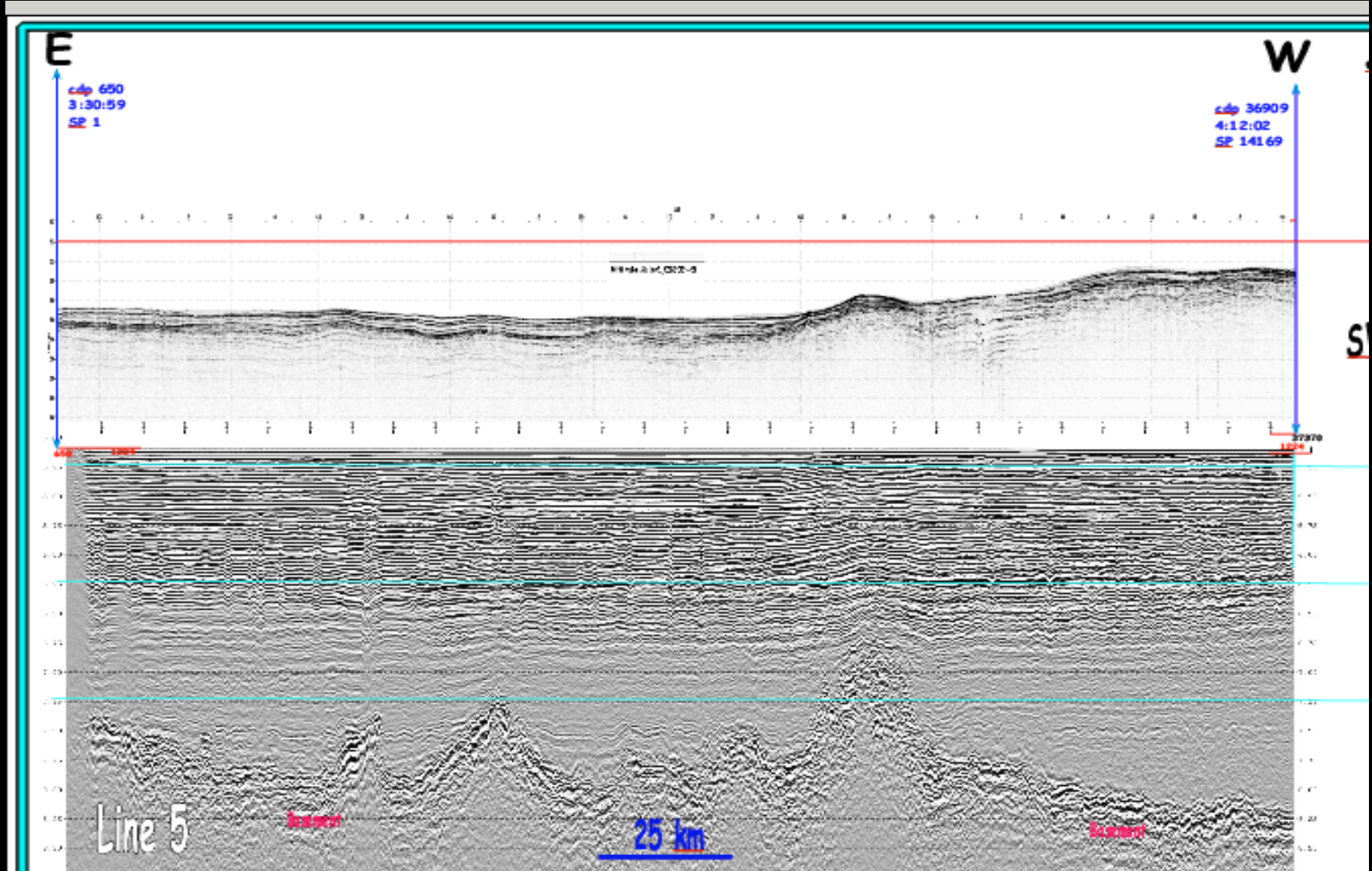


Confirming discovery, large VAMPs tended to be centered above deeply buried basement relief



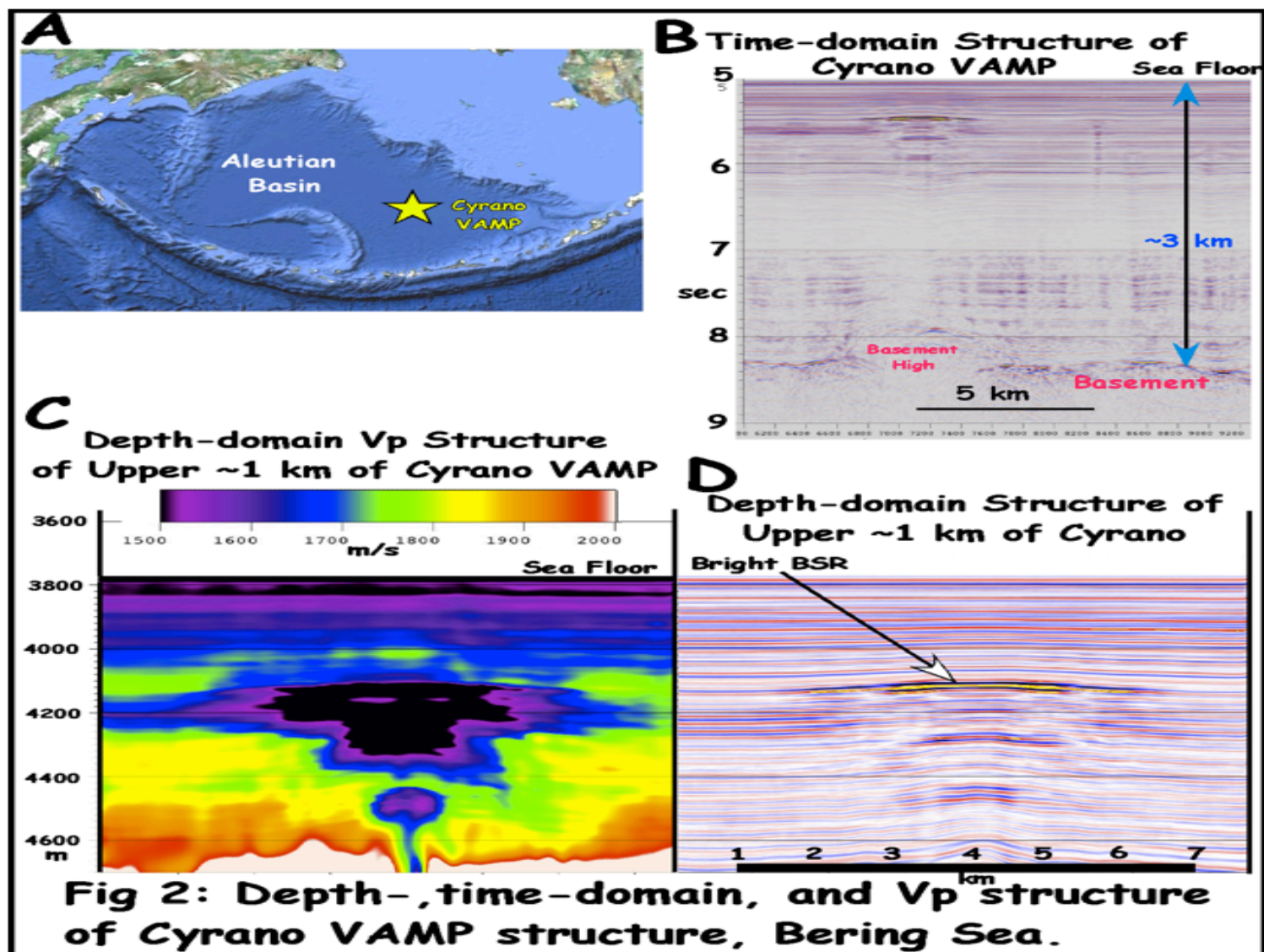


Confirming discovery, large VAMPs tended to be centered above deeply buried basement relief and, at extremely high VE (200-250:1), are overlain by subtle seabed relief





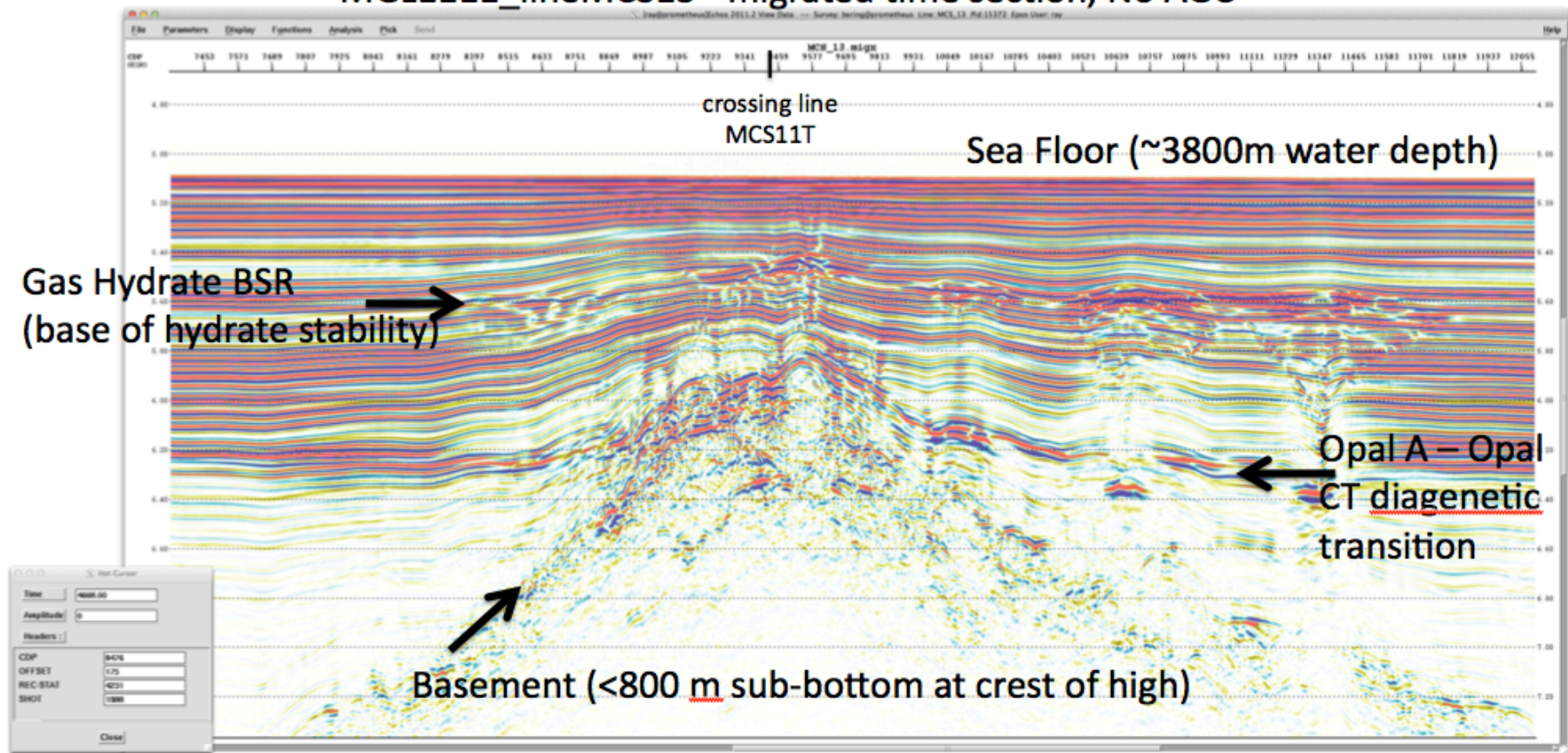
Confirming discovery, VAMPs structures are associated with large volumes of sub-BSR, pore-space methane





## FARNELLA RIDGE BASEMENT DRILLING TARGET, BERING SEA

### MGL1111\_lineMCS13 - migrated time section, No AGC



Based on comparison with DSDP leg 19, site 190,  
highly reflective upper section is distal turbidite and  
diatom-dominated pelagic sediment.





8/29/2010 22:53



