

The Mariana subduction system includes a unique suite of serpentinite mud volcanoes, located in the shallow forearc. These seamounts lie between 20 and 40 km above the downgoing Pacific plate

ODP Leg 125  Conical Seamount

 Pacman Seamount

 Big Blue Seamount

 Turquoise Seamount

 Celestial Seamount

 Blue Moon Seamount

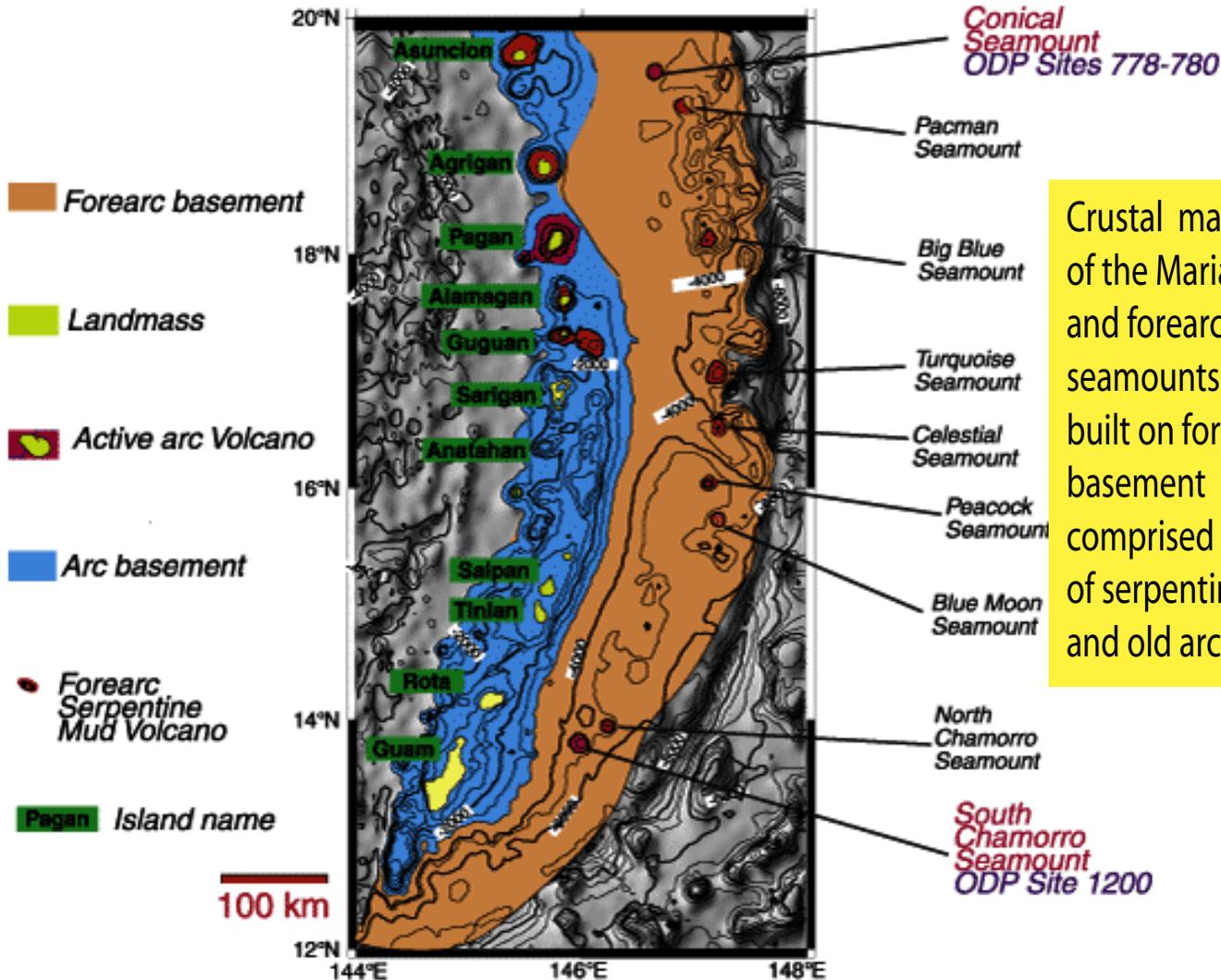
ODP Leg 195  
South Chamorro Seamount 

Data SIO, NOAA, U.S. Navy, NGA, GEBCO  
Data © 2009 MIRC/JHA

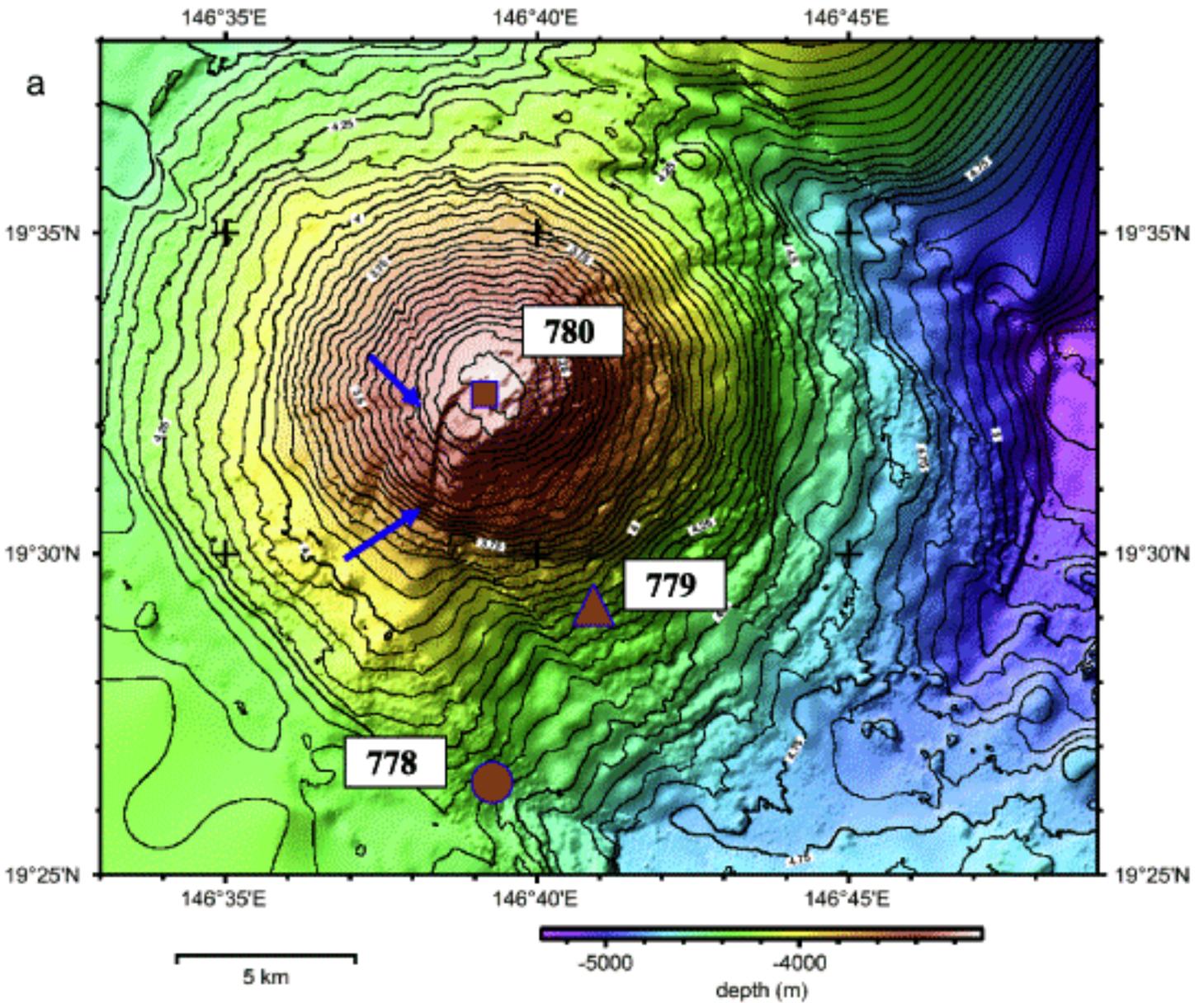
©2009 Google

16°40'06.95" N 145°28'51.92" E elev -2848 m

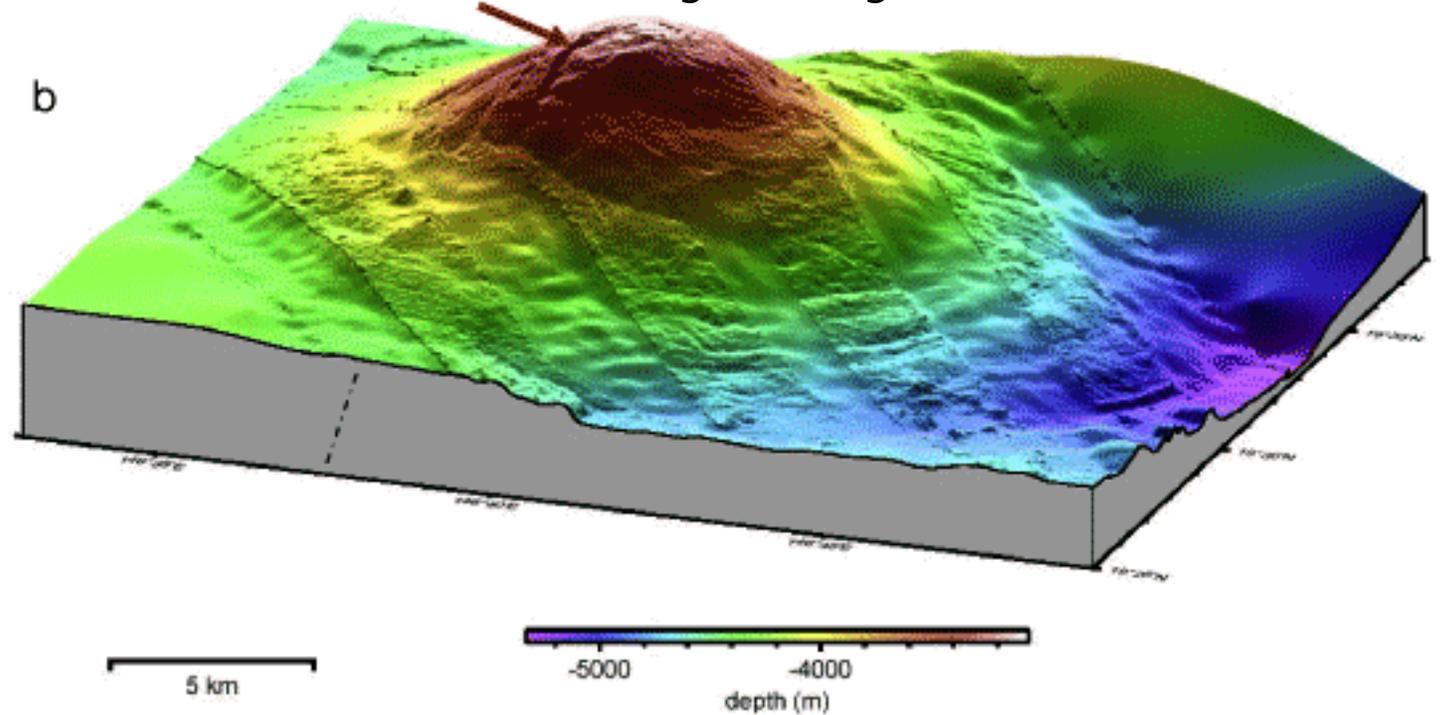
Eye alt 1114.96 km 

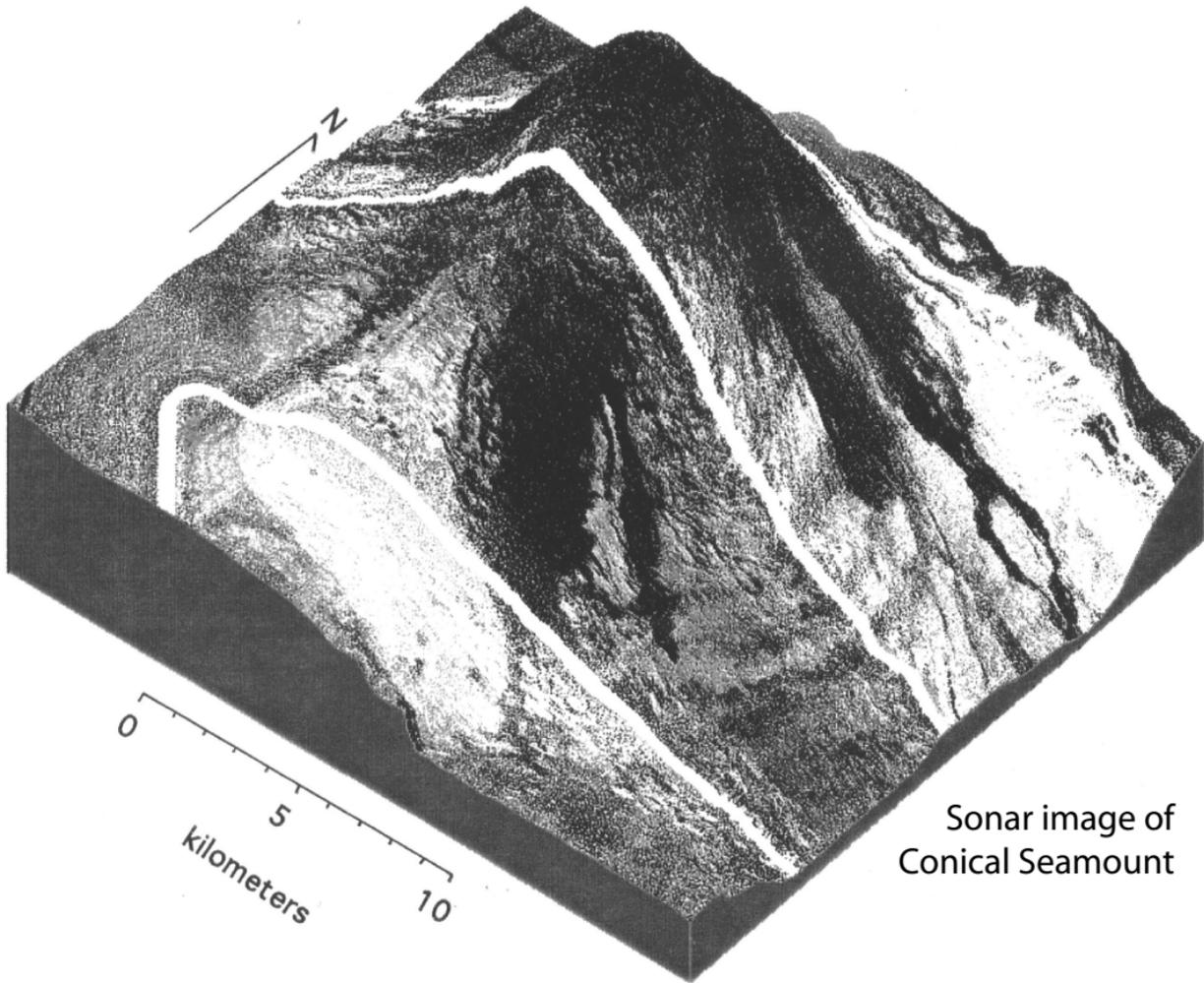


Crustal makeup of the Mariana arc and forearc. The seamounts are built on forearc basement comprised largely of serpentinite and old arc crust.

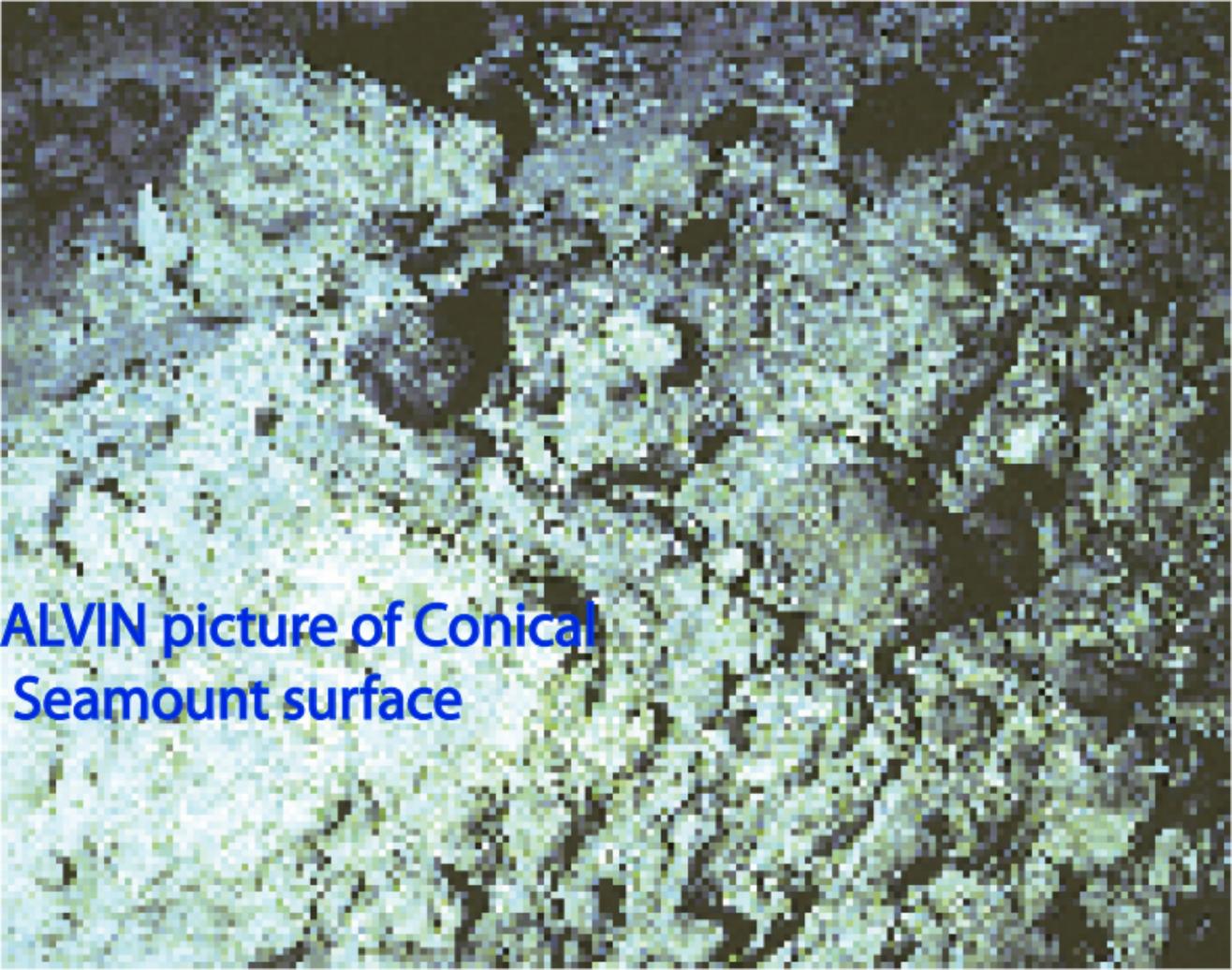


Bathymetry and 3D profile of Conical Seamount, drilled during ODP Leg 125. Drillsites marked above.

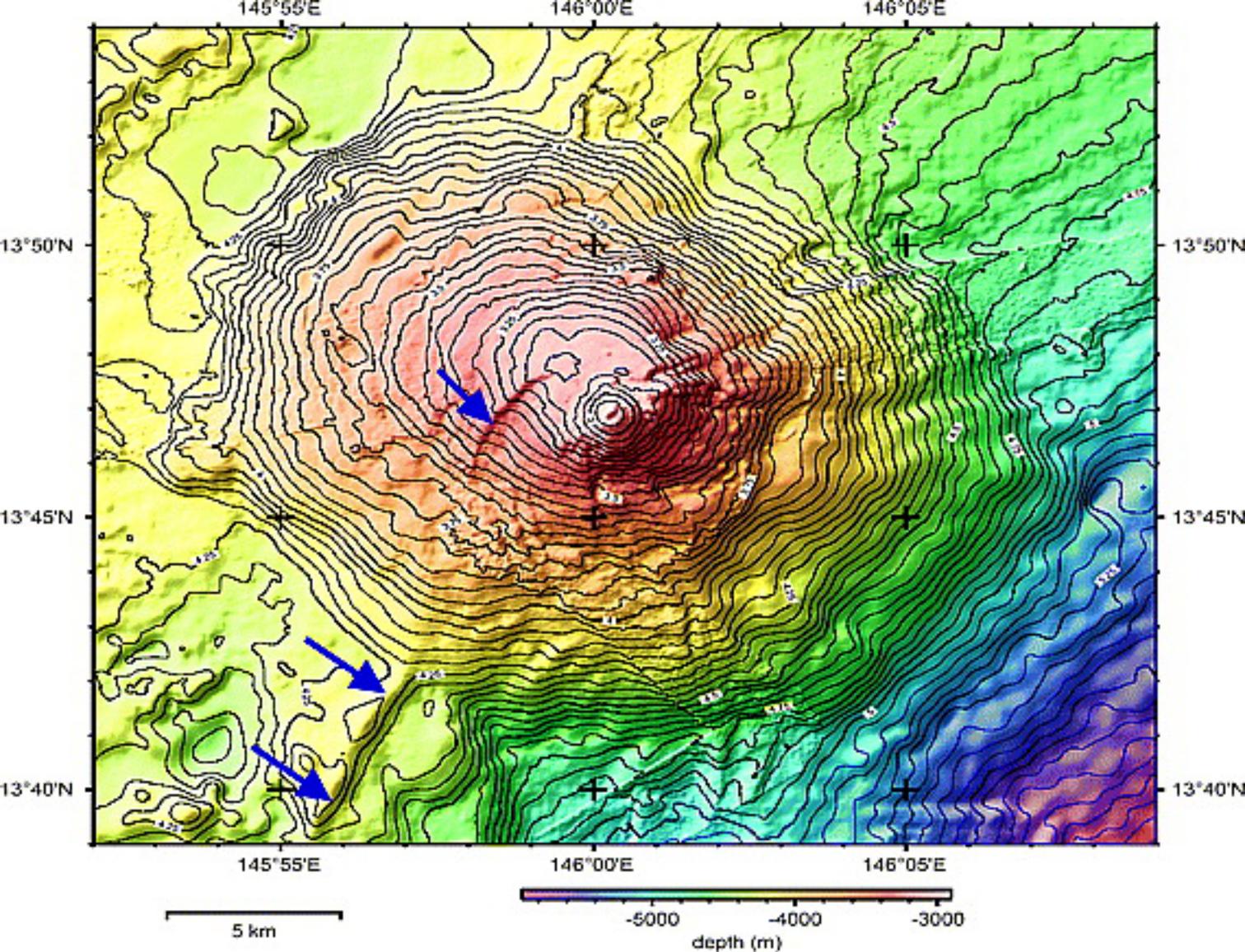




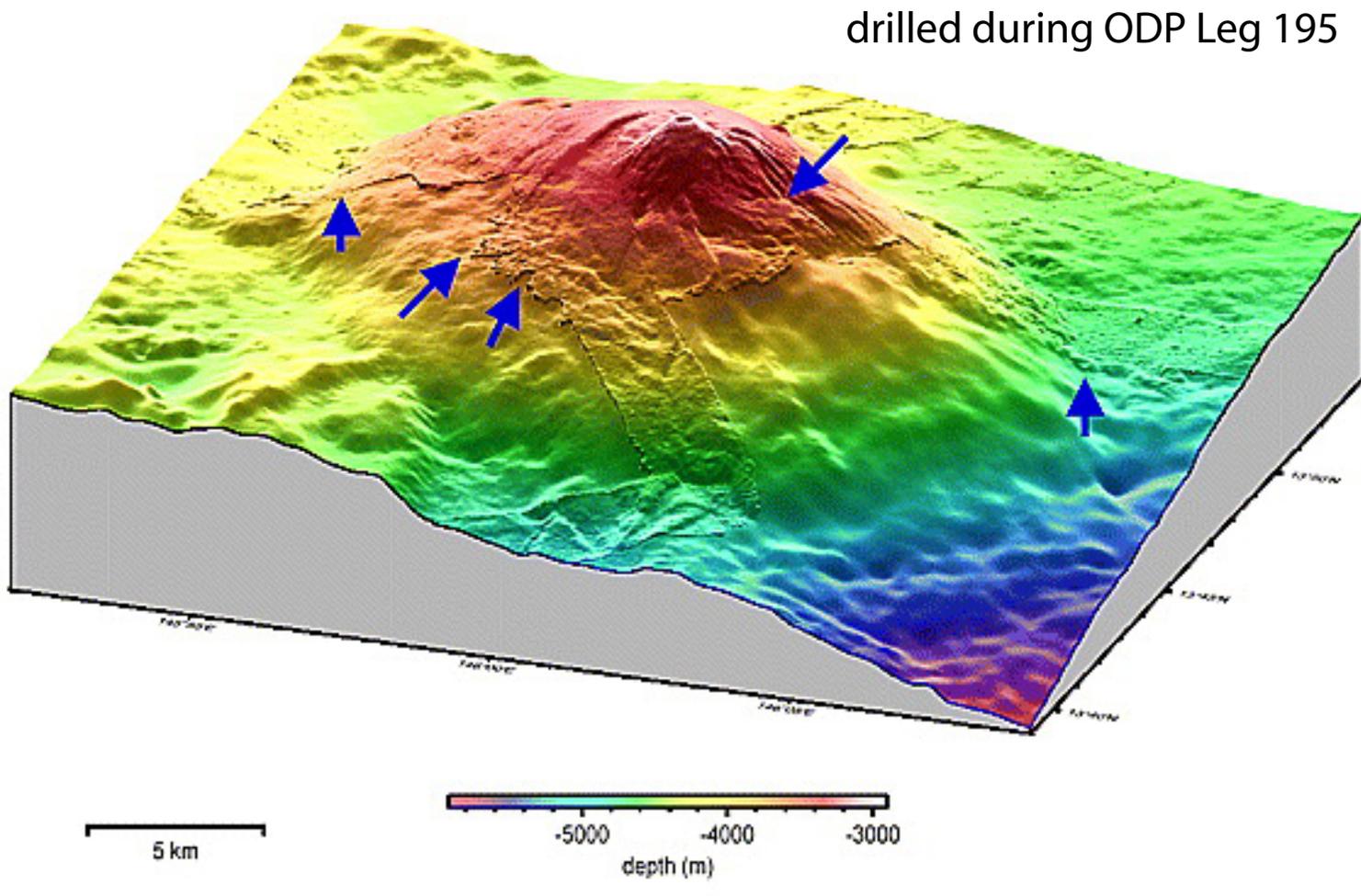
Sonar image of  
Conical Seamount

The image shows a high-resolution, close-up view of a seamount surface. The terrain is highly textured and rugged, with numerous small, rounded mounds and deep, narrow crevices. The overall appearance is that of a densely packed, conical structure. The lighting is somewhat uneven, with brighter areas in the foreground and darker, shadowed regions in the background, highlighting the three-dimensional nature of the surface. The colors are muted, appearing in shades of grey, brown, and black, typical of a deep-sea environment.

ALVIN picture of Conical  
Seamount surface



**A** South Chamorro Seamount, drilled during ODP Leg 195



**B**

145°58'E

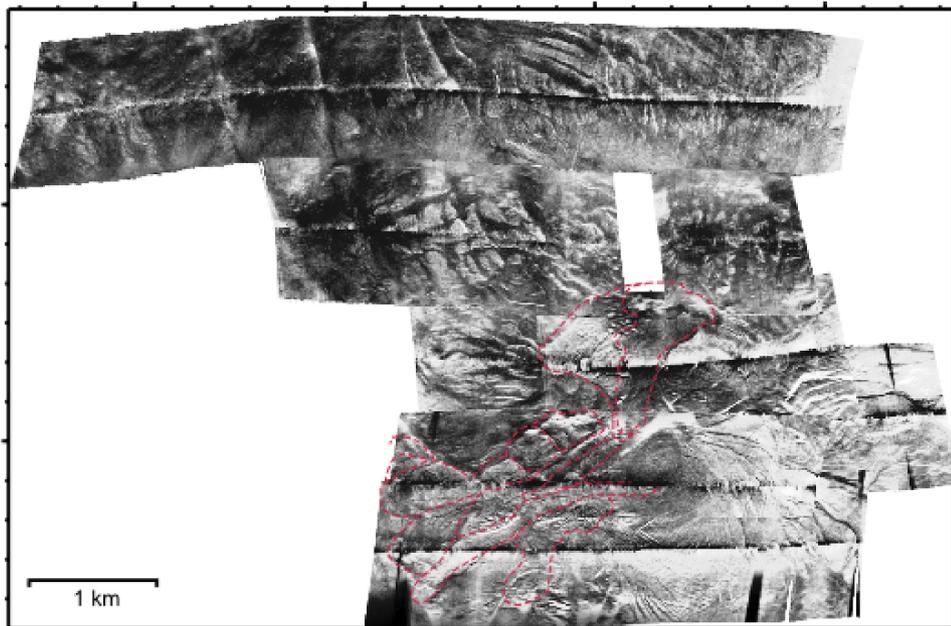
145°59'E

146°00'E

146°01'E

13°48'N

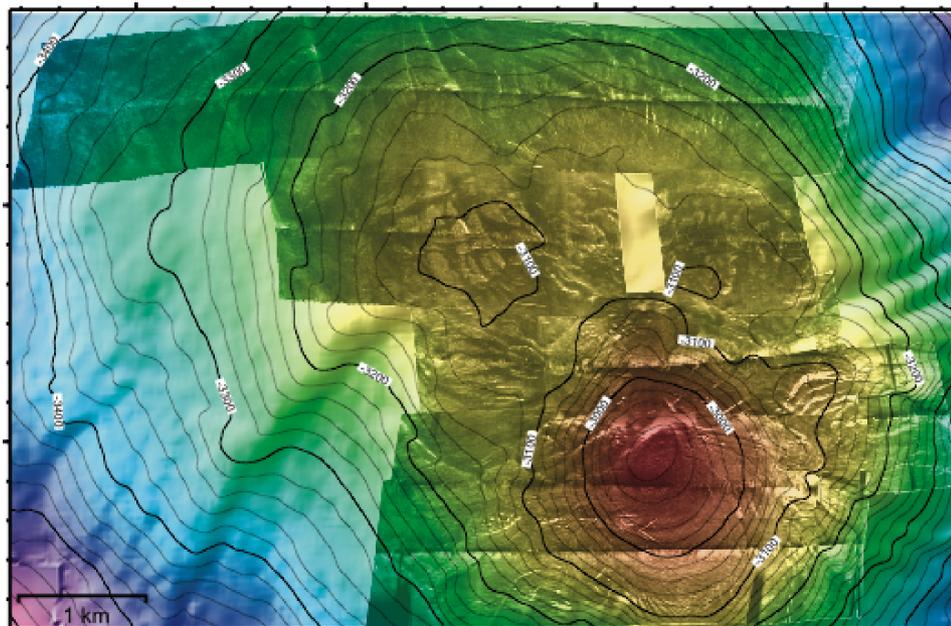
13°47'N



Sonar image of South Chamorro Seamount. Below: overlay on bathymetry.

13°48'N

13°47'N

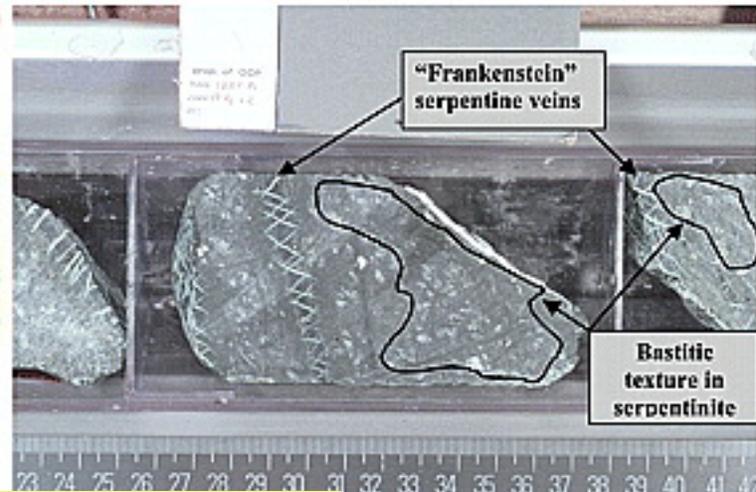
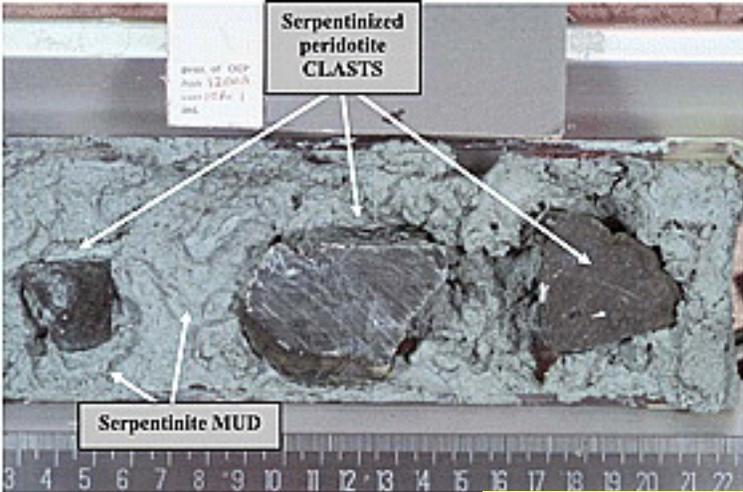


145°58'E

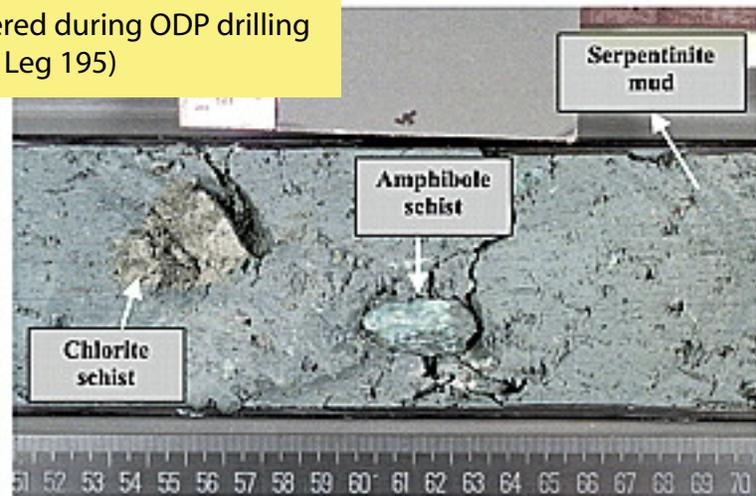
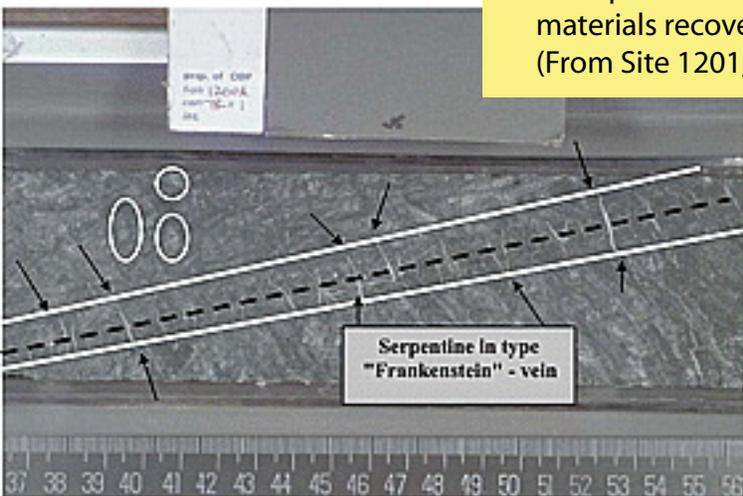
145°59'E

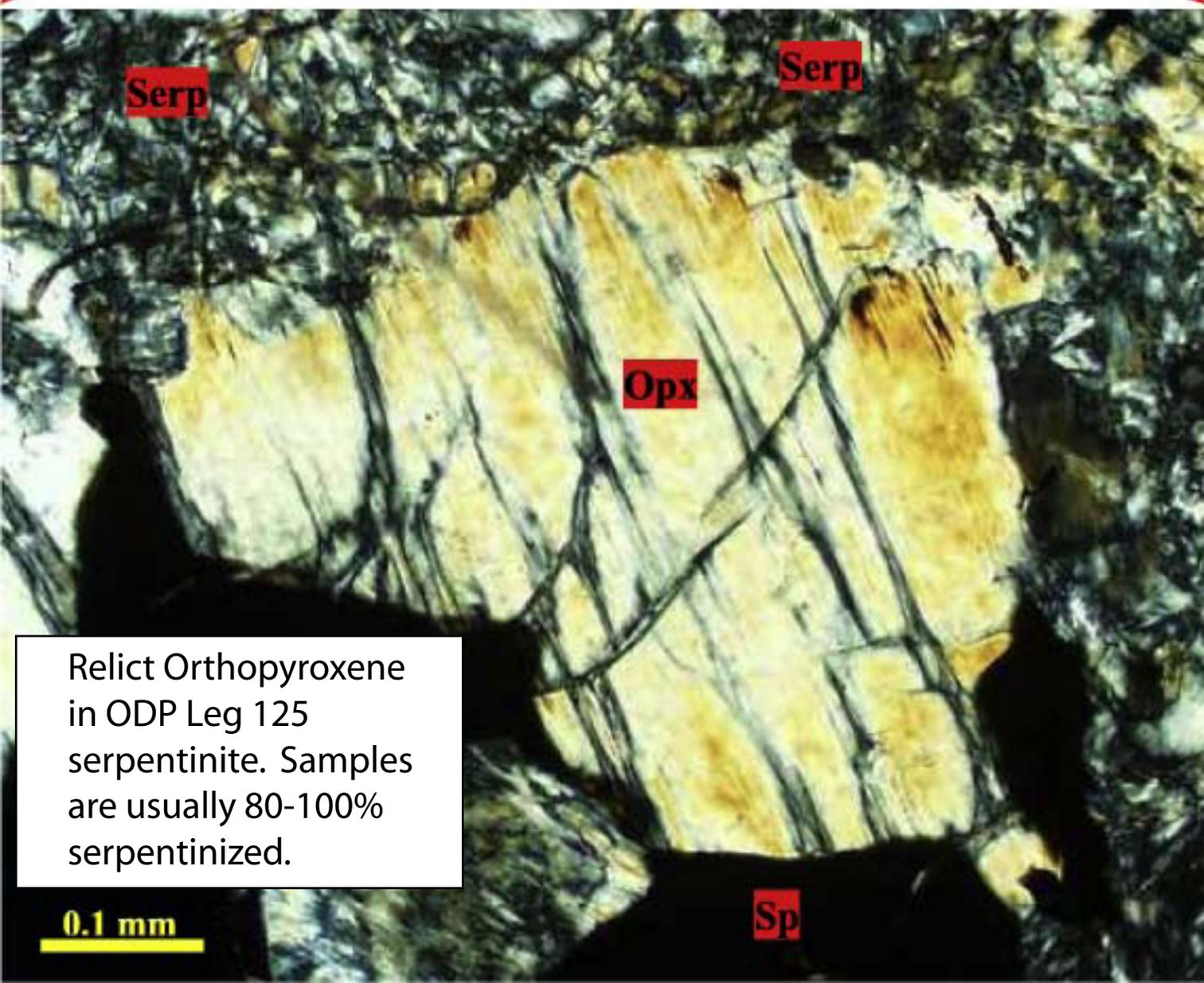
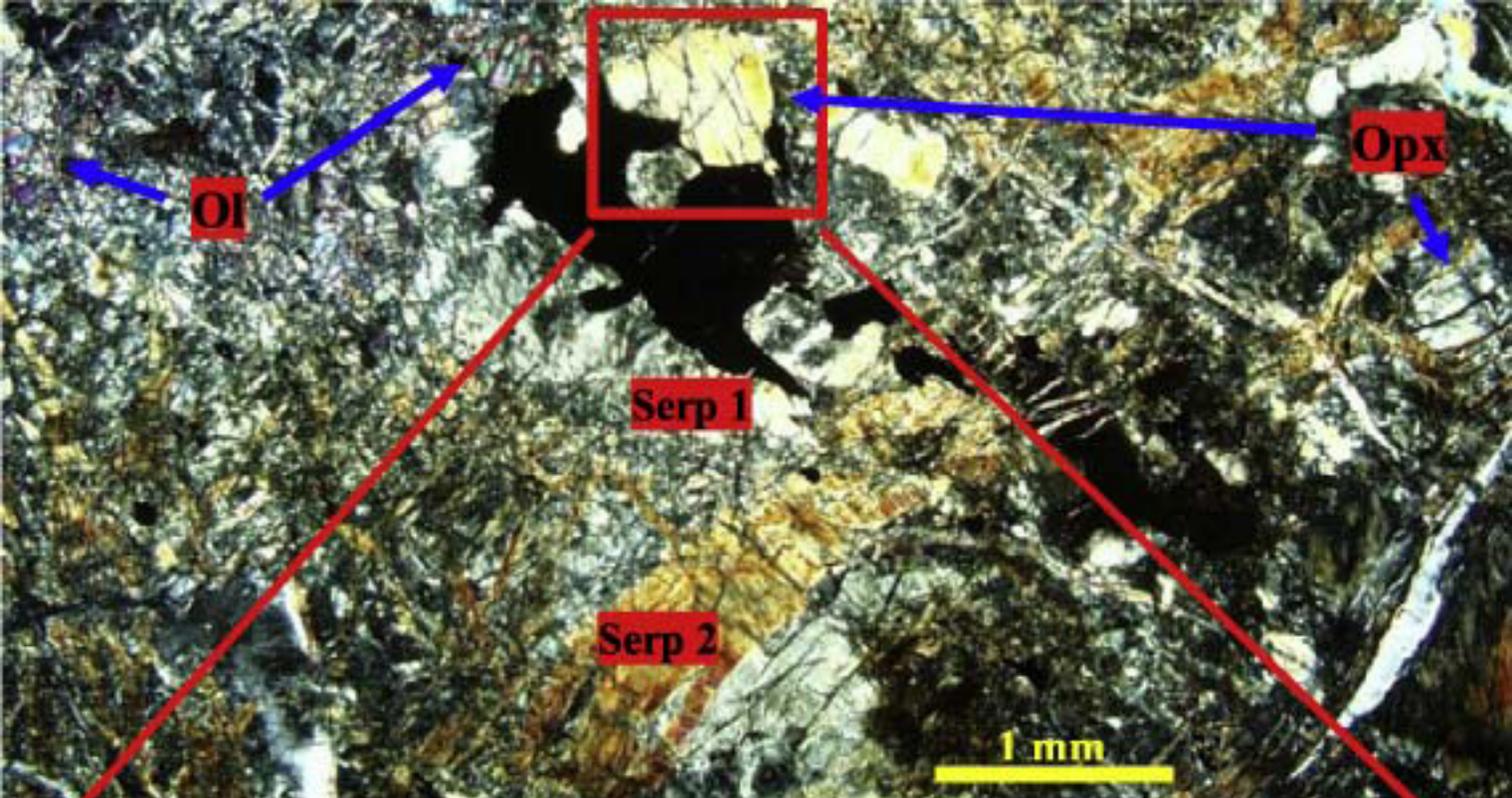
146°00'E

146°01'E



Examples of serpentinite and other materials recovered during ODP drilling  
(From Site 1201, Leg 195)

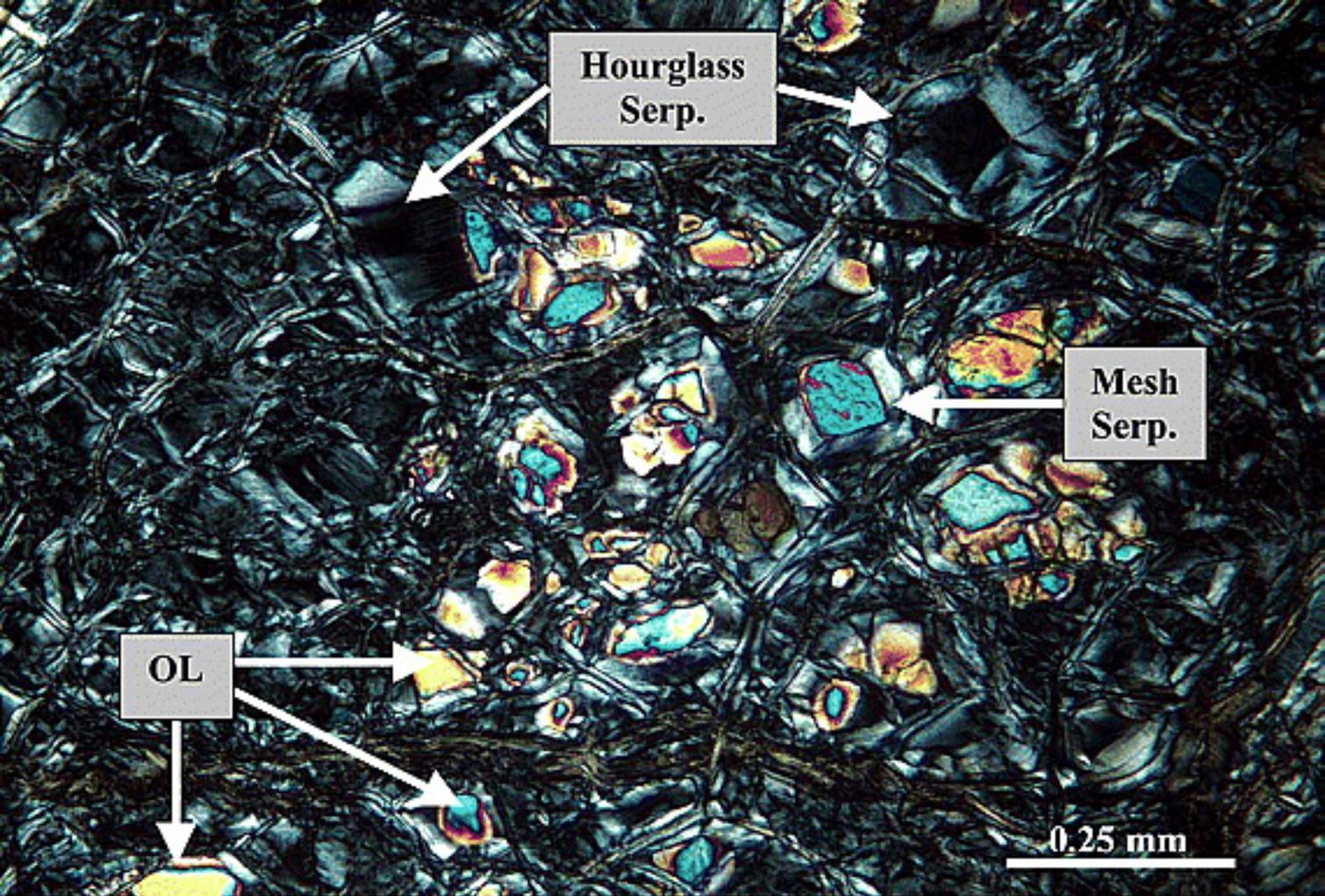




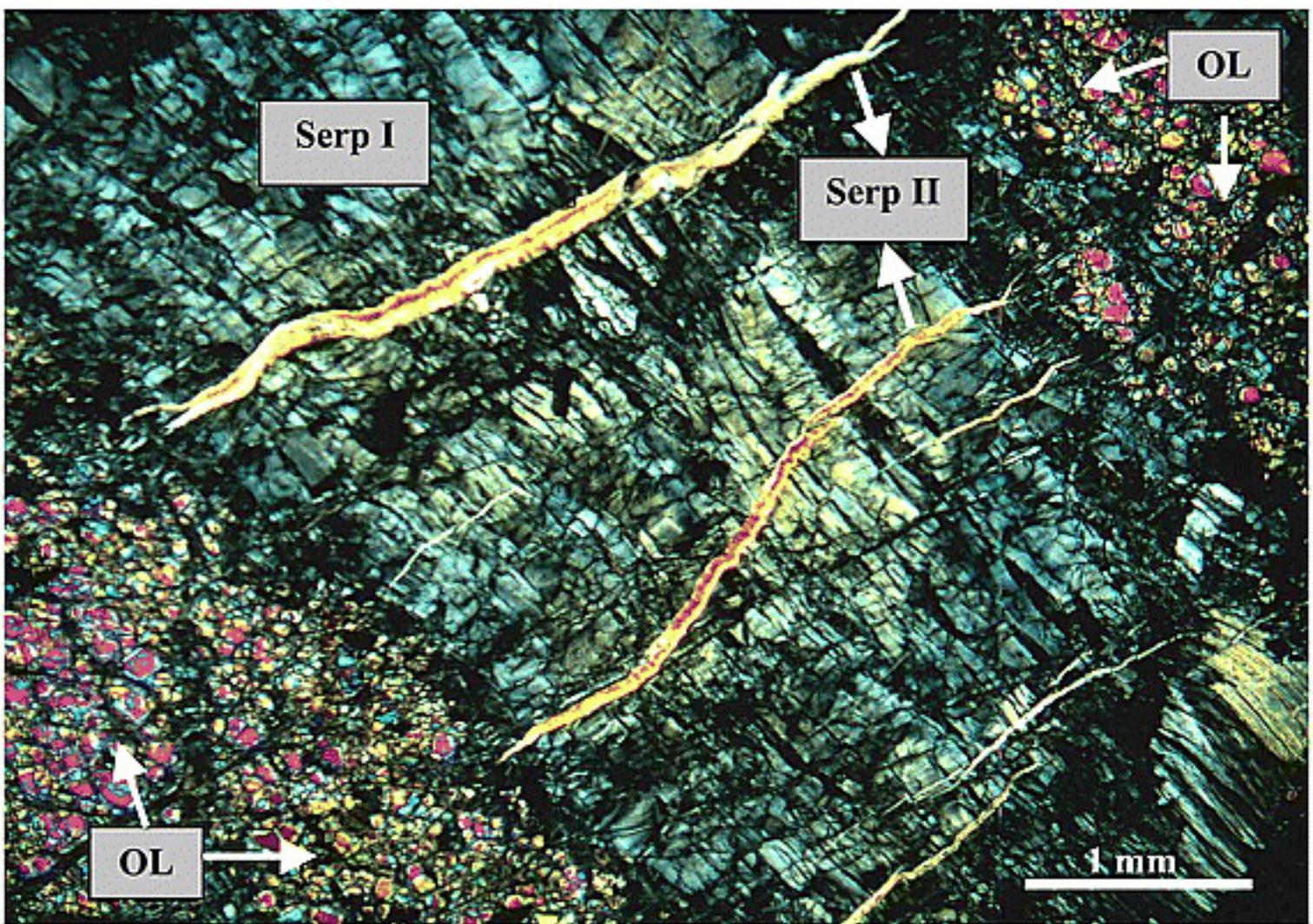
Relict Orthopyroxene  
in ODP Leg 125  
serpentinite. Samples  
are usually 80-100%  
serpentinized.

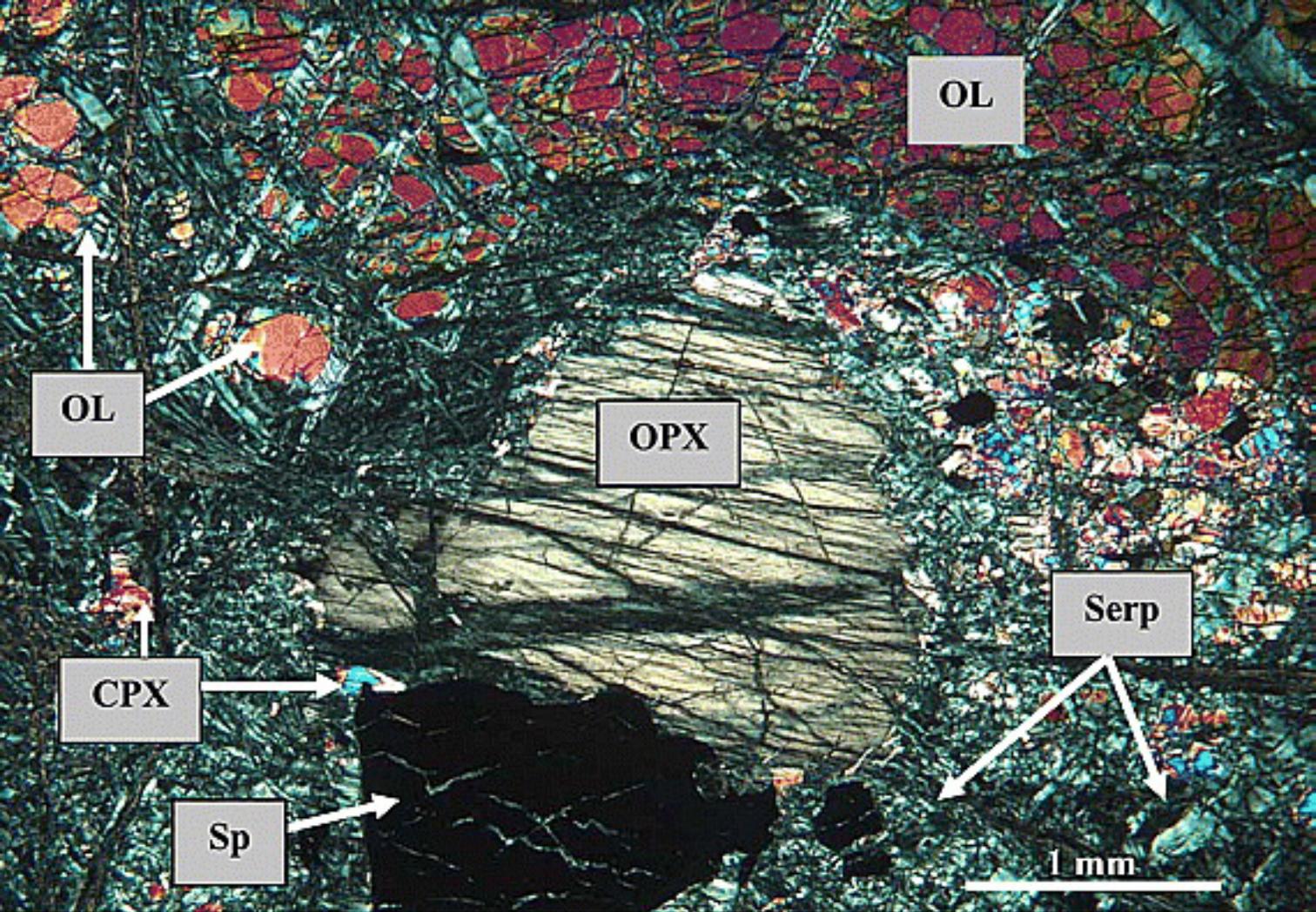
0.1 mm

Sp

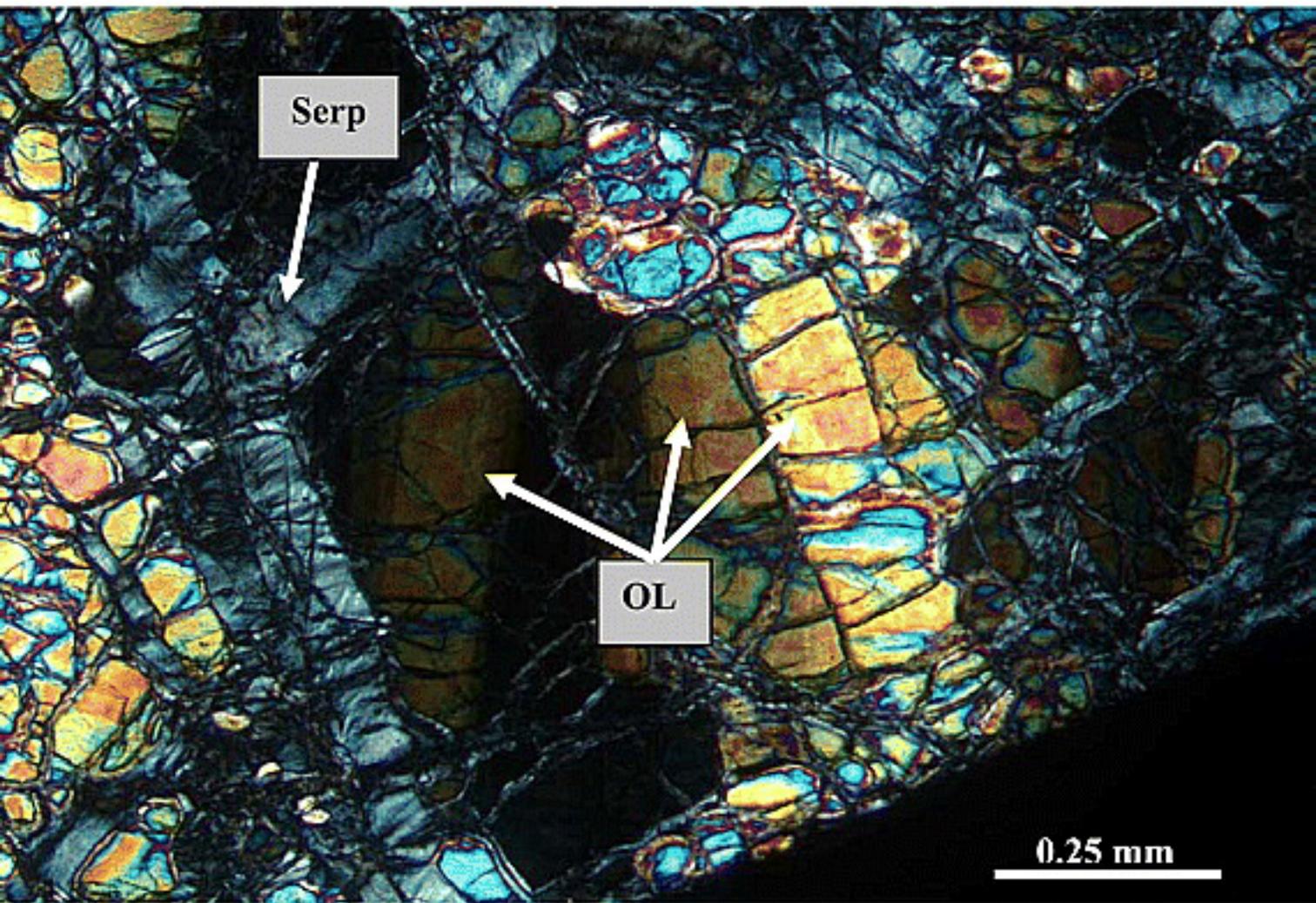


Serpentine Textures (Site 1201, Leg 195)

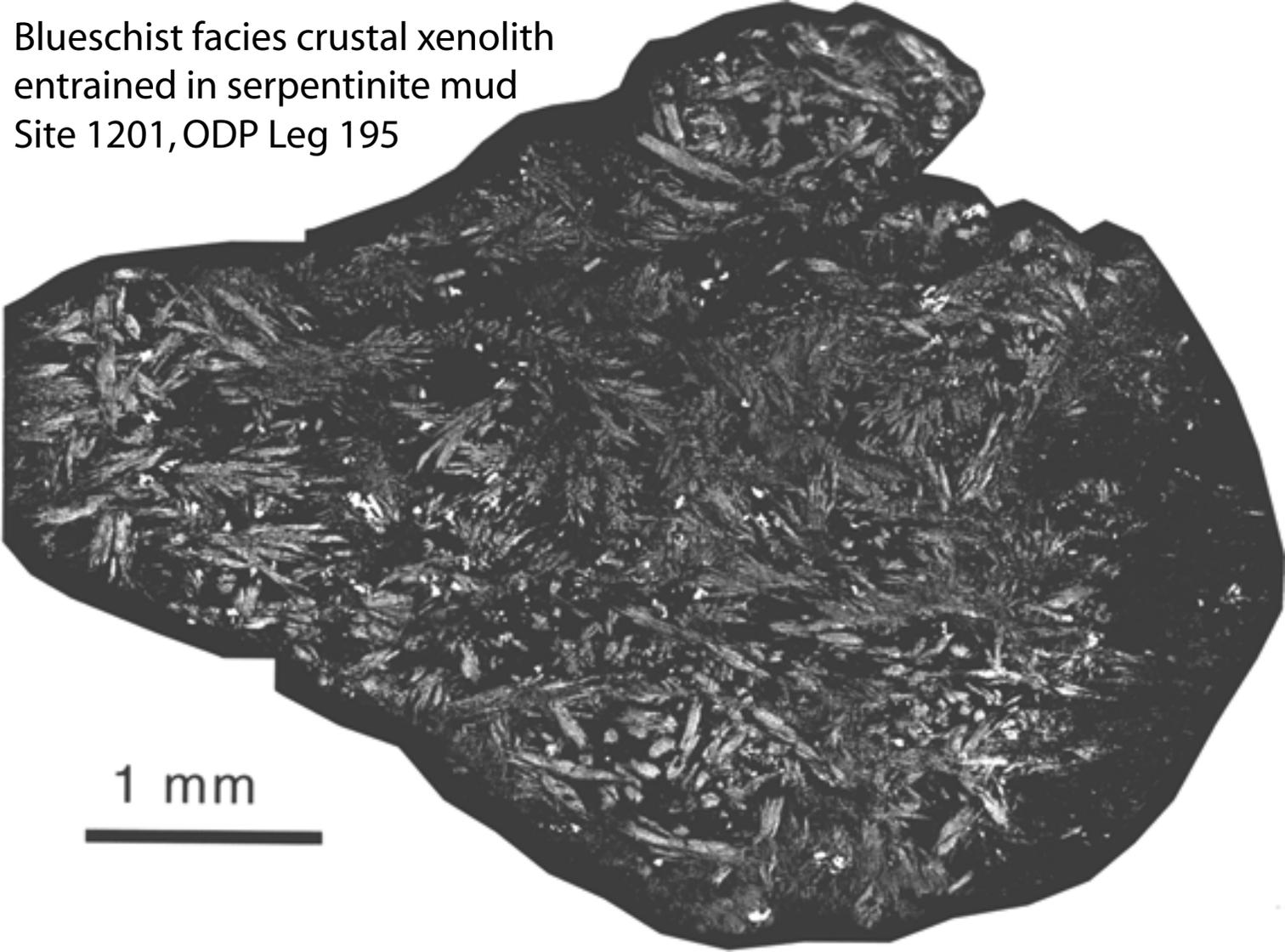




Relict Olivine and Orthopyroxene, rimmed in serpentine (Site 1201, Leg 195)



Blueschist facies crustal xenolith  
entrained in serpentinite mud  
Site 1201, ODP Leg 195



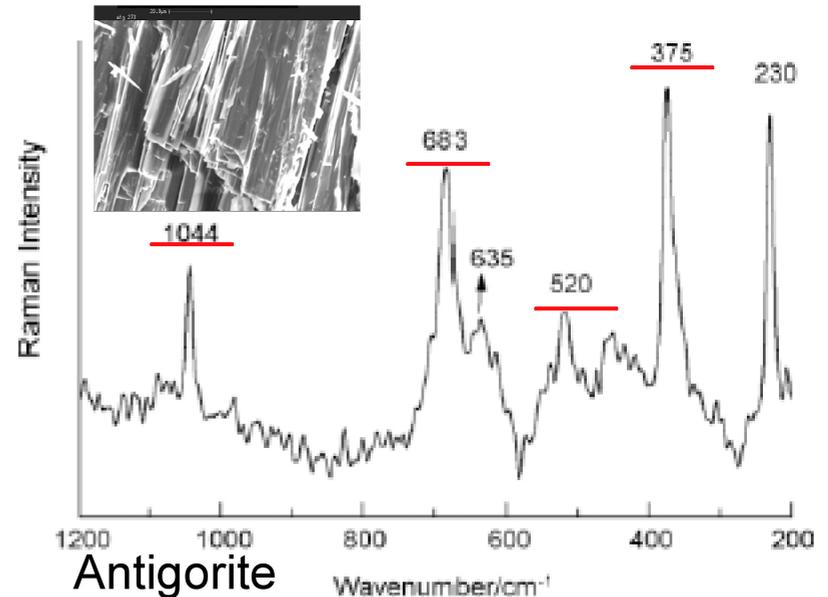
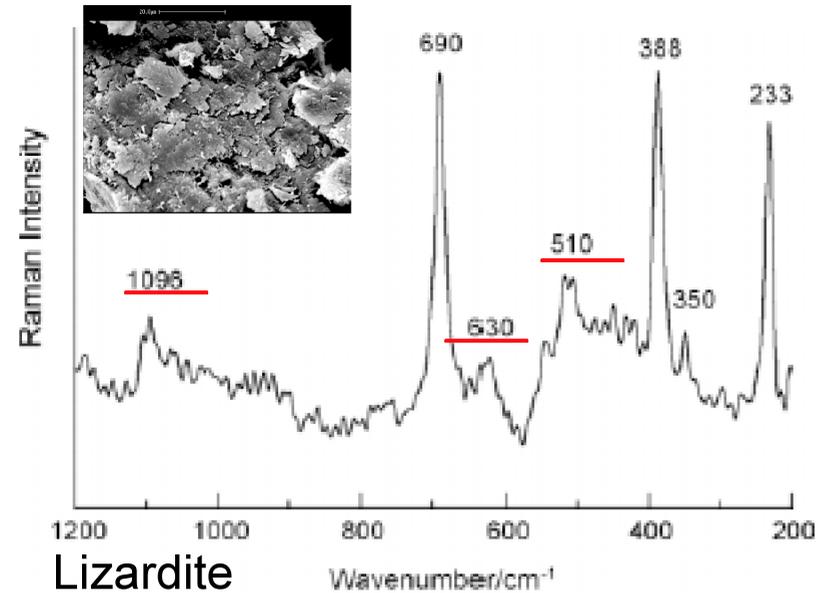
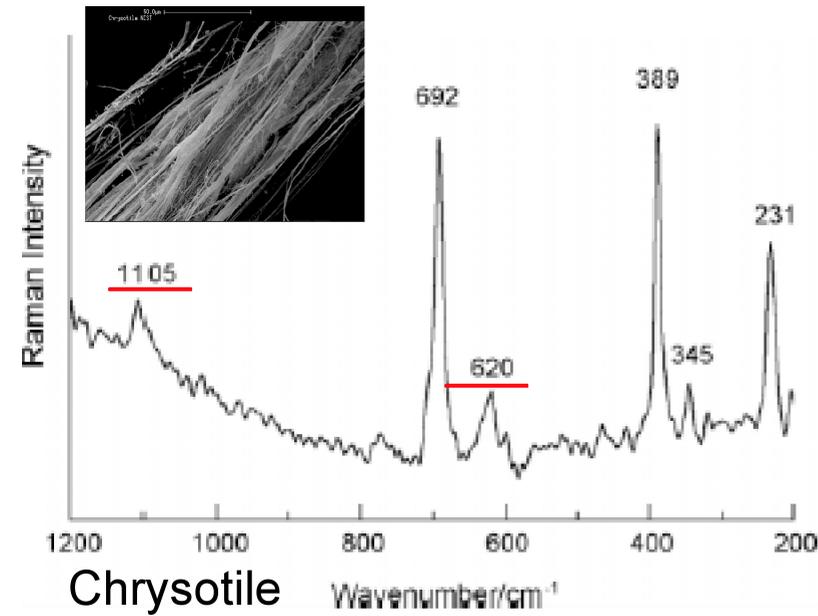
1 mm

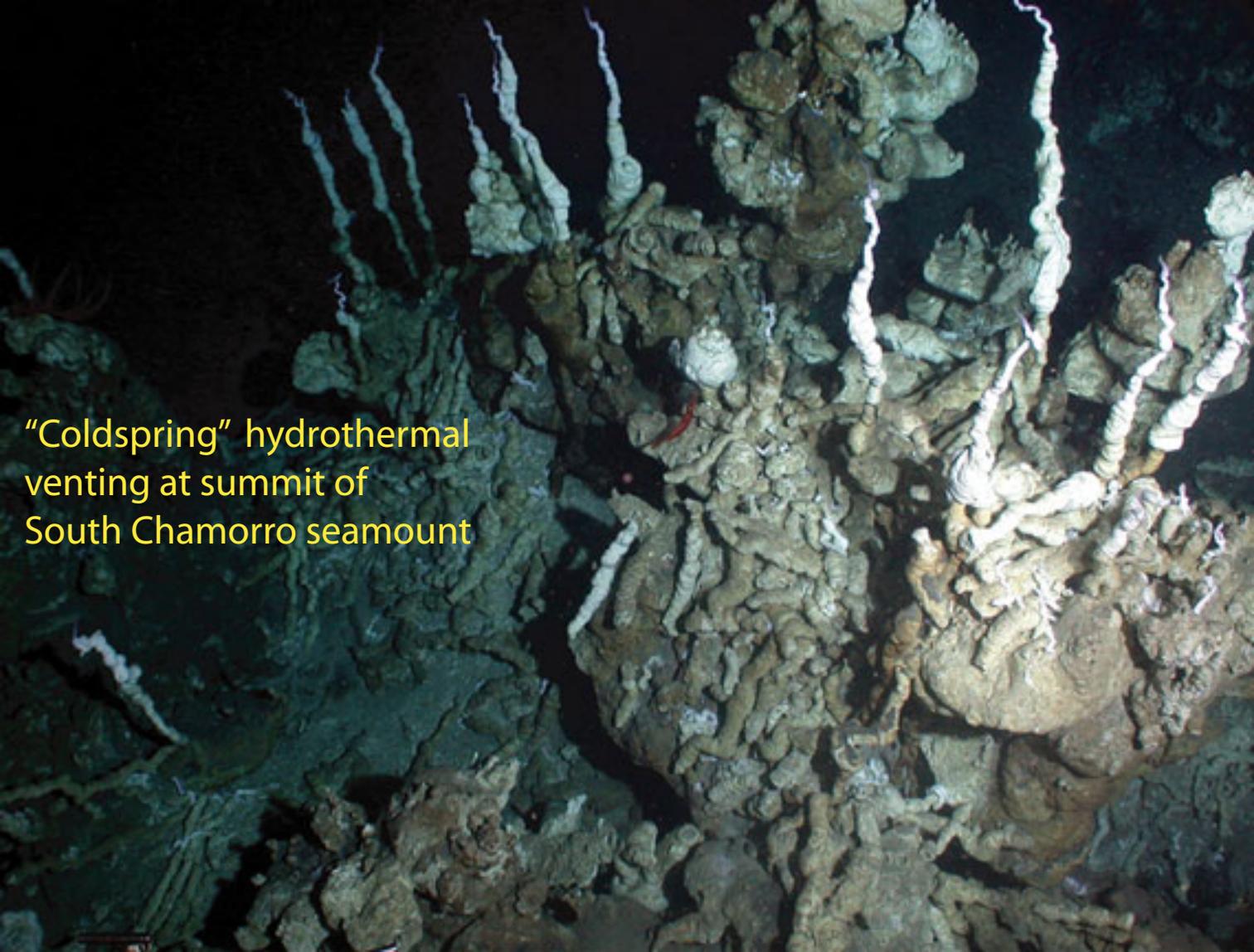
# Common Serpentine Phases:

## Lizardite, Chrysotile, and Antigorite:

### Raman spectra

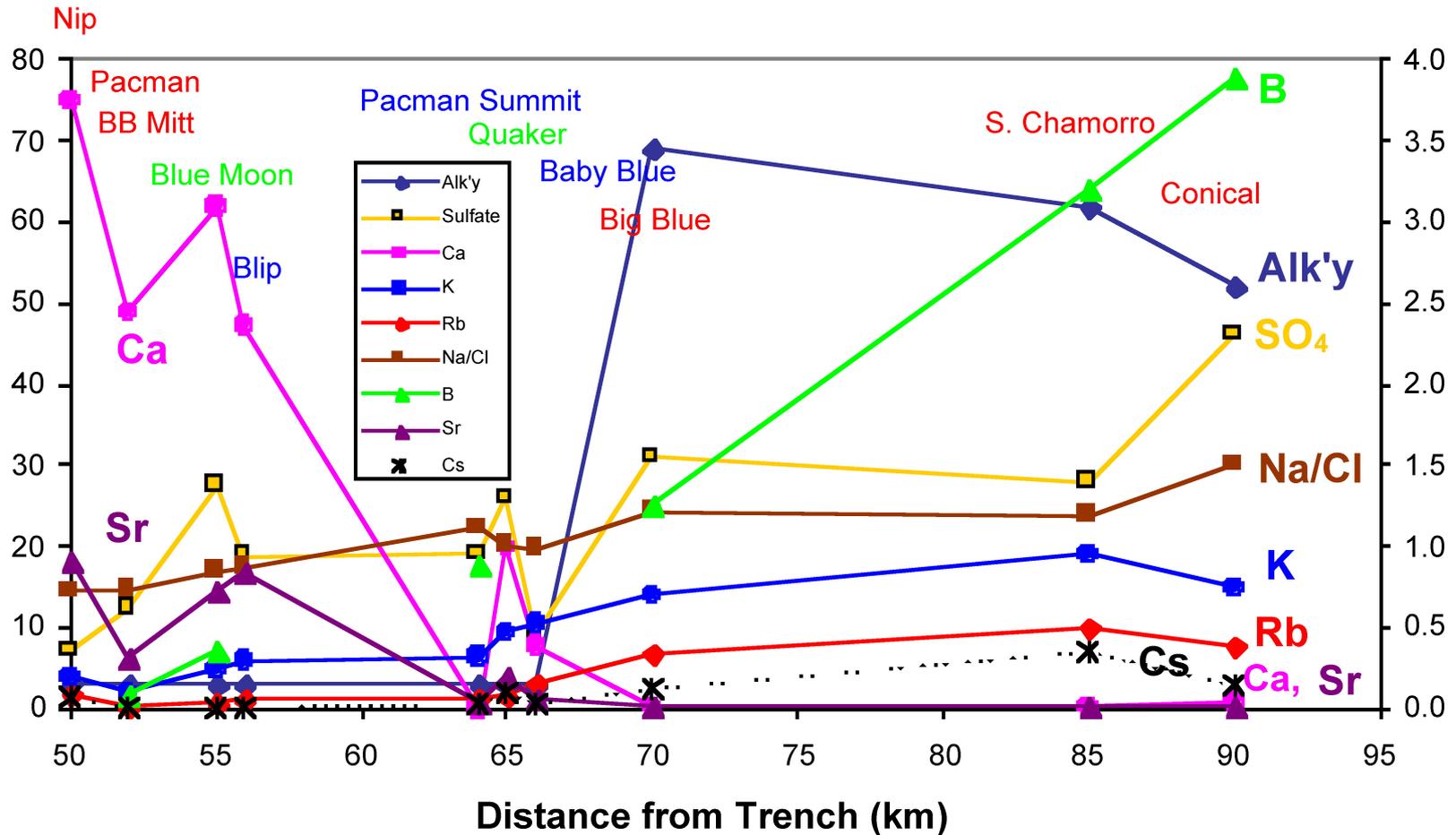
(Raman spectra from Rinaudo and Gastaldi (2003), *Can Min.*, 41, 883-890.)



A deep-sea hydrothermal vent field at the summit of South Chamorro seamount. The scene is dominated by numerous tall, white, mineral-rich chimneys (sulfide structures) of varying heights and thicknesses. The background is a dark, rocky seafloor covered in smaller, brownish mineral deposits. The lighting is focused on the central and right-hand structures, highlighting their intricate, porous textures. A small red object, possibly a diver's tool or a marker, is visible on the seafloor in the middle ground.

“Coldspring” hydrothermal  
venting at summit of  
South Chamorro seamount

# Vent fluid compositions, Mariana forearc seamounts



**With distance from the trench of 50-95 km:**

- alkalinity, sulfate, Na/Cl, K, Rb, Cs, B increase
- Ca, Sr decrease

(Mottl et al., G3, 2004)

