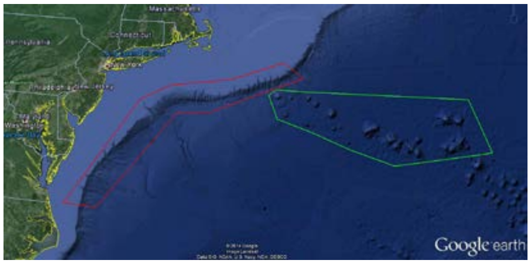
OKEANOS EXPLORER ROV DIVE SUMMARY

Site Name	Kelvin Seamount		
ROV Lead/Expedition Coordinator	Todd Gregory/ Brian Kennedy		
Science Team Leads	Scott France and Susan Schnur		
General Area Descriptor	Northwest Atlantic Ocean; Mid Atlantic U.S. Canyons		
ROV Dive Name	Cruise Season	Leg	Dive Number
	EX1404	3	DIVE09
Equipment Deployed	ROV:	Deep Discoverer	
	Camera Platform:	Seirios	
ROV Measurements	☒ CTD	☒ Depth	☒ Altitude
	☒ Scanning Sonar	☒ USBL Position	☒ Heading
	☒ Pitch	☒ Roll	☒ HD Camera 1
	☒ HD Camera 2	☒ Low Res Cam 1	☒ Low Res Cam 2
	☒ Low Res Cam 3	☒ Low Res Cam 4	☒ Low Res Cam 2
Equipment Malfunctions	The aft lateral thruster on D2 was secured for most of the dive after reposting an error. The lack of the thrusters did not have any significant impacts on the dive.		
ROV Dive Summary (From processed ROV data)	Dive Summary: EX1404l3_Dive09 ^^ In Water at: 2014-09-29T16:58:56.248000 38°, 51.422' N ; 063°, 45.019' W Out Water at: 2014-09-29T23:43:51.807000 38°, 51.358' N ; 063°, 44.048' W Off Bottom at: 2014-09-29T22:35:09.564000 38°, 51.528' N ; 063°, 44.407' W On Bottom at: 2014-09-29T18:07:43.183000 38°, 51.452' N ; 063°, 44.919' W Dive duration: 6:44:55 Bottom Time: 4:27:26 Max. depth: 2075.6 m		
Special Notes	Kelvin was a backup location for a dive that was scheduled to be on Atlantis II Seamount but was canceled due to strong currents.		
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Purpose of the Dive

To explore the biology and geomorphology of Kelvin Seamount

Description of the Dive:

Setting: Dive 9 took place on the southeastern summit of Kelvin Seamount. Kelvin is a large (3300 m tall), elongate, flat-topped guyot with evidence of massive failure and collapse of large parts of the edifice in some locations. Our goal was to explore an unusual bulls-eye or dome-shaped feature rising above the otherwise flat summit of the guyot. These shapes are sometimes indicative of volcanic deformation due to the inflation of a subsurface magma chamber. Alternately the dome could represent a constructional feature, formed by rejuvenated late-stage volcanism during the final cooling and subsidence of the volcano.

Exploration: The dive began at 2075 m on a broad, sandy, gently-sloping plain at the base of the low dome feature, estimated to be only about 150 m high. Well-developed, uniform bedforms in the sand indicated a strong, unidirectional current, with coarser material deposited on the lee slope of each ripple. In places large boulders lying in the sediment displayed a down-current 'shadow' of darker, coarser material. On the rippled sediments urchins (*Echinus* like) were common, but only a single holothurian was observed. Sea pens (*Anthoptilum*), cup corals (*Caryophyllia*?), and xenophyophores were also seen, with *Anthomastus* and sponges seen on the occasional boulders.

At about 2055 m, a sudden sharp incline led about one meter upward to a continuation of the flat, sandy plain. Based on the elongation direction of the ripples, the current below the incline was running parallel to the nearby dome, but above the incline the dominant current was running perpendicular to the dome. Overall, the bedforms above the incline were more chaotic and less unidirectional, perhaps indicating flow turbulence induced by the hill. Soon after climbing the incline, the ROV encountered hard rock lavas and began moving up the dome, which we were able to confirm was a volcanic feature with only patchy sediment cover. The lower reaches of the dome were dominated by lobate flows, with small pillowed zones encountered further up. Immediately upon encountering rocky outcrops at the base of the dome-like feature we observed a high diversity of octocorals, including *Candidella*, *Calyptrophora ?microdentata* and *C. ?antilla*, *Lepidisis, Acanella, Isidella, Chrysogorgia*, *Iridogorgia magnispiralis and I. splendens* (at least some with shrimp ?*Bathypalaemonella serratipalma*), *Metallogorgia melanotrichos* (with ophiuroid associate *Ophiocreas oedipus*), *Clavularia*, *Cornularia*-like stoloniferan octocoral, *Paragorgia*, *Paramuricea* sp. (with ophiuroid *Asteroschema*), *Swiftia, Corallium ?niobe,* and black corals (*Stauropathes, Parantipathes)*. A large *Calyptrophora ?microdentata* appeared to have several parasitized polyps (visible as outsized polyps that

upon first glance can be mistaken for lepadomorph barnacles). We saw a gorgonian-like skeleton that was populated by many red polyps; the question was whether these were anemones that had settled on a bare skeleton, or if this was a *Swiftia* octocoral that had had the coenenchyme removed between all the polyps. Either possibility is of interest. Anther interesting observation was of a shell hash-covered holothurian (?*Meseres*, suggests Dave Pawson) on the rocks.

Moving up the slope a pattern began to emerge of alternating lobate and pillowed zones, leading to the hypothesis that the dome is comprised of a series of stacked lobate sheet flows with pillowed edges. Numerous times during the dive we observed large (1-2 m) lobes that had cracked open to reveal empty interiors. These 'skylights' form when lava drains out from under the solidified crust of an inflated lobe. Near the summit of the dome the ROV encountered a large drainback feature. Hanging over a shallow, flat depression, we could look to either side and see where an inflated crust might have broken off. The orientation and tilt of the drainback features suggests there may indeed have been deformation at the dome. The drainbacks on the lower slopes seemed tilted away from the center of the dome, whereas the large drainback near the summit appeared almost level. No 'bathtub rings' of lava or other indicators of paleohorizontal were observed on the insides of the inflated lobes. Moving up towards the summit we observed a thin (5 cm) sheet flow. The sediment probe was deployed at the end of the dive, and revealed that the sediment pile covering the sheet flows at the summit was only about 25-35 cm thick.

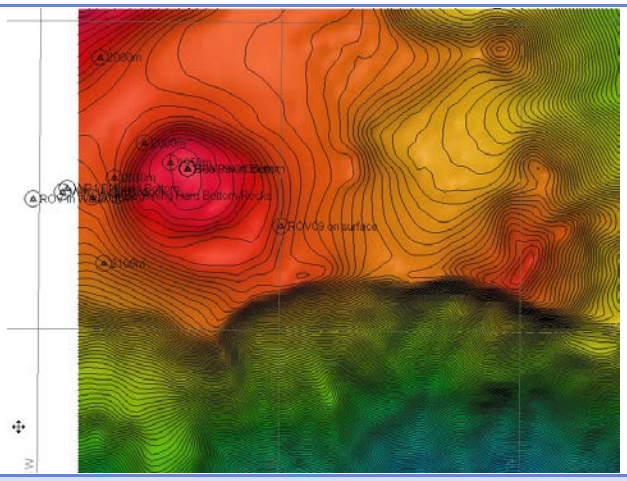
Other biological observations: Only a handful of fish species were observed, including Cusk eel (Ophidiidae), grenadier (Macrouridae), Blue hake (*Antimora rostrata*), hatchetfish, and ?synaphobranchid eel.

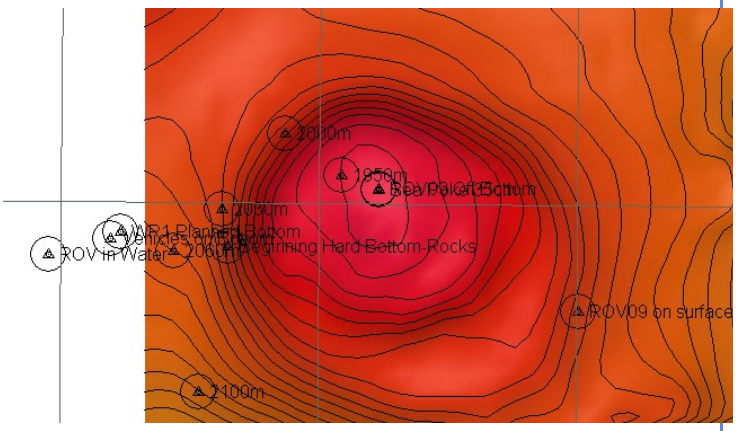
According to Chuck Messing (Nova Southeastern), our observation of several of the purple comatulid crinoids *Xenometra* are the northernmost record for the species. Among the recorded sightings of asteroid seastars were a 6-armed star (?*Ampheraster*), a possible *Coronaster ?briseus, Evoplosoma, ?Chondraster, ?Henricia*, and a terrific video of the asteropectinid *Plutonaster* moving ("gliding") across the sediments raised on pointed podia.

Porifera: Demospongiae *Polymastia*-like, plate sponge ?Pachastrellidae, cladorhizids, "grapefruit"; Hexactinellida *Euplectella*-like
Cnidaria: cup coral; anemones (burrowing Edwardsiidae); zoanthids; solitary hydroid (Corymorphidae)
Mollusca: gastropods, Pteropod *Clio* sp.
Crustacea: *Aristaeopsis edwardsiana* shrimp, nematocarcinid shrimp, red crab (*Chaceon ?quinquedens*), barnacles
Pycnogonida: *Colossendeis* sp.
Echinodermata: Ophiuroidea (many different types, including *Asteroschema* associated with *Paragorgia*); Crinoidea (comatulid); Holothuroidea; Echiuroidea including at least 2 heart urchin tests on sediments, but not living
Possible Brachipoda on rock at 2159 UTC

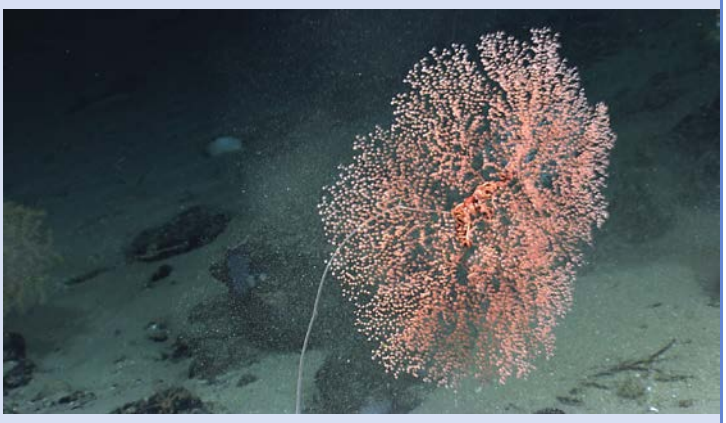
Interesting highlights:
• Drainback features in inflated lava lobes.
• observation and extended video of a pteropod *Clio* sp swimming from the a position at rest on the bottom into the water column.

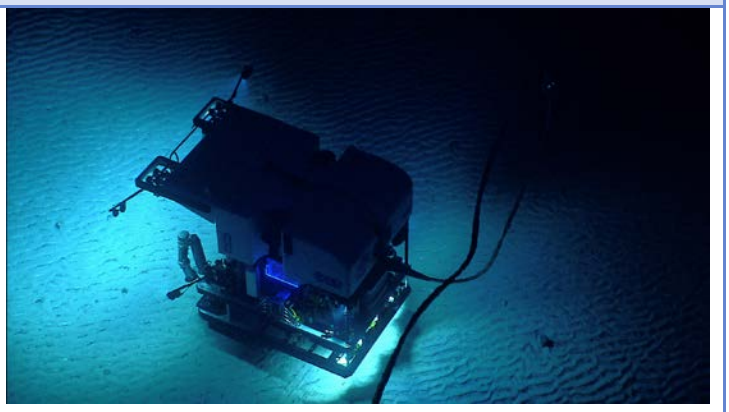
Overall Map of ROV Dive Area	**Close-up Map of Main Dive Site**





Representative Photos of the Dive





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