SPOTLIGHT 6 | Davidson Seamount

35°43.00'N,122°43.00'W

By David Clague, Lonny Lundsten, James Hein, Jennifer Paduan, and Alice Davis

Davidson Seamount is located about 80 km off the central California coast in the Monterey Bay National Marine Sanctuary. It is one of the better-explored seamounts in the world, having been sampled and observed during 32 dives by the remotely operated vehicle (ROV) *Tiburon*. These dives mapped the bottom substrate and biological communities, and collected over 280 rock samples and nearly as many benthic animals.

Bathymetric maps (Figure 1) show that Davidson is composed of a series of parallel ridges, each consisting of numerous steep volcanic cones, unlike more typical conical seamounts. These ridges formed parallel to magnetic anomalies in the underlying oceanic crust and grew where a mid-ocean ridge was abandoned about 20 million years ago. Davidson was sporadically active from at least 14.8 to 9.8 million years ago, based on radiometric ages of 18 volcanic cones constructed of alkalic lavas (Clague et al., 2009). Volcaniclastic deposits formed during explosive eruptions drape many of the summit cones.

The coral and sponge gardens found on the now extinct seamount differ markedly from the surrounding expanses of mud-covered abyssal plain. A welcome observation has been the pristine condition of coral communities on the seamount and minimal evidence of human impact (DeVogelaere et al., 2005). Many new species have been discovered here, including corals, sponges, and seastars. Analysis of video from 17 of the ROV dives yielded 60,374 observations of 168 identified fish and invertebrate taxa, dominated by passive, suspension-feeding corals and sponges. Large corals occur in dense aggregations on local peaks and adjacent steep slopes, but are less abundant in valleys or on the flanks. Researchers have found little evidence of species endemism on and around this seamount (Lundsten et al. 2009a, 2009b; McClain et al., 2009). Animals are, however, found in greater abundance, biomass, and better health than those found in less-optimal habitat, suggesting that seamounts may be a source, rather than a sink, for some species (McClain et al., 2009).

Ferromanganese oxide crusts (Fe-Mn crusts) as thick as several centimeters coat most rock outcrops, especially on the flanks of the seamount. These crusts accumulated at incredibly slow rates of 1–7 mm per million years. Davidson's summit reaches into a strong oxygen minimum zone that controls the chemistry of the crusts, so changes in the crustal layers are good recorders of changes in upwelling, productivity, and the input of terrigenous debris into the coastal ocean.

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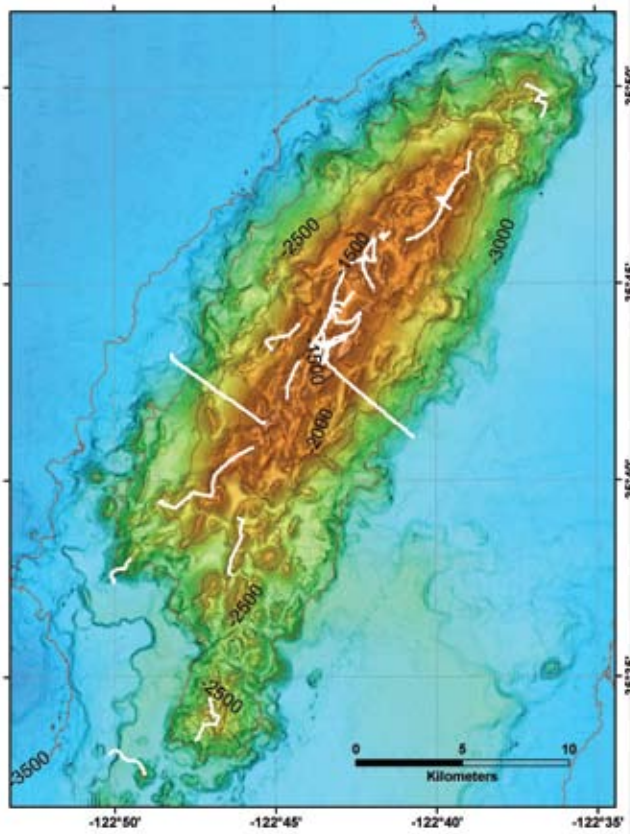

Figure 1. Slope-shaded relief map of Davidson Seamount showing locations of remotely operated vehicle *Tiburon* dives. Contour lines are in 500-m increments.

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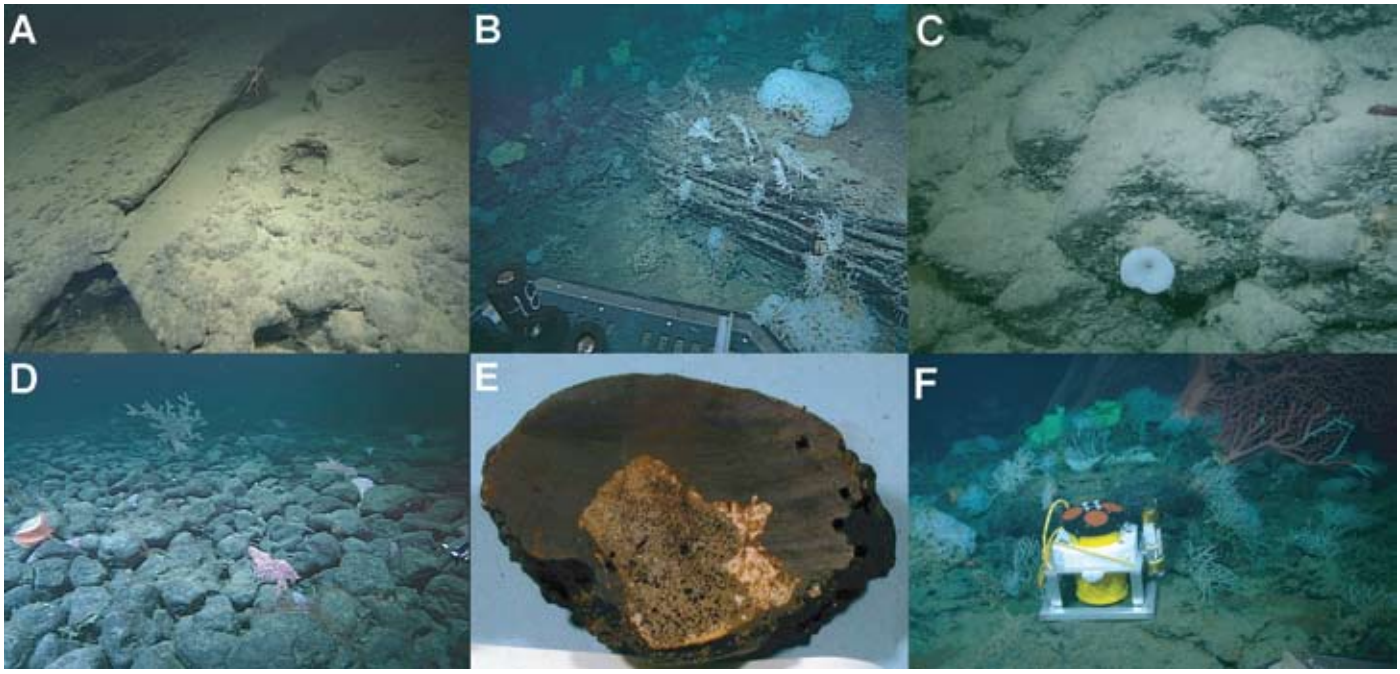

Figure 2. Plate showing (A and B) volcaniclastic sediment at Davidson Seamount, (C) truncated pillow lavas, (D) blocky lava flow, (E) a 9-cm-diameter Mn-encrusted basalt clast, and (F) an acoustic Doppler current profiler deployed to measure particle concentrations and currents near the summit.

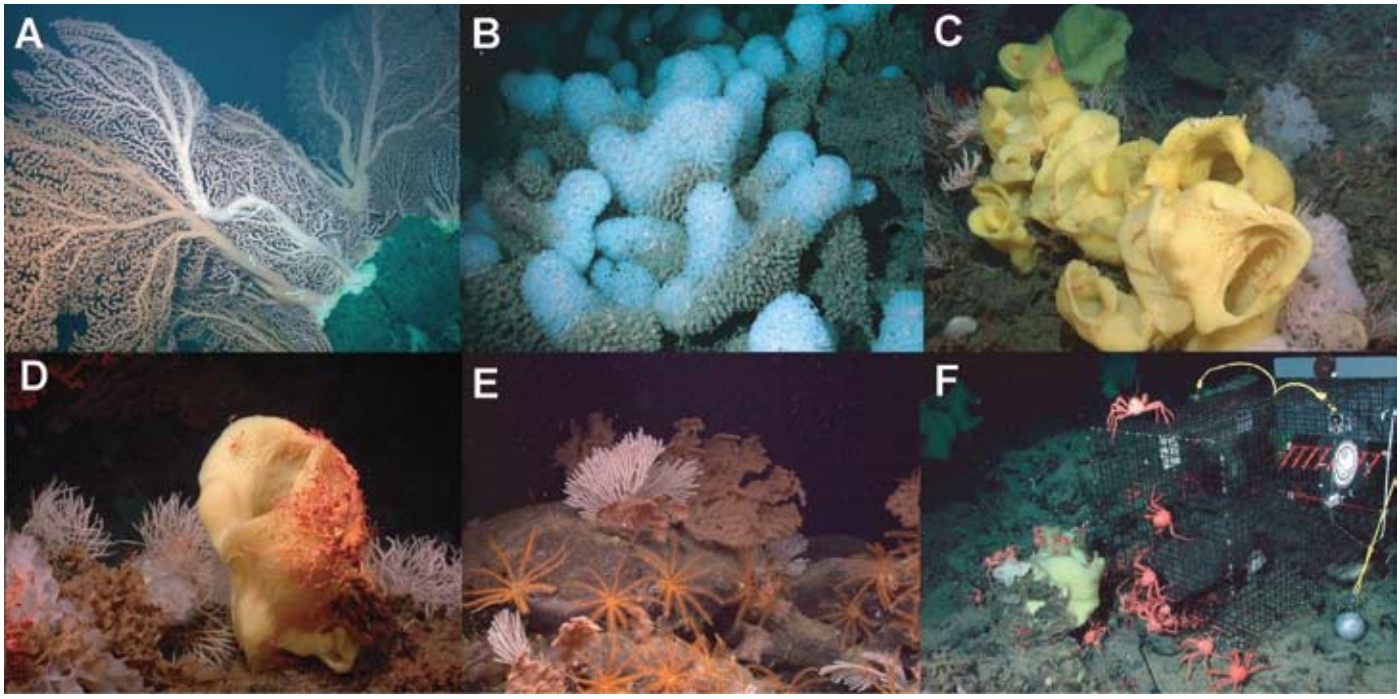

Figure 3. Plate showing the variety of animals found at Davidson Seamount. (A) *Paragorgia arbora*. (B) *Farrea occa* sponge. (C) *Staurocalyptus* sp. sponge. (D) *Asbestopluma* sp., *Farrea occa, Gorgonocephalus* sp., *Staurocalyptus* sp. (E) Crinoids, antipatharians, and primnoids. (F) A baited fish trap that attracted abundant lithodid crabs but few fish.

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