New hydrothermal vents discovered along the Mariana back-arc spreading center

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The Mariana back-arc spreading center is located in the Northwestern Pacific and is part of the Mariana subduction system. Before 2015, the only known active hydrothermal vents in the Mariana back-arc were at the southern-most end (13°N) and in the central back-arc (18.2°N). In November/December 2015, expedition FK151121 aboard the R/V Falkor investigated a 600 km stretch of the nearly unexplored Mariana back-arc spreading center in between 13°-18°N using a combination of water column surveys and Sentry AUV dives. Four new hydrothermal vent sites and a recently erupted lava flow were discovered. The hydrothermal plumes were characterized by excess ^{3}He, particle anomalies, as well as the presence of dissolved chemical species, such as CH_4 and H_2. We present preliminary results on the distribution of ^{3}He in the water column along the southern Mariana back-arc spreading center. Because of its conservative behavior, excess ^{3}He present in the water column is an unequivocal indicator of hydrothermal discharge or recent volcanic activity at the seafloor. In combination with other tracers, ^{3}He can also unravel on-going geologic processes such as potential arc-affinity in areas where arc and back-arc interact. A return expedition planned in the fall of 2016 should allow us to visit these sites with a remotely-operated vehicle, confirm the existence of the hydrothermal vents visually and sample the vent fluids for their chemical composition. This work was supported by the Schmidt Ocean Institute, NOAA's Ocean Exploration and Research Program, NOAA's Pacific Marine Environmental Laboratory, NOAA's Pacific Islands Regional Office, Oregon State University, and University of Washington.