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Eruption-Driven Changes in Hydrothermal Plume Microbial Communities at the East Pacific Rise 9° 50'N

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Hydrothermal plumes in the deep ocean are characterized by microbial communities that rely on chemoautotrophic metabolisms fueled by oxidation of reduced inorganic substrates. Recent studies suggest that these plumes are also dynamic zones of carbon cycling, where microbial metabolisms play an important role in processing organic matter. During a 2025 expedition to the East Pacific Rise at 9°50'N, hydrothermal plume samples were collected using 10L Niskin bottles on a CTD rosette from multiple on-axis vents, as well as from the recently discovered off-axis YBW Sentry vent field. DNA extraction and metagenomic sequencing was carried out on the samples. Hydrothermal plumes were determined in real time by observation of turbidity, temperature, and salinity anomalies in the water column using SeaBird911 CTD sensors. Further confirmation of the presence of hydrothermal plumes was provided by a NOAA-PMEL Miniature Autonomous Plume Recorder (MAPR), measuring changes in redox potential within the water column. On April 29, 2025, an active volcanic eruption was witnessed at the Tica hydrothermal vent site by observers in the submersible *Alvin*. Water samples were collected within ~24 hrs of the start of the eruption and over subsequent days, providing a rare opportunity to track microbial community responses in the immediate aftermath of a seafloor eruption. Pre- and post-eruption samples were collected from directly above the location of the Tica vent site. In addition, samples were collected from other locations along the ridge axis, where WHOI-MISO *TowCam* deep-sea camera footage showed dense white microbial mats had colonized sites of active diffuse flow as rapidly as ~36 hours after the eruption started. Together, these samples provide new insights into how hydrothermal plume and vent-associated microbial communities respond, recover, and recolonize in the days following a major volcanic event that significantly impacts the hydrothermal plumbing system beneath a fast-spreading mid-ocean ridge.