

Time series analysis of hydrothermal vent growth, flow coloration, and colony changes at Mushroom Vent in ASHES Field off the coast of Oregon

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The Ocean Observatories Initiative's (OOI) high-definition video camera, deployed at the Mushroom hydrothermal vent in the Axial Seamount Hydrothermal Expeditions (ASHES) Field off the coast of Oregon, has been recording video footage of an active hydrothermal vent on the Juan de Fuca Ridge 8 times a day since November 2015. Previous research has established tidal periodicity in current flow around hydrothermal vents and vent flow temperature, diurnal and tidal periodicity in pressure at hydrothermal vent sites, and varying rates of hydrothermal vent chimney growth defined by periods of growth and collapse (Baker 1994, Tivey et al 2002, Aliani et al 2003, Sato et al 1995, Johnson and Tunncliffe 1985). The unprecedented time series footage collected by the OOI shows regular fluctuations in bacterial colony growth, vent flow coloration, and vent chimney growth. I determined periodicity in bacterial growth, percent coverage over time heuristically. I created a rating scale to quantify the vent flow coloration, which can be cross-referenced and indexed against measurements of chemical fluid composition from other OOI sensors. I estimated the rate of vent chimney growth by comparing vent height to an object with a known length and compared it to instrument measurements of water pressure at outflow locations to establish a relationship between the rate of vent outflow and vent chimney growth. I compared the rate of chimney growth to fluctuations in outflow coloration to explore if the contents of outflow affect chimney growth. Once the steady-state relationships between chimney growth, flow chemical composition, and colony changes are established, deviations from this relationship can be explored in future studies as a potential indicators of changing mantle conditions.