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A Proposed Experiment and Apparatus for
Measuring the Temporal Change of a
Black Smoker's Heat Flux

A thesis submitted in partial satisfaction of the
requirements for the degree Master of Science
in Engineering Sciences (Applied Ocean Science)

by

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Abstract of the Thesis

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The proposed experiment is to study the temporal characteristics of a black smoker's heat flow. A black smoker is a chimney structure that spews forth metal-laden hot water from beneath the seafloor into the cold bottom water of the ocean. The important parameters in the heat flux equation are the exit flow velocity, temperature, and geometry. From the analysis of the heat flux equation it is apparent that the black smoker's exit flow cross sectional area is the most critical parameter in measuring the heat flow. In order to obtain the required hot vent properties, an autonomous instrument package is proposed, VEMON (vent monitor). VEMON will use a Doppler sonar transducer for measuring the hydrothermal fluid's velocity profiles and the chimney's profile. A thermocouple array will sweep through the

hydrothermal plume to obtain a temperature profile. There will be four data collection modes conducted at set intervals over a period of 6 months to one year. The modes will be: a three dimensional velocity and geometry scan, a temperature sweep at a set elevation, a velocity sweep at the same elevation as the temperature, and a set of velocity measurements taken at the position of the previously measured maximum velocity.

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