

Annual Report for FY 1999

P. I. Name:

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Project Proposal Title:

A Numerical Investigation of Ocean Circulation and Pelagic Fisheries around the Hawaiian Islands

1. Purpose of the Project:

This study is designed to further the understanding of the ocean circulation around the Hawaiian waters and its influence upon the regional pelagic fisheries. Several observational studies have shown the existence of the mean narrow boundary current which flows along the windward side of the Hawaiian Islands. This narrow boundary current (the North Hawaiian Ridge Current), however, has been a subject of debate ever since it was first predicted by Mysak and Magaard and observed by White in 1983. Large fluctuations with time-scales ranging from months to several years have been detected in the NHRC. One of the goals of our project is to clarify the causes of seasonal-to-interannual variability of this boundary current and to assess its influence on the movement of pelagic fish near the Hawaiian Islands.

2. Progress during FY 1999:

Our investigation during FY 1999 extended our work of previous 3 years on understanding the seasonal and interannual variability of the circulation around the Hawaiian waters. Long-term in-situ observations indicate that the North Hawaiian Ridge Current (NHRC) demonstrates significant interannual changes. As the present project is approaching the end, the focus of this year's study has been to summarize and synthesize the observational and modeling results from our investigation. Specifically, we have put together two manuscripts which described the main scientific results from this project. In addition to the work by Qiu, Koh, Lumpkin and Flament (1997), we believe that we have obtained a solid understanding on the oceanic circulation around the Hawaiian Islands. In the following, we describe briefly the major results contained in the afore-mentioned two manuscripts.

Using a high-resolution, 2.5-layer reduced-gravity ocean model, Firing, Qiu and Miao (1999) investigated the seasonal and interannual variability in the circulation around the Hawaiian Islands, with particular emphasis on the NHRC. The numerical model simulation shows that the NHRC exists as a mean entity with a 32-year averaged transport

