JIMAR, PFRP ANNUAL PROGRESS REPORT
FY 2002

P.I. Name: Bo Qiu and Pierre Flament

Project Proposal Title: A Numerical Investigation of Ocean Circulation and Pelagic Fisheries around the Hawaiian Islands

Funding Agency: NOAA

Project Purpose and Indicative Results:
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.

Project Activities and Progress during FY 2002:
Our investigation during FY 2002 has focused on the interaction between the Hawaiian Islands and the wind driven subtropical circulation. Our primary goal is an understanding of the effect of this interaction on the Hawaiian Lee Countercurrent (HLCC), an eastward current crossing the Pacific west of Hawaii in the latitude band 18-21N. A 2.5-layer model is used, with the model island located in mid gyre and equatorward of the gyre center, simulating the Hawaiian Islands. The presence of the island creates two wakes. A transport wake directly west of the island is characterized by an alteration of the zonal transport due to the diversion of the interior flow incident upon the east coast of the island into zonal jets extending westward from the northern and southern tips of the island. A pv wake embedded in the 2nd layer streamlines westward and equatorward of the island is characterized by an alteration of the ventilated pv signature and of the baroclinic nature of the flow. The effects of the two wakes combine for a significant impact on both the transport and the baroclinic structure of the modeled HLCC, indicating that effective modeling of the HLCC should include not only the forcing mechanism, but also the influence of the large-scale Sverdrup flow to the east as modified by the Hawaiian Islands. In particular, a zonal variation in baroclinic structure is predicted which is consistent with observations.

3. Plans for the next Fiscal Year:
This project ended in June 30, 2002.

4. List of papers published in refereed journals during FY2002:


6. Names of students graduating with MS or PhD degrees during FY2002:

Ted Durland was supported under this program and has successfully defended his MS degree in May, 2002. His MS thesis is entitled: "Splitting of Subinertial Coastal Kelvin Waves at a Gap".