University of Hawaii at Manoa

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17 May 1994

From: Pierre Flament
To: John Sibert, Program Manager, Pelagic Fisheries Project
Subject: annual report
"Physical oceanography environment of pelagic fishes"
Cc: Dennis Moore, JIMAR
Bo Qui, Oceanography
Lorenz Magaard, SOEST
Peter Garrod, University Research Council

During the first 8 months of this project (1 September 1993 to 30 April 1994), we have performed the following activities:

(a) in collaboration with WOCE-SVP scientists, we specified the drifting buoys, including modifications of the standard design to increase their resistance to fish attacks. We have selected Clearwater Instrumentation as the manufacturer of the buoys purchased during the first year through competitive bidding by 4 manufacturers, and finalized details regarding calibration, manufacture and packaging after a visit to their assembly plant in Mass.

(b) we interacted with L. Magaard, B. Qiu and D. Koh regarding the modelling effort, which was to start with the second year of this project. It was decided to separate the observational component from the modelling component, for which funding will be requested through a separate proposal to be submitted in the near future.

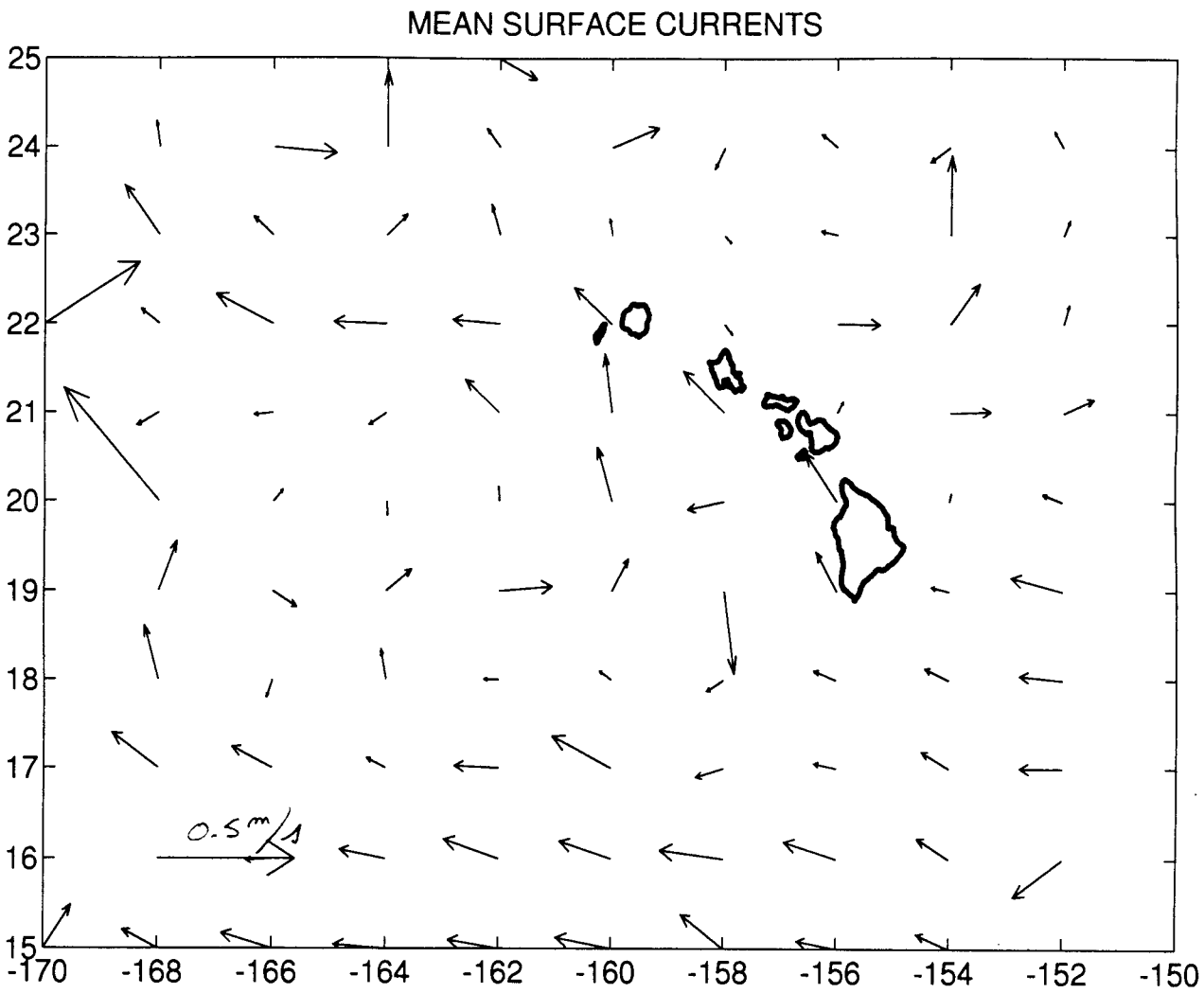
(c) with junior researcher June Firing, we have have begun analyzing historical drifter data in the Hawaiian EEZ. About 75 buoy-years spanning 4 years were found in the WOCE/TOGA data base, yielding an average of 18 buoys active. The attached figures show the mean surface current and current variability inferred from these buoys. This data is presently being used to design an optimum deployment strategy maximizing the residence time in the Hawaiian EEZ. A seminar describing these

results was given at the University of Hawaii in November 1993.

(d) we have interacted with scientists dealing with ocean circulation around the Canary islands, which display many characteristics similar to those found around Hawaii. At the occasion of the 19th Assembly of the European Geophysical Society, we presented the results of our preliminary analysis of the drifter data (abstract attached).

(e) with graduate student Michael Sawyer and undergraduate student Derek Young, we have improved our satellite image processing and drifter tracking capability, and we have installed a file server ready to handle the distribution of these data to other Pelagic Fisheries project investigators.

(f) we have interacted as needed with other investigators in the Pelagic Fisheries project. To this data, Pete Klimley and Keith Bigelow have requested informations on our project and data sets.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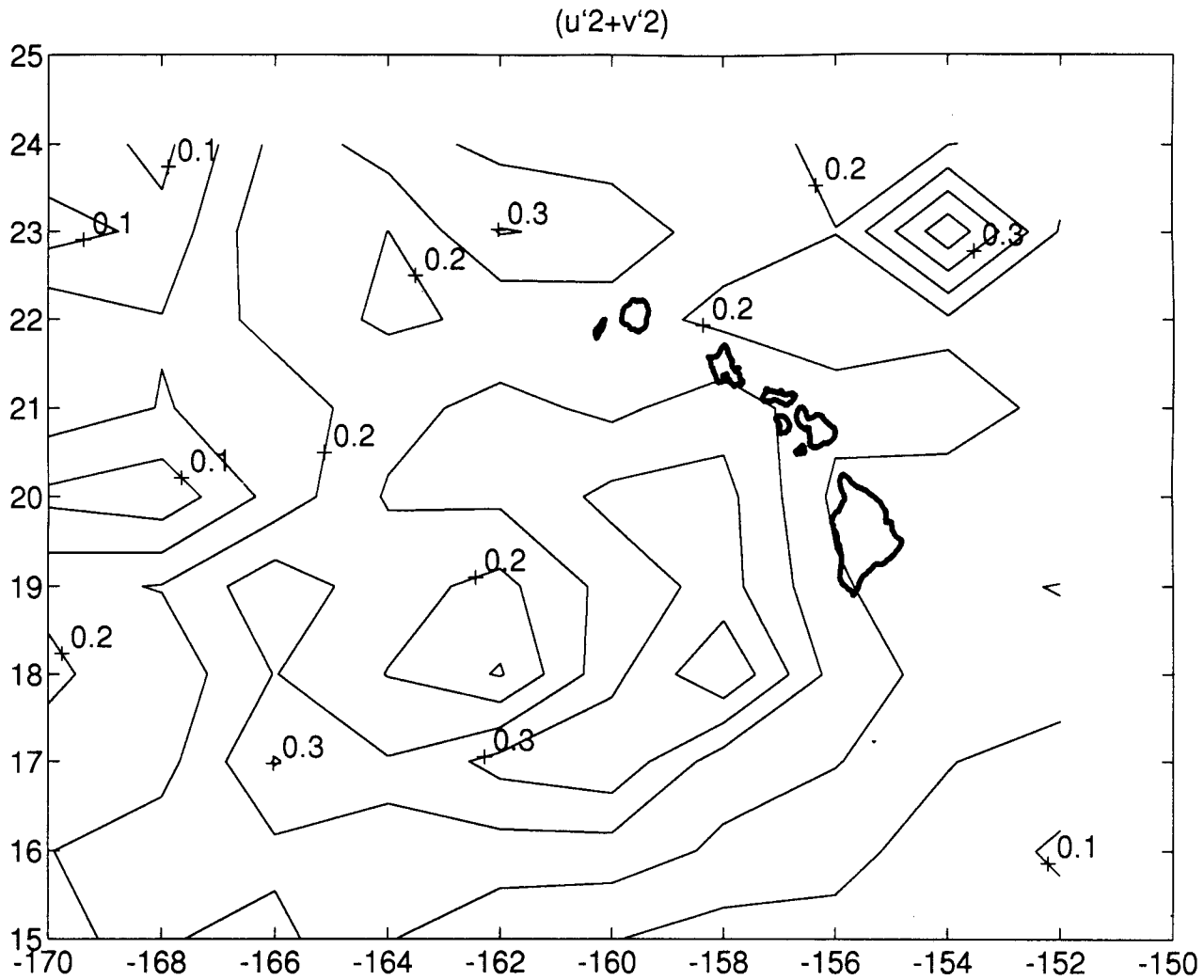
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WIND-DRIVEN OCEANIC PROCESSES IN THE LEE OF THE ISLAND OF HAWAII

P. Flament (Department of Oceanography, University of Hawaii, 1000 Pope road, Honolulu HI 96822).

Hawaii presents an obstacle to the northeasterly trade winds, rising to 4200 m. Narrow shear lines ~1 km wide separate the 10-15 m/s trades from a calm region in the lee. The response of the upper ocean to these wind stress variations was studied in 1990 using shipboard hydrography and ADCP current measurements, drifting buoys, meteorological aircrafts, NOAA-AVHRR infrared images, and 10-m resolution SPOT images of the sun glint.

One-dimensionally, the mixed-layer depth was modulated by the wind stress: outside the calm region, the mixed layer was ~30-m deep, whereas in the calm region, intense surface diurnal warming occured, ~3 C over a depth of ~2 m. Thermal fronts coincided with the shear lines.

Two-dimensionally, the wind stress curl was forcing strong Ekman pumping. Cyclonic eddies up to ~150 km diameter were spun up under the cyclonic shear line. Upwelling and downwelling associated with the shear lines is a dominant mechanism for increasing the eddy kinetic energy in the lee of the island. The mechanism is similar to the response of the coastal ocean to a narrow offshore wind jet, such as in the Gulf of Tehuantepec.

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2. OA-6, Oceanic and Atmospheric flows produced by obstacles
3. P. Flament (Honolulu)
4. None
5. Oral presentation
6. None