Evaluation of Field-Collected Drifter and In Situ Fluorescence Data Measuring Subsurface Dye Plume Advection/Dispersion and Comparisons to High-Frequency Radar-Observation System Data for Dispersed Oil Transport Modeling

APPENDIX A – GEOPOSITION DATA

A Final Report Submitted to

The Coastal Response Research Center

Submitted by:

Dr. James R. Payne
Payne Environmental Consultants, Incorporated
1991 Village Park Way, Suite 206B
Encinitas, CA 92024

Additional Investigators:

Dr. Deborah French-McCay, Chris Mueller, Kathy Jayko,
Brooke Longval, and Melanie Schroeder
Applied Science Associates, Inc.
Narragansett, Rhode Island

Dr. Eric Terrill, Melissa Carter, Mark Otero,
Sung Yong Kim, William Middleton, and Andy Chen
Scripps Institution of Oceanography
La Jolla, California

Dr. Walter Nordhausen, Robin Lewis, Mark Lampinen, and Thomas Evans
CA Department of Fish and Game Office of Spill Prevention and Response
San Diego, California

Dr. Carter Ohlmann
University of California Santa Barbara
Santa Barbara, California

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Appendix A. Geoposition Data

This appendix contains summaries of the geographical position (GPS) data recorded from sampling vessels and the observational plane. Section A.1 describes the methods, and Sections A.2 to A.9 contain maps of geoposition data collected for each of the experimental dates.

A.1 Approach and Methods

A series of seven fluorescein dye releases were completed off the coast of San Diego, CA (Table A-1). In these studies, the dye was sprayed on the water surface at an average water depth of 40 fathoms (73m) in federal waters three miles southwest of Point Loma, San Diego (Figure 1-1). The 10.4 m (34 ft) MSRC vessel, *Response 2*, was utilized for all the controlled dye spraying applications at sea.

Table A-1. Summary table of vessels and aircraft used for all experiments.

Date	Latitude of Release Site (deg. N)	Longitude of Release Site (deg. W)	Dye/Drogue Deployment Vessel	CTD/Fluorometer Sampling Vessel	Aircraft
Nov. 8, 2005	32.6208	117.2898	MSRC *Response 2*	SIO Whaler	DFG twin engine (Partenavia)
March 21, 2006	32.5931	117.2702	MSRC *Response 2*	USCG *Munson*	DFG twin engine (Partenavia)
March 22, 2006	32.6013	117.2817	MSRC *Response 2*	USCG *Munson*	DFG twin engine (Partenavia)
June 21, 2006	32.5994	117.2870	MSRC *Response 2*	USCG *Munson*	DFG twin engine (Partenavia)
June 22, 2006	32.5997	117.2855	MSRC *Response 2*	USCG *Munson*	DFG twin engine (Partenavia)
Nov. 1, 2006	32.6166	117.2815	MSRC *Response 2*	SIO *Saikhon*	DFG twin engine (Partenavia)
Nov. 2, 2006	32.6128	117.2805	MSRC *Response 2*	SIO *Saikhon*	DFG twin engine (Partenavia)

Garmin Global Positioning System (GPS) navigational instruments were used to determine position and time of dye/drogue deployments and sampling efforts aboard all research vessels. All units were set to internally log vessel position at 10 second intervals over the entire sampling effort. In addition, position, time, and depth were manually recorded at each sampling location for the beginning and end of each horizontal or vertical profile, or any other sampling activity. Data from horizontal and vertical profiles of *in situ* fluorescence were combined using time and position data in order to characterize the movement of dye tracer at the surface and at depth.

Garmin GPS navigational instruments were also used to determine position and time of aerial photos and the path of the plane performing that surveillance. Latitude, longitude, and altitude were either combined with photos using time stamps or recorded with the digital image by the Nikon camera aboard the OSPR aircraft.

A.2 Results of 8 November 2005 Experiment

Figure A-1 indicates the locations of the dye release and CTD casts made on 8 November 2005. The line at the drift site indicates the direction of drift as the dye was released. The track of the OSPR aircraft was not automatically recorded for this experiment.

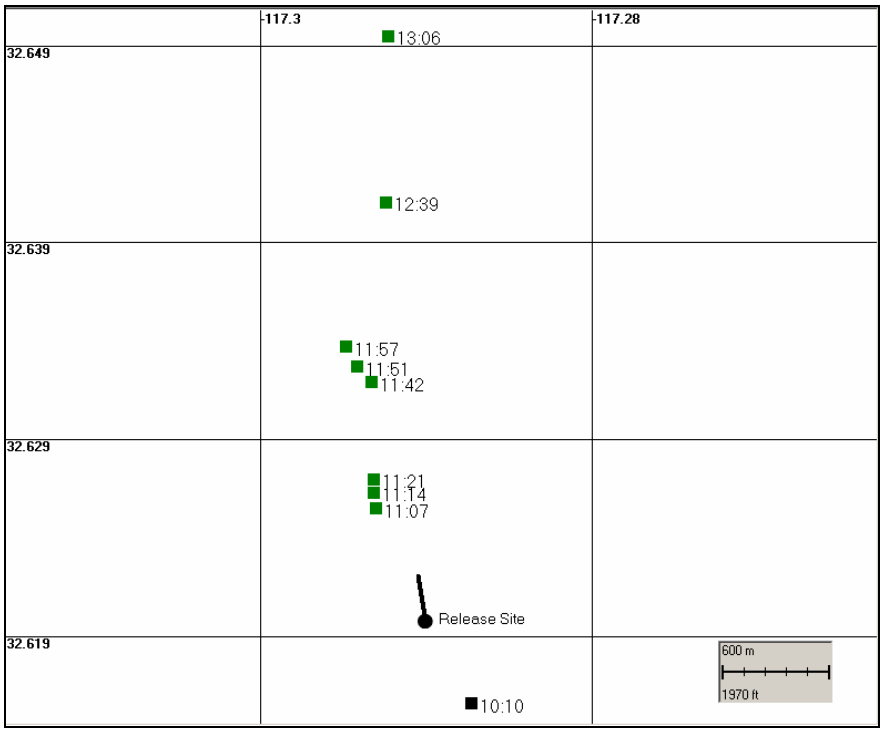

Figure A-1. *In situ* fluorometer and CTD cast locations and times (black = before, green = after dye release) taken abroad the SIO (Scripps Institution of Oceanography) whaler on 8 November 2005.

A.3 Results of 21 March 2006 Experiment

Figure A-2 indicates the locations of the dye release and CTD casts made on 21 March 2006. The line at the drift site indicates the direction of drift as the dye was released. The track of the dye release vessel, the MSRC *Response 2*, is in Figure A-3. The track of the OSPR aircraft was not automatically recorded for this experiment.

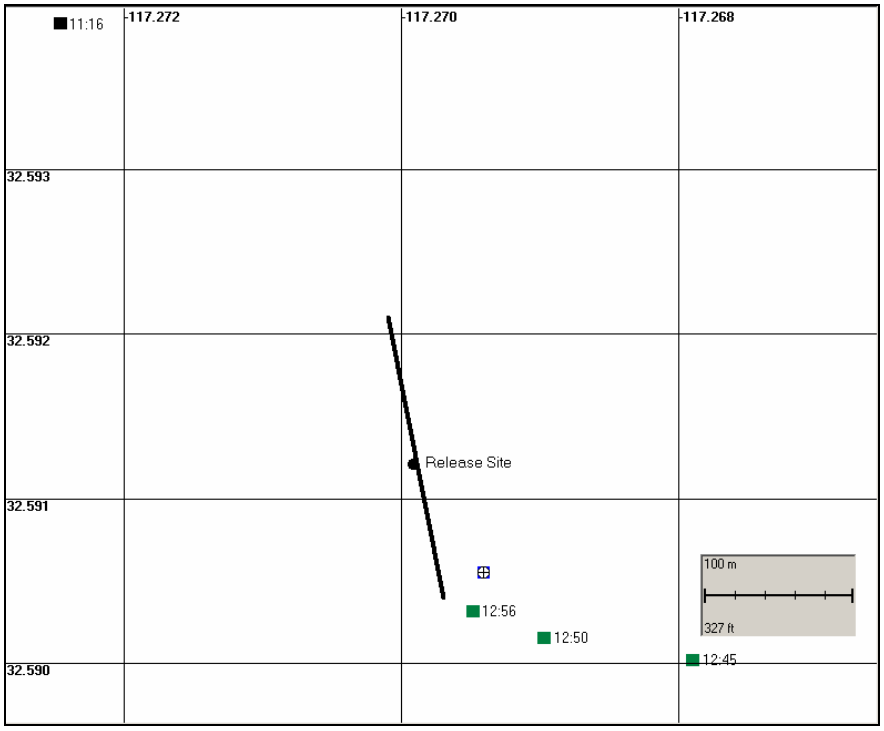

Figure A-2. *In situ* fluorometer and CTD cast locations and times (black = before, green = after dye release) taken abroad the USCG *Munson* on 21 March 2006.

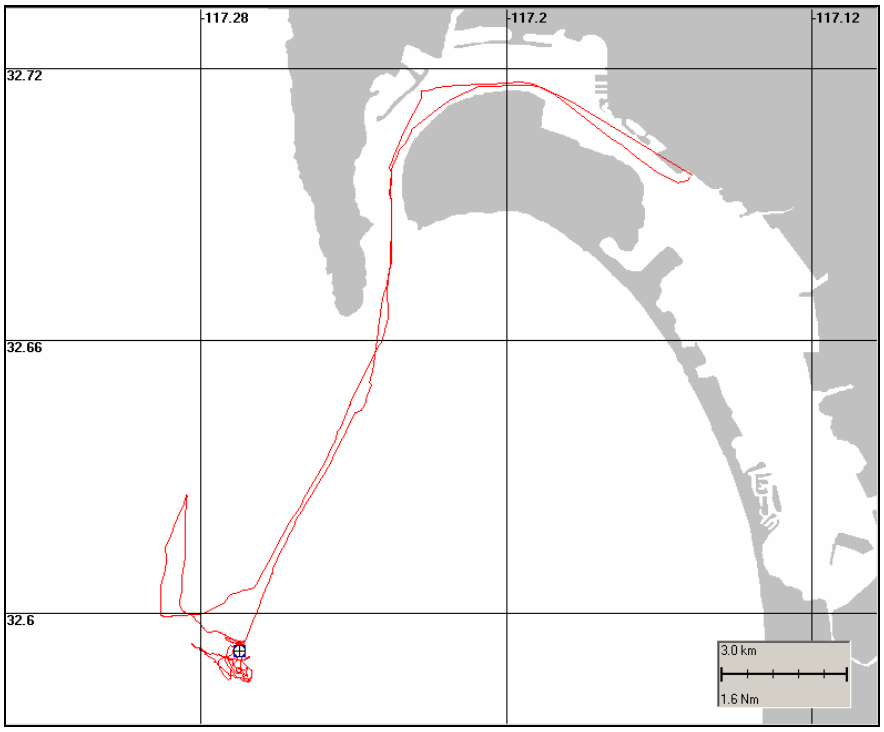

Figure A-3. GPS vessel track of the MSRC *Response 2* circling the plume on 21 March 2006.

A.4 Results of 22 March 2006 Experiment

Figure A-4 indicates the locations of the dye release and CTD casts made on 22 March 2006. The line at the drift site indicates the direction of drift as the dye was released. The track of the dye release vessel, the MSRC *Response 2*, is in Figure A-5. The track of the OSPR aircraft was not automatically recorded for this experiment.

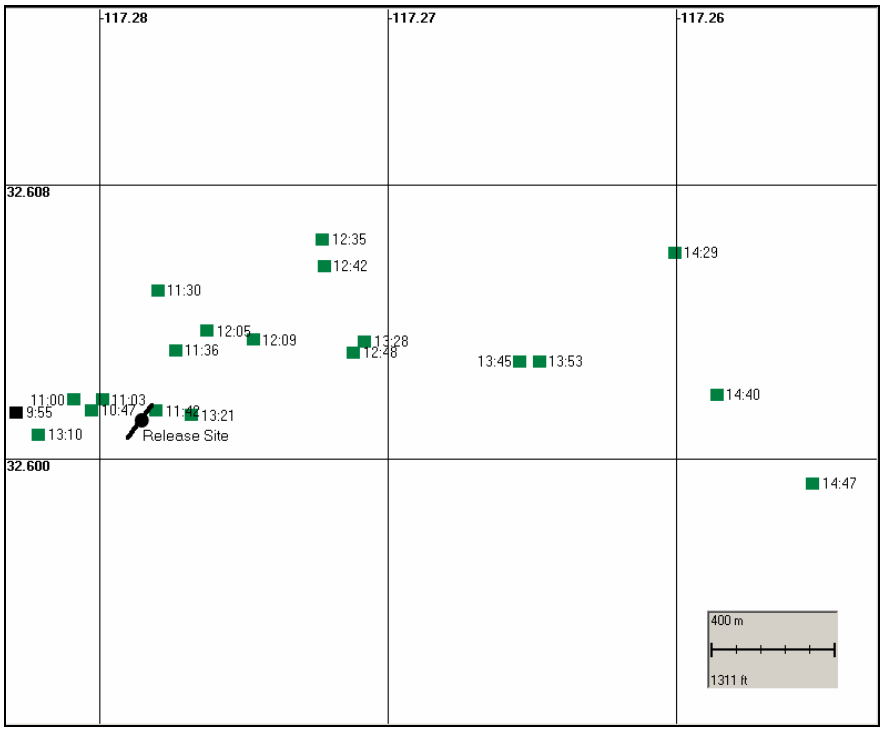

Figure A-4. ***In situ*** **fluorometer and CTD cast locations and times (black = before, green = after dye release) taken abroad the USCG** ***Munson*** **on March 22, 2006.**

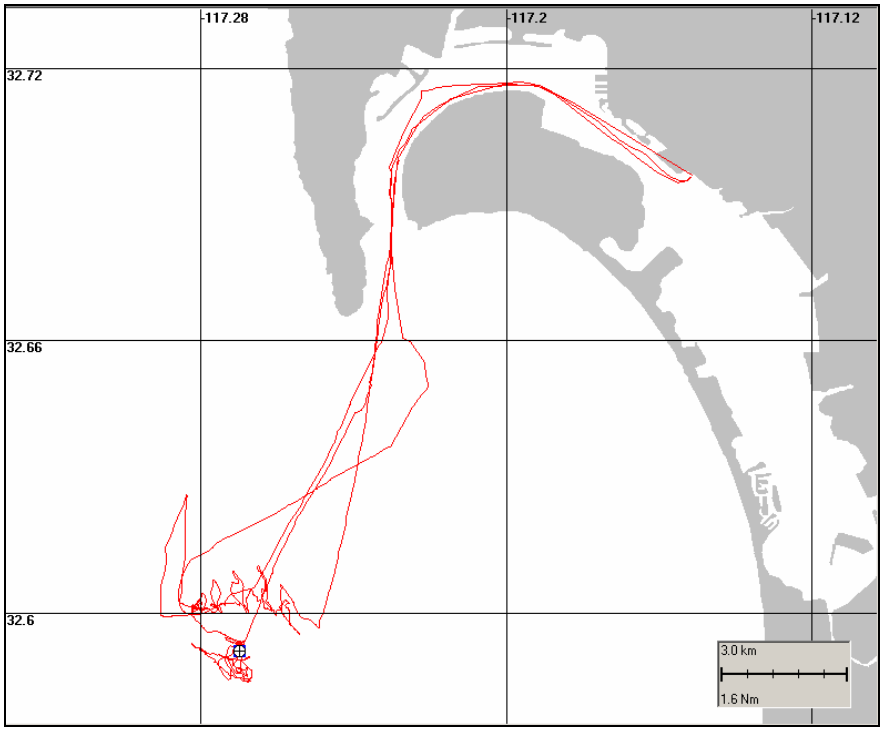

Figure A-5. GPS vessel track of the MSRC ***Response 2*** **circling the plume on 22 March 2006.**

A.5 Results of 21 June 2006 Experiment

Figure A-6 indicates the locations of the dye release and CTD casts made on 21 June 2006. The line at the drift site indicates the direction of drift as the dye was released. The track of the dye release vessel, the MSRC *Response 2*, is in Figure A-7. The track of the OSPR aircraft for this experiment is in Figure A-8.

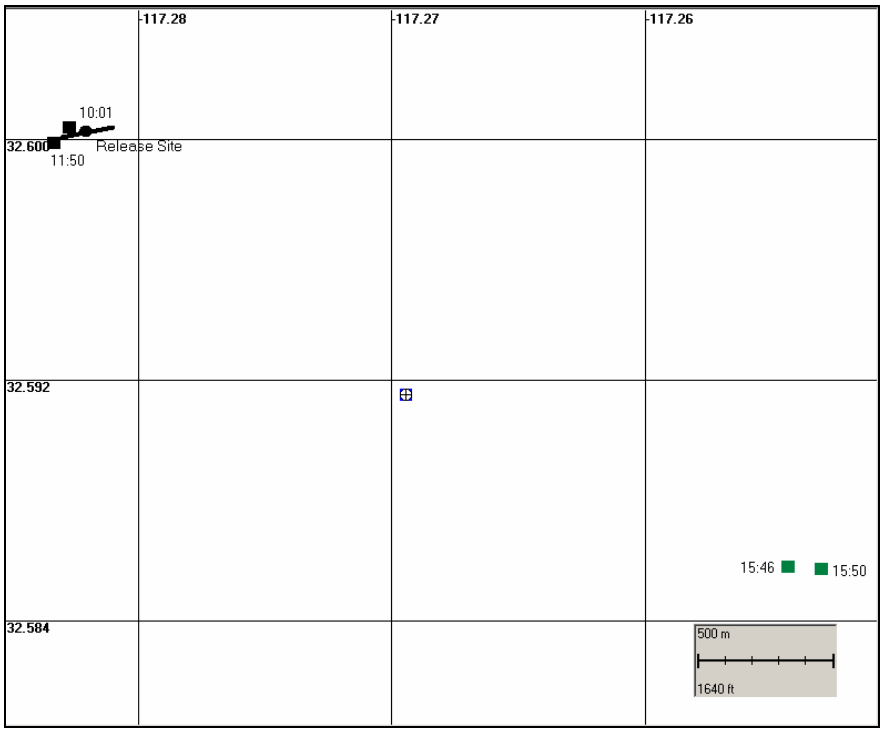

Figure A-6. CTD cast locations and times (black = before, green = after dye release) taken abroad the USCG *Munson* on 21 June 2006.

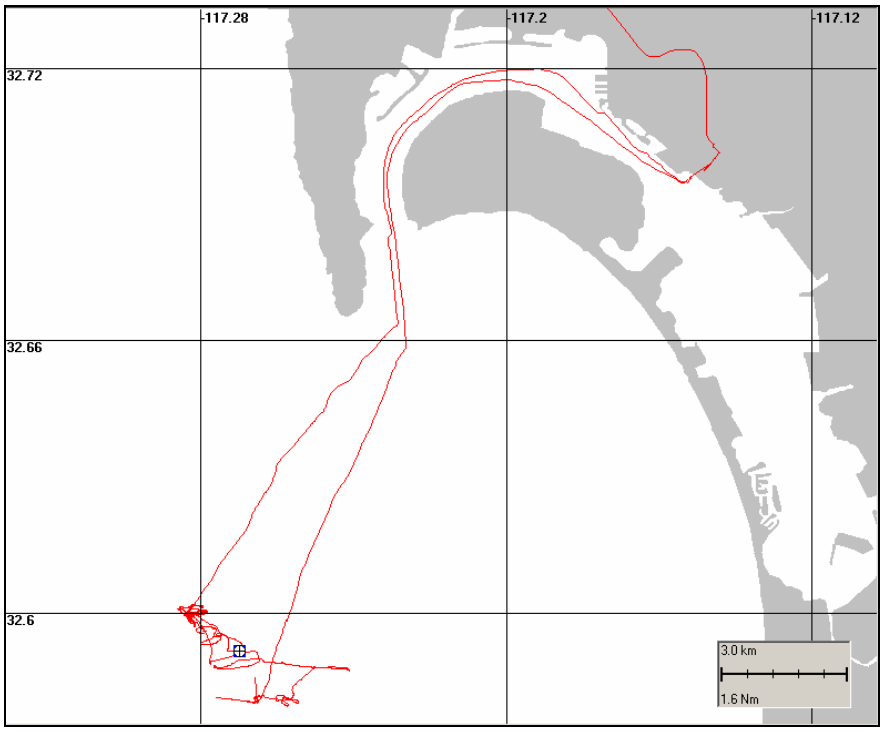

Figure A-7. GPS vessel track of the MSRC *Response 2* circling the plume on 21 June 2006. Note the GPS recording was accidentally left on after returning to the MSRC dock and driving back to SIO.

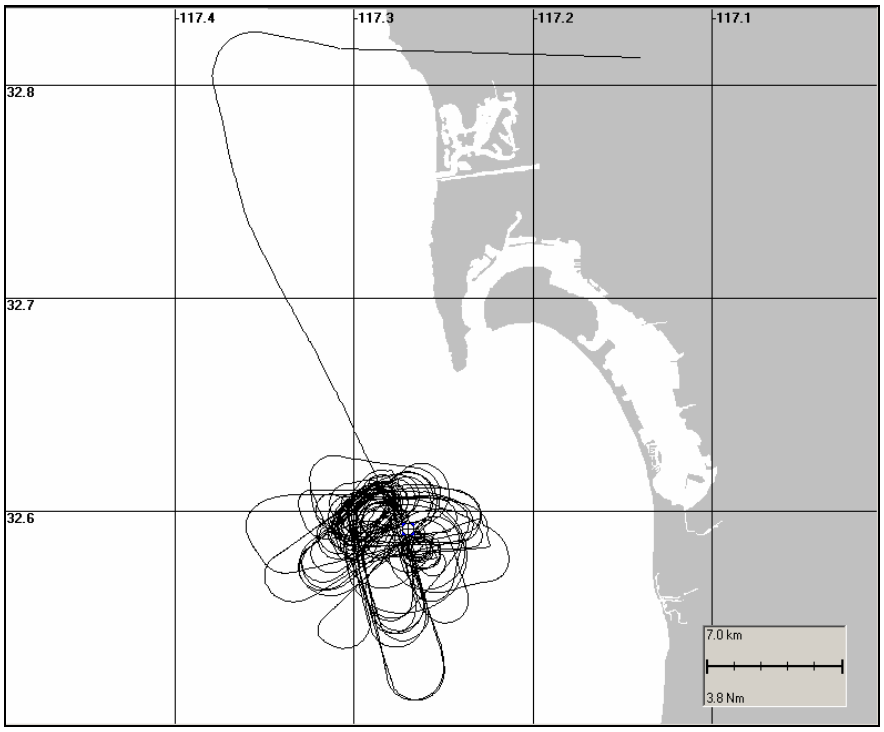

Figure A-8. GPS track of the DFG twin engine aircraft (Partenavia) on 21 June 2006.

A.6 Results of 22 June 2006 Experiment

Figure A-9 indicates the locations of the dye release and CTD casts made on 22 June 2006. The line at the drift site indicates the direction of drift as the dye was released. The track of the dye release vessel, the MSRC *Response 2*,, is in Figure A-10. The track of the OSPR aircraft for this experiment is in Figure A-11.

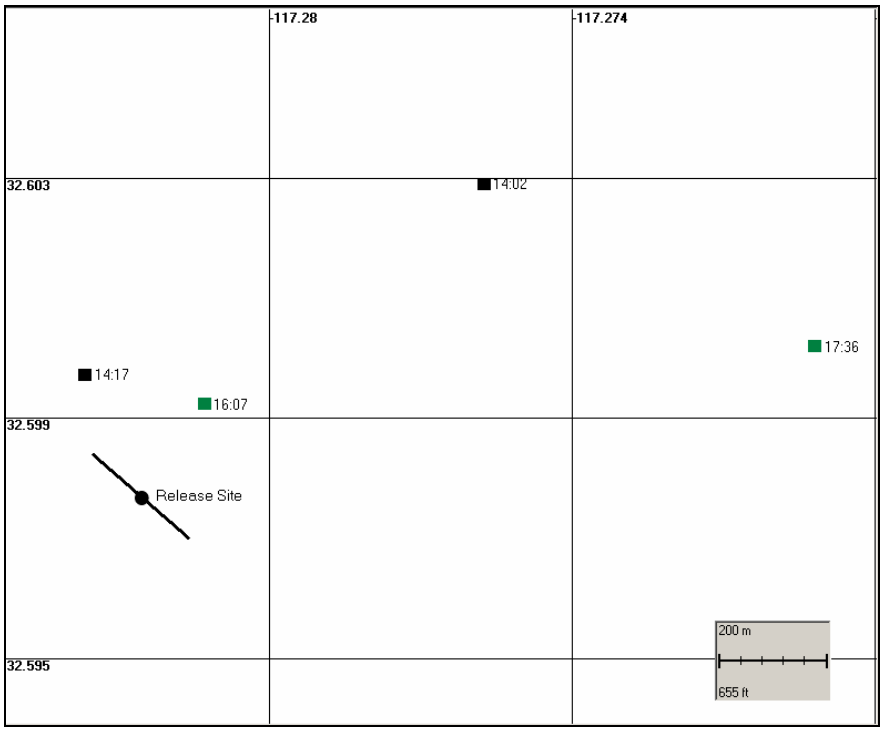

Figure A-9. *In situ* fluorometer CTD cast locations and times (black = before, green = after dye release) taken abroad the USCG *Munson* on 22 June 2006.

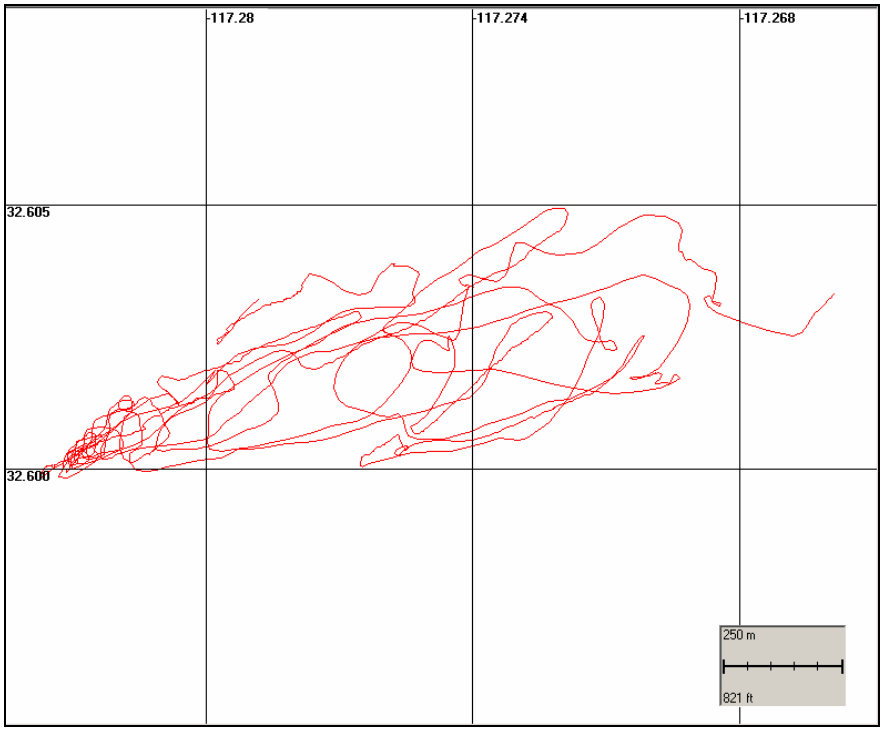

Figure A-10. GPS vessel track of the MSRC *Response 2* circumnavigating the plume over time on 22 June 2006.

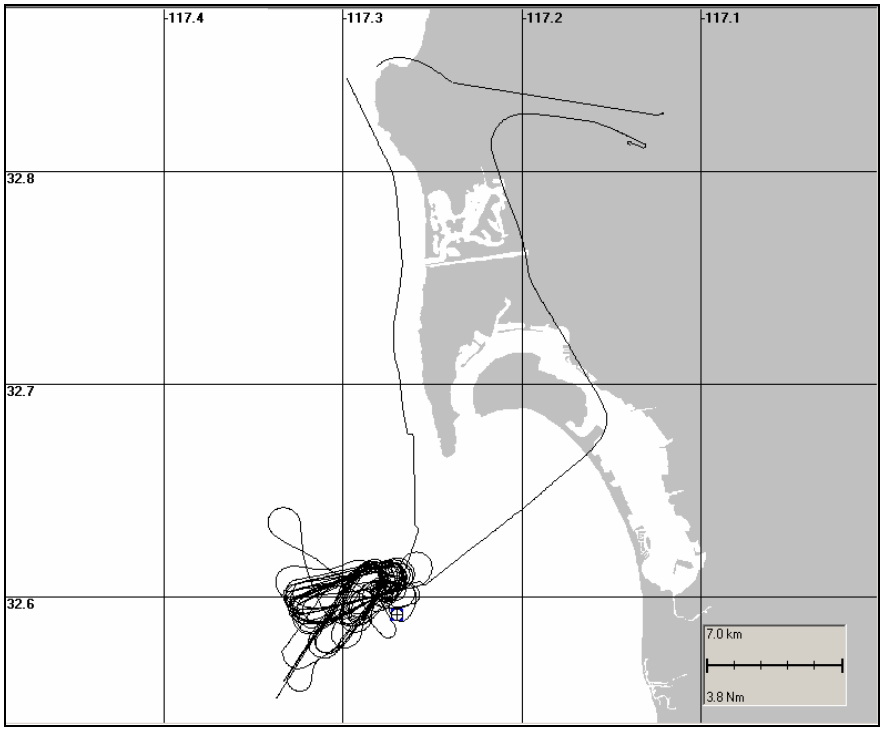

Figure A-11. GPS track of the DFG twin engine aircraft (Partenavia) on 22 June 2006.

A.7 Results of 1 November 2006 Experiment

Figure A-12 indicates the locations of the dye release and CTD casts made on 1 November 2006. The line at the drift site indicates the direction of drift as the dye was released. The track of the dye release vessel, the MSRC *Response 2*, is in Figure A-13. The track of the OSPR aircraft for this experiment is in Figure A-14.

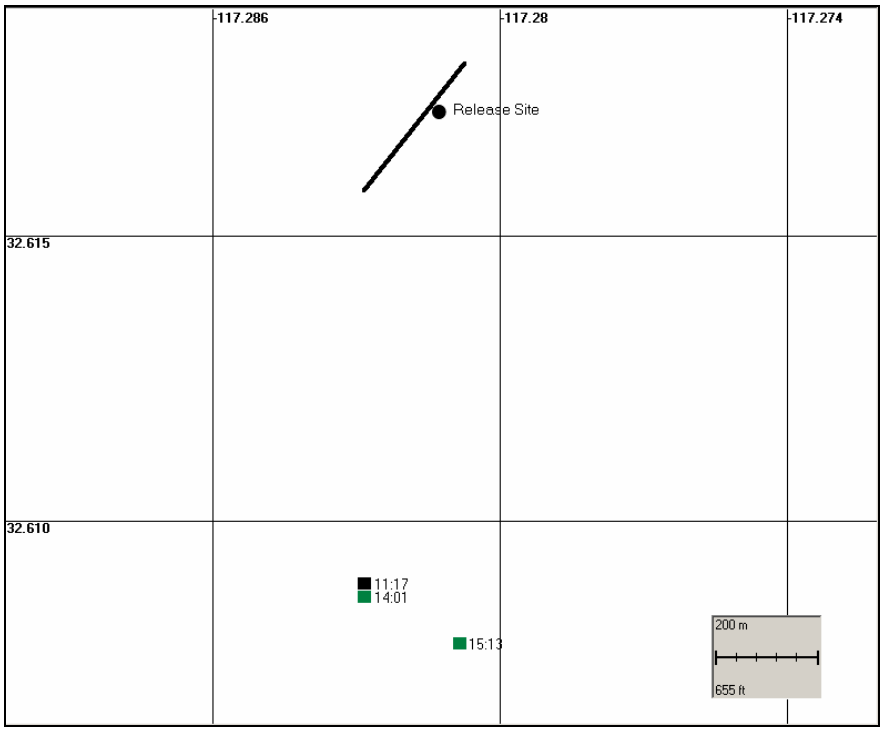

Figure A-12. *In situ* fluorometer CTD cast locations and times (black = before, green = after dye release) taken abroad the SIO *Saikhon* on 1 November 2006.

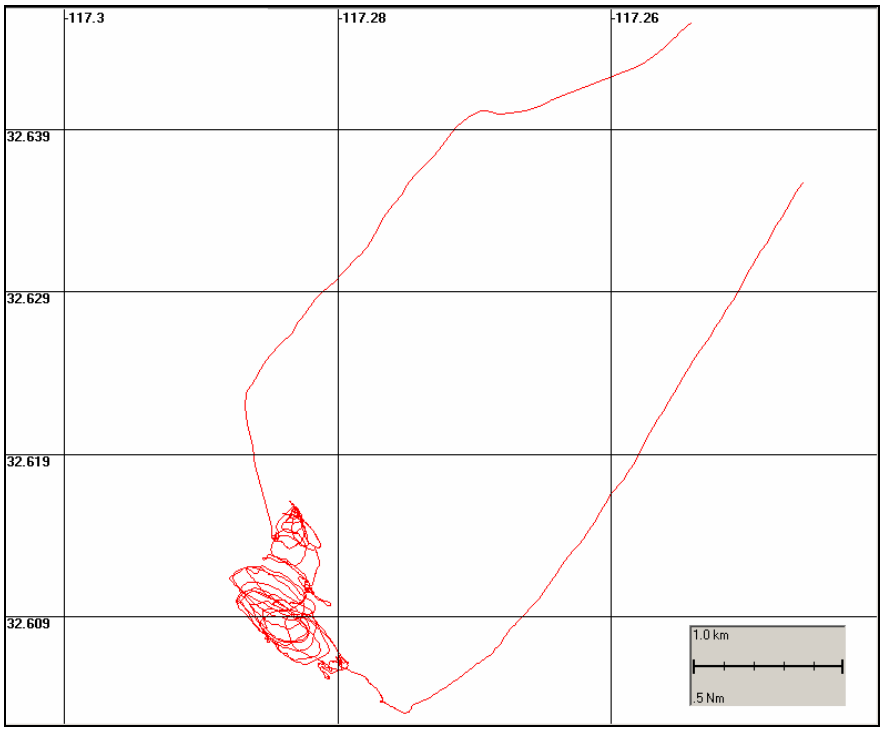

Figure A-13. GPS vessel track of the *Response 2* circumnavigating the plume over time on 1 November 2006.

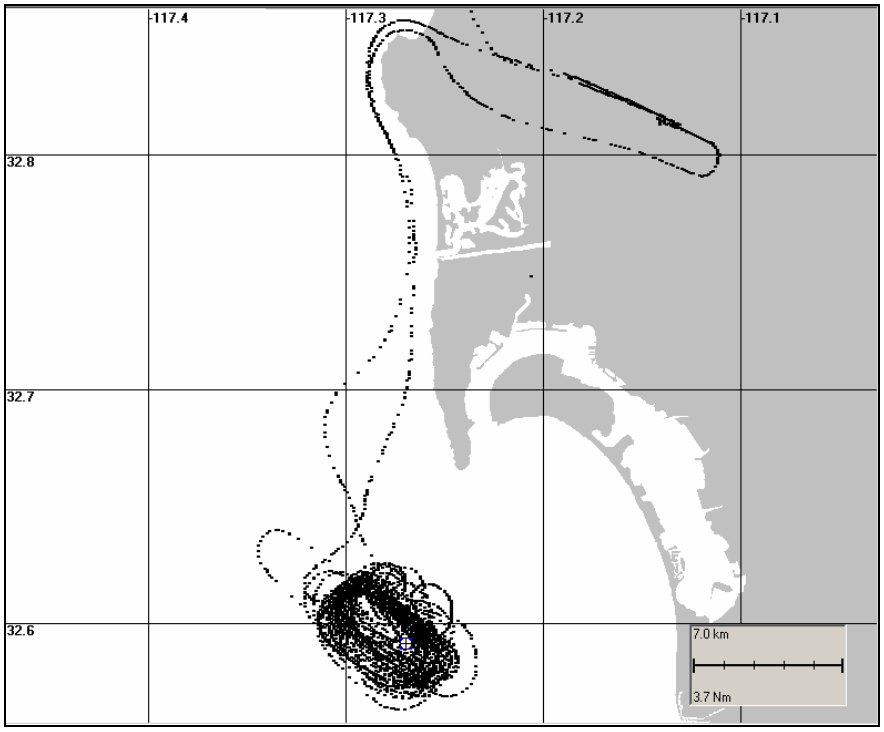

Figure A-14. GPS track of the DFG twin engine aircraft (Partenavia) on 1 November 2006.

A.8 Results of 2 November 2006 Experiment

Figure A-15 indicates the locations of the dye release and CTD casts made on 2 November 2006. The line at the drift site indicates the direction of drift as the dye was released. The track of the dye release vessel, the MSRC *Response 2*, is in Figure A-16. The track of the OSPR aircraft for this experiment was not automatically recorded.

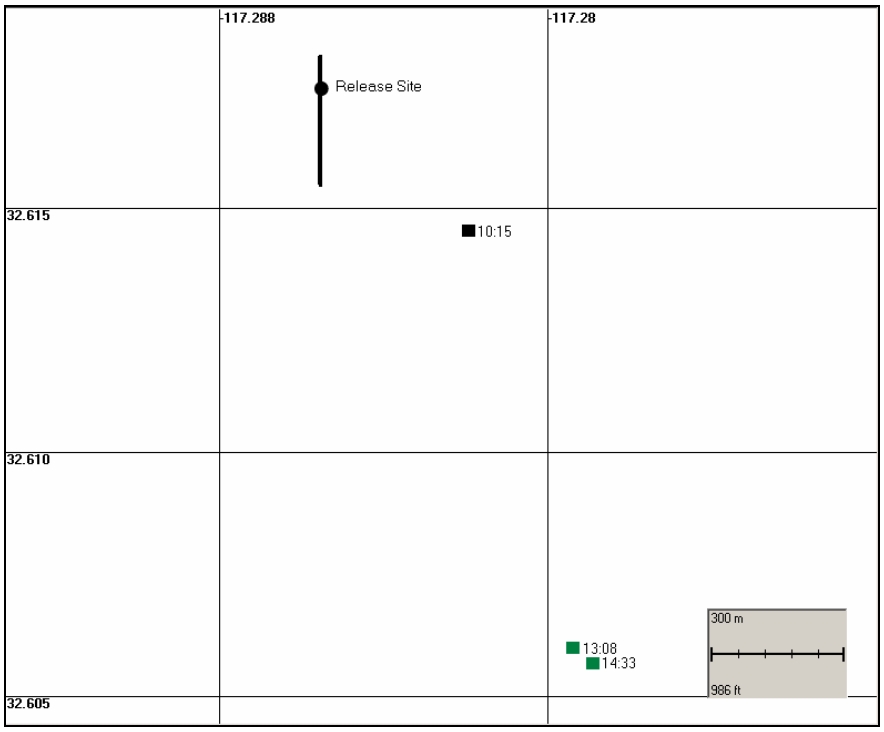

Figure A-15. *In situ* fluorometer CTD cast locations and times (black = before, green = after dye release) taken abroad the SIO *Saikhon* on 2 November 2006.

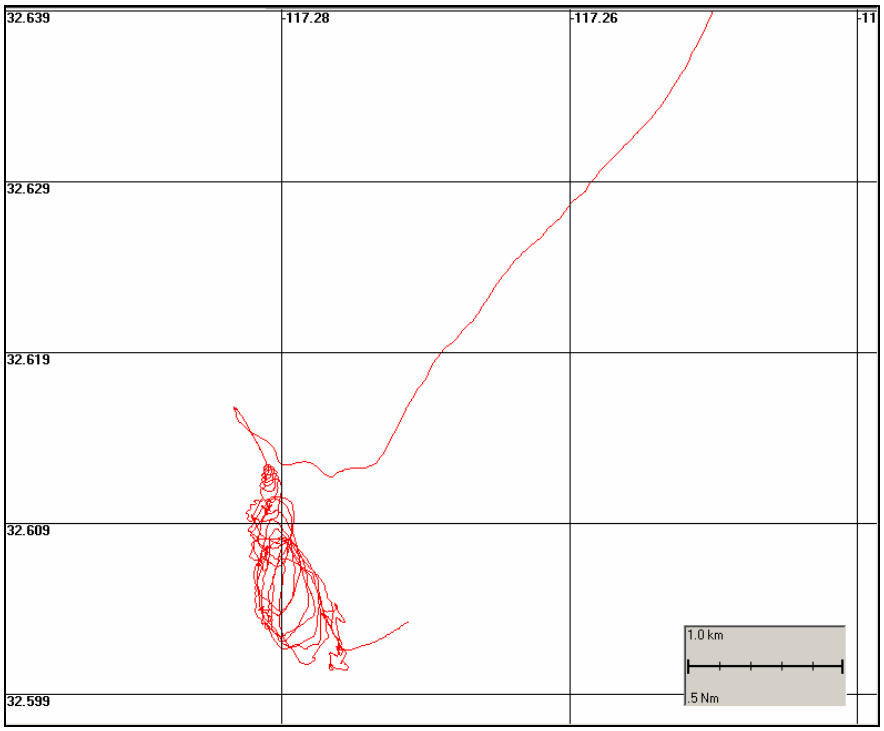

Figure A-16. GPS vessel track of the *Response 2* circumnavigating the plume over time on 2 November 2006.