

October 20, 2014

Dr. Robert Headrick
ONR Code: 332
Office of Naval Research
875 North Randolph Street
Arlington, VA 22203-1995

Dear Dr. Headrick,

Attached please find the progress report for ONR Contract N00014-14-C-0230 for the period of July 20, 2014 to October 19, 2014.



James C. Preisig
President, JPAnalytics LLC

CC: DCMA Boston
DTIC
Director, NRL

Report Documentation Page				Form Approved OMB No. 0704-0188	
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Progress Report #2

Coupled Research in Ocean Acoustics and Signal Processing for the Next Generation of Underwater Acoustic Communication Systems

Principal Investigator's Name:	Dr. James Preisig
Period Covered By Report:	7/20/2014 to 10/19/2014
Report Date:	10/20/2014
Contract Number:	N00014-14-C-0230
Firm Name and Address:	JPAnalytics LLC 638 Brick Kiln Road Falmouth, MA 02540 jpreisig@jpanalytics.com (508) 566-0236y
Program Officer:	Dr. Robert Headrick ONR Code: 322 Office of Naval Research 875 North Randolph St. Arlington, VA 22203-1995 Robert.Headrick@navy.mil
Security Classification:	Unclassified
Distribution Statement:	Approved for public release. Distribution is unlimited.
Total Contract Amount:	\$595,731
Costs Incurred This Period:	\$42,107
Costs Incurred To Date:	\$48,320
Estimated Costs To Complete:	\$547,411

1. **Description:** Technical work this period focused on Research Task 1 from Section 2.2 of the Technical Approach and Justification. Specifically, work began on developing a methodology within the framework of asymptotic random matrix theory (RMT) to explicitly model the time variability of acoustic channels and using this to predict underwater acoustic communications systems performance. Prior methods have accommodated time variability by assuming that the channel is time invariant over an appropriately short interval of time. By explicitly modeling the time variability within the RMT framework it is hoped that the resulting analysis will more accurately predict the trade-offs associated with the rate of channel fluctuations, the number and configuration of hydrophone array elements, the size of filters in subsequent equalizers, and the structure of the equalizer adaptation algorithms.

During this time period, the Principle Investigator also wrote, revised, and/or submitted papers based upon past work and delivered one talk at and helped prepare another one for the UComms 2014 conference.

2. **Major Accomplishments this Period:** None

3. **Results and Recommendations:** None

4. **Publications and Presentations:**

B. Tomasi, J. Preisig, “Energy efficient transmission strategies for delay constrained traffic with limited feedback”, accepted for publication in *IEEE Transactions on Wireless Communications*.

B. Tomasi, D. Munaretto, J. Preisig, M. Zorzi, “Redundancy allocation in time-varying channels with long propagation delays”, submitted to *Elsevier Journal on Ad-hoc Networks*.

A. Yellepeddi, J. Preisig, “Adaptive Equalization in a Turbo Loop”, submitted to *IEEE Trans. on Wireless Communication*.

M. Pajovic, J. Preisig, “Optimal multi-channel equalizer design for underwater acoustic communications”, presented at *The Second International Conference on Underwater Communications (UComms 2014)*, Sestri Levante, Italy, September 3 - 5, 2014.

B. Tomasi, J. Preisig, “Heuristic scheduling for efficient underwater communications with limited feedback capabilities”, presented at *The Second International Conference on Underwater Communications (UComms 2014)*, Sestri Levante, Italy, September 3 - 5, 2014.