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|---|--------------------------------|--|
| 1. REPORT DATE (DD-MM-YYYY)<br>04-05-2018 | 2. REPORT TYPE<br>Final Report | 3. DATES COVERED (From - To)<br>1-Aug-2016 - 14-Aug-2017 |
|---|--------------------------------|--|

|  |   |
|--|---|
| 4. TITLE AND SUBTITLE<br>Final Report: Conference and Symposia Grants: Microscale Ocean Biophysics | 5a. CONTRACT NUMBER<br>W911NF-16-1-0442 |
|  | 5b. GRANT NUMBER                        |
|  | 5c. PROGRAM ELEMENT NUMBER<br>611102    |

|            |                      |
|------------|----------------------|
| 6. AUTHORS | 5d. PROJECT NUMBER   |
|            | 5e. TASK NUMBER      |
|            | 5f. WORK UNIT NUMBER |

|   |  |
|---|--|
| 7. PERFORMING ORGANIZATION NAMES AND ADDRESSES<br>University of California - Merced<br>5200 North Lake Road<br><br>Merced, CA 95343 -5705 | 8. PERFORMING ORGANIZATION REPORT NUMBER |
|---|--|

|  |   |
|--|---|
| 9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS (ES)<br>U.S. Army Research Office<br>P.O. Box 12211<br>Research Triangle Park, NC 27709-2211 | 10. SPONSOR/MONITOR'S ACRONYM(S)<br>ARO                 |
|  | 11. SPONSOR/MONITOR'S REPORT NUMBER(S)<br>69460-MA-CF.1 |

12. DISTRIBUTION AVAILABILITY STATEMENT  
Approved for public release; distribution is unlimited.

13. SUPPLEMENTARY NOTES  
The views, opinions and/or findings contained in this report are those of the author(s) and should not be construed as an official Department of the Army position, policy or decision, unless so designated by other documentation.

14. ABSTRACT

15. SUBJECT TERMS

|                                 |                   |                    |                                  |                     |  |
|---------------------------------|-------------------|--------------------|----------------------------------|---------------------|--|
| 16. SECURITY CLASSIFICATION OF: |                   |                    | 17. LIMITATION OF ABSTRACT<br>UU | 15. NUMBER OF PAGES | 19a. NAME OF RESPONSIBLE PERSON<br>Shilpa Khatri |
| a. REPORT<br>UU                 | b. ABSTRACT<br>UU | c. THIS PAGE<br>UU |                                  |                     | 19b. TELEPHONE NUMBER<br>209-600-2840            |

**RPPR Final Report**  
as of 21-Jun-2018

Agency Code:

Proposal Number: 69460MACF

**Agreement Number: W911NF-16-1-0442**

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DUNS Number: 113645084

EIN: 943067788

**Report Date:** 14-Nov-2017

Date Received: 04-May-2018

**Final Report** for Period Beginning 01-Aug-2016 and Ending 14-Aug-2017

**Title:** Conference and Symposia Grants: Microscale Ocean Biophysics

**Begin Performance Period:** 01-Aug-2016

**End Performance Period:** 14-Aug-2017

**Report Term:** 0-Other

Submitted By: Shilpa Khatri

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**Distribution Statement:** 1-Approved for public release; distribution is unlimited.

**STEM Degrees:** 0

**STEM Participants:** 0

**Major Goals:** This Conference and Symposia Grant was to help support a scientific meeting, "Microscale Ocean Biophysics", held at The Inter-University Institute for Marine Sciences (IUI), in Eilat, Israel from October 30 to November 4, 2016.

The focus of the meeting was on the physics underlying the biological and ecological interactions among microscopic marine biota and the impact on larger scales within the ocean. The goals of the meeting included having approximately 80 interdisciplinary researchers who would have time for significant interactions during the week. Further, we aimed to encourage participation of graduate student and postdoctoral researchers.

All of these goals were completed and details are given in the 'Accomplished' section of this report.

**Accomplishments:** A pdf document is attached.

**Training Opportunities:** As stated in the accomplishments: The meeting was a success with many interactions between participants from different fields. Many of the participants were students and postdoctoral researchers and many of them gave talks and presented posters. Awards were given to the best student presenters and to the best student posters.

This was an opportunity for students and postdoctoral researchers to interact closely with senior researchers in the their field and get feedback on their work.

**Results Dissemination:** One of the goals of this series of meetings is to form interdisciplinary collaborations. We have already seen in the past this occurring and expect that even more collaborations will form as a result of conversations that occurred at this meeting at the IUI.

**Honors and Awards:** Nothing to Report

**Protocol Activity Status:**

**Technology Transfer:** Nothing to Report

**PARTICIPANTS:**

**RPPR Final Report**  
as of 21-Jun-2018

**Participant Type:** PD/PI  
**Participant:** Shilpa Khatri  
**Person Months Worked:** 1.00  
Project Contribution:  
International Collaboration:  
International Travel:  
National Academy Member: N  
Other Collaborators:

**Funding Support:**

**Participant Type:** Faculty  
**Participant:** Roi Holzman  
**Person Months Worked:** 1.00  
Project Contribution:  
International Collaboration:  
International Travel:  
National Academy Member: N  
Other Collaborators:

**Funding Support:**

**Participant Type:** Faculty  
**Participant:** Stuart Humphries  
**Person Months Worked:** 1.00  
Project Contribution:  
International Collaboration:  
International Travel:  
National Academy Member: N  
Other Collaborators:

**Funding Support:**

**Participant Type:** Faculty  
**Participant:** Thomas Kiorboe  
**Person Months Worked:** 1.00  
Project Contribution:  
International Collaboration:  
International Travel:  
National Academy Member: N  
Other Collaborators:

**Funding Support:**

**Participant Type:** Faculty  
**Participant:** Uri Shavit  
**Person Months Worked:** 1.00  
Project Contribution:  
International Collaboration:  
International Travel:  
National Academy Member: N  
Other Collaborators:

**Funding Support:**

**Participant Type:** Faculty  
**Participant:** Roman Stocker  
**Person Months Worked:** 1.00  
Project Contribution:  
International Collaboration:  
International Travel:  
National Academy Member: N  
Other Collaborators:

**Funding Support:**

**RPPR Final Report**  
as of 21-Jun-2018

**FINAL REPORT**  
**CONFERENCE AND SYMPOSIA GRANTS: Microscale Ocean Biophysics**  
**The Inter-University Institute for marine sciences (IUI), Eilat, Israel**  
**October 30, 2016 - November 4, 2016**

The focus of the Microscale Ocean Biophysics meeting was on the physics underlying the biological and ecological interactions among microscopic marine biota and the impact on larger scales within the ocean. The meeting was held between Oct 30 and Nov 4, 2016 at the Inter-University for Marine Sciences in Eilat, Israel. There were seventy-nine participants from interdisciplinary fields including oceanography, biology, physics, applied math, engineering, marine science, and environmental sciences. Thirty-four participants gave talks while numerous also brought posters to share during the poster sessions.

Topics covered during the meeting included the following:

- Propulsion at small scales
- Organism-generated flows
- Sensing, signaling, and chemical exchange
- Predator-prey interactions
- Plankton dynamics
- Particle
- Influence of small-scale turbulence on organism and substrate transport and distribution
- Diffusion of particles and encounters between particles
- Mass transport and filtration processes involved in filter feeding by marine organisms

Furthermore, there were hands-on sessions allowing participants to learn more about cutting-edge multiscale tools, including new theoretical, computational, and experimental techniques. A full schedule of the meeting is attached at the end of this summary.

The meeting was a success with many interactions between participants from different fields. Many of the participants were students and postdoctoral researchers and many of them gave talks and presented posters. Awards were given to the best student presenters and to the best student posters. We anticipate collaborations forming out of the interdisciplinary conversations that began at this meeting.

This grant was used to fund both invited speakers and junior scientists who attended the meeting.

## **MICROSCALE OCEAN BIOPHYSICS**

**Sunday Oct 30 – Friday Nov 4, 2016**

### **SUNDAY OCT 30**

|               |   |
|---------------|---|
| 12:00 - 17:00 | Registration at IUI<br>Dive-checks and arrangements at nearby dive club |
| 12:00 - 14:00 | Guided tours of the observatory (Group I)                               |
| 14:00 - 16:00 | Guided tours of the observatory (Group II)                              |
| 17:00         | Reception at IUI  |
| 19:00         | Dinner @ Orchid hotel   |

## MONDAY OCT 31

- 8:30 - 8:45 Welcome notes
- 8:45 – 9:45 Welcome session
- 8:45 **Uri Shavit, Roi Holzman** – establishing a (successful?) collaboration between a biologist and an engineer
- 9:00 Invited Introductory Lecture: **Amatzia Genin**: “Feeding in the flow: the tale of zooplanktivorous fish in the coral reef“
- 9:45 - 10:15 Coffee
- 10:15 - 11:40 Session I
- 10:15 Invited Lecture: **Kelly Sutherland**: “Small-scale physical worlds of gelatinous zooplankton: implications for feeding ecology”
- 11:00 **Kevin Du Clos**: “Functions of bivalve siphon tentacles”
- 11:20 Flash talks (5 min per talk, three consecutive talks followed by a short Q&A session)
- Julia Samson**: “Collective pulsing behavior in Xeniid corals: combining field, experimental, and computational data to study the effects of background flow on pulsing behavior and near-field velocities”
- Jeanette Wheeler**: “Reorientation and Swimming Stability in Sea Urchin Larvae”
- 12:00 Lunch @ IUI  
Time for diving and snorkeling
- 15:30 - 17:00 One slide self-introduction session
- 17:00 -18:45 Poster + hands on session
- 19:00 Dinner @ Orchid hotel

## TUESDAY NOV 1

- 8:30 - 10:00    Session II
- 8:30    Invited Lecture: **Tamar Lotan**: “Biological micro injection”
  - 9:15    **Lasse Tor Nielsen**: “Prey Capture at Low Reynolds Number”
  - 9:35    **Anna Skipper**: “Propulsion of the Water Flea”
- 10:00 -10:30    Coffee
- 10:30 - 12:00    Session III
- 10:30    Invited Talk: **Matt McHenry**: “Flow mediates predator-prey interactions in fishes”
  - 11:15    **Alexander Hoover**: “Turn the Bell Around: Modeling Neuromuscular Control of Jellyfish Turning”
  - 11:35    **Laura Miller**: “Hydrodynamics of long distance transport of zooplankton by draglines
- 12:00            Lunch @ IUI  
                    Time for diving and snorkeling
- 16:00 - 17:00    Beauty and Diversity of Plankton and the Tara oceans expedition- **Christian Sardet**
- 17:20            1<sup>st</sup> group departs for night activity
- 20:20            2<sup>nd</sup> group departs for night activity
- Dinner @ Orchid after/before the night activity, according to group

## WEDNESDAY NOV 2

8:30 - 10:00 Session IV

8:30 Invited Lecture: **Knut Drescher**: "Biophysics of Biofilms"

9:15 **Idan Tuval**: "How Microalgae Scatter off Solid Surfaces?"

9:35 **Gitai Yahel**: "Teflon bacteria: The most abundant bacterium in the ocean evades predation by slipping through mucous nets"

10:00 - 10:30 Coffee

10:30 - 12:00 Session V

10:30 **Jim Mitchell**: "How diatom nanostructure selects nutrients"

10:50 **Aaron True**: Hydrodynamics of Inhalant-Exhalant Flows

11:10 **Jules Jaffe**: "What 50 million underwater microscope images tell us about organism-organism interactions"

12:00 Lunch @ IUI

13:00 Desert hike

17:00 - 18:45 Night diving/snorkeling

18:00 Public lecture in Hebrew: Lee Karp-Boss (@ lecture hall)

19:00 Dinner @ Orchid hotel

## THURSDAY NOV 3

8:30 - 10:00 Session VI

8:30 Invited Lecture: **Georg Pohnert**: “Exploration of chemical signals from microalgae that structure the marine environment”

9:15 **Francesco Carrara**: “Up or down ? A turbulence induced diversification of phytoplankton migration strategies.”

9:35 **Guido Boffetta**: “Turbulence and phytoplankton motility interactions

10:00 - 10:30 Coffee

10:30 - 12:00 Session VII

10:30 Invited Lecture: **Tom Fenchel**: “Microbial Motile Sensory Behavior”

11:15 **Fouad El Baidouri**: “Decoupling of shape and motility allows evolutionary flexibility in a large group of bacteria”

11:35 Flash Talks (5 min per talk, three consecutive talks followed by a short Q&A session)

**Cherry Gao**: “Real-time visualization of a metabolic switch in a marine bacterium”

**Jen Nguyen**: “The consequences of nutrient fluctuations on bacterial growth”

**Michalec François-Gaël**: “Hydromechanical perception and swimming behavior of calanoid copepods in a turbulent environment”

12:00 Lunch @ IUI

Time for snorkeling (avoid diving if you fly on Friday!)

13:00 IUI seminar (@ lecture hall, everyone is welcome): **Thomas Kiørboe**

16:00 - 17:00

16:00 **Yuval Jacobi**: “True sieving at the sub-micron scale”

16:20 **Karen Grace Bondoc**: “Comparative motility patterns of a biofilm-forming diatom across its life cycle”

17:00 – 17:45 Beer on the pier

17:45 – 19:15 Poster + hands on session

19:30 Dinner @ Orchid hotel

## FRIDAY NOV 4

8:30 - 10:00 Session VIII

8:30 Invited Lecture: **Justin Seymour**: “Swimming in the Sea: The occurrence and significance of motile behaviour among planktonic marine microbes”

9:15 **Òscar Guadayol**: “Experimental comparison of the chemotactic performance of two contrasting motility patterns in Escherichia coli”

9:35 Flash Talks (5 min per talk, three consecutive talks followed by a short Q&A session)

**Julia Dölger**: “Feeding and Swimming in Biflagellate Haptophytes”

**Yoav Lindman**: “Zooplankton distribution in a deeply mixed water column”

**Shai Asher**: “Vertical variations of coral reef drag forces”

10:00 - 10:30 Coffee

10:30 - 11:30 Awards, group discussion and planning of the next meeting