



THE BURGERS PROGRAM FOR FLUID DYNAMICS
SEVENTEENTH ANNUAL BURGERS SYMPOSIUM
BURGERS LECTURE

THAT SINKING FEELING: GRAVITY AND ITS ROLE IN HOW LIFE NAVIGATES THE OCEANS



Friday, November 13, 2020 | 11am EST
Zoom link: <https://umd.zoom.us/j/99020054612>
Meeting ID: 990 2005 4612

Burgers Lecturer

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ABSTRACT

Marine plankton exhibit a Diel Vertical Migration with vertical displacement scales from several tens to hundreds of meters. Even at the scale of small phytoplankton and zooplankton (100 μm to a few mm) the interaction of this vertical swimming behavior with hydrodynamics affects large scale distribution of populations in the ocean and is thus an important component of understanding ocean ecology. However, concurrently observing organismal physiology and behavior is challenging due to the vast separation of scales involved. Resolving physiological processes involves sub-cellular (micron) resolution while tracking freely swimming organisms implies vertical displacements of several meters. We present a simple solution to this problem in the form of a “hydrodynamic treadmill” incorporated into a table-top scale-free vertical tracking microscope [1]. We use this method to study the behavior of freely swimming marine plankton, both in lab and on-board a research vessel, revealing a rich space of dynamic behavioral states in marine micro-organism. Time permitting, I will also share our efforts in bringing oceanography to “seatizens” around the world by democratizing tools for science accessible to sailors across the world [2].

<https://gravitymachine.org>, <https://www.planktonscope.org>

1. Krishnamurthy, D., Li, H., Benoit du Rey, F. et al. Scale-free vertical tracking microscopy. *Nat Methods* (2020). <https://doi.org/10.1038/s41592-020-0924-7>
2. PlanktonScope: Affordable modular imaging platform for citizen oceanography
Thibaut Pollina, Adam G. Larson, Fabien Lombard, Hongquan Li, Sebastien Colin, Colomaban de Vargas, Manu Prakash
<https://doi.org/10.1101/2020.04.23.056978>

BIO

Manu Prakash is a physical biologist applying his expertise in soft-matter physics to illuminate often easy to observe but hard to explain phenomena in biological and physical contexts and to invent solutions to difficult problems in global health, science education, and ecological surveillance. His many lines of research are driven by curiosity about the diversity of life forms on our planet and how they work, empathy for problems in resource-poor settings, and a deep interest in democratizing the experience and joy of science globally.

Prakash received a B.Tech. (2002) from the Indian Institute of Technology Kanpur and a Ph.D. (2008) from the Massachusetts Institute of Technology. He was a junior fellow of the Harvard Society of Fellows (2008–2011) prior to joining the faculty of Stanford University, where he is currently an Associate Professor in the Department of Bioengineering, a member of the Biophysics Program in the School of Medicine and the Center for Innovation in Global Health, Faculty Fellow of Stanford ChEM-H, and a senior fellow of the Woods Institute for the Environment. Prakash was recipient of 2016 MacArthur fellowship.



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