

Newsletter

Spring 2021

The Leon H. Charney School of Marine Sciences

GREETINGS FROM HEAD OF SCHOOL



As we go into press, Israel is still under heavy rocket attacks from Gaza that are compounded by Jewish and Arab

extremists trying to unweave the ties and networks of coexistence of the different populations within the country. The immediate and long-term dangers of this conflict are in direct contrast to the wishes of security, economic prosperity, and peace that people on both sides yearn for. It requires courage to explore new paths of discourse, to build trust and find solutions so that PEACE is ensured for the next generations.

I believe that as environmental scientists we have an important role in forging new paths of discourse,

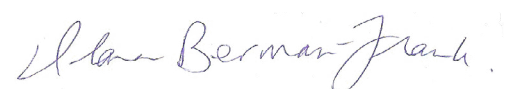
building bridges, and closing gaps by reaching out to our neighbors across all sectors. We need to work together across political, national, and religious divides to address the fundamental issues of food and water security, climate change, and a healthy and sustaining environment for the growing human population of this planet. The marine environment especially does not conform to political borders. Environmental threats to the coastal and marine ecosystems (including oil-spills, industrial and agricultural discharges, shipping, plastic pollution, and war-zone impacts) affect all inhabitants bordering our shared Mediterranean and Red Seas and more widely the global ocean.

To fight the deteriorating health of the marine systems we, as marine scientists, need to work hard together to educate and inform, to promote sustaining and sustainable industries and

practices, to influence regulation and policies; and to encourage conservation and restoration. For this goal, I urge us all to reach out and form new ties and collaborations, breaking down the walls to find the common ground between individuals and communities on national, and international scales, so that we can continue to enjoy the life-sustaining oceans surrounding us.

An excellent example for breaking barriers is the upcoming 8th Haifa Conference on Mediterranean Sea Research (July 14th-15th, 2021) chaired by Drs. Daniel Sher and Michael Lazar from the Leon H. Charney School of Marine Sciences: Deep Dive – accessing the sea with Science, Education and Art (SEA). Please see details at the end of the newsletter.

WISHING AN END TO THE
VIOLENCE AND PEACE FOR
ALL.



NEWS FROM DEPARTMENT HEADS

The Department of Maritime Civilizations

Prof. Ruth Shahack- Gross

Spring 2021 brings hopes for some 'back to normal' after a challenging year under Covid-19. The Fall semester started with teaching over Zoom and wrapping up of the Coastal and Underwater Excavation Field School which was delayed due to the second lockdown at the country. The field school was a great success working both at the submerged Neolithic settlement of Habonim North led by Prof. A. Yasur-Landau and Ph.D. student R. Nickelsberg (see image), and at the coastal Early Bronze Age site of Dor South led by Prof. R. Shahack-Gross and

Ph.D. student Isaac Ogloblin. Students learned how to excavate in both environments, record and collect finds, and both excavations ended up with important research insights.

At the end of the Fall semester, after release of the third lockdown, the department was able to carry out field-based courses, including "Working methods at sea" led by Dr. D. Cvikel, "Advanced field methods" led by Dr. E. Nantet, and the coastal part of the 2021 excavation field school. The underwater part was unfortunately halted due to the severe tar pollution that still exists along the Israeli coast. The students look forward to completion of this part of the field school as well as to having the last



Underwater documentation at the submerged Neolithic site of Habonim North, November 2020. Photo: Amir Yurman, Recanati Institute for Maritime Studies.

field-based course "Research cruise" led by Prof. D. Angel. Lastly, the department acknowledges the many new publications authored by its faculty members and students that appear routinely in respected international and national venues, the fruits of continued research despite the challenging conditions over the last year.

Dr. Moses Strauss Department of Marine Geosciences

Dr. Beverly Goodman-
Tchernov

Students and faculty in the Moses Strauss Department of Marine Geosciences haven't wasted any time this semester finding opportunities to get back into the field. Two field courses took place, 'Mediterranean to Tethys' (Dr. Nicolas Waldmann) and 'Red Sea Marine Sedimentology'

(Dr. Goodman Tchernov), each sending students back to the sea. Med to Tethys was run in collaboration and partnership with Department of Israel Studies (Dr. Nurit Stoober) and Red Sea Mar Sediments with the Interuniversity Institute-Eilat and IOLR (Dr. Timor Katz). Dr. Michael Lazar made waves in international media as part of the team reporting a prehistoric 'megatsunami' found near Dor beach, Israel (PLOSone, Shteinberg et al. 2021), as well as work showing strides in Geophysical work

to identify human impacts in ancient environments (Geoarchaeology, Lazar et al. 2021). Ancient volcanic atolls located right here in Israel along the Mt. Carmel were described by postdoctoral researcher Dr. Or Bialik, who is currently a Marie Curie research fellow at the University of Malta (Sedimentary Geology, Bialik et al. 2021). Plans in the upcoming months, as we return to a new normal, include our annual educational cruise that will bring students to the deeper

parts of Israeli Mediterranean waters to learn new skills and apply theoretical training in geophysical mapping, sediment collections, and expedition planning.



(a) Dr. Nicolas Waldmann teaching on the field during the Tethys to Mediterranean field trip. Photo: Nurit Shtober. (b) students during the Red Sea Marine Sedimentology course in Eilat.

The Department of Marine Biology

Prof. Tamar Lotan

I am very pleased to report that we have started the academic year almost as usual, albeit still under the regulations and challenges of the COVID-19 pandemic. Despite the restrictions, we managed to go for research trips at sea and to continue our projects in the

labs. Currently, our department seminars are still being held via Zoom. However, we are already organizing our next Get Together, a real face-to-face meeting (!) that will be held in June. The lockdowns and harsh restrictions did not affect our productivity, judging by more than 20 papers that were published since January 2021. Additionally, congratulations to the 9 PhD and MSc students who completed their theses during the winter semester. Our faculty were also involved in the campaign to prevent the renewal of the EAPC pipeline activity and the conversion of Eilat and Ashkelon ports to petroleum ports. Sadly, only a few weeks later, we all witnessed the dire consequences of an oil spill. Following the February oil and tar contamination, our students and faculty members joined forces with the marine community in Israel and went on several cruises together to collect samples for analysis. This tragic event reminded us how fragile and vulnerable our marine ecosystem is; but, at the same time, it also demonstrated the strength of our marine scientific community when we join hands and collaborate. Finally, I would like to congratulate Dr. Tal Luzzatto-Knaan for receiving the prestigious VATAT grant to establish a center for Metabolomics and Natural Products; Prof. Dani Tchernov

for winning the outstanding TED Audacious grant for Project CETI (Cetacean Translation Initiative) to study the communication of sperm whales; and Prof. Ilana Berman-Frank for successfully leading the first German-Israeli Helmholtz International Laboratory for studying the East Mediterranean Sea.

The Hatter Department of Marine Technologies

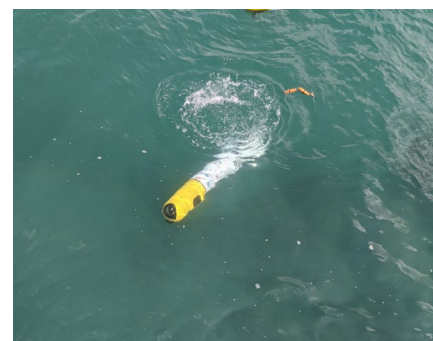
Prof. Morel Groper

Despite the Covid-19 and our limited ability to work in our laboratories, novel researches and new technological projects were promoted in the department. The fruitful collaboration between the SubSea Engineering lab headed by Morel Groper and the VISEAON Marine Imaging lab headed by Tali Treibitz introduced another novel development for the ALICE AUV, this time a new payload combining a forward looking sonar fused with a forward looking camera for enhancing close range visual surveys and reliable obstacle avoidance in complicated scenes. Following a long research and development phase, lead by Ph.D. student Yevgeny Gutnik, the novel concept recently began sea experiments (attached picture) with promising results. In parallel the VISEAON Marine Imaging lab started the

European consortium project DeeperSense and continues the development of the blueROV, a small remotely controlled underwater vehicle that will be used as an affordable and comfortable platform for testing new algorithms developed in the lab. The paper “A real-time speed modulation system to improve operational ability of autonomous planing crafts in a seaway” by our Ph.D. student Allaka Himabindu and M.Sc student Deborah Levy have been awarded by The Royal Institution of Naval Architects (RINA) the institution’s medal. The Underwater Acoustics and Navigation lab (ANL), headed by Roe Diamant began 3 new projects in the last 6 month; “Cyber security for underwater acoustic communications”

funded by NATO science for peace, "Controlling a submerged vehicle from the International Space station" funded by the Ramon foundation and the very interesting project "Impacts of shipping underwater radiated noise on the behavior of aquatic animals". Also in this last 6 months, 3 journal papers of researches in the ANL were published. The new Autonomous Navigation and Sensor Fusion Lab (ANSFL) headed by Itzik Klein official opened in December 2020 and is already in full capacity with a significant large team of master and doctorate students. The main research topic at ANSFL is deep learning based aided inertial navigation system. Also, during this period the underwater vehicles

lab invested a tremendous effort to better absorb and overcome design problems of our large underwater platforms the “SNAPIR” AUV and “YONA” ROV. These efforts were effective and very successful, recently both vehicles accomplished successful scientific missions and are ready for additional adventures.



AUV ALICE at sea towing a surface buoy for wide band communication in the development process. Photo: Aviad Avni and Yevgeni Gutnik.

OUR ALUMNI

Dr. Amikam Bar-Gil
Co-founder and CTO, Yemoja Ltd.
PhD, Marine Biology Department



I'm the chief technology officer and one of the founders of

Yemoja, which grows micro-algae to supply ingredients for cosmetics, nutraceuticals, and in the future, even for pharmaceuticals. My studies gave me the tools I need to be a scientist. The department's openness to new methods and instrumentation, one of its greatest strengths, broadens your horizons and opens your mind to the use of new technologies in the marine sciences. My personal experience in the department was no less than perfect. Starting with my advisor who gave me all the

tools I needed to become an independent researcher and scientist; to the lab manager, who assisted in every possible way and was open to all of my “crazy” ideas; to the department researchers whose doors' were always open for advice; to their labs and lab managers, who were always willing to lend a hand. The administrative staff was efficient, fast, and always welcoming and did their best to help with bureaucratic procedures. For me, the department was and still is a family.

NICE TO MEET

Welcoming our new Zuckerman postdoctoral scholar

We are happy to welcome to CSMS our new Post-doctoral scholar from the Zuckerman STEM leadership program that “supports future generations of leaders in science, technology, engineering, and math in the United States and Israel”. We wish Dr. Silas Dean a productive and happy time in our School and hope that his experience will be a positive and enriching one.

Dr. Silas Dean

Host- Dr. Nicolas Waldmann
The Basin Analysis and Petrophysical Lab (PetroLab)
Department of Marine Geosciences



Silas Dean is doing postdoctoral research at the Department of Marine Geosciences concerning palaeolacustrine environment at Erk el-Ahmar in the Pliocene-Pleistocene. His other research interests include sea-level change, paleoenvironmental impacts on humans,

underwater archaeology, and coastal dynamics. He is from the USA but earned his PhD at the University of Pisa Department of Earth Sciences. This is his second time here, because he took his MA from the Department of Maritime Civilizations. He is happy to be back in Haifa.

Dr. Aviad Scheinin

Top Predator project manager

The Morris Kahn Marine Research Station



"After studying for an M.Sc. in marine ecology at Tel Aviv University and conducting preliminary research on the coastal dolphin population in Israel, I found the home for dolphin research that I was searching for at the University of Haifa's Maritime Civilizations Department. The freedom and opportunity that I was granted to study the relationship between dolphins and trawler fishing helped me reach some significant accomplishments. In recent years, in light of my research, we successfully promoted an official announcement

by the International Union for Conservation of Nature (IUCN) recognizing the Israeli Mediterranean shoreline as vital to the survival of the coastal dolphin population in Israel.

Since 2015, I have found a new home and research that interests me at the Morris Kahn Marine Research Station, part of the Leon H. Charney School of Marine Sciences. I was truly privileged to be part of the team that established the research station, where I lead the Top Predator project. As part of the Marine Research Station, I set up a southern station for the study of top predators at the Ashdod Sailing Center. In 2016, I established the Dolphin and Sea Center, an educational museum designed to inform the general public, and in particular Israeli school children — from kindergartners through high schoolers — about the wonders of the Mediterranean Sea from the dolphin's perspective. The center operates under the auspices of the Delphis organization"

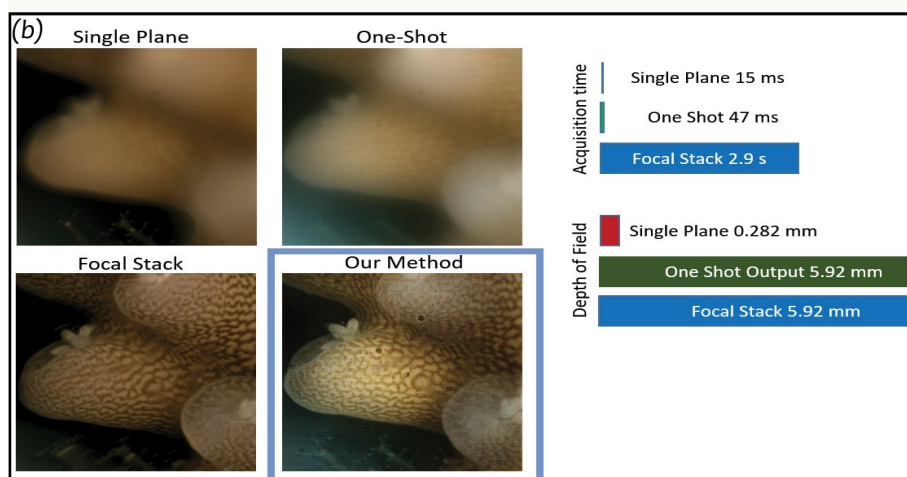
RESEARCH HIGHLIGHTS

Computationally Extended Depth of Field for Microscopy On-the-Go

Judith Fischer, Aviad Avni, Tali Treibitz

Underwater microscopy assists exploring small scale organisms in their natural environment. However, a large magnification is necessary to resolve small details, which in turn results in the problem of having a small depth-of-field (DOF). In stationary microscopy, this is commonly solved by focal stacking. A focal stack is a sequence of images taken at different depth layers in the scene. This requires a static scene throughout the whole acquisition time which can take seconds. Thus, it is not suitable for scenarios where the objects or the microscope is moving. Therefore, we propose a computational approach which is inspired by classic focal stacking but

adapted for fast imaging. This is achieved by scanning over the organism in the same way as in focal stacking while keeping the camera shutter open. In this way, information from the focus layers of the object is saved in one image. The one-shot image is blurry as it contains many superimposed focal planes. In this research, we are using a deep neural network that enables a more flexible setup and a larger DOF to deblur. We are able to increase the DOF over 44 times with only a small increase in time.



(a) In-situ experiment with the underwater microscope in Eilat. (Photo: Aviad Avni)
(b) Comparison between our method, a single focal plane and a focal stack. (Photo: Judith Fischer)

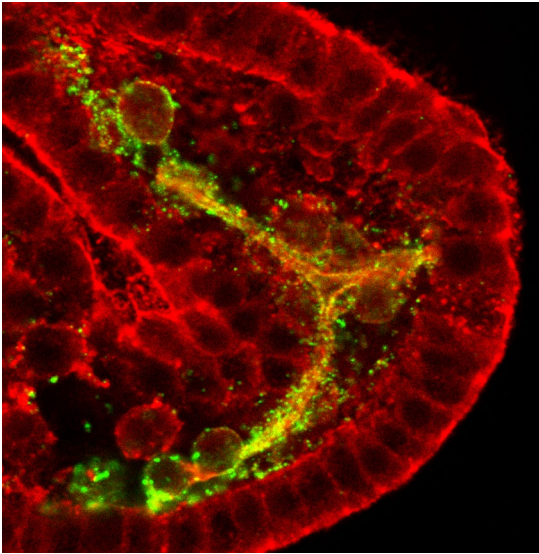
Calcium-vesicles perform active diffusion in the sea urchin embryo during larval biomineralization

Mark R. Winter, Miri Morgulis, Tsvia Gildor, Andrew R. Cohen and Smadar Ben-Tabou de-Leon

From the silica cell-walls of diatoms through the corals that build the reefs to the human bones, organisms across the five kingdoms of life use minerals to form shells and skeletons that provide them with physical support and protection.

In this process, called biomineralization, cells control the mineral shape and properties in ways far beyond modern human technology. In all the studied biomineralization systems, the mineral is carried inside vesicles to the biomineralization site, but how this motion is regulated by the cells was unknown.

In a recent paper, from [Prof. Smadar Ben-tabou De-leon lab](#), the researchers used 3D live imaging to study the motion of the calcium bearing vesicles in the cells of live sea urchin embryos during skeletogenesis. The cutting edge image analysis developed and applied by the Zuckerman STEM Leadership Program fellow, Dr. Mark Winter, revealed that the vesicle motion is not



The calcite skeleton of the sea urchin embryo is made by the skeletogenic cells (green – skeletogenic marker) and coated in actin filaments (marked in red) Photo: Tzvia Gildor.

directed to the biomierazliation site, but instead they perform a diffusion motion that is defined by the cytoskeleton actomyosin network. This is a striking demonstration of the strength of live-imaging and advanced image analysis algorithms to decipher the subcellular dynamics of biological entities and reveal their physical properties. The paper received warm recommendation by the Biology Prelight [website](#).

Evolutionary conserved neural singaling between human and sea anemone

Shani Levy, Vera Brekhman, Anna Bakhman, Assaf Malik, Arnau Sebé-Pedrós, Mickey Kosloff and Tamar Lotan

A collaborative study by Prof. [Tamar Lotan](#) and Dr. Shani

Levy from our Marine Biology Department, and Dr. Mickey Kosloff (Department of Human Biology) has discovered surprising evolutionary similarities in the functioning of the human nervous system and that of the sea anemone. The exciting results were published in [Nature Ecology and Evolution](#).

The researchers found that the inhibitory neurotransmitter GABA, which inhibits neuronal differentiation

and stem proliferation in the mammalian brain, follows a similar regulatory process in the sea anemone *Nematostella vectensis*. GABA activity is mediated by receptors called GABA_B. Sea anemones like all cnidarians (jellyfish, corals, and hydra) have a much simpler nervous system, and despite an evolutionary gap of 700 million years, we revealed that the active site of these GABA_B receptors is conserve between mammals and the sea anemone. Cnidarians life cycle begins with a fertilized egg that develops into a swimming larva that metamorphoses into a polyp that settles on the seabed. We set out to discover what controls the larva-to-polyp metamorphosis in the sea anemone. We discover that metamorphosis is regulated by

the GABA_B receptor and using a drug that was developed to target human GABA_B receptors we could reversibly halt the process. We further showed that the signal transduction cascade that was characterize in mammals is evolutionary conserved and is found in *Nematostella*, an organism without a central brain as in mammals. Moreover, we showed that activation of this signaling cascade inhibits the expression of genes that are related to neuronal differentiation in *Nematostella*. Our results reveal a tight connection between the nervous system and metamorphosis and open new evolutionary and ecological avenues for research, as well as new opportunities for pharmaceutical discoveries – where the sea anemone can be a simple yet accessible model organism for testing new drugs.



Nematostella in mud. Photo: Shani Levy.

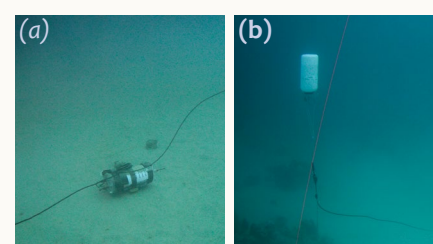
School of Marine Sciences Launches Novel Project to Explore the Damaging Effects of Noise Pollution on Marine Wildlife

Roe Diamant, Aviad Sheinin

Underwater sound plays an important role in the various critical life functions of aquatic animals. Research showed that aquatic animals are sensitive, responsive and vulnerable to shipping underwater radiated noise (URN), and that the increase of shipping activities and nautical tourism in our seas have dire implications on the health of marine bio-fauna. The potential effects of noise pollution from shipping URN on aquatic animals varies and depends on the noise source level, distance from the source, temporal pattern, spectrum and noise exposure

duration. Considering these risks, legislation authorities have made efforts to mitigate shipping URN. An important, knowledge gap in these standards is how shipping URN impacts marine animals, and the current limitation are only geared to physical damage, neglecting behavior changes. A new project led by Dr. Roe Diamant (Dep. of Marine Technologies) and Dr. Aviad Scheinin (Dep. of Marine Biology) aims to quantify the impacts of shipping URN as a widespread and long-term disturbance to the behavioral of Bottlenose dolphin (*Tursiops truncatus*) and Common Dolphin (*Delphinus delphis*). the researchers will study how features in the dolphins' whistles change when a ship is present. In March 2021, a self-made acoustic device

was installed near a beach in Eilat known to be visited by dolphins. The device will continuously record for two months and the recordings will be offline analyzed to measure the soundwaves of passing vessels and dolphins in tandem. Should this experiment yield interesting results, they hope to conduct the same methodology across several other locations in the Mediterranean Sea.



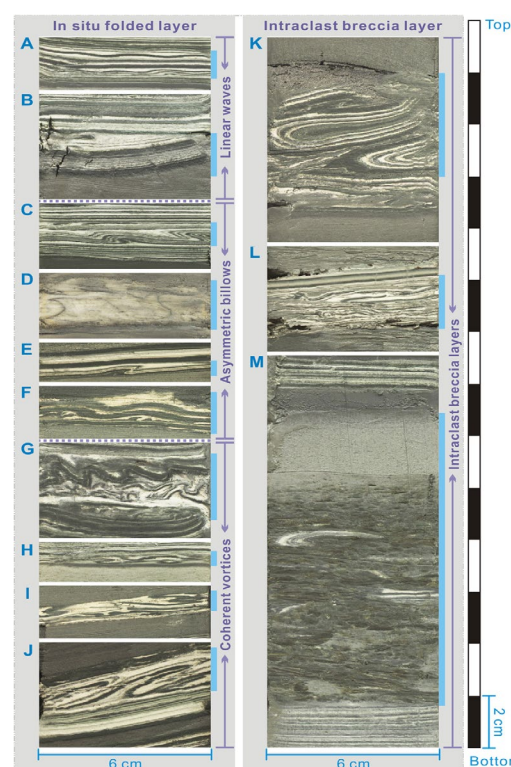
(a) and (b) Photographs of the recording units at the deployment site. Equipment was self-designed and implemented at the underwater acoustic and navigation laboratory. Photo: Hagai Nativ, The Morris Kahn Marine Research Station.

Researchers from the Department of Marine Geosciences coauthor a paper in Science Advances with the discovery of 220,000 years of seismic activity in the Dead Sea

Nicolas Waldmann, Yin Lu, Shmulik Marco, Glen Biasi, Amotz Agnon and Nadav Wetzler

A study reviewing 220,000 years of Dead Sea geology predicts the occurrence of a major seismic event to hit the region in the next few decades. According to research data uncovered from the Dead Sea seabed, 7.5-magnitude tremors

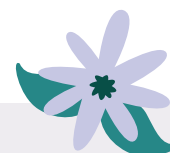
hit the Dead Sea every 1,300-1,400 years – instead of every 10,000 years as previously believed. Since the last quake of such magnitude hit the area in the year 1,033 C.E., we are currently living in a tectonically active period. [Dr. Nicolas Waldmann](#) (Dr. Moses Strauss Department of Marine Geosciences), who specializes in sedimentology and seismic stratigraphy analysis, is a co-author of the study, which appeared in [Science Advances](#). Read more in Ynet.



Sections of the core retrieved by the ICDP from the deep part of the Dead Sea showing faulted, distorted, convoluted and mixed alternation of laminae packages, which resulted from past seismic events.

CONGRATULATIONS

Congratulations to our faculty for newly funded grants



Principal investigators	Project name
D. Sher	Identifying anthropogenic pollutants in the Eastern Mediterranean Sea (EMS) using natural bacterial communities as biosensors
D. Sher	An oceanic triangle: how do the interactions between Prochlorococcus, heterotrophic bacteria and phage affect the cells molecular structure, elemental stoichiometry and nitrogen budget?
T. Luzzatto Knaan, D. Tchernov, T. Lotan	Interdisciplinary Unit for Metabolomics and Natural Products
R. Diamant	Cyber Security for Underwater Acoustic Communications
Y. Makovsky	Pressurized sampling of seafloor gas seeps in the Levant Basin
I. Berman-Frank	The Eastern Mediterranean Sea centre- An Early Warning model system for our Future Ocean, partnered with GEOMAR Helmholtz center for Ocean research Kiel
D. Tchernov	The Eastern Mediterranean Sea Basin: A Sea of Opportunities Facing Global Change

Congratulations on faculty promotions

Tamar Lotan - Associate Professor

Gil Rilov - Associate Professor

UPCOMING EVENTS

Deep Dive – accessing the sea with Science, Education and Art (SEA)

8th Haifa Conference on Mediterranean Sea Research – July 14th-15th, 2021

The seas and oceans cover 70% of the planet and are critical resources for humanity. Responsibly harnessing the seas and oceans while conserving them for future generations requires a deep understanding of the oceans and, potentially, necessitates major changes in how we

bond between people and the sea? What is the role of maritime education and outreach? Do we need to forge



an emotional bond (“a love for the sea”), and what are the roles of scientists, artists and educators in forging this bond? How can we engage

different communities, creatively overcoming cultural, technological and financial barriers?

On July 14-15, 2021, the SEA conference will take place at the University of Haifa, along the Israeli coasts and remotely (online). SEA will focus on the many ways in which the worlds of science, education and art can come together with respect to the seas and oceans

The organizing committee: Michael Lazar, Maayan Tsadka, Daniel Sher and Naama Charit-Yaari.