Category winner

Jessica Kendall-Bar

Category: Ecology and Environment

Essay title: *Lessons from sleep in the deep: Records of seal sleep at sea reveal extreme sleep duration flexibility*

Biography

Dr. Jessica Kendall-Bar is a Schmidt AI in Science Postdoctoral Fellow at Scripps Institution of Oceanography, UC San Diego originally from San Francisco, California, USA. Her research combines engineering, data science, ecology, and visualization to measure behavior and physiology of marine animals amidst a changing climate.

For her dissertation, she developed a non-invasive system to record and visualize the first recordings of marine mammal sleep at sea published in Science. She is an award-winning scientist, artist, and science communicator who designs data visualization courses, large-scale exhibits, immersive analytical tools, and decision support tools. Her data visualizations, published in local news outlets, The New York Times and The Atlantic, have informed international policy in domains ranging from marine mammal conservation to coral reef restoration.

Abstract

The extreme sleep adaptations of marine animals can reveal clues to sleep's function, plasticity, and pathology. For my PhD, I designed a new submersible system for electroencephalogram (EEG) recordings of wild northern elephant seals, Mirounga angustirostris. Unlike fur seals and dolphins that sleep unihemispherically, seals sleep bilaterally during deep dives (100-400 m), spiraling downward upon entering REM-associated sleep paralysis.

Using this biomechanical signature of sleep, I wrote an algorithm to estimate sleep from 334 time-depth records, creating a range-wide "sleepscape". Across seasons, seals transitioned from sleeping 10 h per day on land to 2 h per day for up to 295 days at sea. This unparalleled sleep duration flexibility challenges assumptions of baseline mammalian sleep requirements with implications for understanding sleep deprivation.