

# ROSENSTIEL AIRCRAFT CENTER FOR EARTH STUDIES

UNOLS SCOAR MEETING 2022  
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VETLESEN PROFESSOR OF EARTH SCIENCES  
DIRECTOR, AIRCRAFT CENTER FOR EARTH STUDIES





SENSOR PROGRAM - IN-SITU  
& REMOTE SENSING TECH

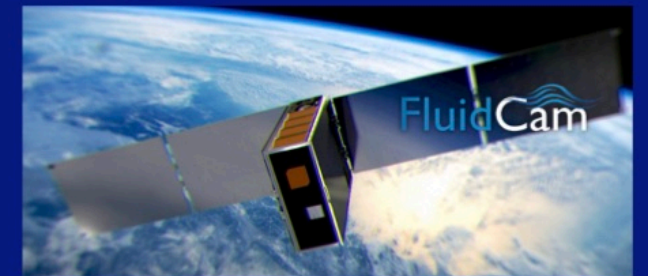
FluidCam 

MiDAR 

AERONAUTICS PROGRAM -  
DRONES, HOP, SOLAR DRONE



CUBESAT PROGRAM -  
PATH TO SPACE

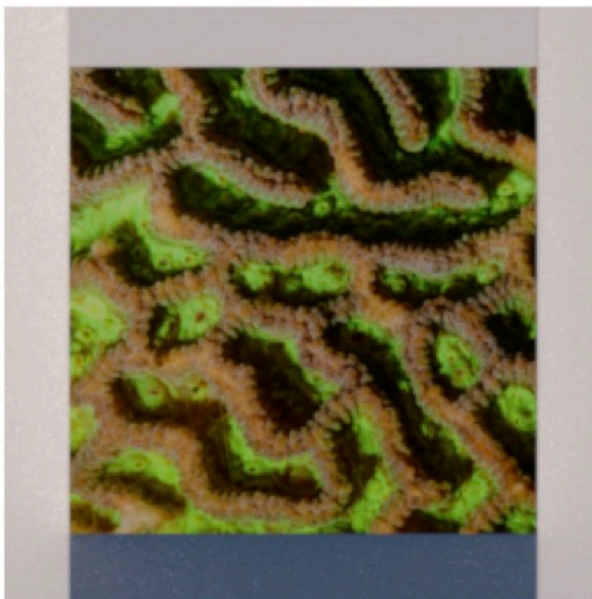


AI & HIGH-PERFORMANCE COMPUTING

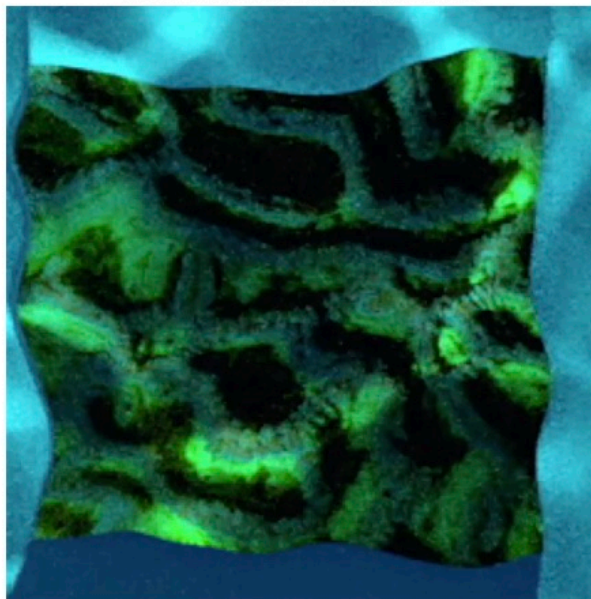


## 2D Fluid Lensing, Coral Test Target, Depth = 4.5m, MSL

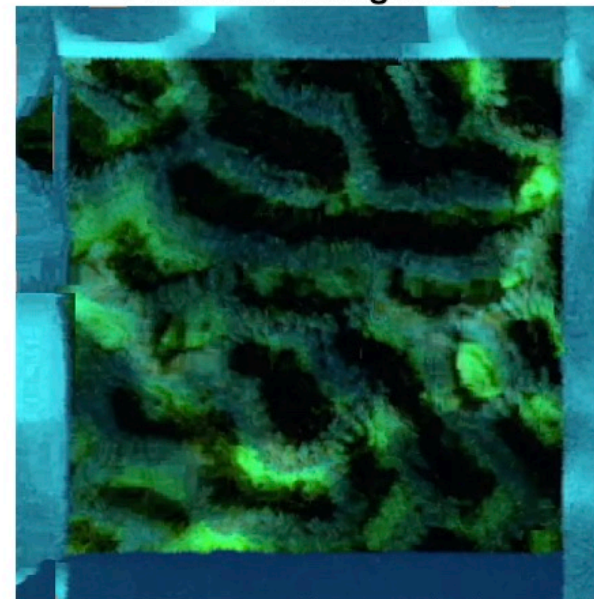
No Fluid



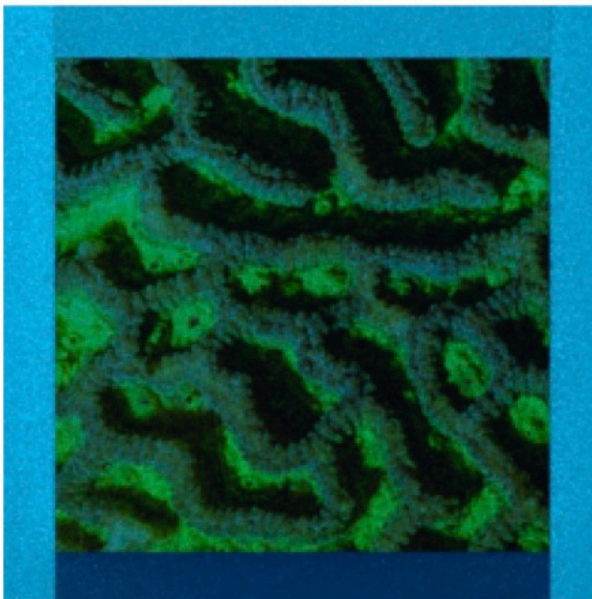
Raw Distorted Frames



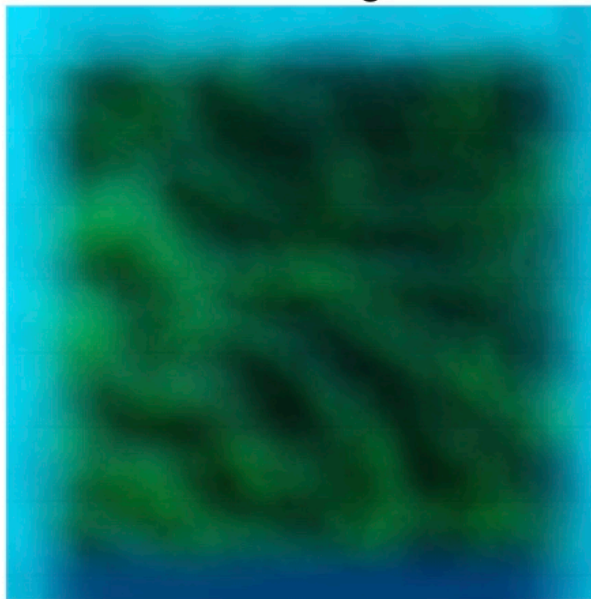
2D Fluid Lensing Results



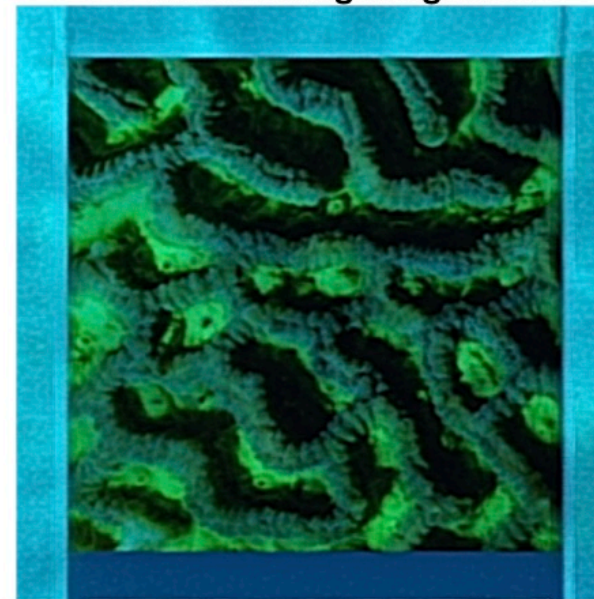
Flat Fluid



Mean Image



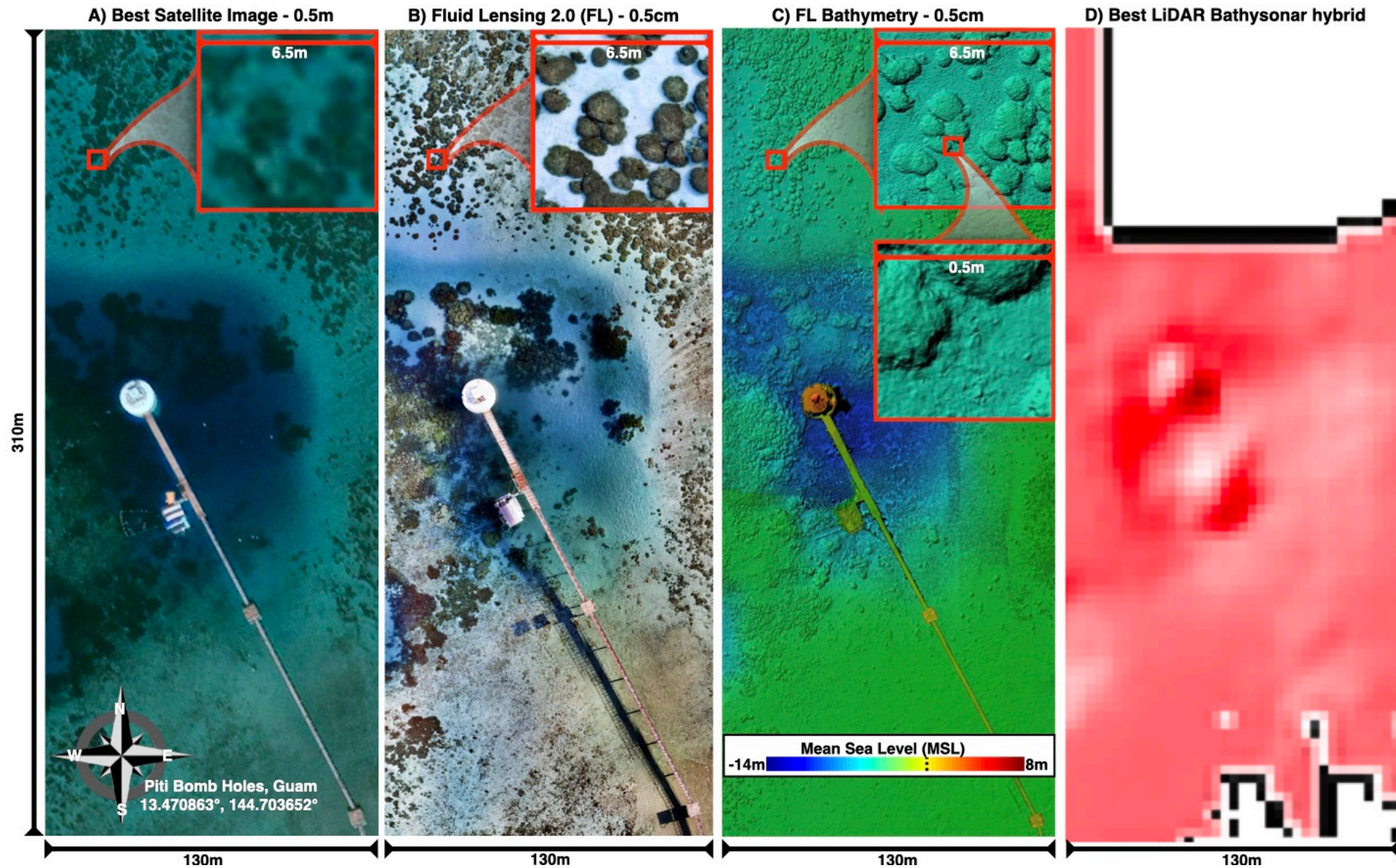
2D Fluid Lensing Integration

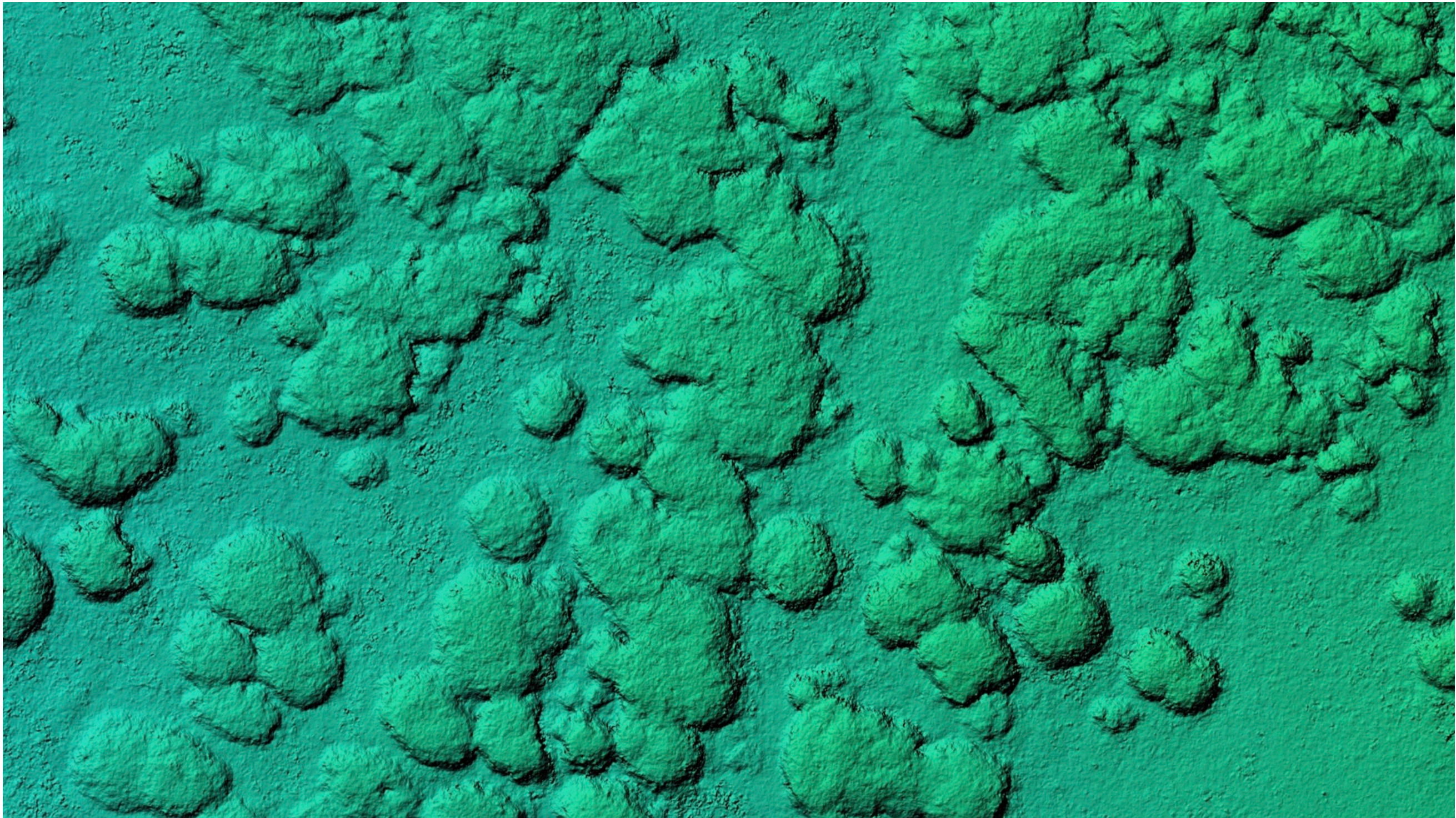




NEW FLUID LENSING 2.0 BREAKTHROUGH @ 45FT DEPTH IN GUAM (2021)

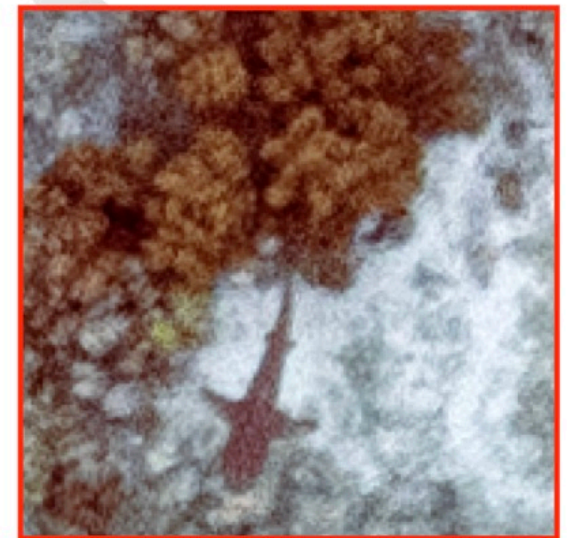
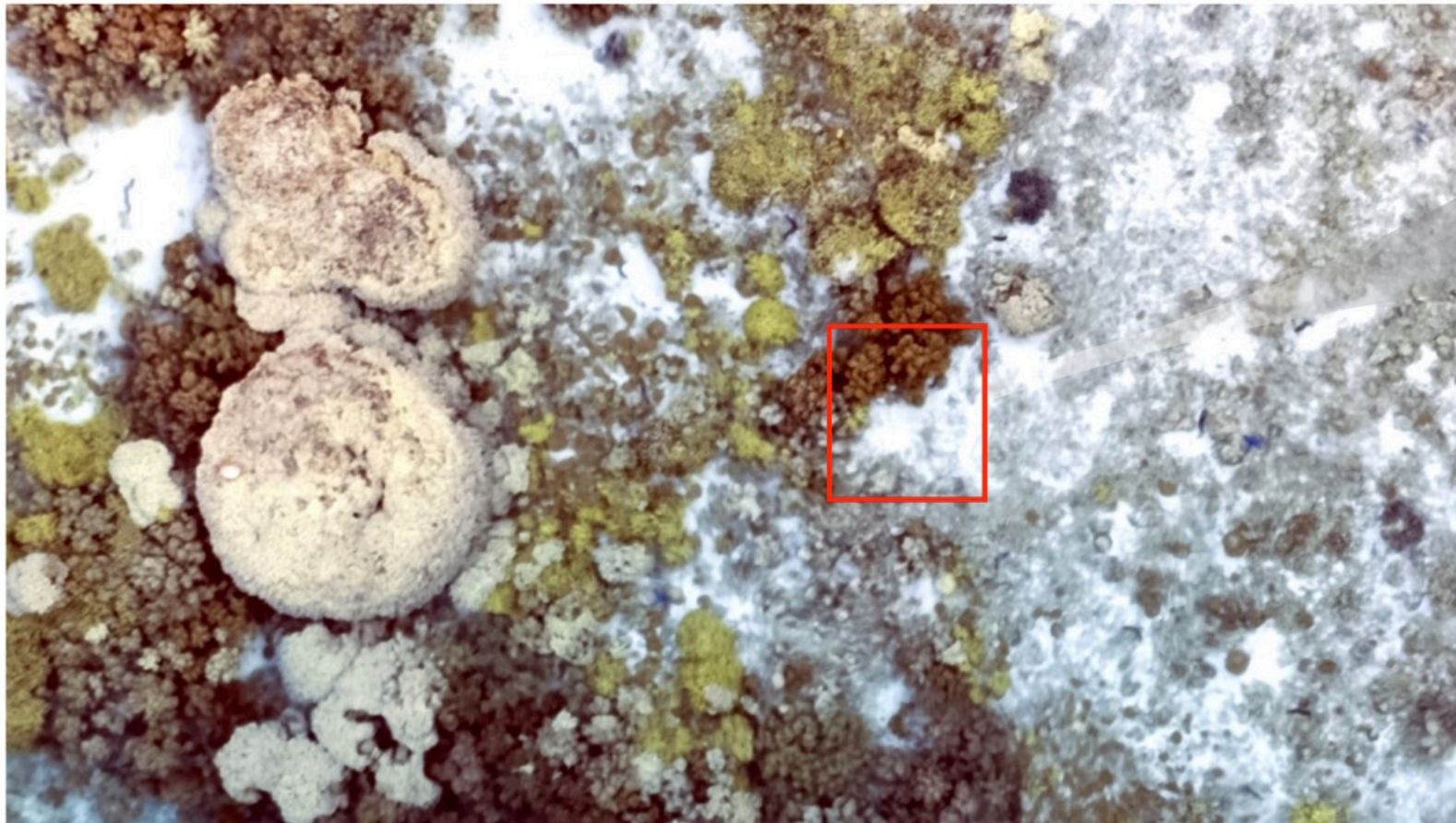
# NEW FLUID LENSING 2.0 RESULTS - GUAM 2021



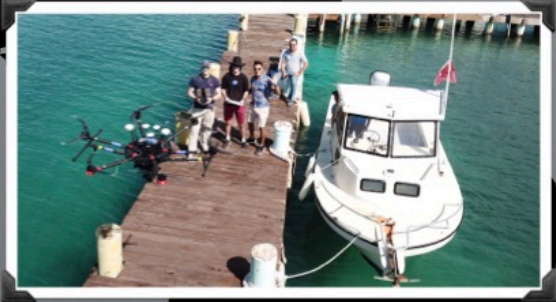




# NEW FLUID LENSING 2.0 RESULTS



# FIELD CAMPAIGNS





# GUAM AIRBORNE FLUID LENSING CAMPAIGN

MAY - JUNE 2022



# ACES FIELD CAMPAIGN

LANA'I HAWAII MAY 2022

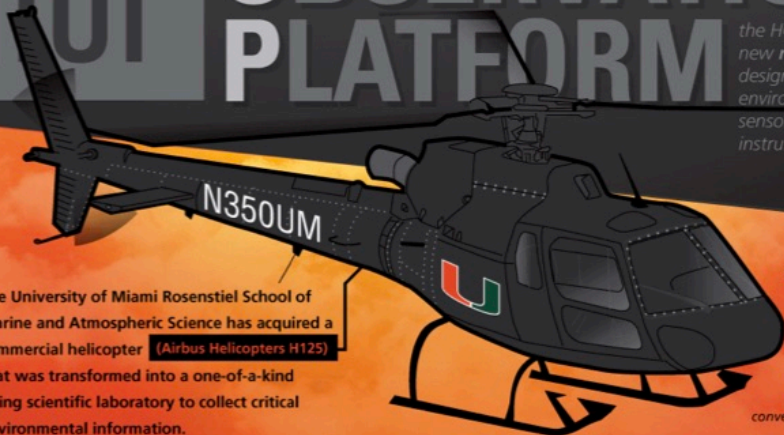
# NEW PLATFORMS & CAPACITY BUILDING



INTRODUCING THE

# HOP OBSERVATION PLATFORM

*the HOP is a brand new research tool designed to carry environmental sensors and instrument inlets*



The University of Miami Rosenstiel School of Marine and Atmospheric Science has acquired a commercial helicopter (Airbus Helicopters H125) that was transformed into a one-of-a-kind flying scientific laboratory to collect critical environmental information.

*The HOP fills critical gaps in physical, chemical and biological observations of the environment.*

**Sensors collect information** from undisturbed air in front

**Flat floor design** convenient for installing scientific payload

## HOP OPERATIONAL DETAILS

### Scientific payload (Up to)

**1,000 LBS** internally  
**3,000 LBS** externally

### Flight time

**4 HOURS** without refueling at airspeed of 65 knots

### Fast cruising speed

**140 KNOTS**

### Range

**350 NAUTICAL MILES** at top cruising speed

### Altitude

from a few feet above the Earth's surface, to the mid troposphere



### works at various altitudes

*Ideal to access remote areas and conduct airborne sea-surface measurements.*

Capability to hover is

**IDEAL FOR REMOTE-SENSING OBSERVATIONS**

Capable of

**HIGH-ALTITUDE FLIGHTS**

Easily transported

**ANYWHERE IN THE WORLD**

Can be operated from an

**OCEANOGRAPHIC RESEARCH SHIP AT SEA**

Ideal to

**ACCESS REMOTE AREAS AND CONDUCT AIRBORNE SEA-SURFACE MEASUREMENTS**

Available to the

**ENTIRE SCIENTIFIC COMMUNITY**

@UMiamiRSMAS #UMHOP

# ACES HOP



# SOLAR ELECTRIC RV PROTOTYPE





Video Courtesy National Geographic, Taylor Schuelke



# CAPACITY BUILDING - PACIFIC FLEET

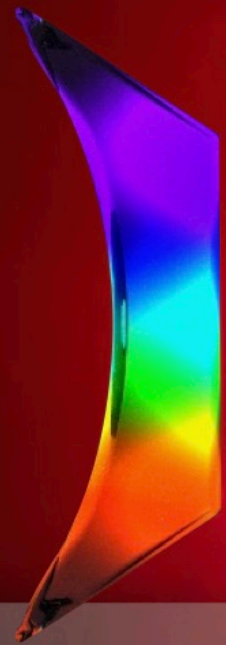


# ONGOING GLOBAL IMAGING CAMPAIGNS









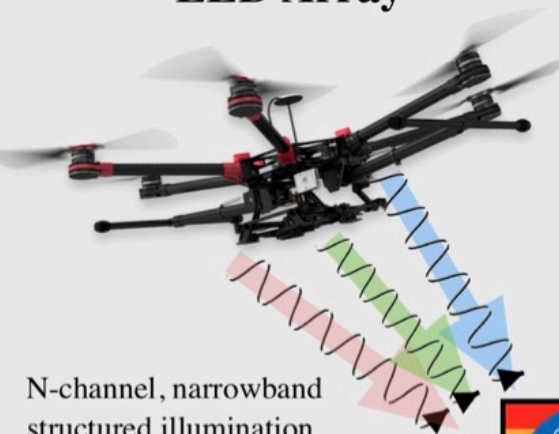
# MiDAR

MULTISPECTRAL IMAGING, DETECTION  
AND ACTIVE REFLECTANCE INSTRUMENT

# MiDAR REMOTE SENSING



## MiDAR Transmitter - LED Array



N-channel, narrowband structured illumination,  $\phi_{e,\lambda}(\mathbf{P},t)$  and embedded data stream at  $bN/\tau$  bits/s



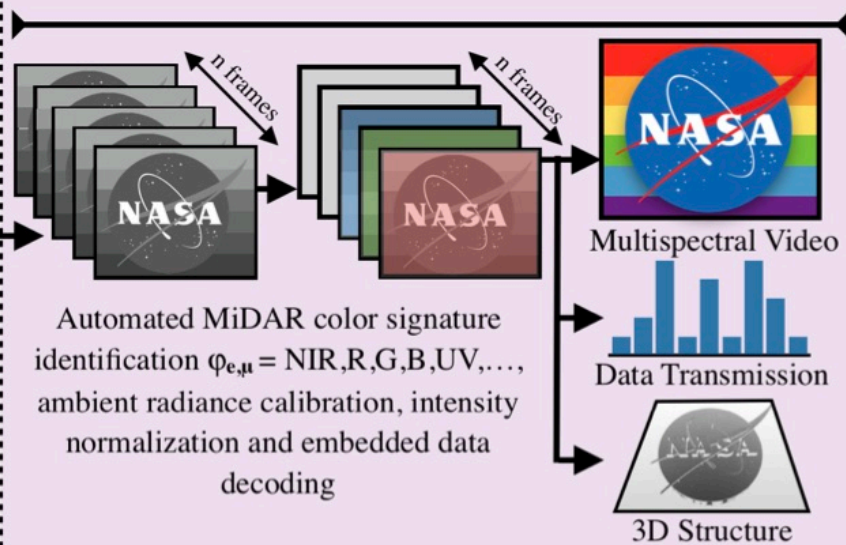
## MiDAR Receiver - FluidCam NIR



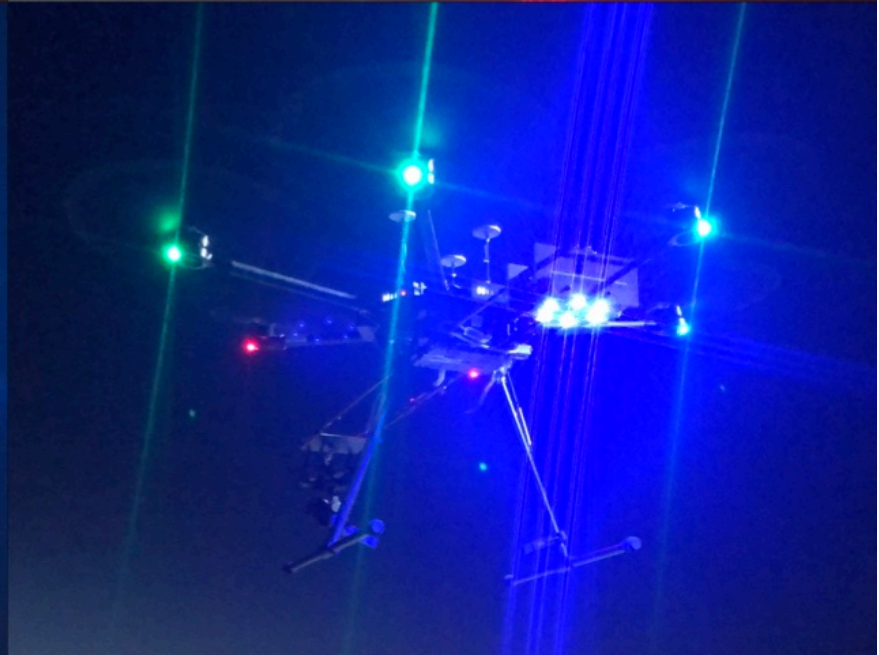
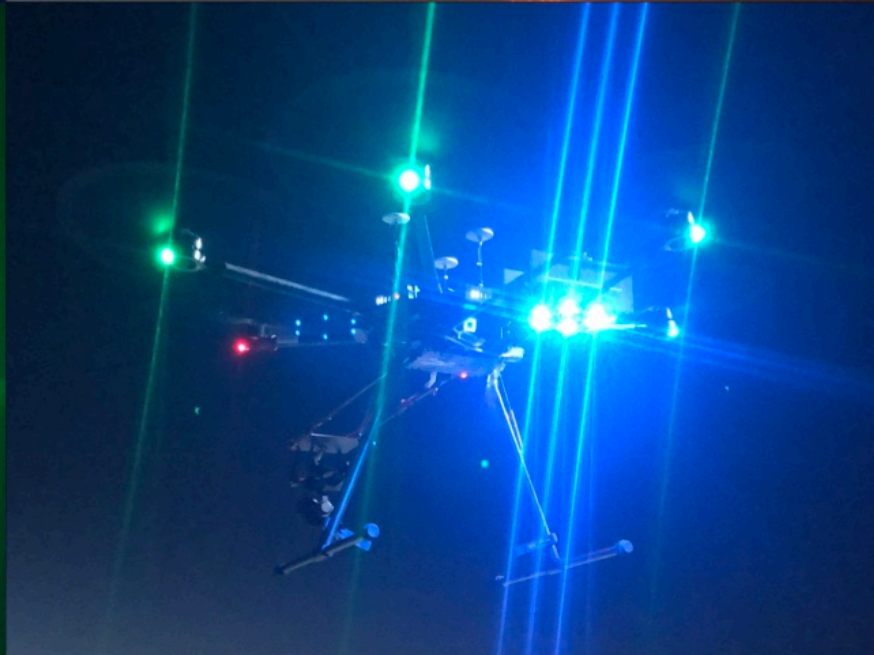
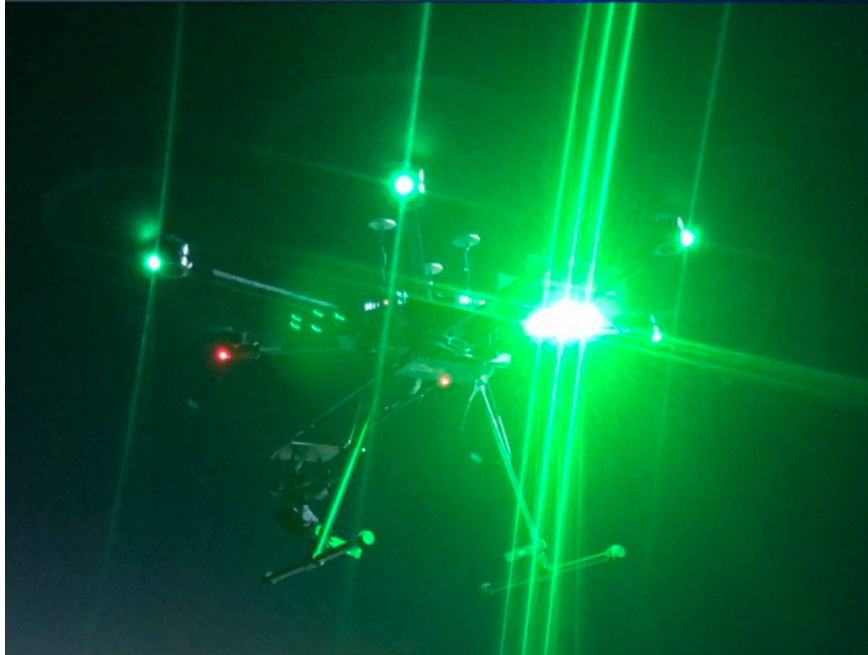
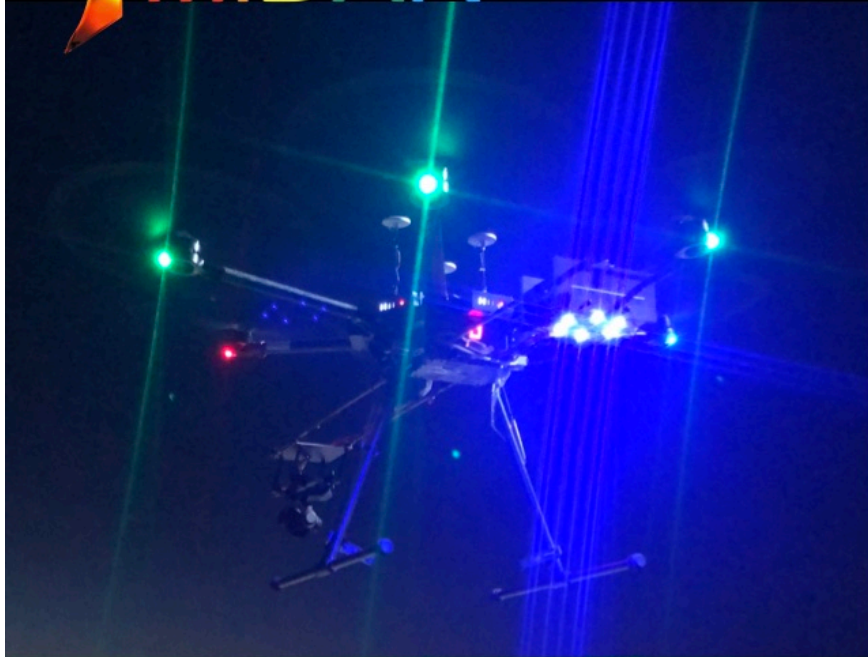
Panchromatic high-frame-rate computational imager records frames  $\mathbf{I}[x,y,t]$

Target

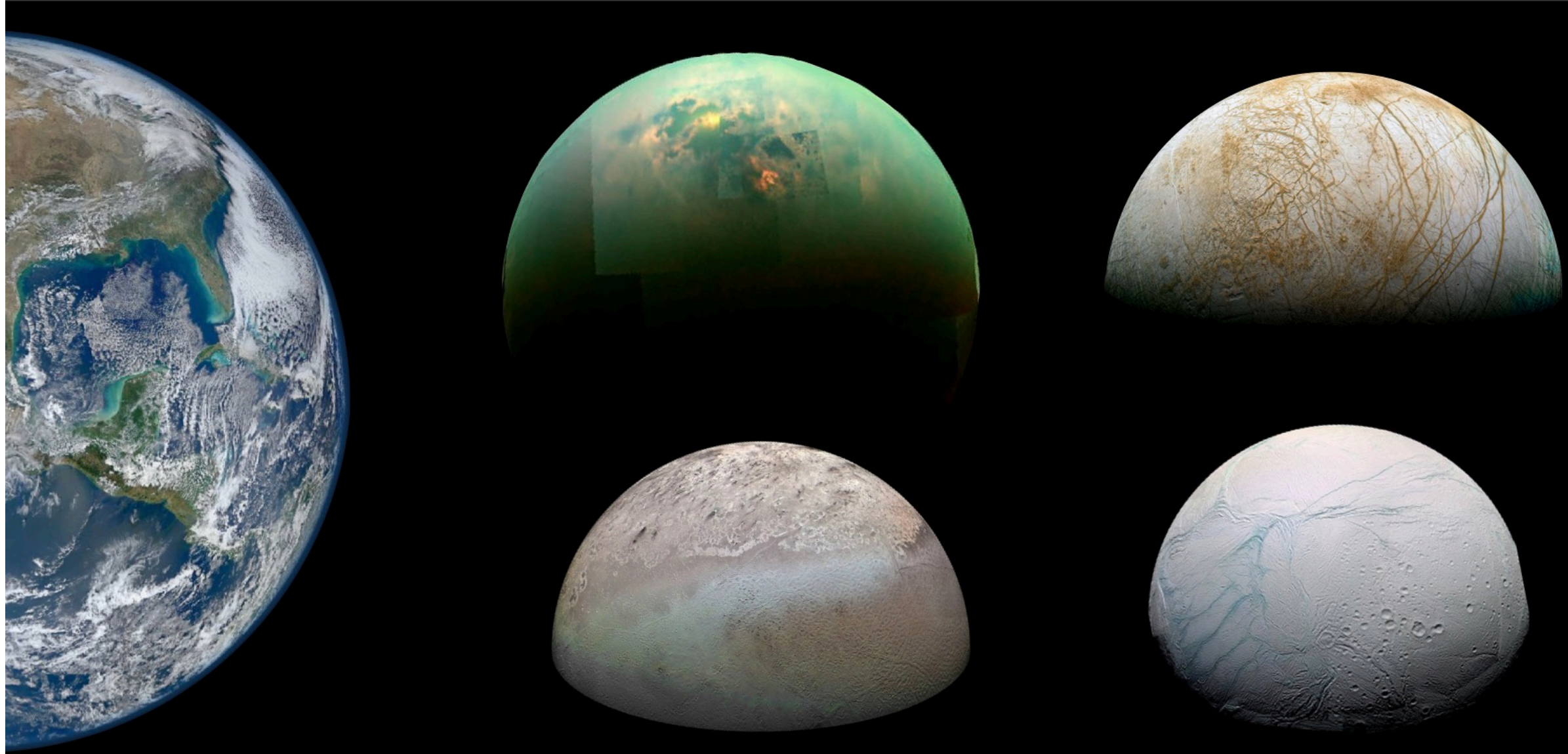
## MiDAR Multispectral Reconstruction



 MiDAR

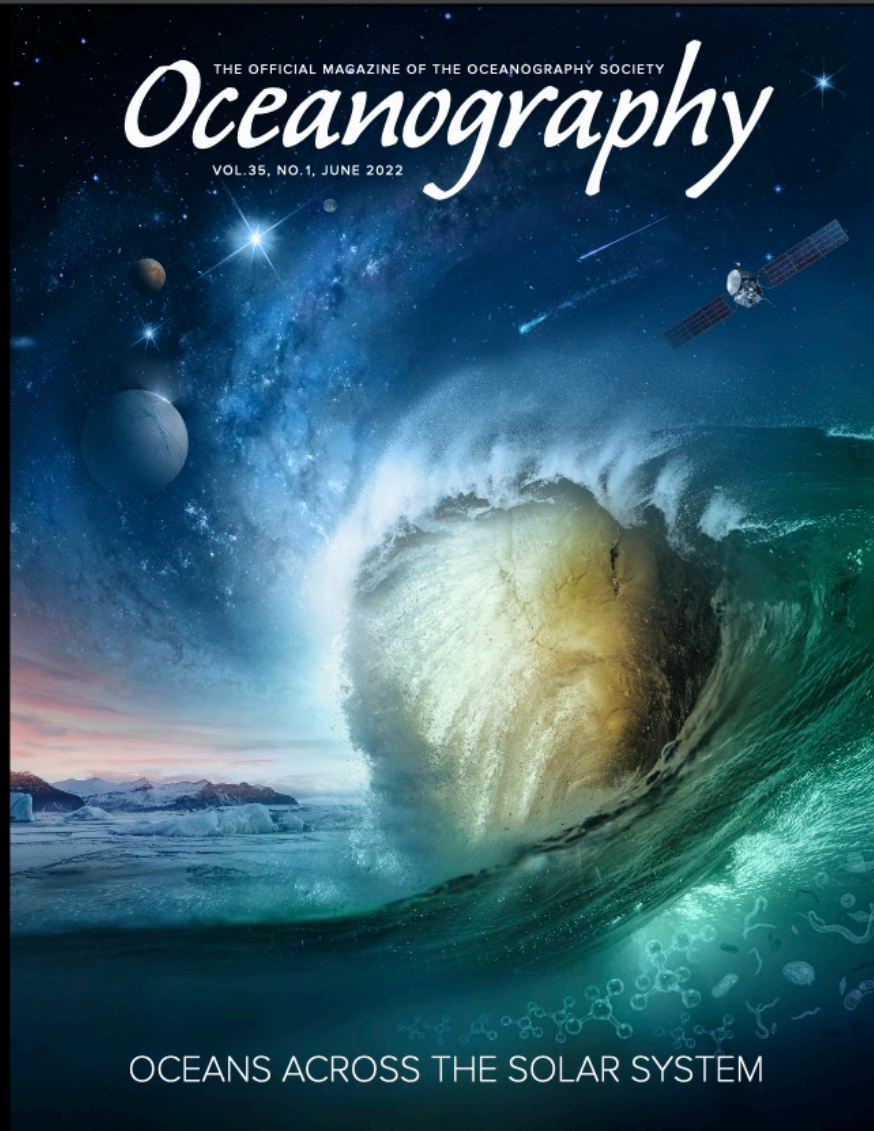


# OCEANS ACROSS THE SOLAR SYSTEM





# NEW PUBLICATIONS

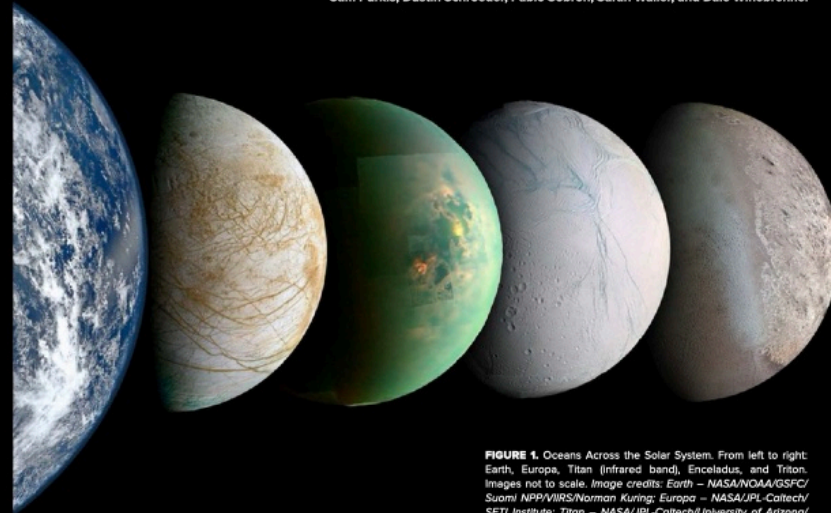


> SPECIAL ISSUE ON OCEANS ACROSS THE SOLAR SYSTEM

## OCEANS ACROSS THE SOLAR SYSTEM AND THE SEARCH FOR EXTRAOCEANIC LIFE

TECHNOLOGIES FOR REMOTE SENSING AND IN SITU EXPLORATION

By Ved Chirayath, Elizabeth Bagshaw, Kate Craft, Heidi Dierssen, Darlene Lim, Michael Malaska, Oscar Pizarro, Sam Purkis, Dustin Schroeder, Pablo Sobron, Sarah Waller, and Dale Winebrenner



**FIGURE 1.** Oceans Across the Solar System. From left to right: Earth, Europa, Titan (infrared band), Enceladus, and Triton. Images not to scale. Image credits: Earth – NASA/NOAA/GSFC/Suomi NPP/VIRS/Norman Kuring; Europa – NASA/JPL-Caltech/SETI Institute; Titan – NASA/JPL-Caltech/University of Arizona/University of Idaho; Enceladus – NASA/JPL-Caltech/Space Science Institute; Triton – NASA/JPL/USGS





Photo by Taylor Schuelke, National Geographic



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