

# Aerial Operations in Monterey Bay

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Research Institute

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# Introduction

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# About MBARI



*The mission of MBARI is to achieve and maintain a position as a world center for advanced research and education in ocean science and technology, and to do so through the development of better instruments, systems, and methods for scientific research in the deep waters of the ocean.*



# UAVs @ MBARI – A Snapshot

- We are one year into a two-year scoping study, targeted at producing a roadmap for future unmanned aerial efforts at MBARI that span across the following:

Science Use Cases

Technology Development

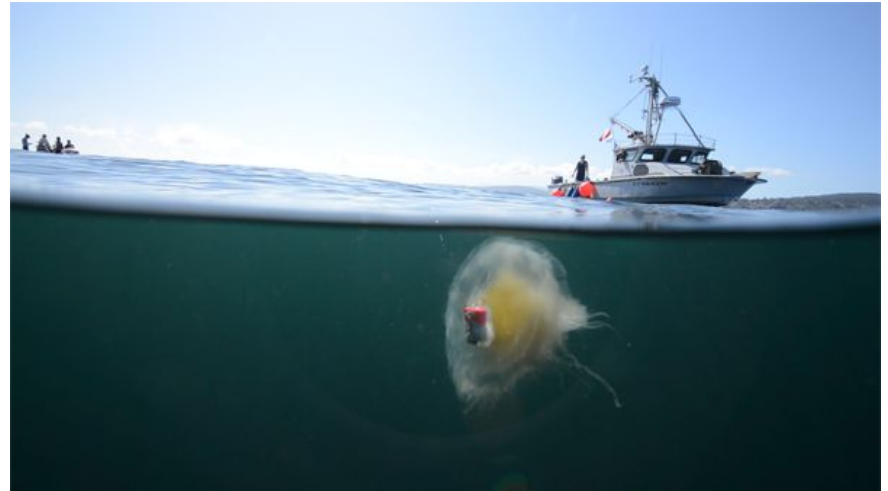
Operational Utility

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# Science Use Cases

Efforts that Line Up with existing MBARI efforts:

- Large Area Aerial Surveys, such as:
  - Harmful Algal Bloom (HAB) tracking and assessment
  - Near surface animal ecology (i.e. jelly population and distribution studies)
  - Collaborative Synaptic Surveys
- Atmospheric data collection
- Water Sampling



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# Technology Interests

- Multi-Vehicle Collaborative Efforts:
  - Synaptic surveys (In progress)
  - Offshore sparse communication networks
- Autonomous Capabilities:
  - Targeted Sampling
  - Target Tracking and Identification
- Sensor network deployment for persistence applications



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# Operational Utilities

- Asset Search and Rescue missions
  - Improvement on time consuming RDF with UAV based localizations
- Remote asset inspection for long deployments
  - Aid in costly decisions regarding at-sea interventions.
  - Replace periodic inspections from vessels
- Ship-to-ship data transfer aid



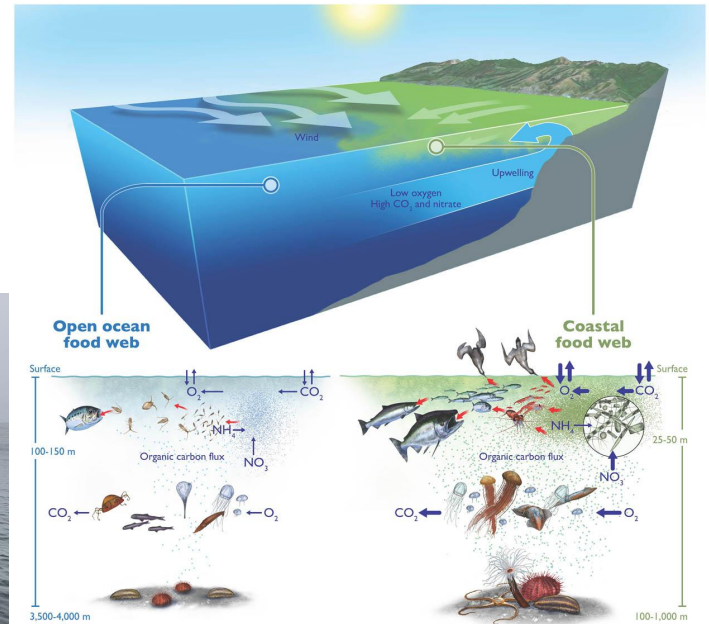
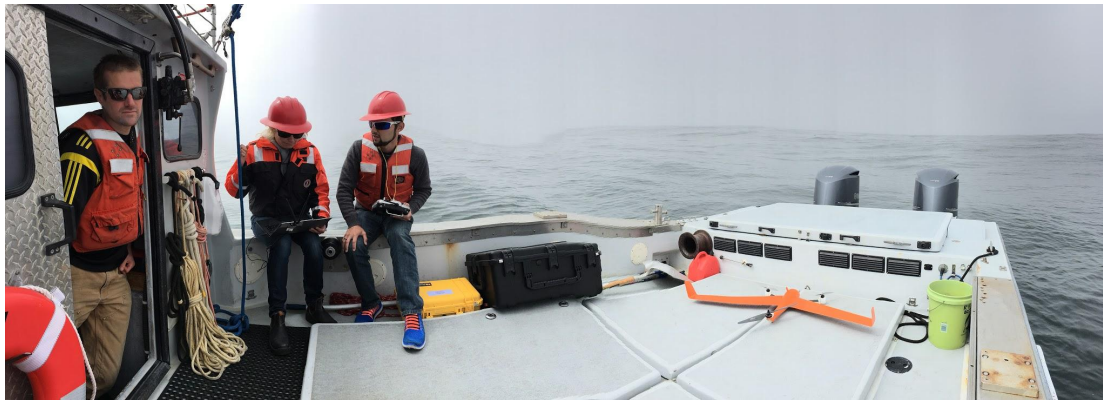
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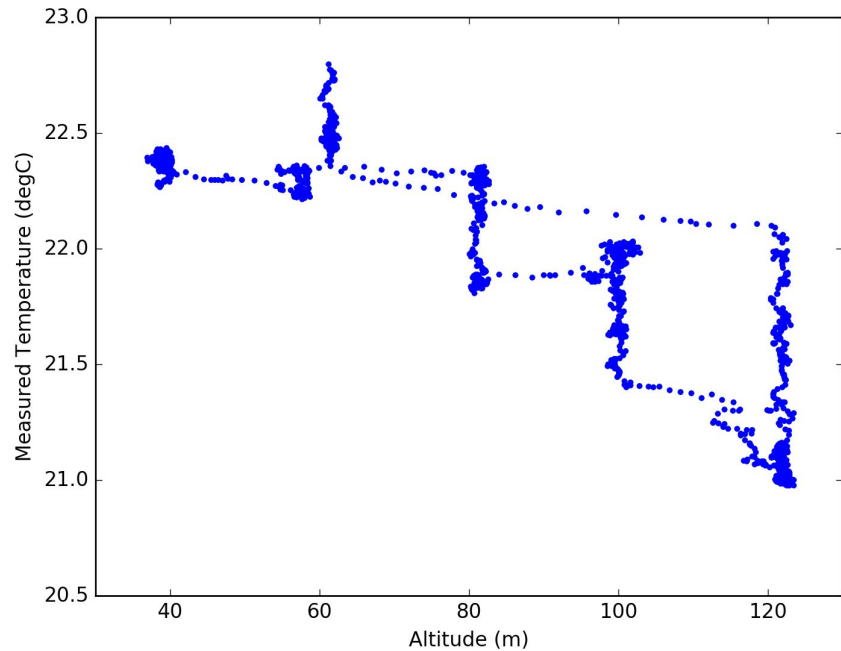
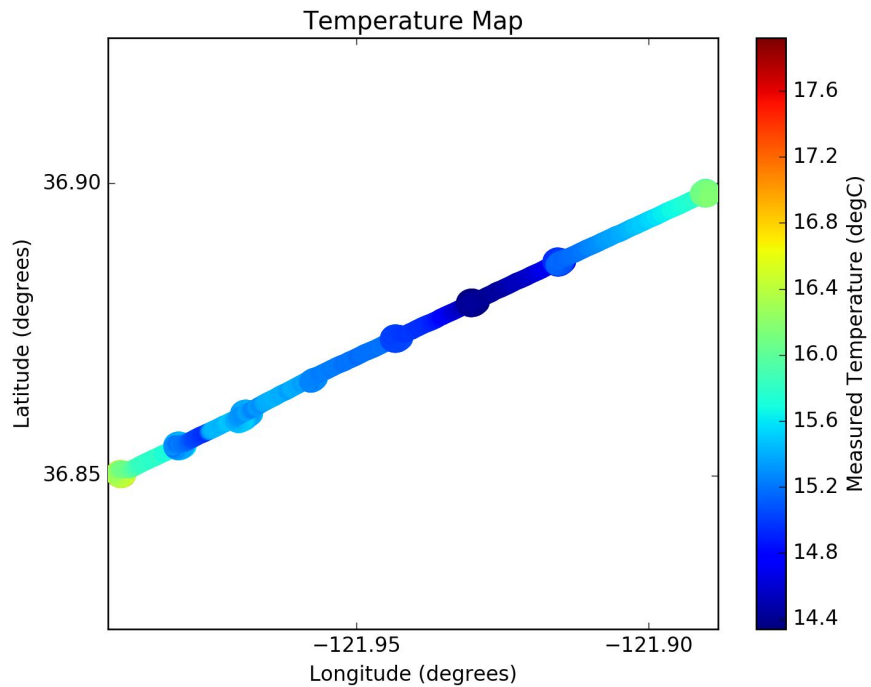
# Current Efforts



# MBARI's CANON Experiment

2017's interdisciplinary field experiment used UAVs for the first time to attempt collection of surface temperature data in collaboration with a the [Flightwave VTOL](#) system.





Preliminary Sea surface telemetry collected by FLIR Duo Camera

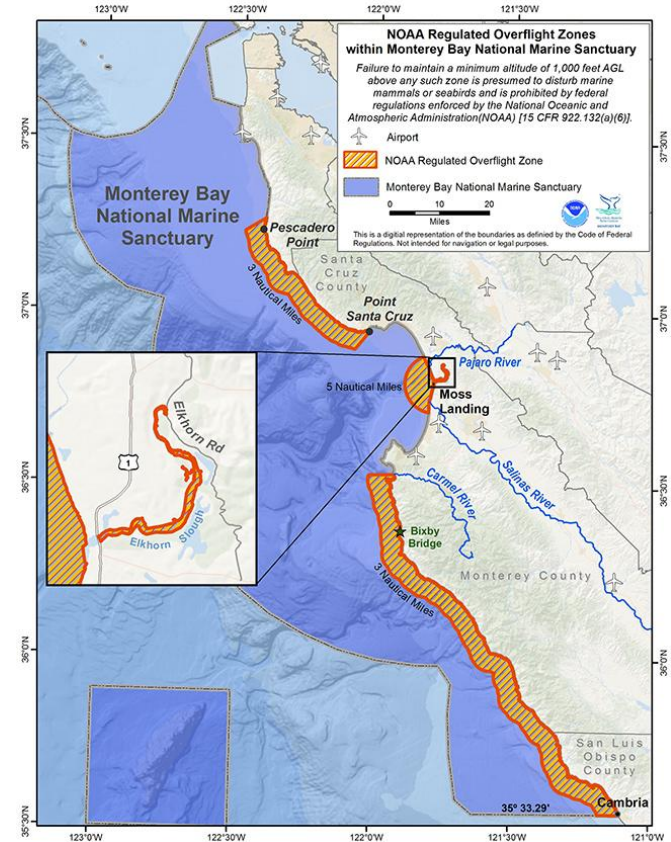




# Challenges

# Challenges for UAV Operations in Monterey Bay

- MBNMS Overflight Zones
  - min 1,000 ft AGL
- Critical coastal areas
  - restrict takeoff/landing areas
- Permit Requirements
- Part 107 Licensing
  - 400 ft max altitude and line-of-sight requirements.



# Challenges for Marine Environments

- Sun Glint
- Water vapor and the marine layer
  - Visual and thermal imager troubles
- Payload limitations
- Offshore takeoff and landing
- Line of sight in the marine layer



Image credit [NASA](#)



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# Moving Forward

- Acquire platforms that can conduct large surveys and small scale operations, while offering payload capabilities.
- Develop payloads, test using our Helikite platform
  - Imaging and thermal payload
  - RDF localization payload



Questions?

