MBARI’s UAS program
Project team

- Ben Erwin (pilot and engineer)
- Bryan Schaefer (pilot and engineer)
- Tom O’Reilly (engineer)
- Rob McEwen (engineer and pilot)
- John Ryan (scientist: mammals and ocean color)
- Steve Haddock (scientist: jellies and surveys)
Monterey Bay Aquarium Research Institute (MBARI)

- Non-profit founded in 1987 by David Packard
- Located at head of Monterey Canyon
- Emphasizes collaborative relationships between scientists and engineers
MBARI drone choices

FlightWave Edge
VTOL with Tilt-pod rotors

• Endurance: 45 min/38 km
• Payload: 300g
• Max windspeed: 15kt
• Biotransects, ship-launch
FW *Edge* VTOL tests (2017)

- Payloads: FLIR Vue Pro,
- Foxeer Legend 16 MP RGB camera
- Launched/landed on *RV Paragon*
- chased drone in flight
- Flew ~8 km transects at 60 m altitude thermal front
Payload design and fabrication

- Nose cone + plastic brackets: ~70 g
  - FoxTech Map-02 25 MP camera, 178 g
  - Total weight: 248 g

- Payload B
  - FLIR Duo R, 84 g
  - Foxeer Legend-1 16 MP camera, 49 g
  - Total weight: 203 g
MBARI drone choices

Believer airframe
Long-endurance fixed wing

- Endurance: 4+ hour
- Payload: 2kg.
- Up to 60 kt speed
- Long range surveys
Believer recovery options

• Ground landing
• Water landing
• Net capture
• Parachute
MBARI UAV applications

• Air-sea interface processes
  – Phytoplankton, including HABs
  – Animals – jellies, fish, birds, whales; behavior, population
  – Thermal structure
  – Ocean/atmosphere interactions (e.g. DMS)
  – Bioluminescence
  – Long (30+ km) monthly transects

• Public outreach
• Locate assets on surface
• Data transfer relay
• Water sampling
Jellies (likely *Aurelia aurita*)

Birds in flight
FW Edge transects

FW Edge transects overlaid on JPL ROMS SST nowcast, 5/10/2017
Thermal front in FLIR images
FLIR vs CTD temperature:
SW-NE transect
Fluoroscein dye tracking experiment, 10/2018
RV Paragon (left) and Long Range AUV (yellow object on right)
Data post processing

- Embedding metadata
- QGroundControl
- BIN to ULOG conversion