ADVANCES IN AUTONOMOUS BATHYMETRY
ACHIEVING PLANETARY COVERAGE WITHOUT CREW OR FUEL

SEBASTIEN DE HALLEUX, COO
SAILDRONE IS A WIND-POWERED USV DEVELOPED UNDER PUBLIC-PRIVATE PARTNERSHIP WITH NOAA, DESIGNED FOR AUTONOMOUS MISSIONS OF UP TO 12 MONTHS IN ANY OCEANS.

- 23 feet / 7.5m long
- 15 feet / 5m tall
- Wind power for propulsion
- Solar power for electronics
- Satellite link for live data
Each USV carries a standard metocean sensor suite measuring key ocean variables.

**Atmospheric Measurements**
1. **WIND** - Gill Windmaster 3D 20Hz @ + 5.0 m
2. **AT / RH** - Rotronic HC2 - S3 @ + 2.2 m
3. **PRESSURE** - Vaisala BAROCAP PTB210 @ + 0.2 m
4. **RADIATION** - LICOR LI-192SA @ + 2.2 m

**Ocean Measurements**
5. **CTD** - SBE 37 & RBR Conductivity @ -0.5 m
6. **DO & TEMP** - RBR Coda ODO & SBE 37 ODO @ -0.5 m
7. **CHL-A** - Wetlabs ECO-FL-S G4 & Turner Cyclops-7F
8. **SKIN SST** - Heitronics CT15.2 @ +2.2 m
9. **WAVES** - Dual GPS aided IMU - VN 300
10. **CAMERAS** - Sky, Sea and Horizon Cameras

**Acoustics Options**
11. **ADCP** - Teledyne RDI Workhorse 300 kHz @ -2.0 m
12. **ECHO-SOUNDER** - SIMRAD WBT Mini (EK80) @ -2.0 m
13. **MULTI-BEAM** - Norbit iWBMS multibeam + winch SVP
100+ SAILDRONES ARE ACTIVELY COLLECTING IN-SITU OCEAN DATA ON A GLOBAL BASIS

OVER 500,000 NAUTICAL MILES OF SUCCESSFUL OPERATIONS IN EXTREME ENVIRONMENTS

US Arctic
Fish stock assessment
Bathymetry, metocean

North Atlantic
Current, carbon, hurricane monitoring

Gulf of Mexico
Oil spill, hypoxia and bathymetry

Southern Ocean
Australia, New Zealand
Antarctic Circumnavigation

US West Coast
Fish stock assessment
bathymetry, oil spill and metocean monitoring

Western Trop. Pacific
Current, biogeochemistry,
typhoon monitoring

Eastern Tropical Pacific
Satellite cal/val, El Nino monitoring, Shark tracking
ANNUAL ACOUSTIC SURVEY OF US WEST COAST
Previously undiscovered wreck surveyed by SD1024.
ROADMAP FOR AUTONOMOUS BATHYMETRY CAPABILITY FOR MAPPING & CHARTING

- SINGLE BEAM
  - simrad EK80
  - < 7m
  - 2,000 meters

- SHALLOW MULTIBEAM
  - norbit iWBMS + SVP
  - < 7m
  - 250 meters

- DEEP MULTIBEAM
  - kongsberg EM304
  - < 22m
  - 7,000 meters
SMALL DRONE BATHYMETRY WITH SV PROFILER
SAILDRONE SURVEYOR

An unmanned, long endurance, multi beam system for deep ocean

**Payloads:**
- Kongsberg EM 304
- Kongsberg EM 2040
- SIMRAD EK80
- SIMRAD 150 kHz ADCP
- RDI Pinnacle 45 ADCP

**Stats:**
- Mapping Speed: 10 Knots
- Utilization: 330 Days / Yr
- Coverage: 5000 Sq km / day
  1.6m Sq km / Yr
Radar, visual and IR cameras @ 50 ft Elevation

Remote Bridge, manned 24/7
- Conforms to COLREGS
- Onboard processing of bathymetry data
- Processed data transferred in real time
<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
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<tbody>
<tr>
<td>Length</td>
<td>22m</td>
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<tr>
<td>Draught:</td>
<td>3m</td>
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<tr>
<td>Survey Speed:</td>
<td>10 Knots</td>
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<tr>
<td>Transit Speed:</td>
<td>15 Knots</td>
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<tr>
<td>Continuous Operation:</td>
<td>6 Months</td>
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<tr>
<td>Depth Capability:</td>
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A new era in bathymetry......