UNOLS

UNIVERSITY-NATIONAL OCEANOGRAPHIC LABORATORY SYSTEM

UNOLS Fleet Improvement Committee

Research Vessel Enhancements to Facilitate Coordination with Airborne Facilities and Platforms

20 October 2014

SCOAR

Surface / Air Platform Support

- Investigators have an increasing – and increasingly capable – inventory of airborne tools to conduct ocean research operations.
- These include Unmanned Aircraft Systems (UAS), and fixed- and rotary-wing aircraft, and the sensors they carry.
- These platforms may deploy from on shore or from aboard the ships.
- Future R/V new builds and refits can maximize the inter-operability of these platforms.

Manned Aircraft

New University of Miami ocean research Helicopter.

CIRPAS Twin-Otter ocean research airplane

Unmanned Systems

Shipboard Infrastructure: Comms.

- Inexpensive ground-air transceivers permit direct voice communications with supporting aircraft.

Aircraft tracking & vectoring: ADF

- Currently these are on several ships, used for finding released subsurface moorings when they surface.

Aircraft tracking and de-confliction

- ADS-B system will be required on all aircraft after 2020. Like shipboard AIS systems, these transmit altitude, position, course and speed.

UAS/Aircraft Tracking from the ship

- Small phased array air search radars are being developed specifically for tracking UAVs.

Infrastructure: Deck Real Estate

- New ship builds should consider the addition of helipads. Lightweight, pre-fabricated versions can even be of a bolt-on/off design, permitting support of helicopters for specific missions.
- Ships as small as 70 feet LOA have supported helicopters.

Helipad Examples

Infrastructure: Deck Real Estate

- Support for UAS launch and recovery requires forethought, too.
- Photos Boeing Corp.

58 Foot Fishing Vessel/Scan Eagle

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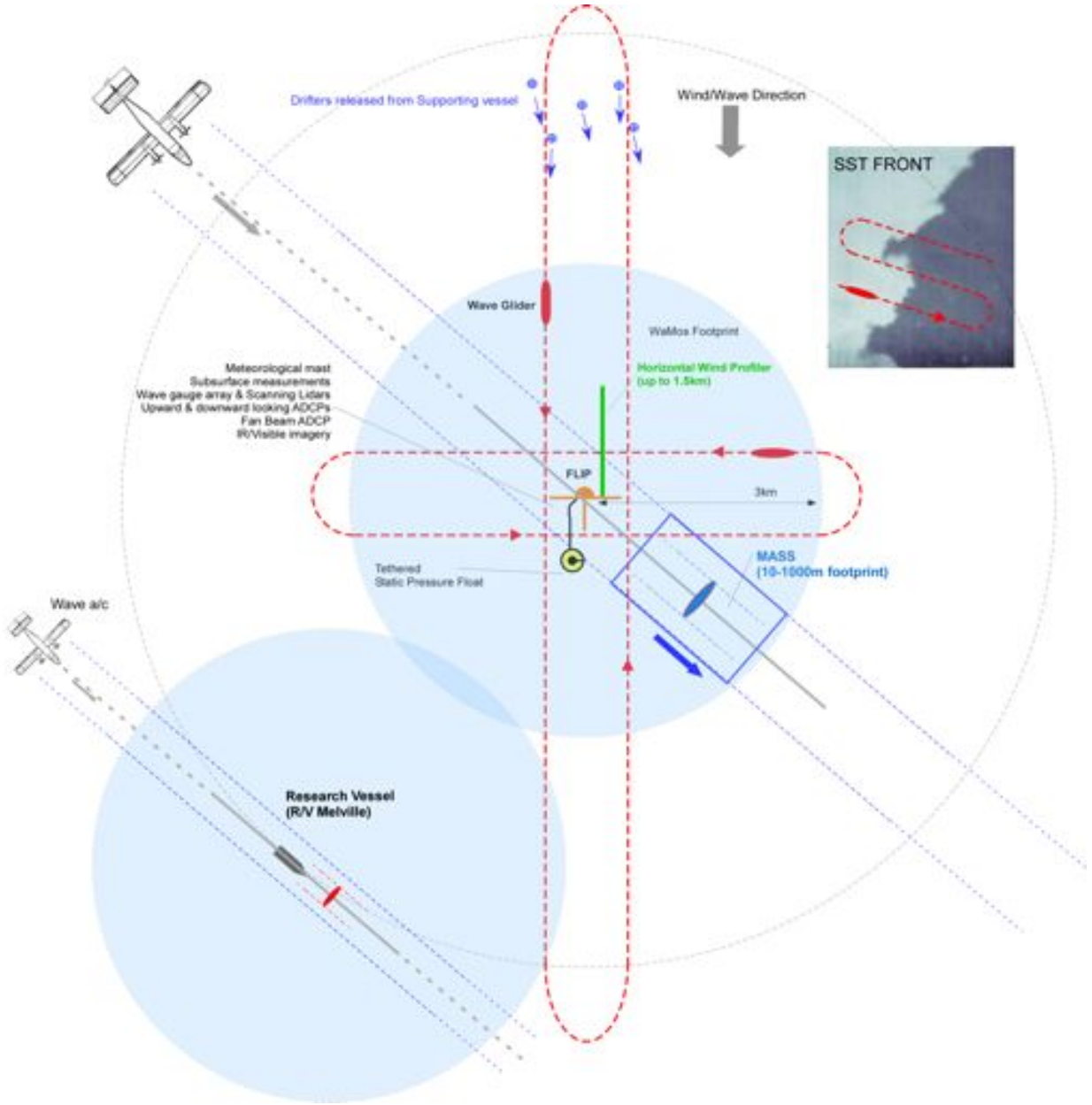
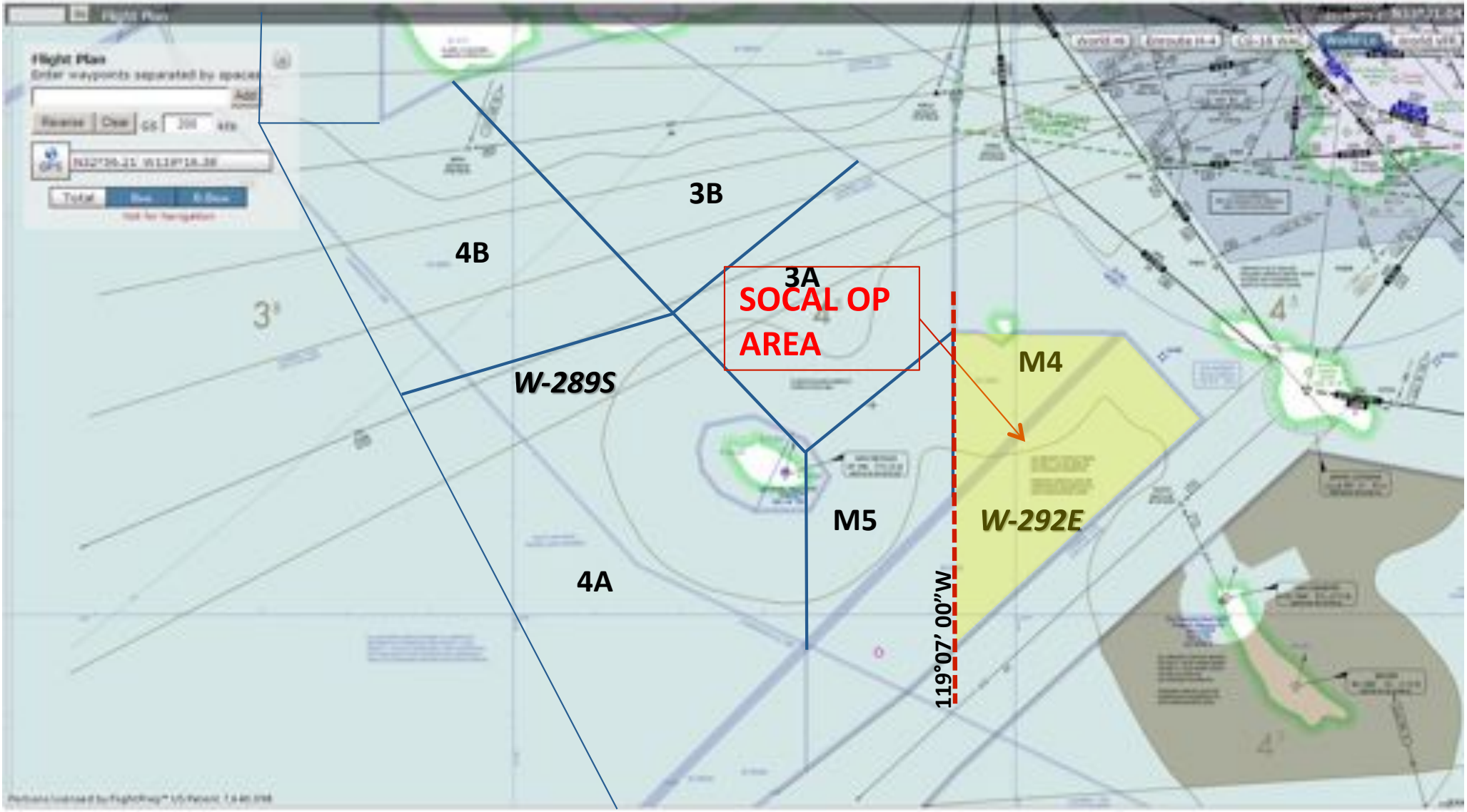
Examples of recent projects requiring air/ship coordination

Recent project requiring air/ship coordination:
SOCAL2013 (Partenavia P68+Wave Glider + R/V Melville + R/P FLIP)
(Melville & Lenain SIO)



Complex Air & Water spaces request coordination

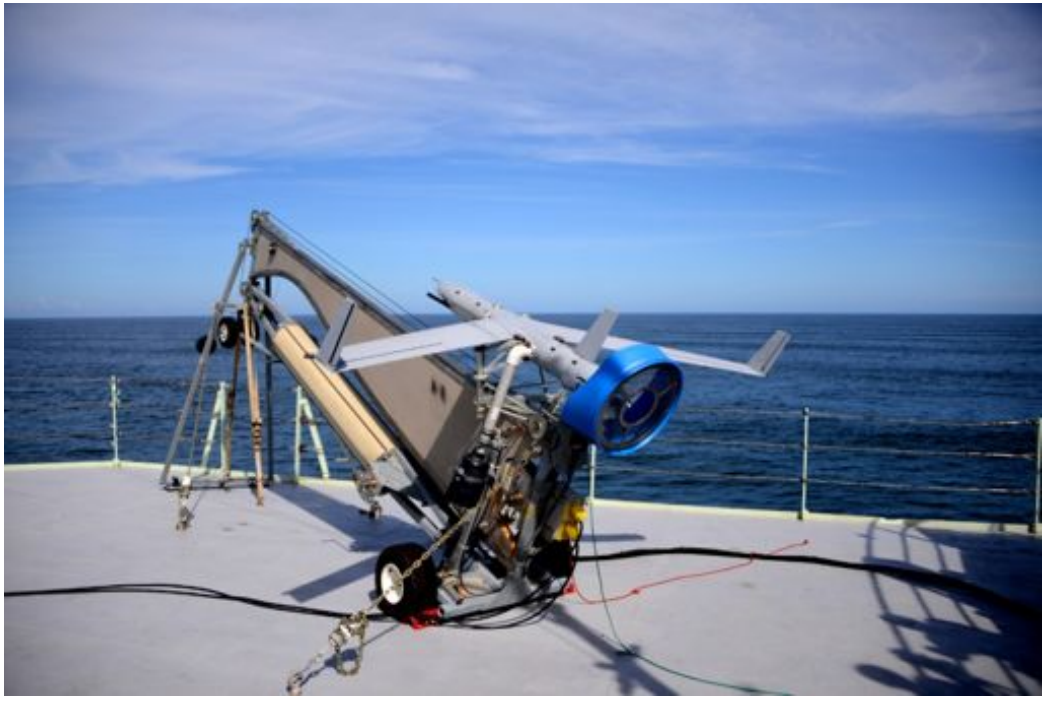


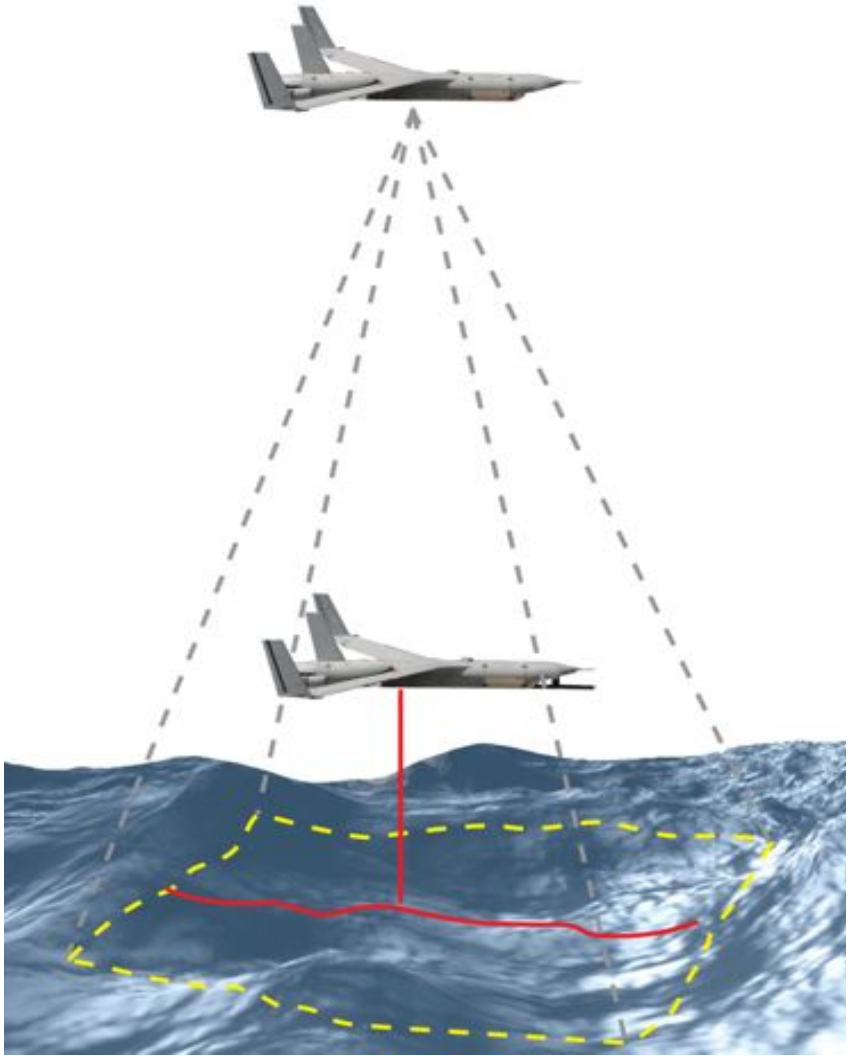
Deployment of R/P FLIP (moored), R/V Melville, MASS-instrumented aircraft (Partenavia P68) and Wave Gliders in November 2013.

Ship-based UAV measurements of the marine atmospheric boundary layer during TW13

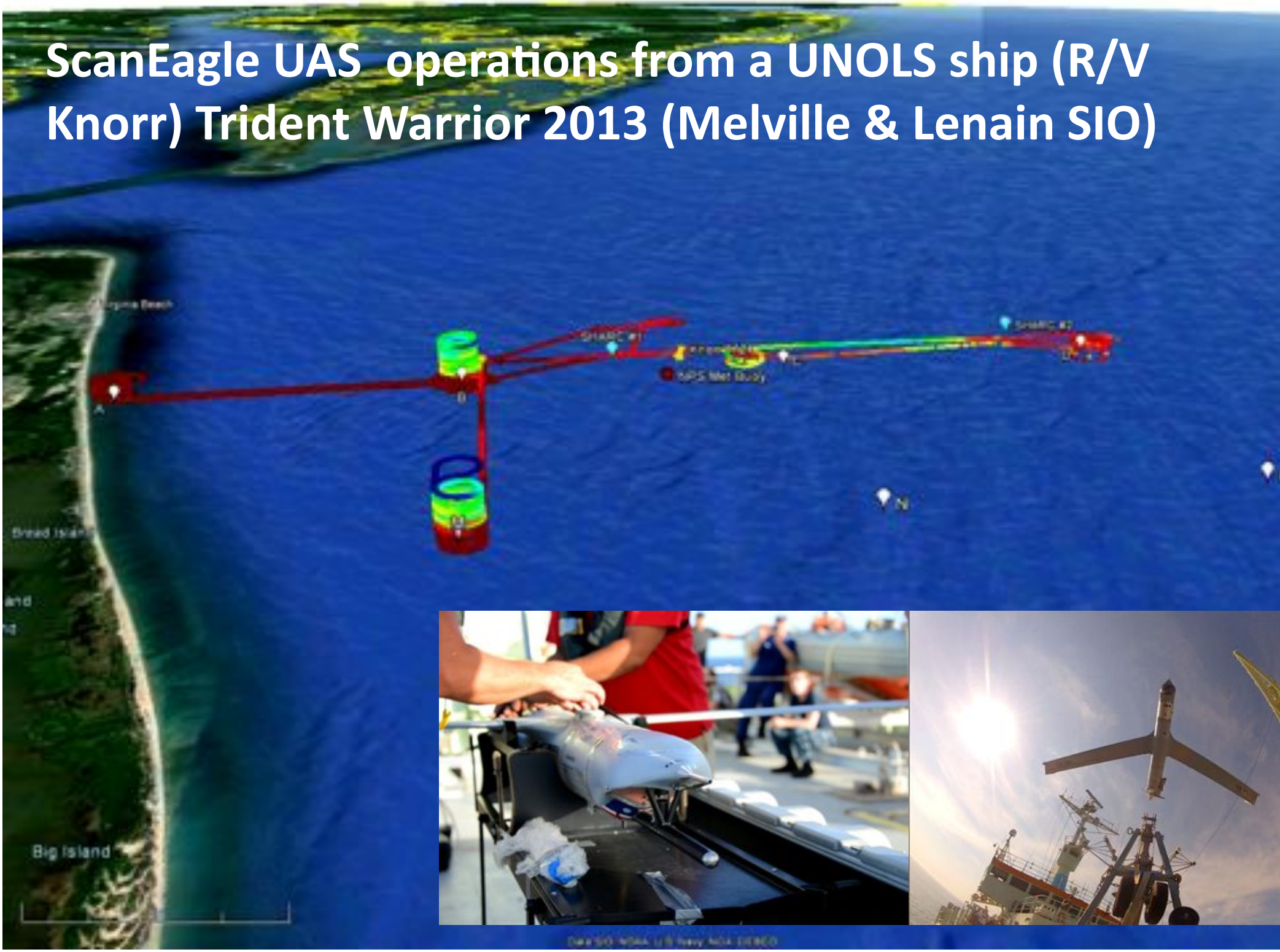
METOC Unmanned System Experiment
Electromagnetic Weapon/Sensor Mission

(Melville & Lenain SIO)





ScanEagle UAS operations from a UNOLS ship (R/V Knorr) Trident Warrior 2013 (Melville & Lenain SIO)



- **Goal: To demonstrate the usefulness of instrumented, ship-launched and recovered UAVs (ScanEagles) for real-time environmental measurements that can feed into environmental models in a simulated operational environment.**

Science objectives:

*Time-varying 3D structure of MABL (vert. profiles wind, temperature, humidity)

*Response of MABL to SST, subsurface structure, and visa versa

***Real-time data assimilation** of measurements into Coupled Ocean/Atmosphere Prediction System (COAMPS) (NPS, NRL)

*Electromagnetic propagation monitoring, model evaluation (SPAWAR, SIO)

CONCLUSIONS

- These are only a few examples of shipboard equipment and infrastructure with which we can enhance ship/ aircraft interoperability.
- Airborne platforms leverage surface ship and observatory data collection and offer cost effective ways to vastly open the geospatial and temporal horizons of legacy platforms and facilities. They are becoming an increasingly important component of our mission infrastructure.
- Planning for future Academic Fleet improvements and acquisitions must take air/sea interoperability into consideration.