THE UNIVERSITY OF SOUTHERN MISSISSIPPI®

College of Arts and Science
School of Ocean Sciences and Engineering
Division of Marine Science

Hydrography at USM

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- Ocean Engineering
- Marine Science
- Remote Sensing
- Geospatial information management
- Optics, Acoustics, etc.

Doctorate (Ph.D.)
in Marine Science (Hydrography)
Master of Science (M.S.)
in Hydrographic Science
Bachelor of Science (B.S.)
in Marine Science (Hydrography)
Hydrographic Science Research Center (HSRC)

Hydrography is located at:

- Stennis Space Center, MS

- Gulf Park Campus (Long Beach, MS)

- Marine Research Center (Gulfport, MS)

1) ***Academic programs***

- *Ph.D. in Marine Science (Hydrography)*

- *Master of Science in Hydrographic Science*

- *Bachelor of Science in Marine Science (Hydrography)*

2) ***Hydrographic Science Research Center***

- *Uncrewed Maritime Systems (UMS) Certificate Programs*

1) ***Academic programs***

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2) ***Hydrographic Science Research Center***

- Uncrewed Maritime Systems (UMS) Certificate Programs

Master of Science in Hydrographic Science

- Established in 2000
- Partnership with the US Navy (CNMOC)
- Recognized by the FIG-IHO-ICA IBSC at Cat “A” level
- Oldest Program in USA still in operation
- 233 graduates from 34 countries
- Current students: 16 M.S. and 4 Ph.D.
- 100% employment after graduation

Master of Science in Hydrographic Science

Available tracks for M.S.:

- 1 year (starts every August)
- 2 years (starts every August)
- 2.5 years (starts every January)

Master of Science in Hydrographic Science

<u>Sponsorships</u>:

- IHO-ROK Program (CL 30/2021, deadline 11 Jan 2022)
- US Navy (through diplomatic channels)
- USM scholarships (Ken Barbor Fund)
- USM grant sponsorships

Bachelor of Science in Marine Science (Hydrography)

- Recognized in 2018
- Recognized by the FIG-IHO-ICA IBSC at Cat “B” level
- Only undergraduate program in USA
- One of only 6 in the world
- 10 graduates (2018-2021)

Bachelor of Science in Marine Science (Hydrography)

- Current students: 12 (4 years)
- 100% employment after graduation
- Will boost the “hydrographic profession”
- Scholarships are available

Both M.S. and B.S. programs are focused on:

- geospatial data management

- nautical charting

(beyond the minimum S-5A/B Standards)

At the final field projects, students are required to focus on their clients' requirements and deliverables AND to comply with NOAA's Hydrographic Survey Specifications and Deliverables (HSSD)

Hydrographic group is currently working on two lines:

- Creating a Marine Spatial Data Infrastructure (MSDI) within the USM, following the 4 pillars of the IHO-MSDIWG (People, Standards, Data, ICT)

- Establishing a XML model for data collection based on NOAA's specifications


POINT SUR


GILBERT R. MASON
Glosten


UNIVERSITY OF SOUTHERN MISSISSIPPI
MARINE SCIENCE


DELL
Trimble

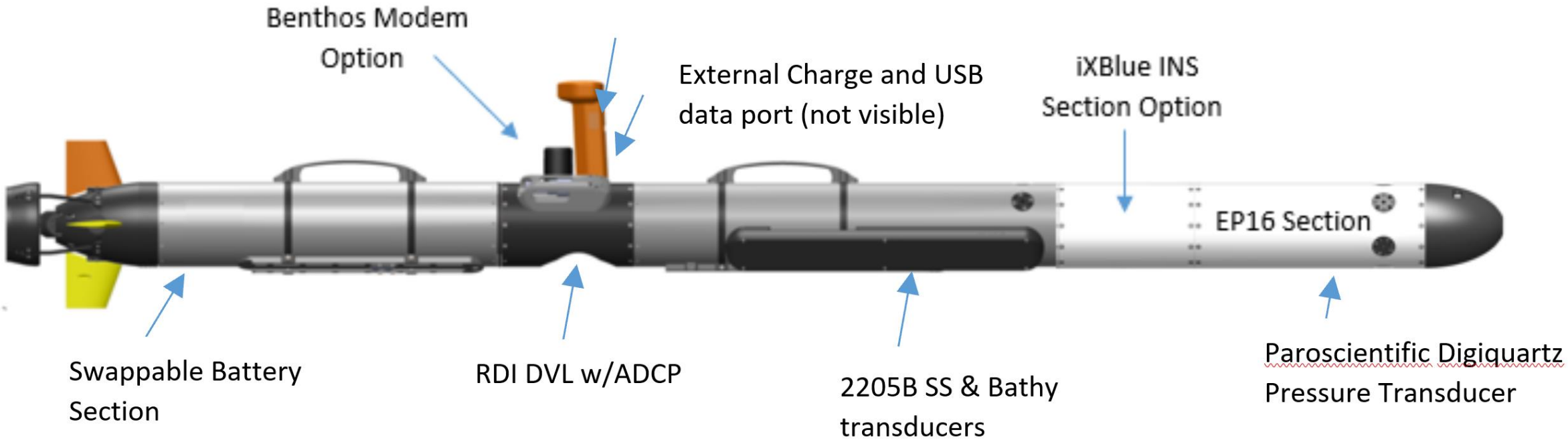
ASV Sea Eagle C-Worker 5

ASV WAM-V


ASV EchoBoat

AUV Eagle Ray

AUV IVER3 (2 units)



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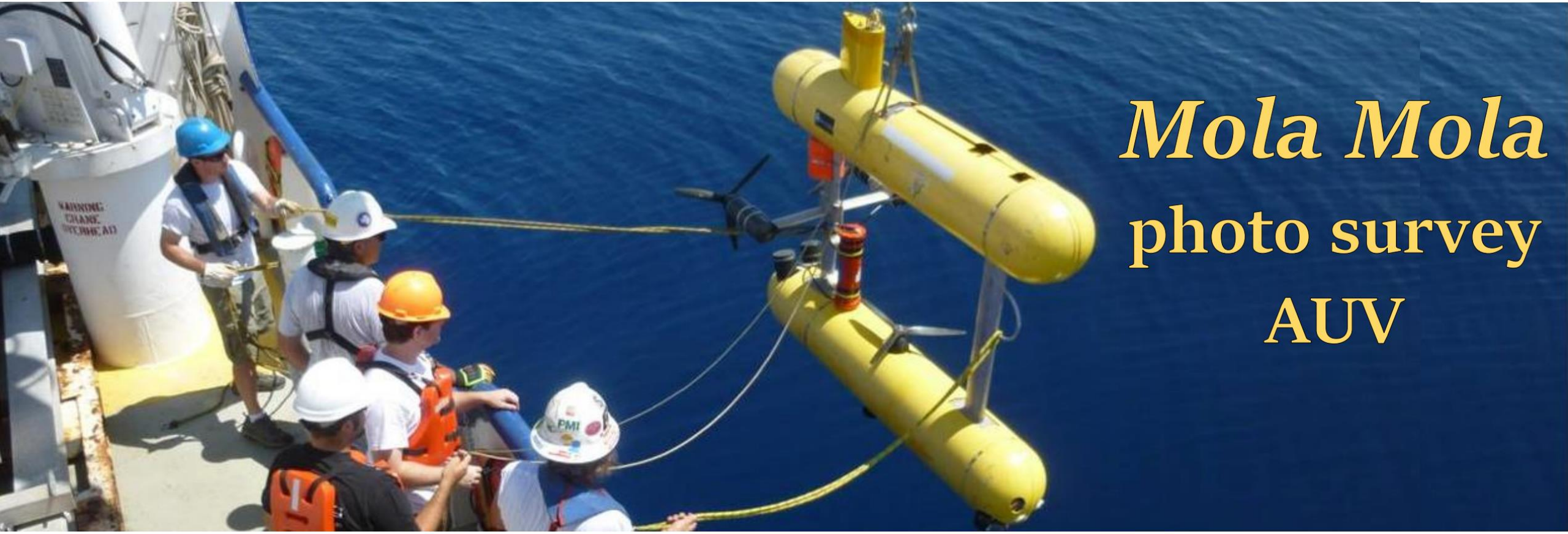


Mola Mola

photo survey

AUV

Slocum Gliders (3 units)

KONGSBERG

NORBIT
- explore more -

EdgeTech
The Leader in Underwater Technology

TELEDYNE CARIS
Everywhereyoulook™

PicoMB-130-Surf
The world's smallest integrated Multibeam Echosounder

TELEDYNE
ODOM HYDROGRAPHIC
A Teledyne Technologies Company

CHESAPEAKE TECHNOLOGY

SONARWIZ

TELEDYNE RESON

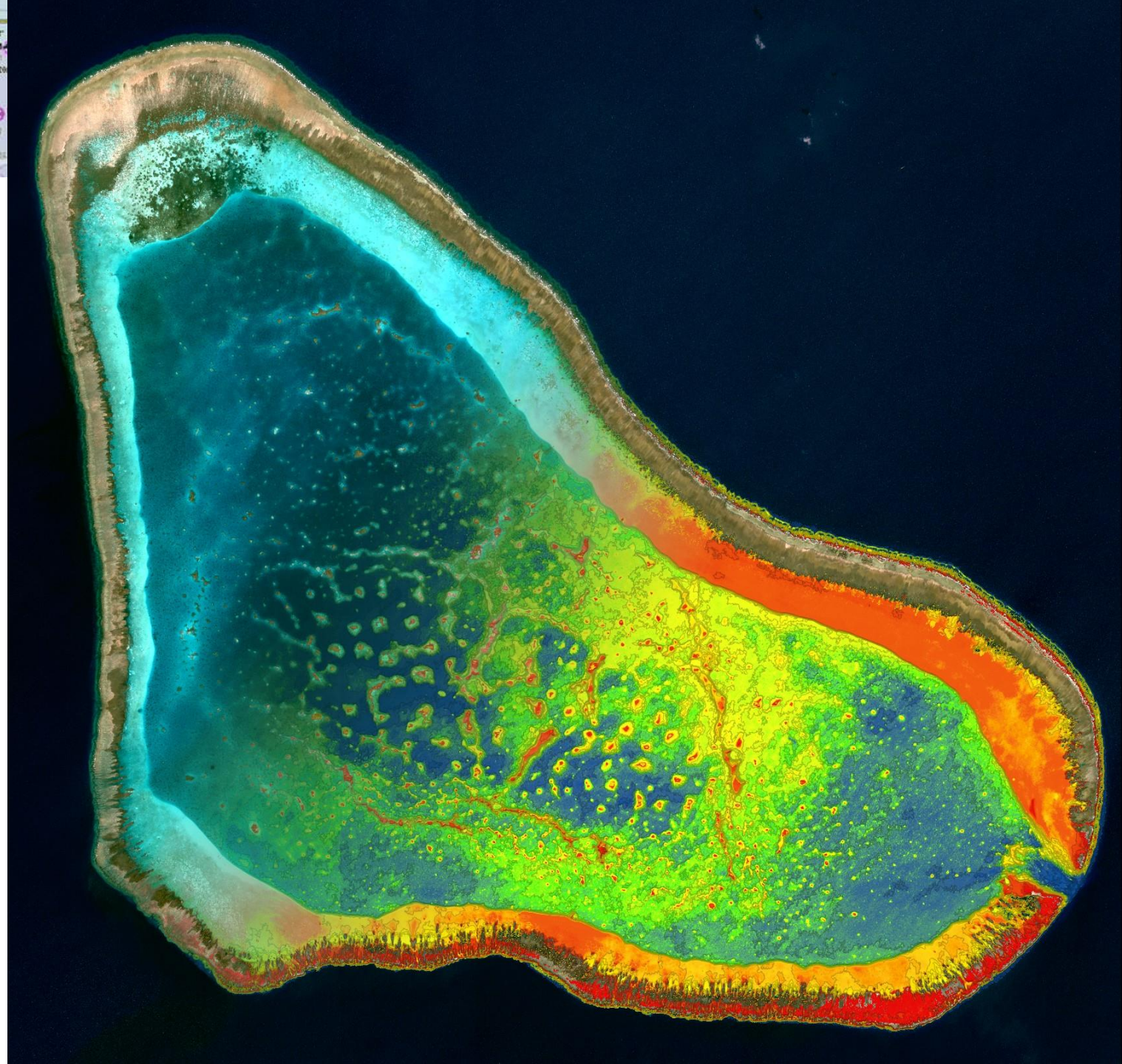
TOPCON

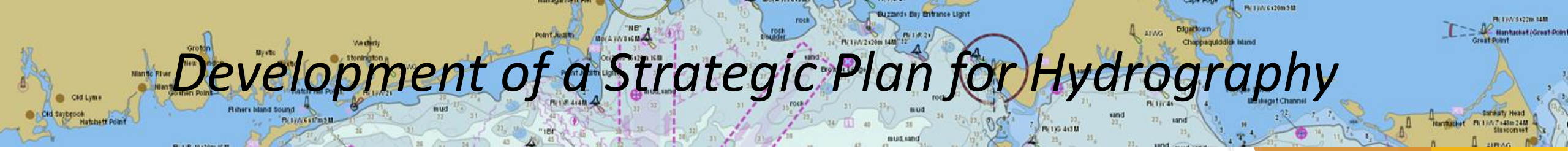
Leica
Geosystems

applanix
A TRIMBLE COMPANY

HYPACK
a xylem brand

Partnering with TCarta for Satellite Derived Bathymetry (SDB) (ongoing discussion)

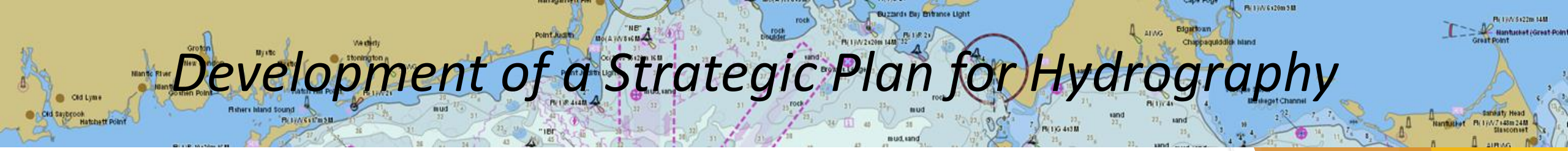




Development of a Strategic Plan for Hydrography

Main directions:

- Geospatial data collection and processing, using IHO S-100 framework and other standards (OGC, ISO, etc.), building common operating picture (COP) and generating decision aids (disaster, defense, etc.)
- Lidar and Satellite Derived Bathymetry
- Autonomous vehicles, Internet of Things for marine sensors, autonomous instrument calibration
- Inland water and estuary survey and mapping



Development of a Strategic Plan for Hydrography

Main directions are supported by:

- Machine/deep learning
- Geospatial data management
- Remote sensing
- Crowd-sourced Bathymetry (CSB)
- Engagement with stakeholders (industry, government and academia)
- Communications plan (internal and external)

*1) **Academic programs***

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About USM's HSRC

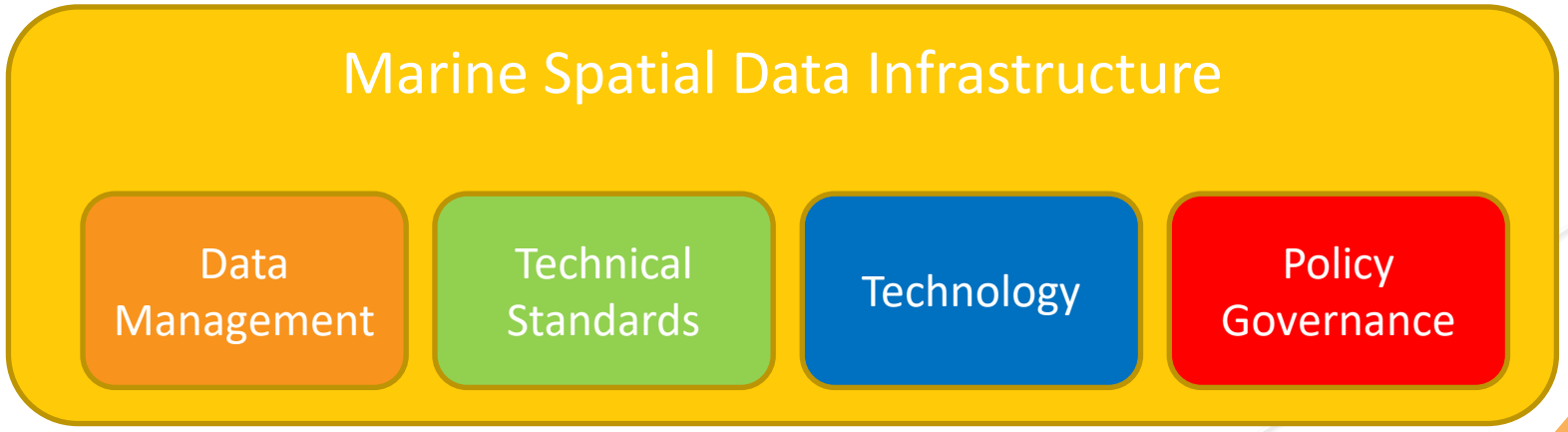
Established in 2001 as the research complement to the academic program

Assesses emerging trends *vis a vis* realizable benefits to operations

Develops new techniques to enhance operations

Provides bridging implementation of emerging technologies into operations

Hydrography provides the geospatial backbone to all marine science, marine resource use and management, and is a key component of Marine Spatial Data Infrastructure



Education and Training

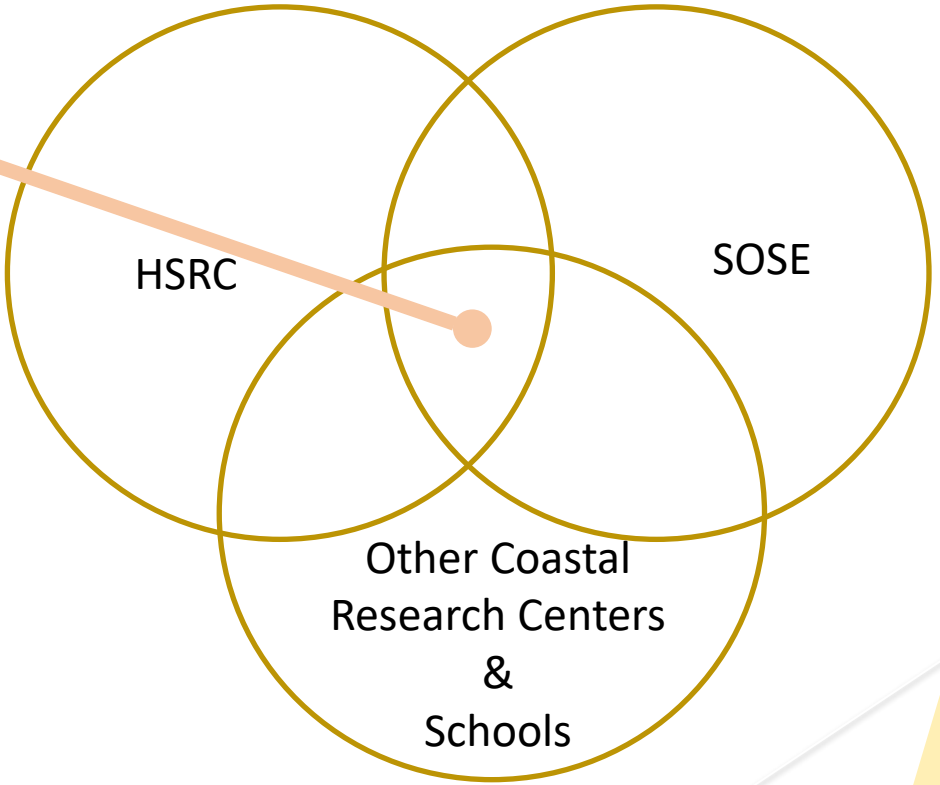
Through a long-standing partnership, the HSRC has provided funding and research opportunities for students, and access to state-or-the-art equipment for classes.

Teaching Through Research

Research/Projects and Funding for Students

State-of-the-Art Vessels and Equipment for HYD academic exercises

State-of-the-Art Vessels and expertise for Uncrewed Maritime Systems Certificate Programs



HSRC Research Themes

Data Sharing

- Best data management practices for crewed and uncrewed survey missions
- Integrated Ocean and Coastal Mapping (IOCM)
- SeaBed 2030

Coordinated Survey Planning

- Integrating NOAA and other agency water level data
- Improving regional VDatum
- IOCM for many users (offshore aquaculture, navigation, …)

Standards Development and Integration

- S-100, Ocean Best Practices

Innovation and Technical Development

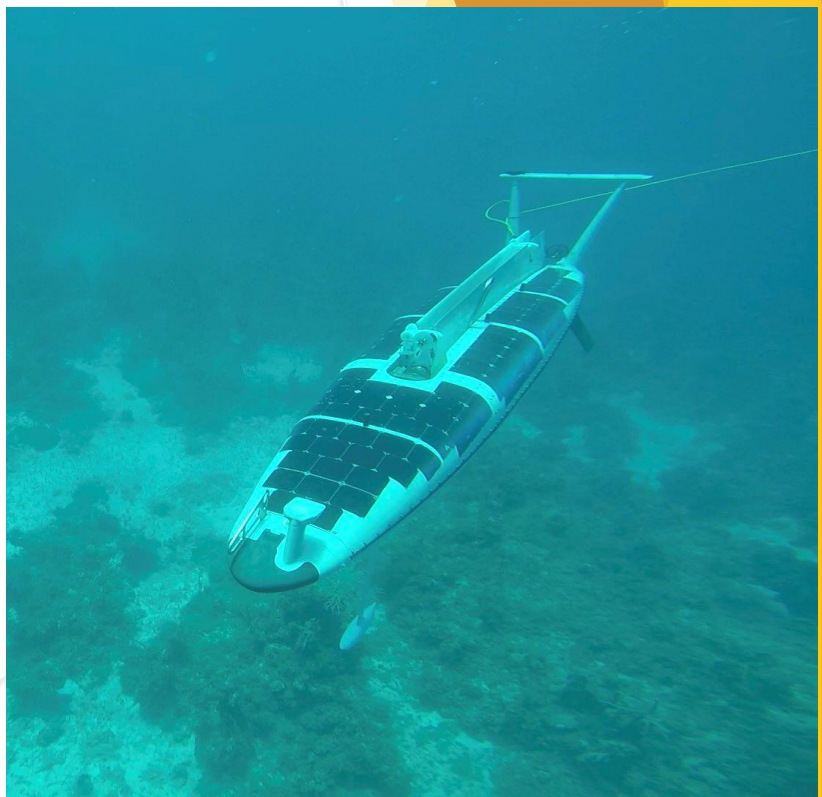
- Uncrewed systems (AUVs, ASVs, UAVs)
- Integrating NOAA and other agency water level data
- UMS for Aquaculture
- Precise Positioning

Current Unmanned System Projects

Autonomous Surface Vessels

L3 ASV Global C-Worker 5 “Sea Eagle” (NOAA OCS)

OceanAero Triton (with USM Ocean Enterprise)



WAM-V (USACE)

Current Uncrewed System Projects

Uncrewed Aerial Vehicles WingtraOne

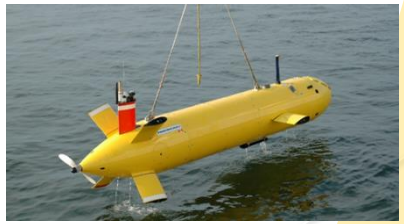
GNSS

High resolution (42 MP) camera, or

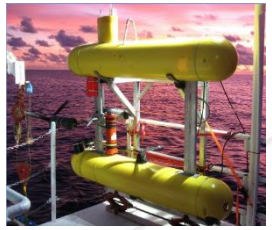
Multi-band calibrated multispectral camera with 6 channels

Shallow water bathymetry, Shorelining and ASV validation

Autonomous Underwater Vehicles (NOAA OER)



3000 m rated ISE Explorer-class "Eagle Ray"



2000 m rated SeaBED "Mola Mola"

Other Current Projects

Offshore tidal datum – ellipsoid separation using bottom pressure gauges and short-term GNSS buoy or ASV water level survey to ellipsoid

VDatum validation in the northern Gulf using USGS water level gauges, offshore buoys or ASVs and bottom pressure gauges

Low cost, low power, mass-market, GNSS and INS (L3MMGI)

End-to-end data management following international standards for data and metadata

Utilizing UMS for integrated mapping and environmental baseline surveys for offshore aquaculture

- Can this technology lower the cost of entry into the industry?

Previous Projects

- Quantified multibeam error budget for NAVO survey ships
- Extended offshore range of GPS/GNSS precise positioning techniques
- V & V of electronic charting methodologies - ECDIS Lab
- Developed GPS Tide Buoy Techniques & SOP
- Coastal Zone Mapping and Imaging Lidar (CZMIL) - an US Army Corps of Engineers (USACE) sponsored development project that fielded the next generation airborne sensor supporting the National Coastal Mapping Program
- LIDAR shorelining of Great Lakes
- Development of Saildrone mapping capability and testing of mapping in remote locations

Ocean Exploration Cooperative Institute (OECI)

"…this consortium will bring skills and capacities that will complement and amplify the exploratory science, technology, and education and outreach capabilities of the NOAA Office of Ocean Exploration and Research …"

- University of Rhode Island
- University of New Hampshire
- The University of Southern Mississippi
- Woods Hole Oceanographic Institution
- Ocean Exploration Trust

oeci
EXPLORING THE NATION'S BLUE FRONTIER

Ocean Exploration Cooperative Institute (OECI)

Roger F. Wicker Center for Ocean Enterprise

Centerpiece of research and development, creating a unique maritime technology environment on the Mississippi Gulf Coast.

Regional engineering and development center, co-located with an innovation and commercialization center to support maritime systems and platforms for ocean exploration, forecasting, and data collection.

Gulf Blue Initiative

Elevate Mississippi's Blue Economy

Big Ideas Out of the Blue

GULF BLUE SM

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