UGOS Science and Technical Perspectives

Steven F DiMarco, GERG Director

Wm Bryant Oceanography Chair for Teaching, Research and Mentoring Excellence
Texas A&M University

GCOOS Spring Meeting April 14, 2026

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GCOOS
GULF OF AMERICA
COASTAL OCEAN
OBSERVING SYSTEM
20
YEARS


INTEGRATED OCEAN
OBSERVING SYSTEM


FLORIDA AGRICULTURAL MECHANICAL UNIVERSITY
HEAD
HEART
HAND
FIELD
1887


WOODS HOLE OCEANOGRAPHIC INSTITUTION
1930


NC STATE
UNIVERSITY


THE UNIVERSITY OF
SOUTHERN MISSISSIPPI
1910


A&M


UNIVERSITY OF
Rhode Island


OS
OCEAN SIERRA


UNIVERSIDAD NACIONAL AUTÓNOMA DE MÉXICO


RUTGERS


CICESE


CODAR
OCEAN SENSORS


FLORIDA STATE UNIVERSITY
VIRES
ARTES
MORES
1851


FUGRO


UNIVERSITY of SOUTH FLORIDA
TRUTH
WISDOM
1956


MIAMI


FATHOM
SCIENCE
UNDERSTANDING
THE DEPTHS


mseas


TEXAS A&M
UNIVERSITY
CORPUS
CHRISTI
HARTE
RESEARCH INSTITUTE
FOR GULF OF MEXICO STUDIES


INSMET
CENTRO METEOROLOGICO PROVINCIAL DE CAMAGUEY

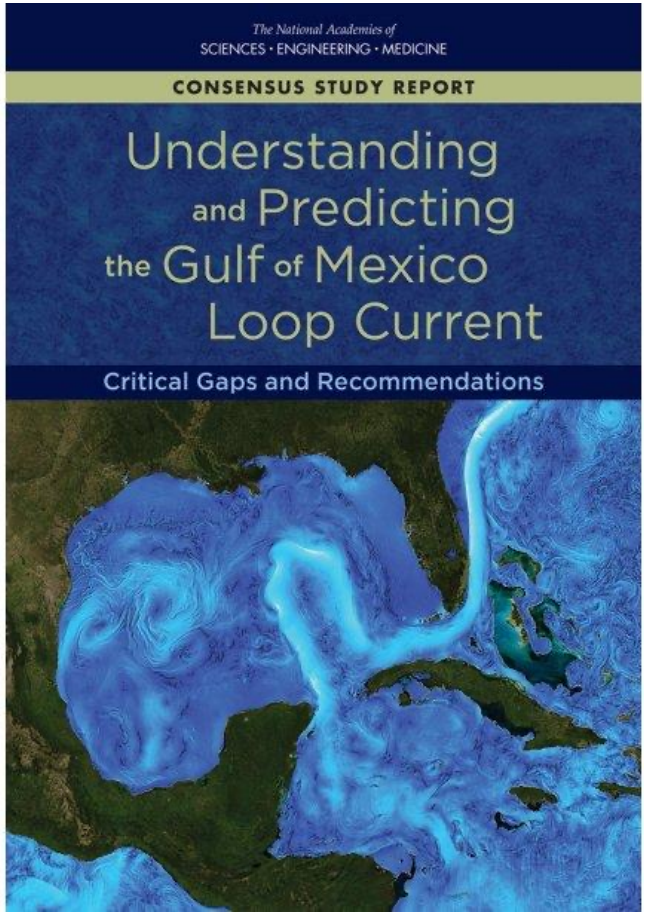
UGOS: Understanding Gulf Ocean Systems

History

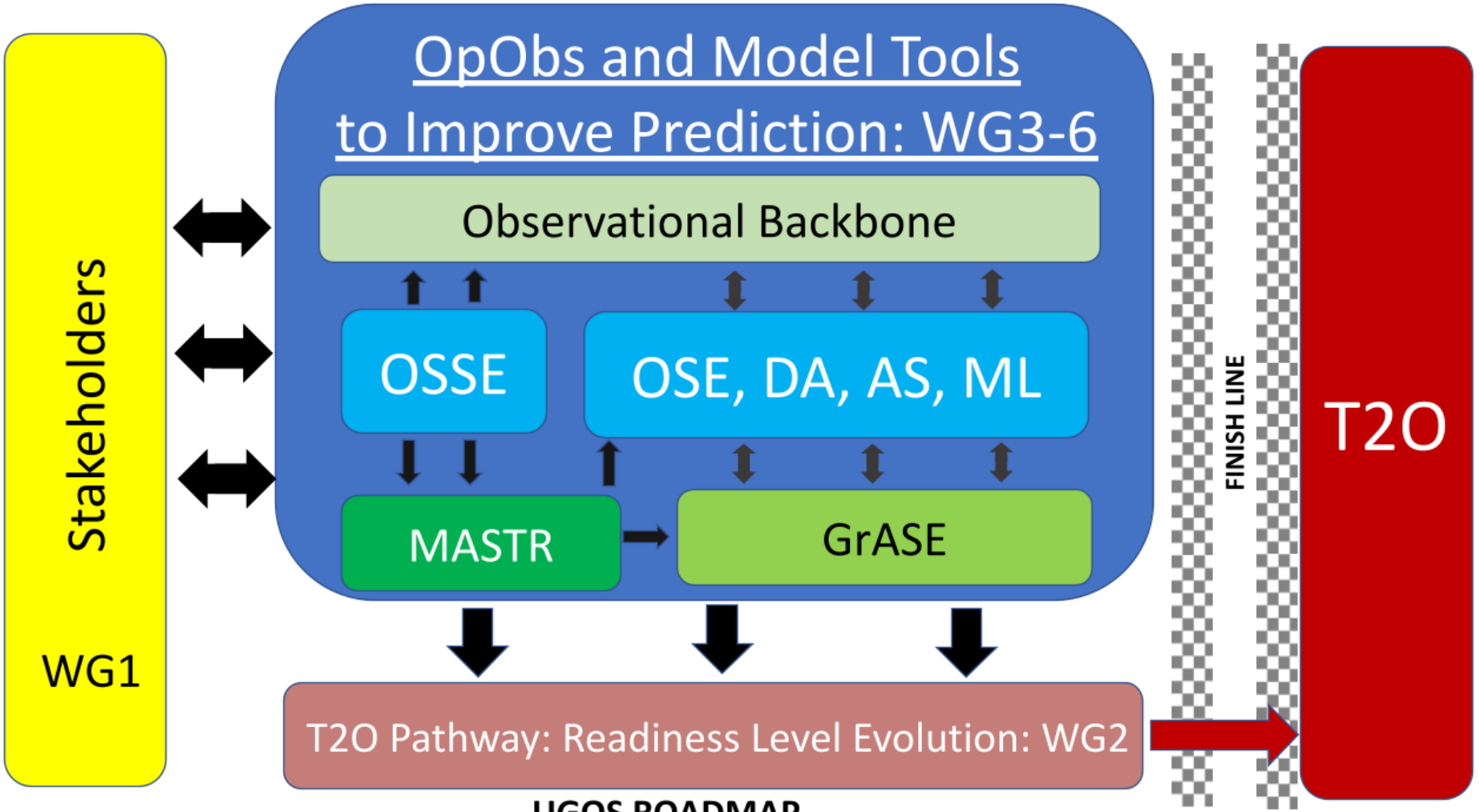
- 2016 GRP Advisory Board
- 2018 Consensus Study Report
- 3 rounds: $40M funded projects

Goals

- Advance Understanding of Loop Current Dynamics
- Improve Forecasting and Predictive Skill
- Reduction of Risks to Offshore Energy Sector



UGOS Road Map



UGOS ROADMAP

GCOOS Spring Meeting April 14, 2026

2024 MASTR and 2025 GrASE Elements

18 January – 01 May 2024 15 April – 30 November 2025

Target: GOM Inflow/Outflow, LC Separation regions

Observations:

- Gliders: CICESE, Rutgers, TAMU
- Floats: Argo WHOI APEX-EM (T/S/v) UMiami
- **Drifters: WHG FHD drifters**
- HFR: UGOS Yucatan TAMU, Rutgers, UNAM, USM
- **ROCIS Flights (Fugro)**
- Background Obs: Argo

Operational Products: WHG Mapper, Reachability, Data Flow

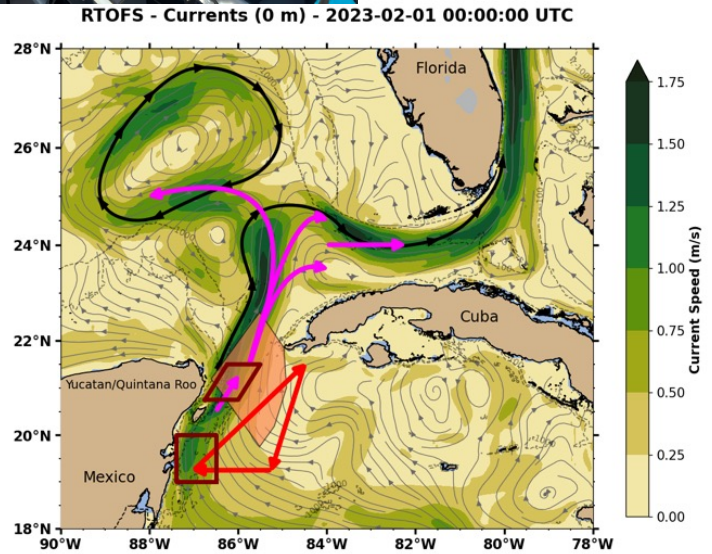
Operational Numerical Output:

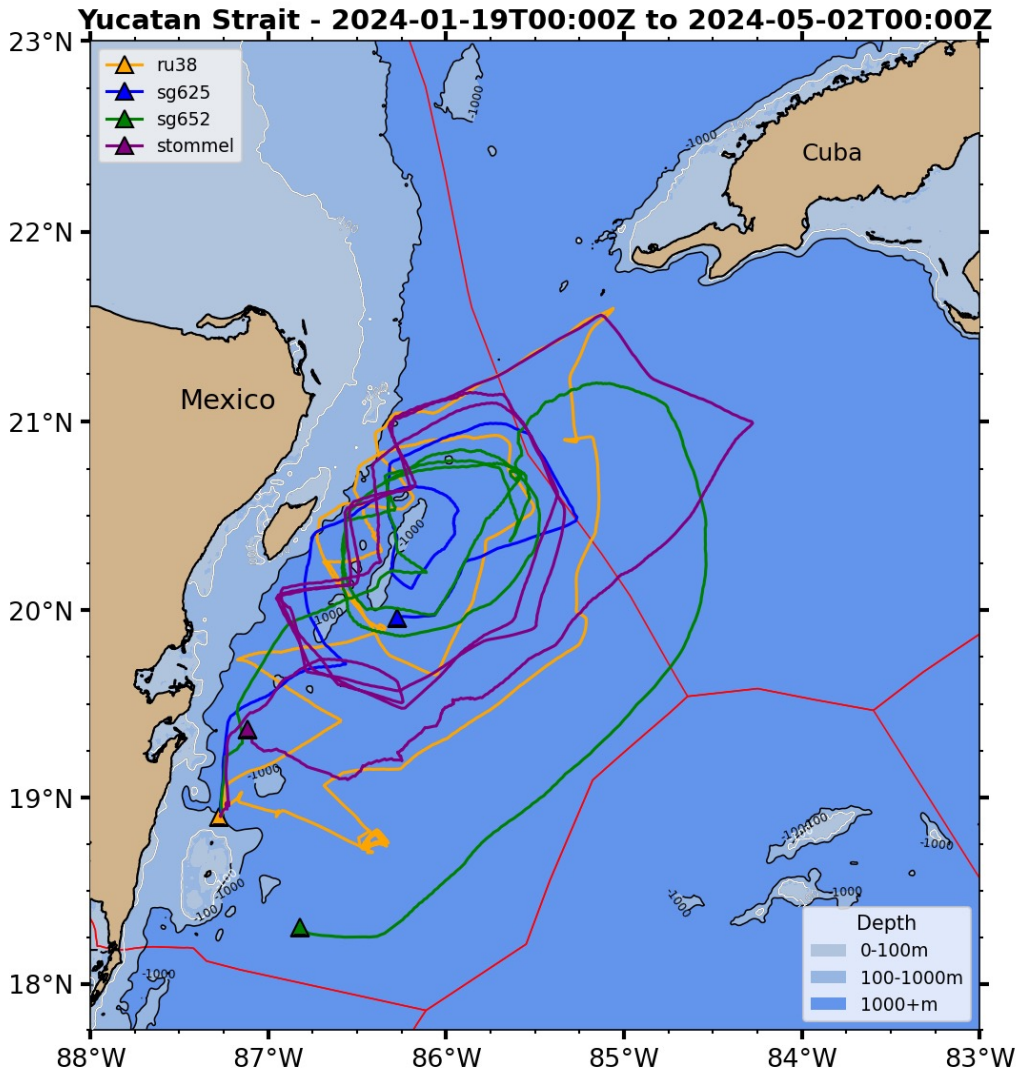
GOFS (Navy),CMEMS (EU), RTOFS (NOAA)

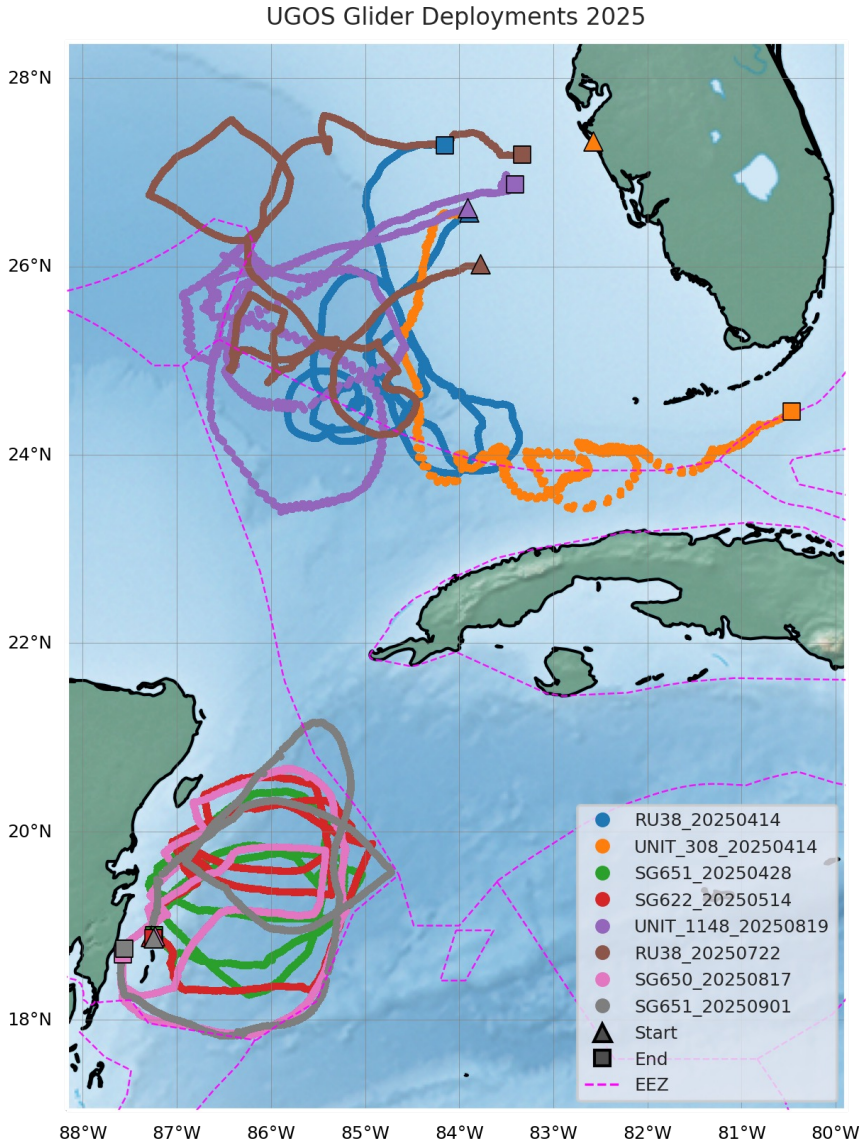
TOPS-DA (CLS industry)

Research Numerical Models: FSU, NCSU, CICESE

US State Department, Mexico, Cuba







MASTR

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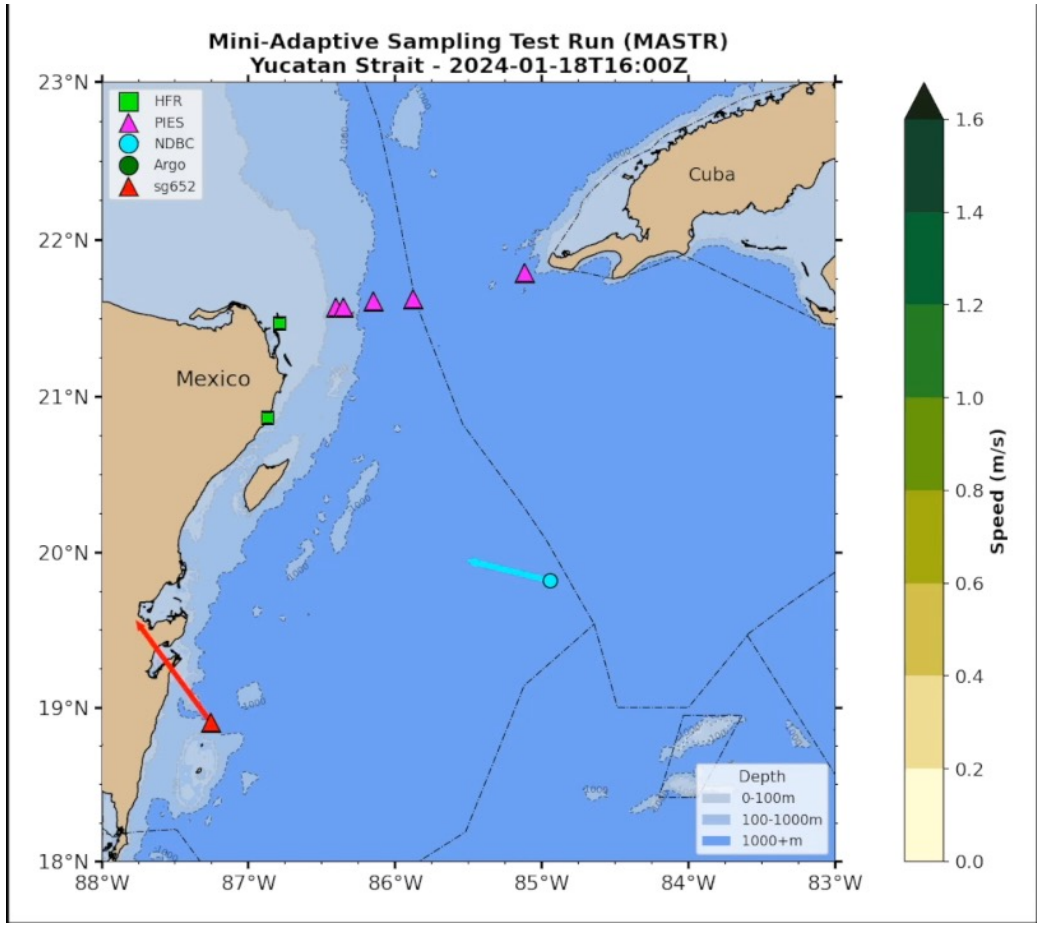
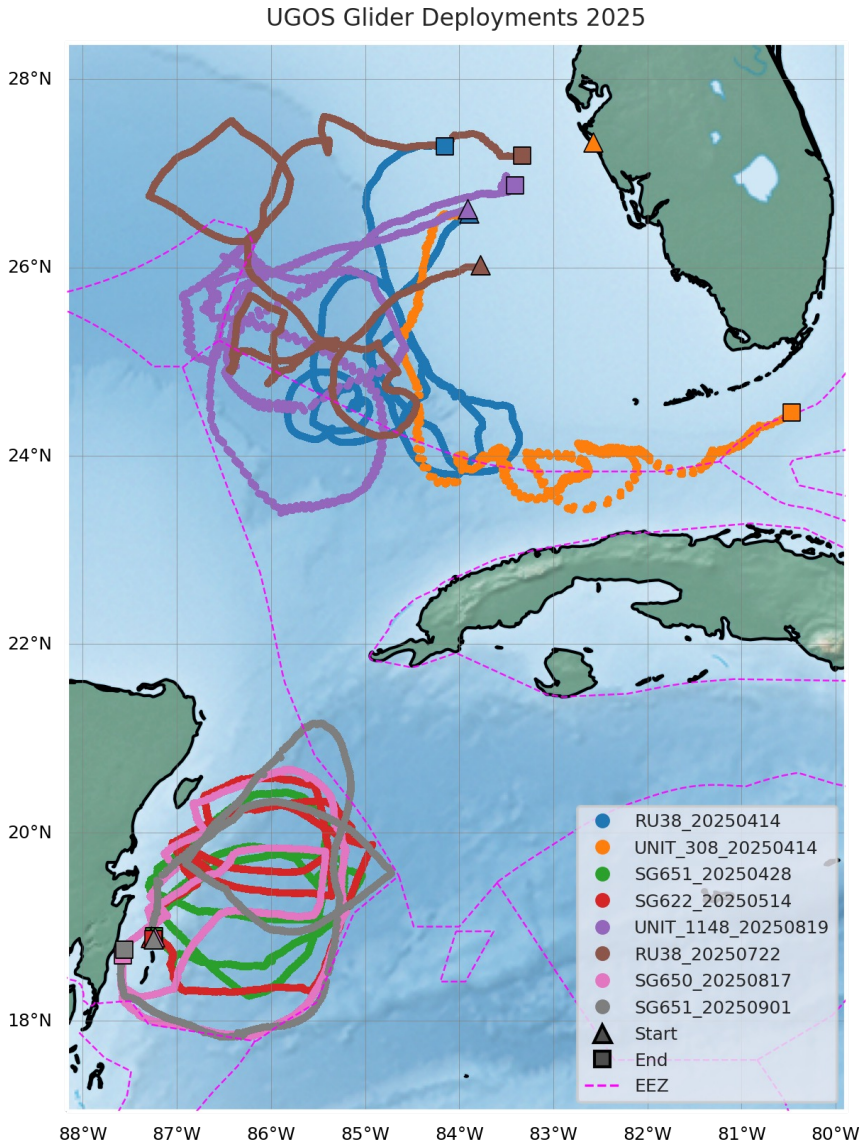
GrASE





MASTR

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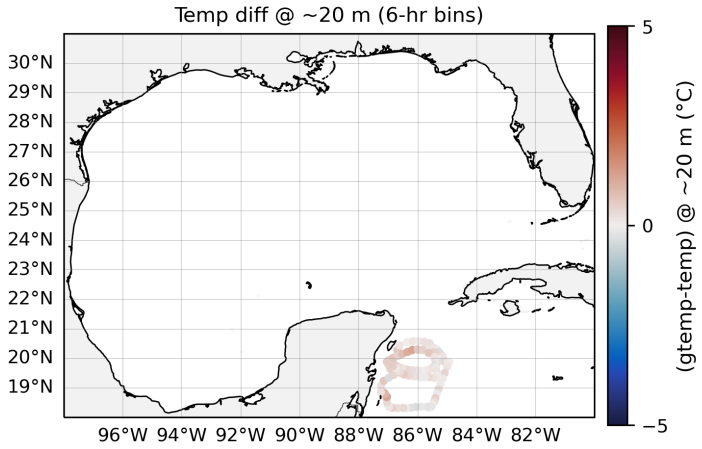
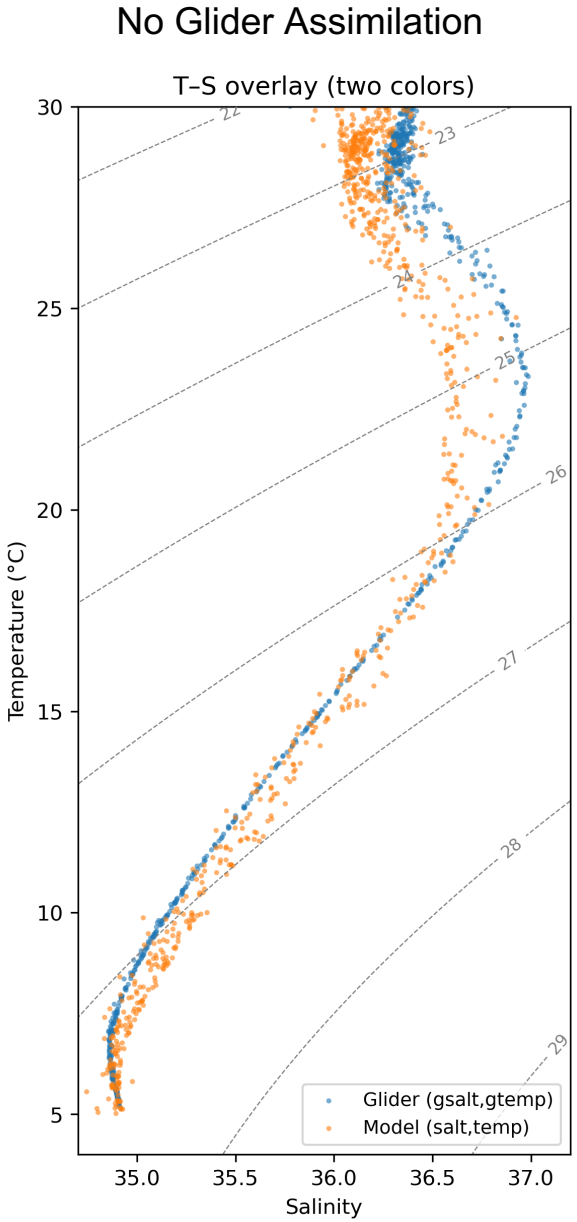
GrASE

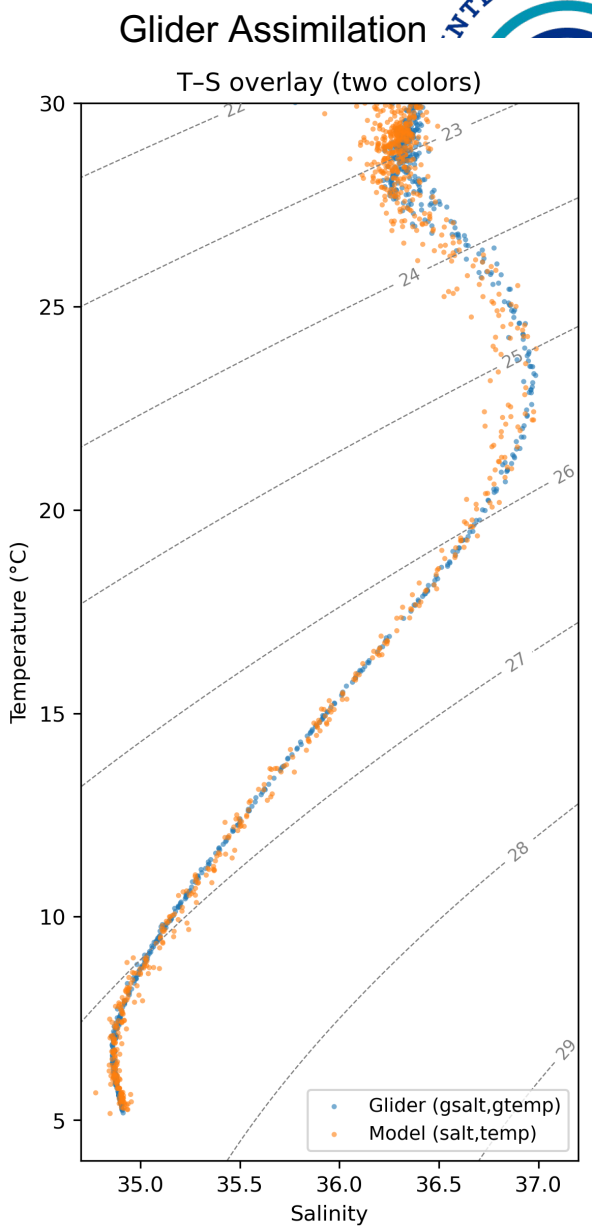
Assessing impact of assimilating observations on numerical models.

T/S Yucatan Current

HYCOM-FSU



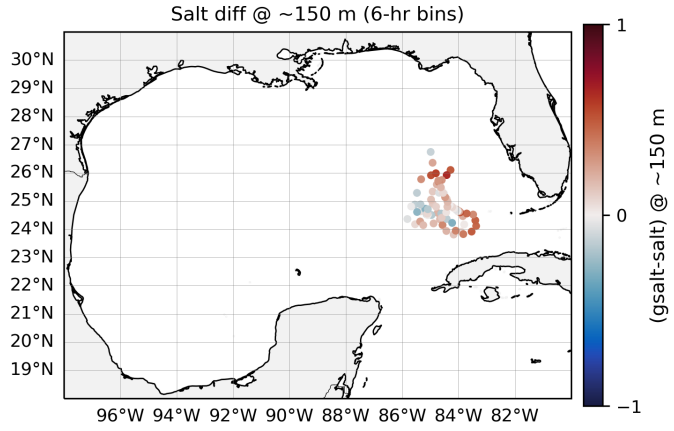


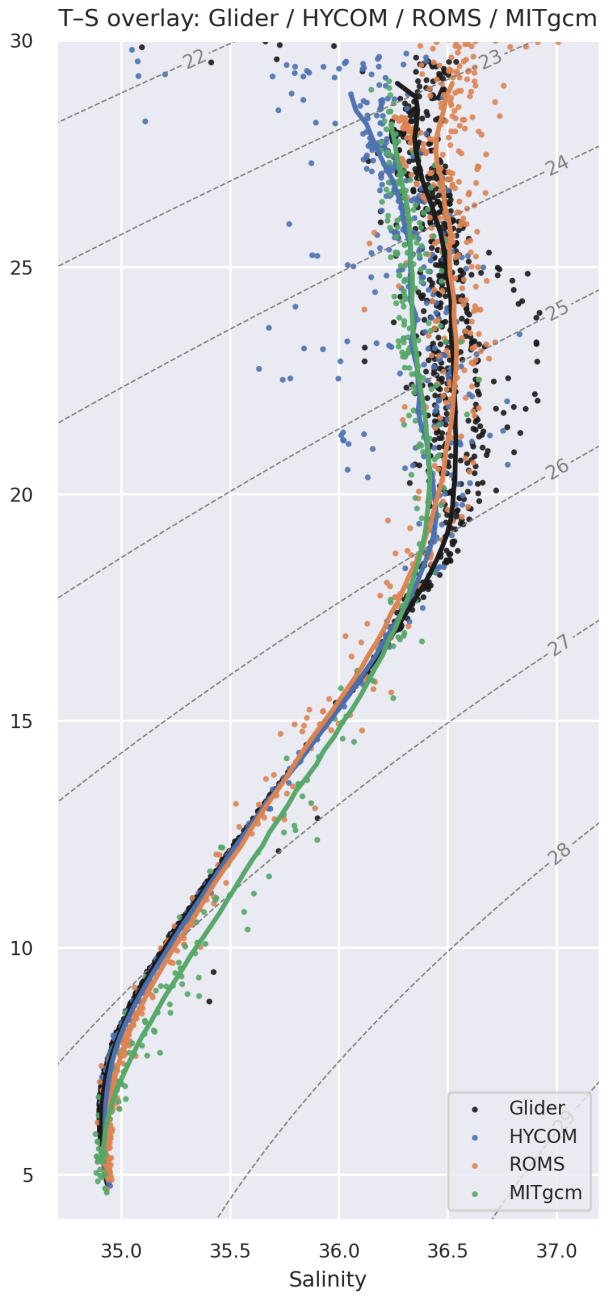


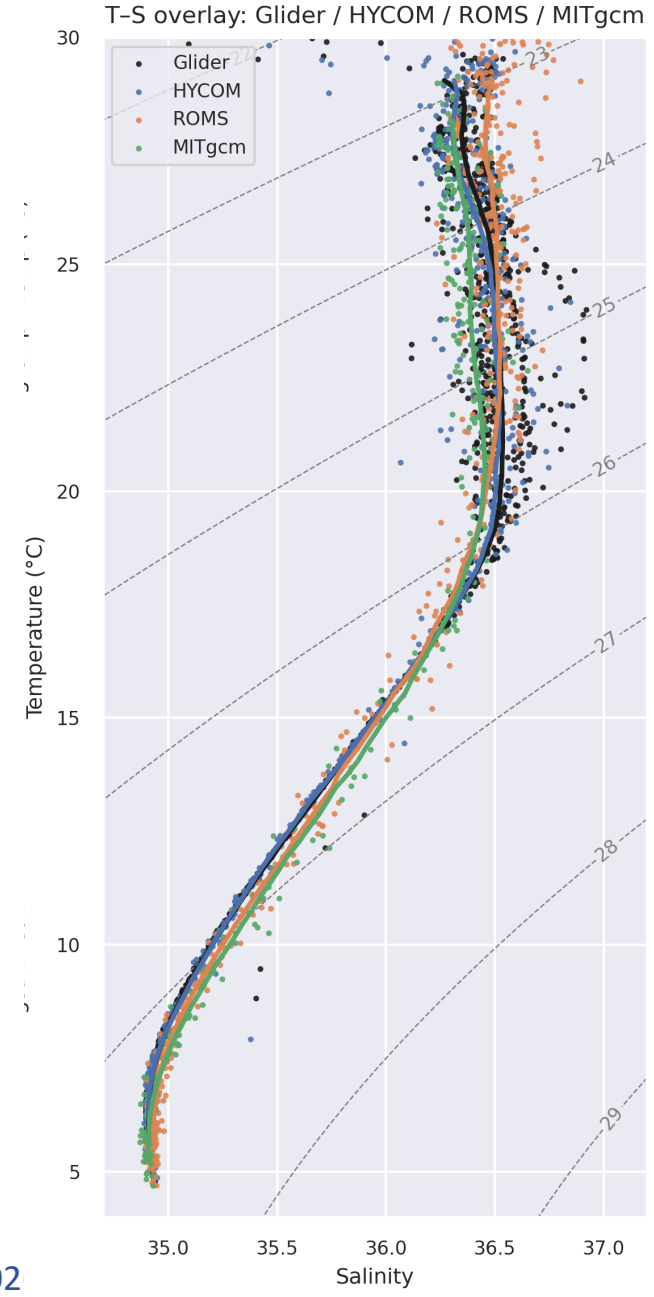
Assessing impact of assimilating observations on numerical models.

T/S

Downstream LC







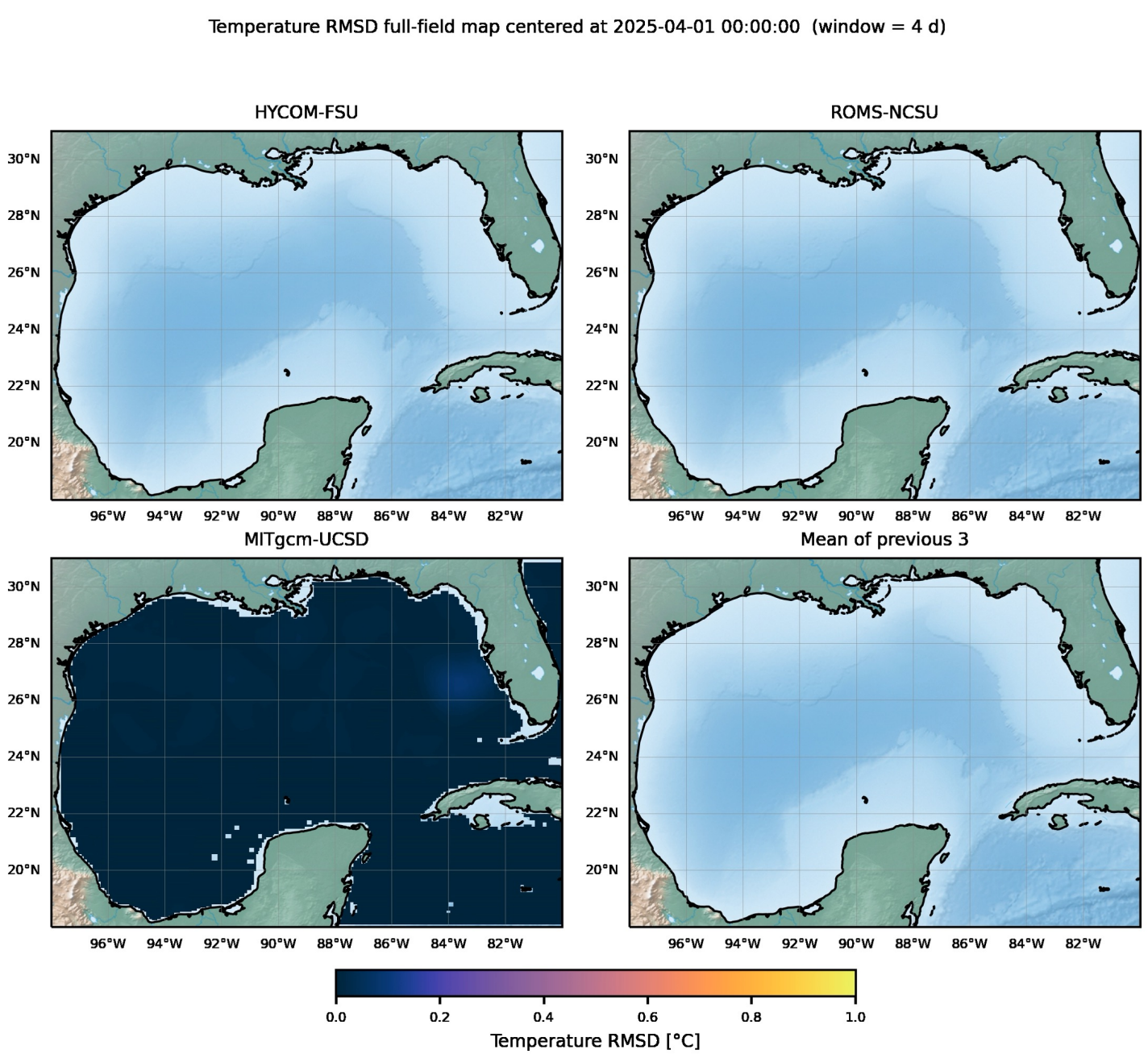
Assessing impact of assimilating observations on numerical models.

Temperature

HYCOM-FSU

ROMS-NCSU

MITgcm



GCOOS GULF OF AMERICA COASTAL OCEAN OBSERVING SYSTEM

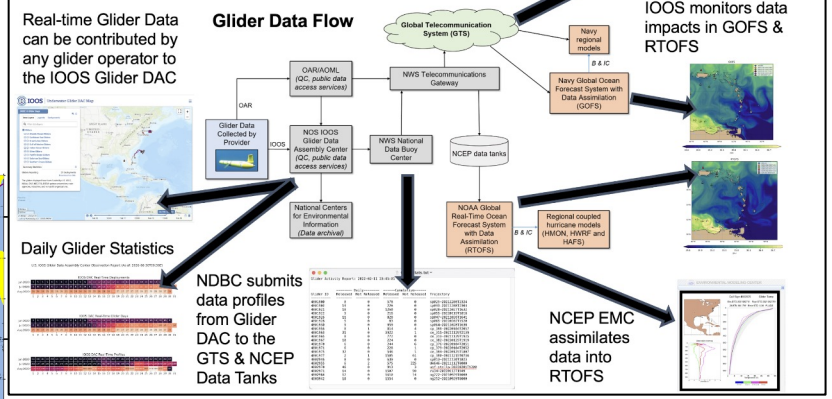
20 YEARS

INTEGRATED OCEAN

Operational Systems: *Glider Data Flow*

Real-time Glider Data can be contributed by any glider operator to the IOOS Glider DAC

Glider Data Flow



OSMC monitors GTS; Accessed by OceanOPS

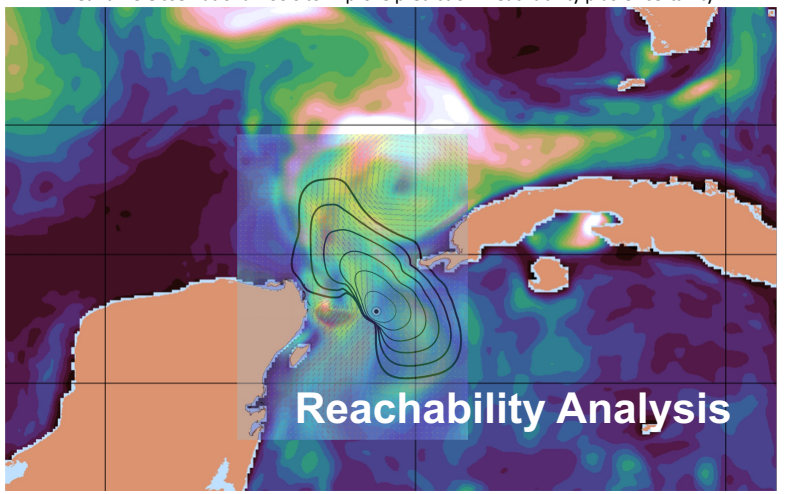
IOOS monitors data impacts in GOFS & RTOFS

Daily Glider Statistics

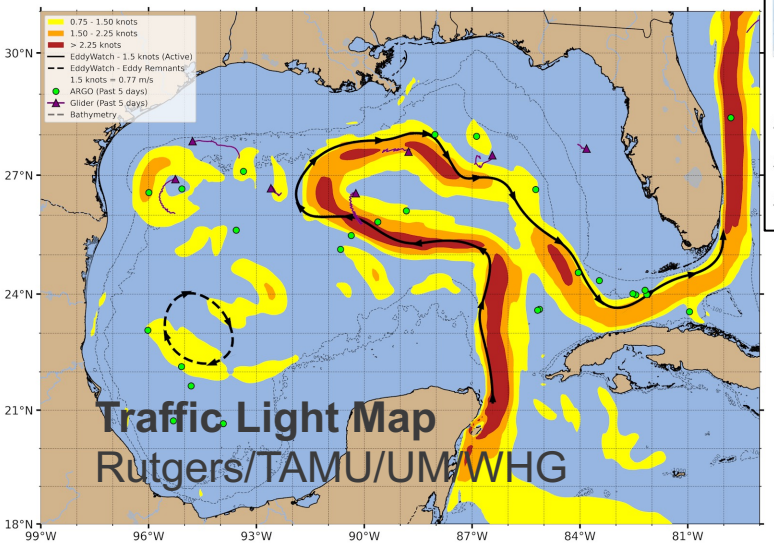
NDBC submits data profiles from Glider DAC to the GTS & NCEP Data Tanks

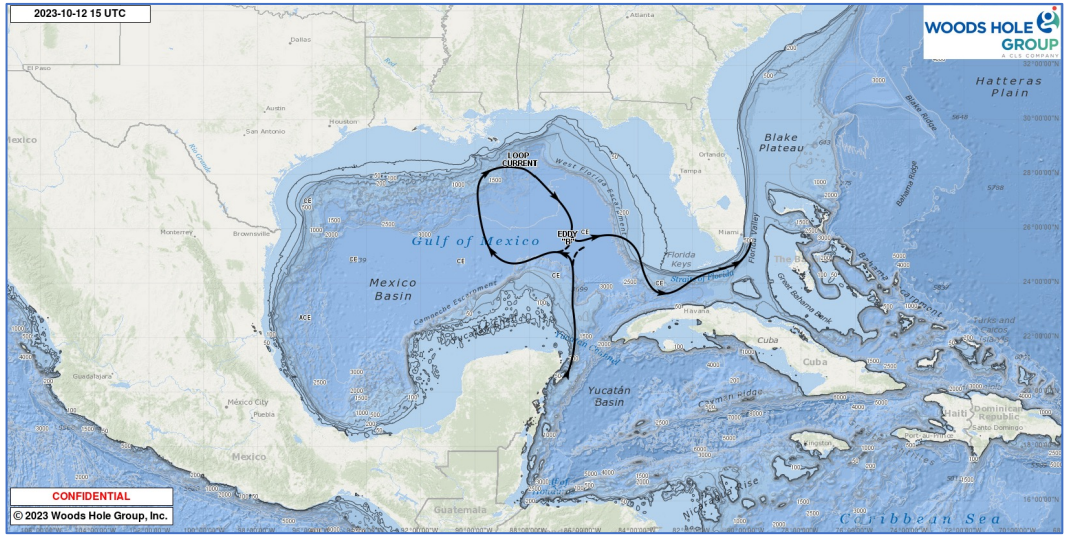
NCEP EMC assimilates data into RTOFS

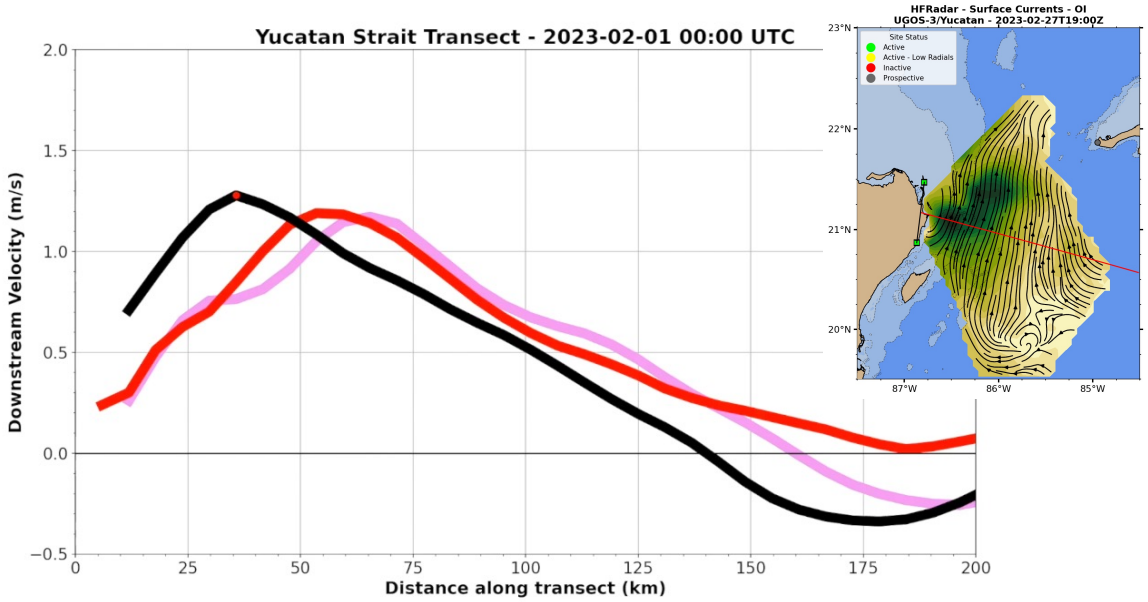
Real-time Observational Tools to improve prediction: Reachability plus Uncertainty



Surface Current Comparisons - 2022-09-04 12:00 UTC - GOFS







Unprecedented Achievement

- End-to-End Demonstration
  - Diplomacy to logistics to collection to dissemination to ingestion
  - Multiple published papers (so far,… planned special issue Oceanography)
- How is “success” assessed? D. A. T. A.
  - Data Delivery: Simultaneous deployments in target region
  - Ingestion: Assimilation of UGOS platforms into multiple numerical models
- Aspirant Goals
  - Quantification of impact of **MASTR/GrASE** observations on numerical model output
- Unexpected Successes: Operational Tools
- Unexpected Discovery: Influence of Arrowsmith Bank on Dynamics
- Unexpected Simulation Revelations: Caribbean Hydrography/YC Core position

Collect data, not dust ™

GERG CETI Buoy: Caribbean Sea 2022

05 April 2023

TAMU, College Station, TX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