Cyber Infrastructure and Skill Assessment

IOOS DMAC - 2023

Brainstorming - NOS Modeling Community

BIL/CIFIM-10 - Goal

This project is being developed under the BIL/CIFIM-10, which aims to: "*…Develop and implement shared cyberinfrastructure and tools to assess quality of observations in support of data assimilative models and to assess model skill (i.e., performance) to help forecast and changing conditions at the coast*".

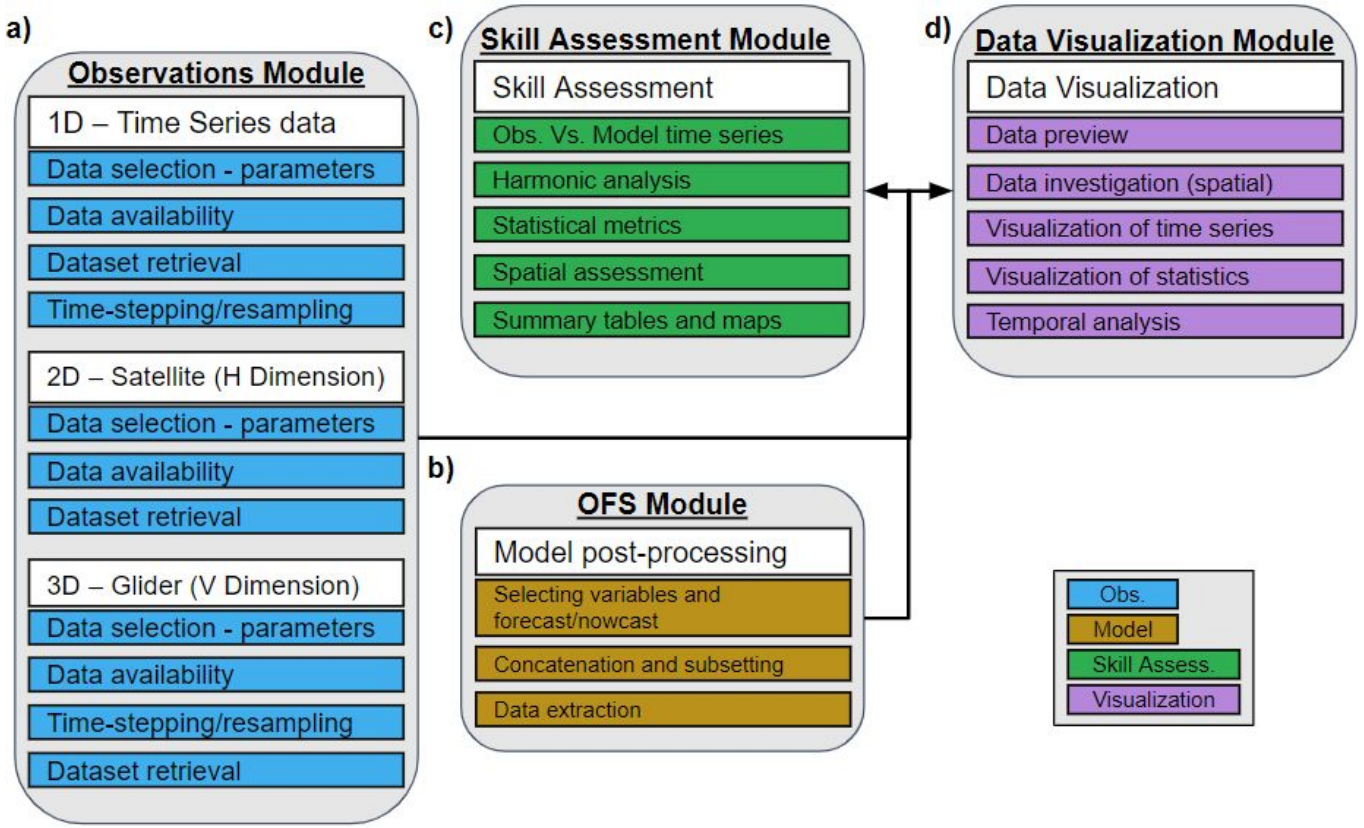
NOS - Vision

- *"shared cyberinfrastructure in which NOS modelers can work to quality control observations and model outputs"*.
- *"web-based tools for routine quality assessment of OFS outputs and selection of input data"*.

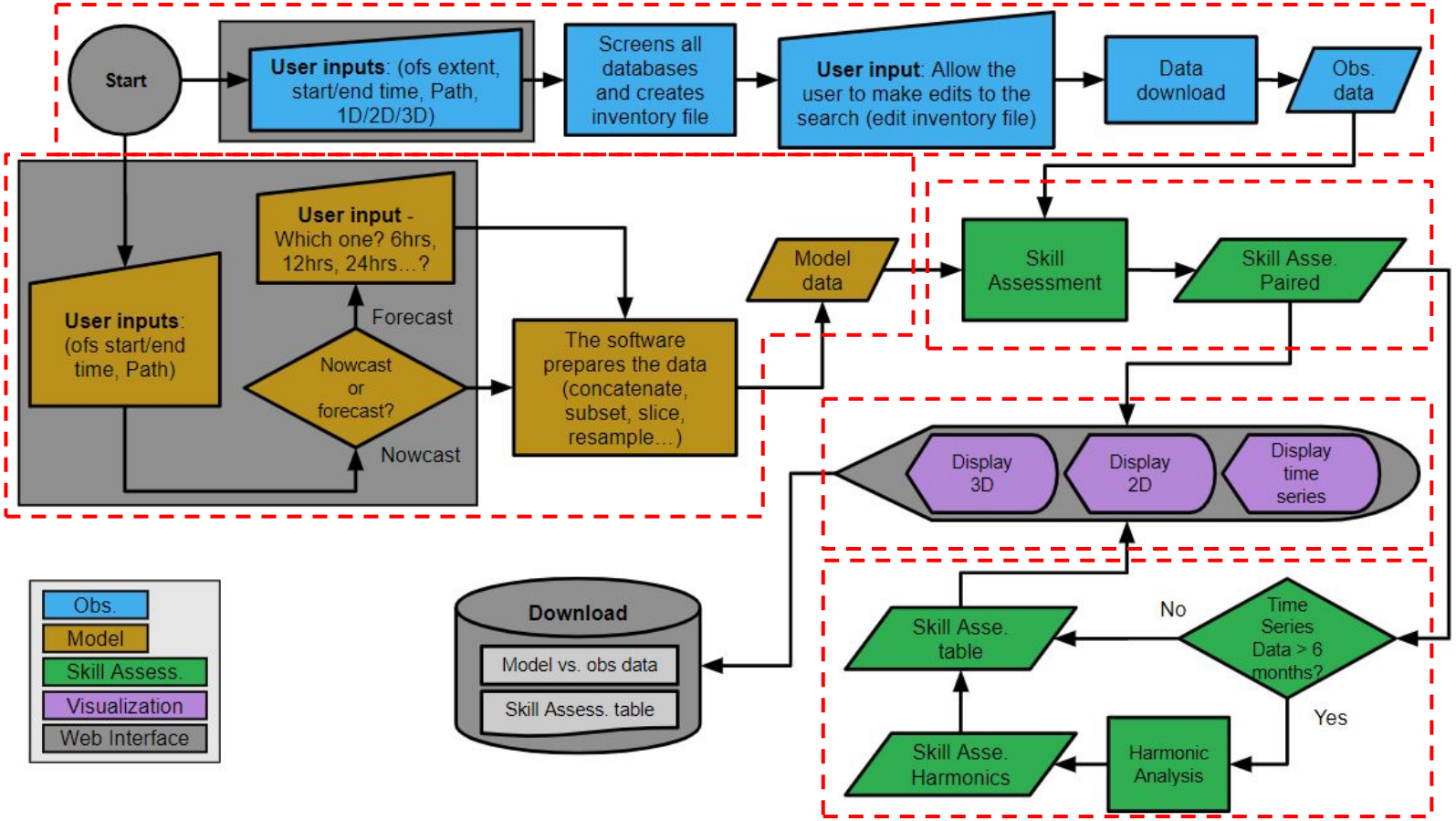
Requirements

1. Accessible by OFS developers and operators across NOS.
2. Skill assesses existing and new OFS by:
   a. efficiently accessing:
      i. near-real-time OFS outputs
      ii. oceanographic observations
      iii. model forcing
   b. in an environment where the users can:
      i. visualize (spatially and temporally) time series, profiles, 2-D maps, cross sections
      ii. obtain verification statistics for existing and new OFS

SCI-SA Software Modules



SCI-SA - Flowchart



Back-end Cyber Infrastructure

Core Capability 1

Standard Run

Standard skill assessment and related QA run on a set schedule (say every model run)

- Data retrieval and processing would occur on a set schedule with results viewable at any time via a web interface

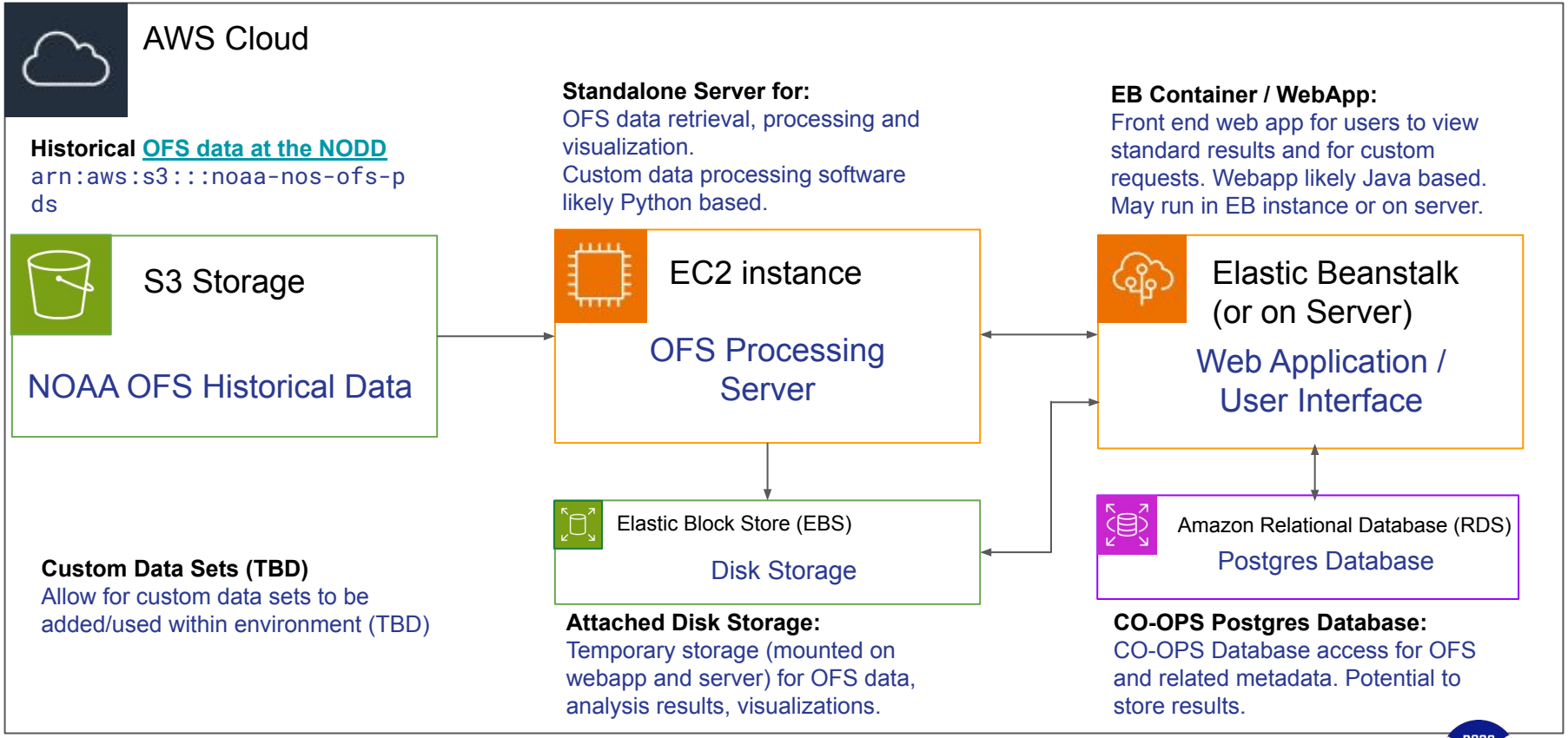
Core Capability 2

Custom Run

User-requested OFS data analysis for custom OFS extents

- Due to the long data retrieval and runtime, this process is asynchronous. Users would make a request and view results at a later time.

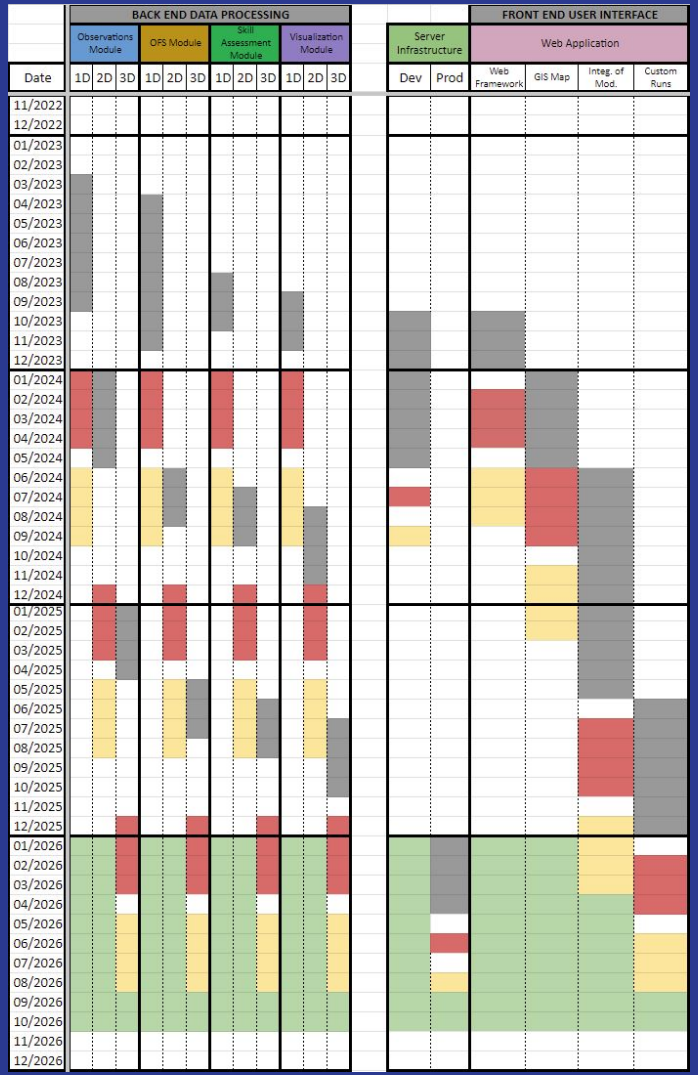
Cyber Infrastructure



Timeline

- Year 1 (2023):
  - Project Requirement Document
  - Project Kickoff Document
  - 1D Applications
- Year 2 (2024):
  - Web/GIS Front-end application
  - 2D Applications
  - Dev Server creation
- Year 3 (2025)
  - Complete integration of modules
  - Implementation of custom capabilities
  - 3D applications
- Year 4 (2026)
  - Prod Server creation
  - Debug
  - Final Documentation

Legend
Development
1st rd of review and bug fixing
2nd rd of review and bug fixing
Final Bug fixing phase
Milestones



OCS Team

Coastal Marine Modeling Branch

Saeed Moghimi
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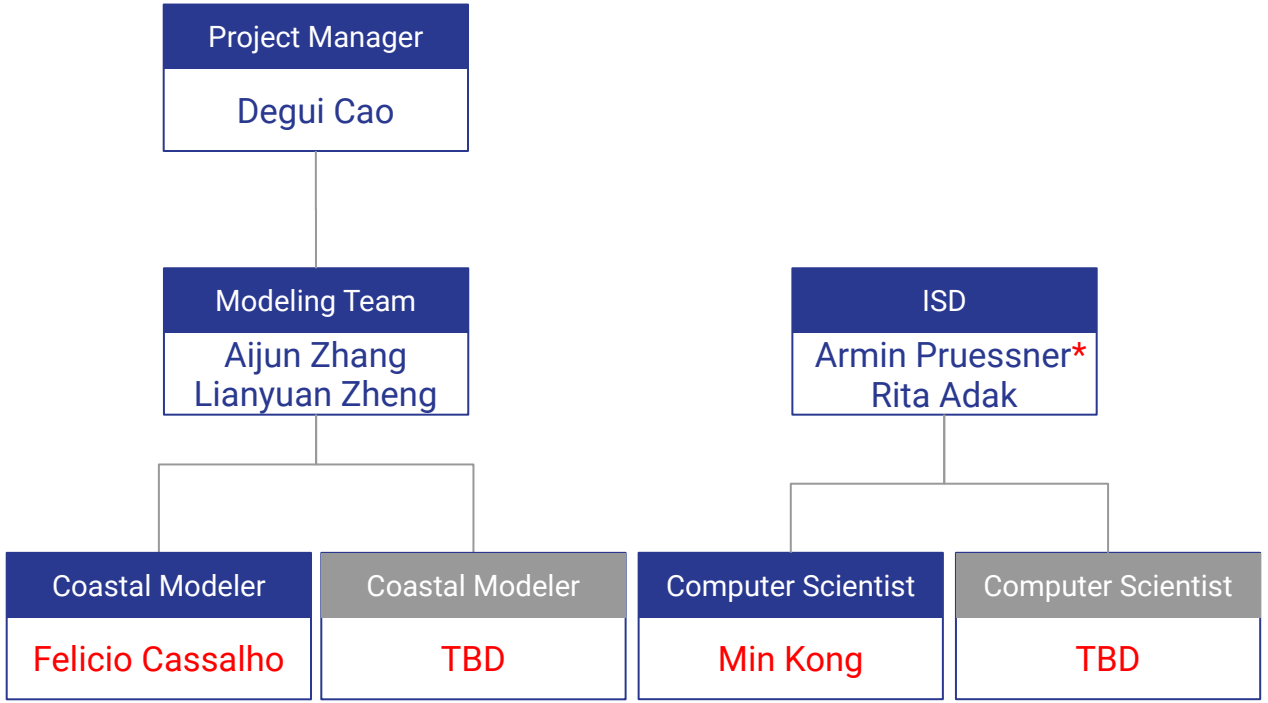
Coastal Modeler

TBD

CO-OPS Team



*Developers

Cyber Infrastructure and Skill Assessment

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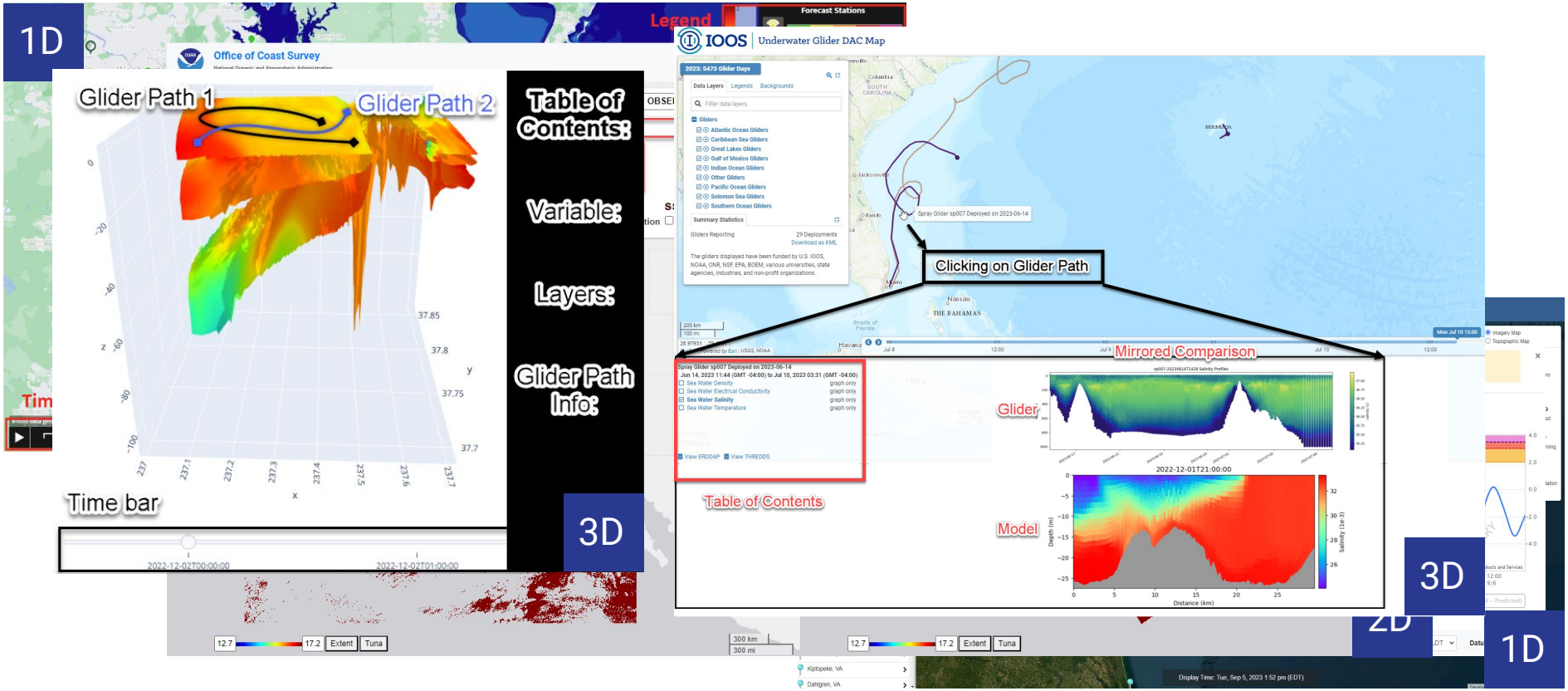
Back-end Cyber Infrastructure

- Data Processing Server
  - Jobs processed on a set schedule to retrieve OFS data and perform skill assessment processes.
  - Jobs processed for custom user requests. Users would be notified that results are available.
  - Results would be visible to all users via the webapp.
- Web Application
  - Interface to view standard results/reports//visualizations
  - Interface to allow users to select custom OFS data extents and time periods, and analyses to run.
- OFS Data (S3 Bucket)
  - NODD S3 bucket for historical OFS data (usually up to 2 years of data is available)
- Data Processing Results/Visualizations (EBS share)
  - Location where data processing server results are shared with the web application.
  - Custom user requested results would only be available for a limited time.
- Postgres Database (Amazon Relational Database)
  - Utilize existing CO-OPS database for OFS stations and metadata
  - Potential to store some results (if needed)

Front-end Cyber Infrastructure - Webpp

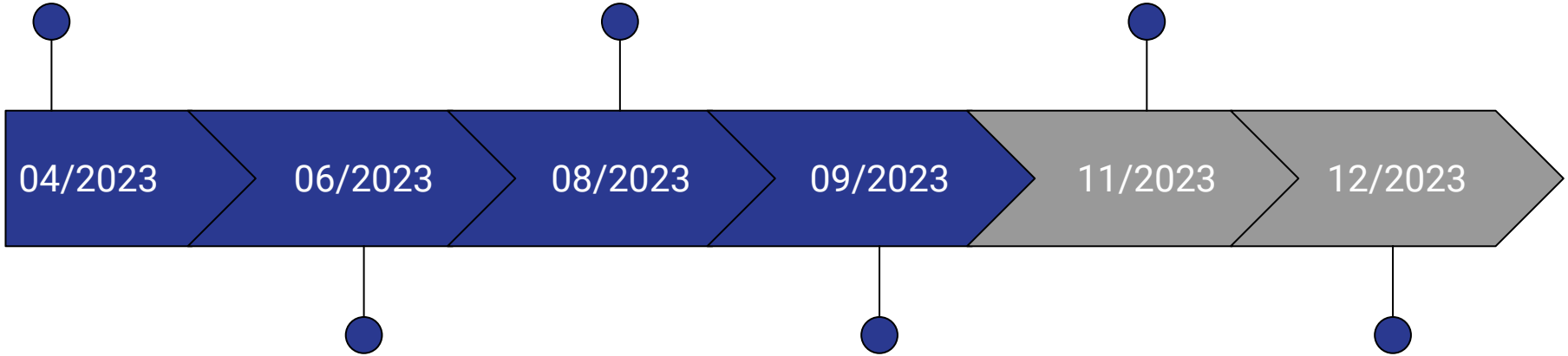


Progress and Short-term Goals

Beginning of Development

- 1D OFS Module (V.1):
- *[SSH, SST, Salinity, Currents]*:
  - [FVCOM-based OFS]

- 1D Visualization Module (V.1)
- Standardization of script
- 1D OFS Module (V.2):
  - [FVCOM, ROMS-based OFS]



- 1D Observations Module (V.1)
- *[SSH, SST, Salinity, Currents]*:
  - COOPS
  - NDBC
  - USGS

- 1D Skill Assessment Module (V.1) :
  - Paired time series
  - [RMSE, R, Bias, %Bias]

- Delivery of 1D Prototype
- Web Framework (access to results)