

Developing a MOBY-NET instrument, suitable for a federation network for Vicarious Calibration of Ocean Color Satellites

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1) Objective

The objective of this proposal is to develop and build two copies of a prototype Vic/Cal instrument, called MOBY-NET, which can be packaged in a 40' shipping container. These instruments will have all of the augmentations that we are doing to the current existing MOBY instrument, but be suitable for shipping to other locations. Commercial partners are integral to this effort and allow the future development of a federation of distributed identical MOBY-NET instruments deployed throughout the world, but centrally calibrated and characterized to enhance the vicarious calibration capabilities for use by ocean color satellites. By having at least one additional site, time required to collect a suitable number of high quality matchups will be reduced significantly. Other improvements currently being implemented at the MOBY site, that will be incorporated in this new design, will help to reduce the uncertainties of the MOBY measurement, already the highest quality measurement available, and thus reduce the number of matchups required to achieve a stable vicarious calibration of an ocean color satellite. The commercial vendors will supply completed major subsystems of the instrument to allow a pathway for further instruments to be built as desired. This project will develop the modular optical system, test the transportability of this optical system while maintaining its calibration, acquire and adapt additional instrumentation to test the stability before and after shipping, and extend the hyperspectral measurement capability from 370 -900 nm to 350-900 nm (to match the PACE objectives).

2) Summary of Accomplishments during this period, including the achievement of any milestones

- 1) The stability test for the Stability Source and Monitor has been going very well.
- 2) The rest of the MOBY-Net buoy design is being finalized, along with the single pickup point design.
- 3) We are continuing characterization of the spectrometers.
- 4) Software to control individual components of the spectrometers has been created.

3) Current Progress Description

- 1) Stability source and monitor

The stability monitor has been participating in a long-term test at NIST. So far the instrument is doing very well, with the stability within 0.1% through the test.

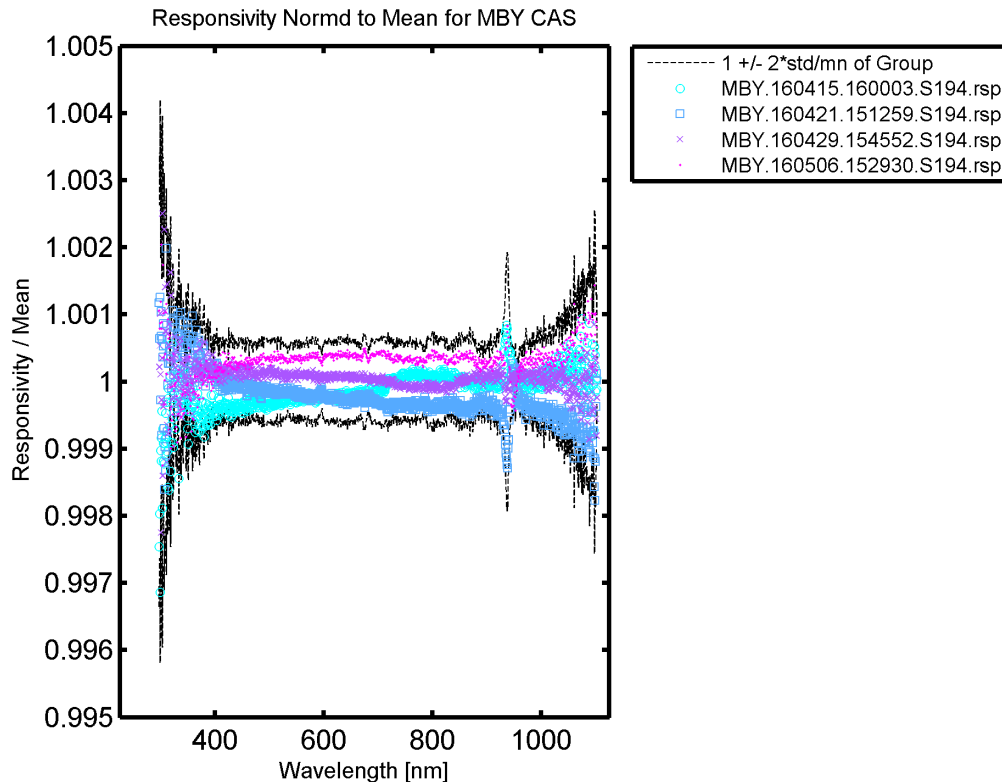


Figure 1. Time series with MOBY Net CAS. The first lamp used, S195, which is run at constant current, was not stable in the voltage drop and this resulted in varying output, which the CAS tracked. The second lamp, S194, is more stable, with the four results agreeing to within $\pm 0.1\%$.

2) MOBY-Net Hull components

The rest of the MOBY-Net buoy design is being finalized, along with the single pickup point design (by Mooring Systems Inc.). The current MOBY uses two pickup points, requiring two cranes on the deployment ship. Use of a carbon fiber spar should allow a single pickup point to be used (with proper design of a bridle and methodology) which could allow ships with only one crane to be used for deployment and recovery.

3) Spectrometer characterization

As stated earlier, we have prototype blue and red spectrometers in house now and have begun characterization of these systems. There are no final results to report since the last period, when we were able to say that the red and blue spectrometers we had were operating well.

4) Software development

Many, if not all, of the procedures for control of the software have been done. We have individual programs to control the imager, shutter block, ancillary measurements such as roll, pitch, and depth, and output file creation. These components are now being

integrated to work together for end-to-end data acquisition. We have dedicated a lot of effort developing the file structure for the MOBY-Net files, and data files for the spectrometer. Rather than using the heritage format for MOBY, we are moving to a HDF-5 format, which will make the data file format to be more flexible and to be multiplatform.

4) Work Plan for next Reporting Period

During the next Reporting period we will do the following:

- A) Continue characterization of the red and blue spectrometers as they are delivered. We expect the MOBY-Net spectrometers to be delivered within this next period.
- B) Continue construction of the control electronics.
- C) Continue the characterization and testing of the field calibration/stability devices. We will be testing how well the stability monitor works after being shipped during this period.
- D) Complete the software development for the radiometer control system.

5) Schedule Status (include any slippages or accelerations in schedule and note the cause)

The major slippages in the project are due to the time it took to finalize the large PO's involved with the project. The MOBY Hull was delayed in this manner, but will not have a major impact as it was scheduled to appear significantly earlier than the optical package and when we needed it. We also discovered that we needed a modified lens system in the red spectrometer and additional filters in the blue spectrometer to achieve the desired performance. We expect to get the optical package by the end of September. We now have the stability source and will be working to catchup with this part of the project. Most of the overall project is driven by the lead time for the optical package, so the delay in the other items will not have an impact on the projects overall success.

6) Delays/Problems Experienced

See above for delays

7) Corrective Actions/Recovery Plan

None to date

8) Technology Readiness Level Assessment

There has been no change in the TRL of this project during this 2-month period.

There are several different levels in this project. The MOBY-Net optical system is currently at TRL 2-3. We have data with prototype spectrometers, similar to the proposed system (TRL 3), but there are portions of the system (bifurcation to two spectrometers, modularity and transportability of the system) that are currently at TRL 2. The electronic/software control system is currently at TRL 2. The MOBY-Net Hull, in a configuration that can be easily shipped and assembled on site is at TRL 2. The stable source is at TRL 8, as it will only require a small change from the commercial device.

The monitor for this stable source is commercially available, and will just require minor adaptation for this purpose so is TRL 8.

9) Publications and Presentations

None in this period.

10) Additional Comments or Pertinent Information

Nothing to report at this stage.