

Johnson, Honolulu, September 2012 (dates are local; midnight GMT is 14:00 HST)
Monday, Labor Day, 9/3/12. Fly out. Went to work and prepared for meeting on Sept 4.

Tuesday, 9/4/12. Team meeting. Boat contract issues. Compass design. Reduced data for calibration. Delivered LED source and sphere to M.Y. for integration. Worked on LED stability data.

Wednesday, 9/5/12. Flora continued processing my LED stability data from the RSL. Met with Mike O on trip plans. Processed data from May trip (HONO13) on VXR's measurements of the uncalibrated sphere NIST 12" OL455. Mike F will use this for Resonon testing, it is a stable source. I used the HONO13 VXR/NPR data to calibrate the OL455: $L_{unk} = L_{npr} * S_{unk} / S_{npr}$. Add to spreadsheet net_signals_hono13.xls. Decided on disk sizes. Boat arrived. Redid JPSS SOW.

Thursday, 9/6/12. Flora finished processing my LED data, including the calibration of the SIRCUS 8004 in bare fiber and irradiance mode that I will deliver to Ping. I wrote up the OL455 radiance calibration with the VXR for Mike F. I selected the channel assignments. Mark photographed the FOV, Mike E is working on software/hardware integration, the boat is getting prepped, Mike O is getting ready, Darryl and Terry are working on the buoy (as Mark will tonight). The LED source of Zong's I brought has got a problem, it goes off and on – bad chip? This impacts the LED / Resonon stability. Mike F. took OL420 calibration data with the Romack/Resonon.

Friday, 9/7/12. Canceled boat, conditions overcast & rainy. Steph analyzed the FOV data (few percent variation except for Fiber 2 which is 13% and Fiber 4 which is 8%. Decide to use Mark's Thorlabs LED for on board stability. More work on 8004 calibration. Sent to Ping. Mike F repeated cals with the Resonon/Romack and the OL420; boat continued to be set up; Mike F worked on integrating shutter block software; Tom S worked on the instrument housing. Track 1 on the blue with the OL420 repeated to 0.3% from yesterday.

Saturday, 9/8/12. Mike F calibrated at the sub system level – Romack fibers, Specs, Cameras with the OL420. Mark and I started to integrate then instrument and got as far as integrating the long Romack fibers to the shutter block. Mike O went to sea with Tom S on his sailboat to collect VIIRS overpass data. Darryl and Terry made a tarp for the back deck of the Hapa so the sun will not kill them. The partially assembled instrument was put in the cal. hut. Terry started to prepare the disks we will use.

Sunday, 9/9/12. Mark and I worked on integrating the instrument, and it is complete. Mike F, Carol, Mark, and Steph did the first calibration of the complete system using the OL420. Darryl reduced MOBY data and continued to help with boat set up. Terry got the cosine collector for the new instrument (we need a name) sorted out. Mike O gave his Saturday data to Steph and she looked at his Es and it seems in the ballpark, so we can use it for a good reference. Terry found the telescoping sticks we will use for occulting the Es sensor, and he painted them. Steph called Dennis and gave him a report. The cal runs today were with Mike F's computer running the specs and Mark's computer running

the shutters. Mike will integrate the two programs, initial tests indicated there might be issues. We had to change the polarity on the shutters for the red, and one shutter (#5 on the red) was found to be bad. It was replaced. We set the iris for the LED channel on the red to be about 10% of fully open, as we'd like to get all things on scale in the water with the same integration times. We cancelled the sail tomorrow and will work with Es to get its iris adjusted, then put the fibers on the fork, and see what happens when we put it in the water off the pier.

Monday, 9/10/12. Mike F and I calibrated the system using the long fibers and the OL420 with the jig designed for it, in the Cal Hut. We did wavelength calibrations using the 407nm diode laser, a HeNe laser, and a Hg and Ne emission line. Not all tracks were wavelength or radiance – calibrated – specifically track 14 which has the LED integrated into the shutter block assembly, Track 1 which is hooked to Es, and the unused tracks (2, 4, 6, 8, 10). We held the Es sensor outside pointed zenith so we could see how much we would need to back down the iris so to get Es on scale with the Lu scans and the LED. We took the long fibers off completely, laid them out straight on the dock, tied them to the fork frame, and made a cable using a line and floats. We moved the instrument onto the boat and spent several hours finalizing the box (which includes a small A/C unit). Stephanie processed data from Sunday, in order to get a system response. Work finished about 9:30 pm.

Tuesday, 9/11/12. Trouble with the boat power. Turns out the ground is floating because the ship has an aluminum hull, and grounding to that would cause corrosion. There are two 110Vac wall plugs in the cabin – turns out on the starboard side the ground was floating about 50V off from the 110V, and on the port side it was floating about 250V. I got shocked touching Mike O's computer case, and we burned up a power supply for the shutter controllers on the red spec. So Mark asked me if I could buy a generator, this turned out to be a futile search because the NIST staff were gone. I did hear back a few days later, but not in time for us to fix the problem when we needed to. So MLML bought the small generator, and we run all our stuff off that. Mark and Mike fixed the power supply, and they sailed about noon. This was bare fiber on the fork, with the ends left in the positions they were for attaching the disks. The idea was to see if with all fibers/tracks measuring the same thing, and all with a system response, could we get the same answer. The conditions were rough, with 12knot winds and the boat rolling in the rough sea. The fiber tips came out of the water a lot. The fork could not be positioned off the stern, rather it ran to starboard. The red spec did not work, and the blue spec data – derived radiances using the OL420 cal and no immersion coefficients – had tremendous scatter beyond about 500nm. Mike O got CTD, HyperPro, ASD, and Microtops data for the VIIRS overpass. Conclusions were, besides needing to fix the red spec, that this is not going to work unless we can find some calmer water, if that means moving over to the west side or tucking under near Diamond Head. The winds are blowing in such a direction that there is little wind shadow from the island.

Wednesday 9/12/12. Mark and Mike repaired the red spec, which was acting like the shutters had a mind of their own. Not sure if this was related to the power supply failure. Mark had built the shutter circuitry, and had ordered spare parts so he could make/repair

the red shutter controller. Mike separated the USB instruments from one USB to two, and started running the shutter control program on Marks computer, separate from the instrument control computer. Once things were fixed, we shot plaques on the back deck to see if we could get the same radiance under controlled conditions. We used a 10% gray spectralon plaque and two “colored” floor tile (one slate, one ceramic) that I got at Home Depot and Lowes. The intent was to find something blue rather than gray. We ran out of time to deploy into the water at Snug Harbor, but after dinner and sunset we moved the 12” OL455 to the cabin and used its 15 position jig plate at the predetermined distance and took data with the 5.0um and 1.0um setting. These radiance level settings had been calibrated with the VXR in May using the NPR as the reference. We noticed issues with the darks – first they are too small and second some are getting set as zero. Correct answer is about 600DN. So we spent some time with changing the data format, which at first seemed to explain the problem (DN all about 100, but no zeros). We worked until 11pm. The ac-s arrived from Italy and was delivered to the UH Marine Facility.

Thursday 9/13/12. Mike wrote the company (Princeton Instruments) and Steve Brown to discuss the camera dark. One thought was the cameras are not really at -70degC but while at sea today (day 2 of sailing, they went over by Diamond Head) Mark and Mike ran a really long integration time and things were ok. Another thought was Mike’s custom program may be different from the WinSpec so today they ran both cases. Stephanie worked on organizing and making consistent her data processing programs. Terry put the discs on the fork before they sailed (at 9am). The day was cloudy and windy, but not as windy as Tuesday. There may be some useable data. Mike O did his measurements. Stephanie and I estimated the OL455 radiances using the 6-point VXR data and the NPR for comparison, and she reanalyzed the gray plaque data. When using the OL420 cal hut data for a system response, the 6 fibers do not give the same radiance for the plaque – and they should because they are all looking at the same thing at the same time. If we use the OL455 5.0um level setting, things are much better, and the radiance measured by the 6 fibers agree to 1% to 2%. This was with each Lu scan normalized by the area under the Es scan (in ADU/pxl/sec) since we don’t have a Es calibration yet, either for wavelength or irradiance responsivity. The LED is holding pretty constant, the scatter is less on the two boat days compared to the Cal Hut OL420 cal, but the variability is about 1%. In the morning Mike O went and got the ac-s, and after they got back, began working on getting it going. We are missing a cal file for in air. Mike F updated his acquisition program, making little fixes that were on his to do list.

Friday 9/14/12. The ac-s is on board. they sailed at 9am local. Turned out the fibers were not connected to the disks in the order that we had thought, which explains yesterday’s data that appeared that the deeper bare fiber was greater than the shallower bare fiber. The boat returned at 2:30 pm local. They went 13 miles offshore and think they got some good data. The deeper bare fiber turns away from nadir as the orientation of the fork changes during the day, which changes the direction it’s looking as well as the separation from the near surface bare fiber. We remeasured the fork dimensions and made up a log sheet to record boat and fork positions. Boat heading (where the bow points) is not recorded automatically, only drift. We calibrated the Es head on the FSI and also did wavelength calibrations with Ne and HgAr. Worked until 10pm HST (14h day).

Saturday 9/15/12. Took nut off disk SMA so could make fiber tip flush with bottom surface of disk. Removed first (close to the fork) 5 or so floats and painted them black and reinstalled. Added log sheet for boat heading, fork orientation, etc. Sailed at 9am HST.

Sunday 9/16/12. Was a very clear day, the best so far. The winds were down. We cleaned the fibers and found gunk on the tip of F13, which is the one that is decreasing in the blue although it is looking good in the red. We used the spare Thorlabs LED to test the end to end system response before and after sailing. Mike O gave us his raw data to date, and Steph can read all the files and make sense of them. His Es is off from the FSI by 5% to 25% and we will investigate this further. Mike F took data using different Gains and readout speeds, in an attempt to understand the noise level in the FSI. I gave guidance on depths, as Mark wants to get close enough to have calm waters but not too close to see the reflectance in the blue off the bottom.

Monday 9/17/12. I am making measurements to model the effect of buoy tilt, one of my goals while here. Buoy tilt affects several of the derived MOBY products. Steph has reorganized all the data and the way she keeps track of things. I confirmed I can convert Mike O's HandHeld ASD files from binary to ASCII. They sailed just after 9am HST, and the skies are partly cloudy today. Conditions were not so good today, more wind and clouds. We decided tomorrow will be the last boat day, we need to be off the boat by 6pm Wednesday and getting in at 2 or 3 does not leave enough time for proper teardown.

Tuesday 9/18/12. Started out rainy and cloudy. Winds supposed to shift. They sailed at about 9am. They got good data, using the 54cm in addition to the other sets of disks. I worked on the 3D geometry problem of how to interpret buoy tilts about x and y in order to correct for the Es cosine response, the arm depth, and the position for the self-shading (azimuth-dependent) angle. I helped Steph research how to apply complex EOF to the dichroic-based system level responsivity change during deployments. Mike F, Mike O, and I did a OL455 system level cal of the six FSI fibers on the Hapa. Calibrated the Lu sensor on Mike O's HyperPro on the small boat. Quit at 7:30 pm.

Wednesday 9/19/12. Tear down the equipment off the Hapa. Move the FSI to the tent and have Mike O show Mike F how to run the HyperPro so the Es calcs can be done as Mike F is cal'ing the new buoy. Start drafting the report and looking at the results carefully.

Thursday 9/20/12. Made list of all data streams and their instrument sources. Reviewed results posted to date by Steph on the web page. Begin organization of write up. Mike F will do the post cal on the FIS Es collector tonight and also calibrate Mike O's Es HyperOCR-I.

Friday 9/21/12. Reviewed results, discussed plans, writing of report. Packed the equipment I brought out here.

Saturday 9/22/12. Flew home.

Sunday 9/23/12. Arrived home.