

NAAMES 3 LISST data processing

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Cruise name: NAAMES 3

Ship: R/V Atlantis

Location: North Atlantic

Dates at sea: August 30 – September 25, 2017

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Group Leaders: Emmanuel Boss and Lee Karp-Boss

Sequoia LISST serial numbers 1183

We use a calibration independent technique (Slade et al., 2010) to obtain particulate attenuation (cp) and particulate volume scattering function (VSF) at 670 nm by differencing measurements with a 0.2um filter from measurements made with no filter. Dissolved absorption and attenuation are obtained by subtracting daily MilliQ run from 0.2um filtered measurements. Filters are exchanged weekly and flow-tubes are cleaned every day. Switching between filtered and unfiltered measurements is done every 60min (50min total, 10min dissolved).

Bad VSF are removed manually and arise, generally from bubbles going through the instrument. All these periods of bad VSF matched the ones from the ACS running on the same system. For each minute, the remaining data between 15th and 75th percentiles are binned-averaged and their standard deviation is kept for reporting. The particulate bins are processed by subtracting the filtered measurements from the unfiltered measurements. Filtered values needed to obtain the particulate values are interpolated to the time of particulate measurements linearly.

The LISST measurements are processed using standard procedures described in Boss et al. 2018, Agrawal and Pottsmith 2000, and Sequoia Processing Manual (2008). Resulting products submitted to SeaBASS includes the particulate forward volume scattering function (VSF), beam attenuation (cp) and the particulate size distribution (PSD).

The code used for processing is available at:

<https://github.com/OceanOptics/InLineAnalysis/blob/c0fc9402d182ca390978a199685a8904b1d828ae/lib/processLISST.m>.

The calibration parameters used are:

ZSC = [2.203500e+001, 2.568500e+001, 2.503000e+001, 2.986000e+001, 2.842500e+001, 3.283000e+001, 3.077000e+001, 3.659500e+001, 2.978000e+001, 3.552000e+001, 3.198000e+001, 4.216000e+001, 3.916500e+001, 4.662500e+001, 3.974000e+001, 4.454000e+001, 4.403500e+001, 4.604500e+001, 4.430000e+001, 4.510500e+001, 4.719500e+001, 3.850000e+001, 5.373000e+001, 2.664000e+001, 3.180500e+001, 1.655500e+001, 2.205500e+001, 1.554000e+001, 1.422000e+001, 1.123000e+001, 8.780000e+000, 8.555000e+000, 1.515000e+003, 1.167900e+003, 6.410000e+001, 1.055150e+003, 7.700000e+001, 2.116600e+003, 1.807000e+003, 5.476500e+003]

DCAL = [1.0000000e+000, 1.0038000e+000, 9.9360000e-001, 1.0027000e+000, 9.9720000e-001, 9.9570000e-001, 9.9030000e-001, 9.9430000e-001, 9.9290000e-001, 9.9000000e-001, 9.9290000e-001, 9.9300000e-001, 9.9150000e-001, 9.9300000e-001, 9.9230000e-001, 9.9090000e-001, 1.1032000e+000, 1.1123000e+000, 1.2430000e+000, 1.1562000e+000, 1.3273000e+000, 1.1999000e+000, 1.0740000e+000, 1.7489000e+000, 1.5382000e+000, 2.5109000e+000, 2.5468000e+000, 3.5504000e+000, 3.9338000e+000, **2.6**, 7.5143548e+000, 1.2528083e+001]

VCC = 48493

Spherical Inversion

DS = [1.2500, 1.4750, 1.7405, 2.0538, 2.4235, 2.8597, 3.3744, 3.9818, 4.6986, 5.5443, 6.5423, 7.7199, 9.1095, 10.7492, 12.6841, 14.9672, 17.6613, 20.8403, 24.5916, 29.0180, 34.2413, 40.4047, 47.6776, 56.2595, 66.3863, 78.3358, 92.4362, 109.0747, 128.7082, 151.8757, 179.2133, 211.4717, 249.5366]

References

Agrawal, Y. C. and H. C. Pottsmith, 2000. Instruments for particle size and settling velocity observations in sediment transport. *Mar. Geol.* 168, 89–114.

Boss, E., N. Haëntjens, T. K. Westberry, L. Karp-Boss, and W. H. Slade, 2018. Validation of the particle size distribution obtained with the laser in-situ scattering and transmission (LISST) meter in flow-through mode. *Optics Express*. DOI: 10.1364/OE.26.011125.

Sequoia Scientific, Inc., 2008. Processing LISST-100 and LISST-100X data in MATLAB. <https://www.sequoiasci.com/article/processing-lisst-100-and-lisst-100x-data-in-matlab/>.

Slade, W.H, E. Boss, G. Dall'Olmo, M.R. Langner, J. Loftin, M.J. Behrenfeld, and C. Roesler, 2010. Underway and moored methods for improving accuracy in measurement of spectral particulate absorption and attenuation. *Journal of Atmospheric and Oceanic Technology*, 27:10, 1733-1746.