

LISST 100-X preliminary data processing procedures:

T. Kostadinov, February 3, 2011

The instructions below were reverted back to using the Sequoia software version 4.65, because the newest software still has bugs. The newest software allows for batch processing (very useful) and non-spherical particle inversion (also potentially useful), so when Sequoia fix the problems, we should start using their newest version.

Step 1: Preparing the files for processing:

LISST raw files are recorded by the instrument internally (planned on the DH-4 in the future) in binary format readable by the Sequoia Scientific proprietary instrument software, LISST-SOP, current working version is 4.65 [\[Need to change to the latest LISST-SOP v5. See two important links on the Sequoia website: 1\) http://www.sequoiasci.com/library/software_updates.aspx?Product=LISST-100&id=1 and 2\) http://www.sequoiasci.com/Articles/ArticlePage.aspx?pageid=128 \]](http://www.sequoiasci.com/library/software_updates.aspx?Product=LISST-100&id=1). [Site may require you to register for free.](#)

The background scattering file (ASCII) is collected each sampling day and is stored separately on the computer running the LISST-SOP software during background collection. The first step in processing is to invert the raw files to particle size distribution (and ancillary data) ASCII files, using the LISST-SOP proprietary inversion scheme and applying the appropriate background scattering file.

In the LISST-SOP software, from the File menu, select 'Open raw data file'. In the dialog box that opens, make sure to select the correct instrument serial number (of the ones installed on that particular computer). Then select the file to be processed, the appropriate background file taken shortly before (or in some cases after) the cruise, then the path and filename of the output file(s). Press 'Save'. A dialog box will then open in which the individual data records can be examined. Normally, you just press the 'Process File' button, making sure all frames are selected for processing. Go to File → Settings → Output tab, in order to control which types of files are to be output. Normally we are not operating in real time mode, and all three file types - *.log, *.psd, and *.asc need to be produced. The software will look for instruments described in the file InstrumentData.txt, located in the LISST-SOP installation directory, usually c:\Program Files\Sequoia\LISST100\. The ringarea_xxxx.asc file also needs to be in that directory, where xxxx is the instrument serial number.

The rest of the processing scheme is preliminary, built by T. Kostadinov, and is therefore ERI and Plumes and Blooms-specific. It needs to be incorporated into standard PnB processing and ultimately SEABASS files need to be produced. Notably, no despiking, moving averaging or binning is implemented yet and needs to be. **These would need to be implemented after step 2 and before step 3 below.**

Step 2: Run LISST_pick_ud_cast_v2.m

The following processing steps will occur in a specific cruise directory on the appropriate processing disk, e.g. pb215.

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- Create subdirectories raw, Sequoia and processing in the main cruise directory.
- In the 'raw' directory, copy the raw binary *.DAT files as output by the instrument and the corresponding background scattering file. It is very important to keep reliable copies of these files, as any reprocessing will start with them and any technical support by Sequoia will need these files and instrument data.
- In the 'Sequoia' directory, copy the files output by the LISST-SOP software. Usually these would be *.asc, *.log and *.psd files (more if randomly shaped particles inversion is used). The files of interest to us will be the ascii inverted PSD files, *.asc.
- Next processing steps are coded in matlab and will produce intermediary and final outputs in the 'processing' directory.
- Run `LISST_pick_ud_cast_v2(pathname,cruise,rs)`, where `pathname` is a string containing the path to the main directory containing LISST cruise data and `cruise` is a string of the form 'pb215', indicating the specific cruise to be processed. If `rs = 1`, the script works with randomly-shaped particle inversion from LISST-SOP v5. And looks for corresponding subdirectories and files that have `_v5` appended to their name. If `rs = 0`, it operates on the spherical inversion output.

Example call:

```
LISST_pick_ud_cast_v2('c:\icess_disk_4\postdoc\LISST\data\', 'pb219', 0)
```

- The script calls `bt_LISST.m`, which is modified from existing AC-9 and HS-6 scripts that allow manual picking and marking of the downcasts and upcasts from the entire data record. The split casts data is then saved a *.mat file in the processing subdirectory.

Step 3: Run `process_LISST_profile.m`

This script goes through the downcast data, calculates derived parameters, and saves them as a separate file in a self-contained structure with metadata. The derived parameters are bin-normalized number concentration, $N(D)$, which is used to fit for the PSD slope ξ and the N_o parameter (see Kostadinov et al. 2009). This step produces the finalized product for LISST, which should be used to create SEABASS files. The naming convention for the final product is:

“LYYMMDDs_p_final.mat” where YYYMMDD is the date and ‘s’ is the station letter

Step 4: Run `calc_LISST_surf_v2.m` (independent of Step 3, necessary if creation of surface averaged data is desired). A wrapper script called `calc_LISST_surf_driver.m` can be used to process multiple cruises and output and save a file with the surface data and derived products, calculated in a way consistent with Step 3 procedures.