

# MSSS Week 44: Source finding on MSSS mosaics

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## Summary

I have run the standard source detection and analysis scripts of all the MSSS mosaics made recently.

## Recent Most Relevant Reports

- Week 19: Report on source finding techniques (Chiara Ferrari & Antonia Rowlinson)
- Week 30: Report on source finding tests (Pommier)
- Week 31: Report on further source finding tests (van Velzen)

## Data Location and Steps Taken

- The mosaics were copied from the Dwingeloo machine back to CEP2:  
`locus059:/data/scratch/williams/mosaics`  
Each mosaic has its own sub-directory within which is a mosaics sub-directory where the  $10.5^\circ \times 10.5^\circ$  sub-images are located with the names `sub-mosaic-band*.fits` and `sub-mosaic-averaged*.fits`. The list of mosaics and their co-ordinates is given in Table 1.
- The `/velzen/msss/pybdsm_msss.py` was run on all mosaics using the averaged map as the detection image  
`python ~velzen/msss/pybdsm_msss.py sub-mosaic-band*.fits -d sub-averaged_map.fits'`  
The output is saved in the directories `sub-mosaic-band*_pybdsm` under the latest `_date_` and `catalogues`, but the pybdsm output source and gaussian fits files were copied back to the `*_mosaics` directories.
- The `/bretonr/msss/msss_field_analyzer.py` script was run on all the mosaics. Some errors were encountered on some mosaics (see Notes below). The output files, in each field\_mosaics directory are:
  - `msss_field.match.txt`<sup>†</sup>
  - `msss_field_finding_chart_band.pdf`<sup>†</sup>
  - `msss_field_finding_chart_detection.pdf`<sup>†</sup>
  - `msss_field_offset_hist-BAND*.pdf`
  - `msss_field_offset_vs_nu.pdf`
  - `msss_field_spectral_hist.pdf`
  - `msss_field_spectral_vs_chi2.pdf`
  - `msss_field_chi2_vs_dist.pdf`
  - `msss_field_spectral_vs_dist.pdf`

where the files marked with <sup>†</sup> are the only ones available for low declination fields where matches to the NVSS-WENSS-VLSS catalogue is possible. Some example images are included for field M005+03 (see Fig. 1) and for a higher declination field where the analysis script worked completely (Figs. 2 to 4).

Table 1: MSSS Mosaics processed and their co-ordinates

Name	RA	DEC
M005+03	00:20:00.0000	+2:30:00.000
M035+03	02:20:00.0000	+2:30:00.000
M045+03	03:00:00.0000	+2:30:00.000
M055+03	03:39:60.0000	+2:30:00.000
M065+03	04:19:60.0000	+2:30:00.000
M115+03	07:40:00.0000	+2:30:00.000
M345+03	23:00:00.0000	+2:30:00.000
M355+03	23:40:00.0000	+2:30:00.000
M005+13	00:20:00.0000	+12:30:00.000
M035+13	02:20:00.0000	+12:30:00.000
M055+13	03:39:60.0000	+12:30:00.000
M145+13	09:39:60.0000	+12:30:00.000
M255+13	17:00:00.0000	+12:30:00.000
M295+13	19:40:00.0000	+12:30:00.000
M315+13	21:00:00.0000	+12:30:00.000
M355+13	23:40:00.0000	+12:30:00.000
M005+23	00:21:10.5882	+22:30:00.000
M016+23	01:03:31.7647	+22:30:00.000
M026+23	01:45:52.9412	+22:30:00.000
M037+23	02:28:14.1176	+22:30:00.000
M048+23	03:10:35.2941	+22:30:00.000
M132+23	08:49:24.7059	+22:30:00.000
M154+23	10:14:07.0588	+22:30:00.000
M164+23	10:56:28.2353	+22:30:00.000
M291+23	19:24:42.3529	+22:30:00.000
M334+23	22:14:07.0588	+22:30:00.000
M344+23	22:56:28.2353	+22:30:00.000
M355+23	23:38:49.4118	+22:30:00.000
M006+33	00:23:13.5484	+32:30:00.000
M017+33	01:09:40.6452	+32:30:00.000
M110+33	07:21:17.4194	+32:30:00.000
M122+33	08:07:44.5161	+32:30:00.000
M020+43	01:19:60.0000	+42:30:00.000
M033+43	02:13:20.0000	+42:30:00.000
M082+73	05:27:16.3636	+72:30:00.000
M115+73	07:38:10.9091	+72:30:00.000
M147+73	09:49:05.4545	+72:30:00.000

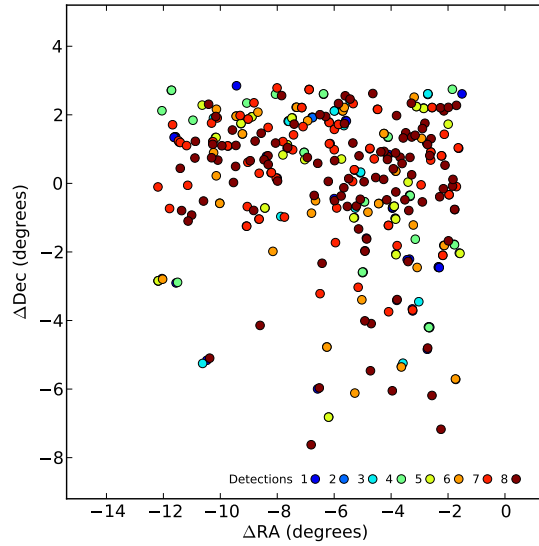
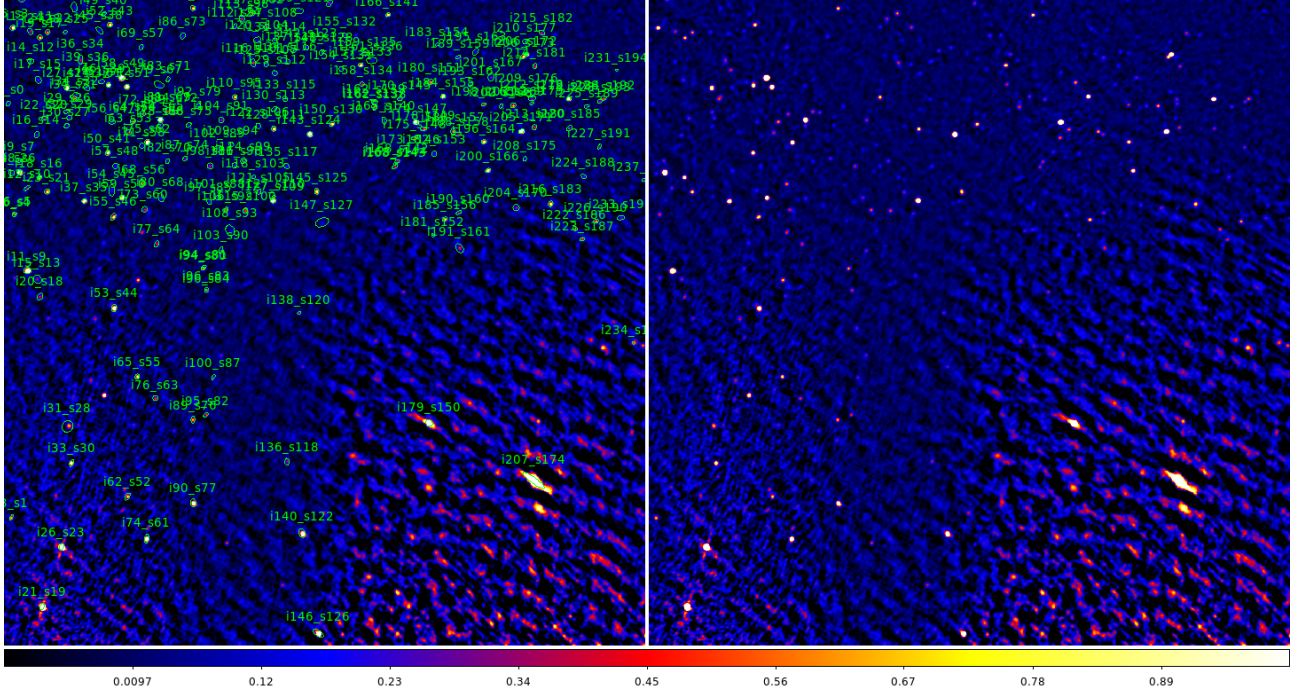


Figure 1: M005+03: Top: ds9 view of the averaged map, overlaid on the left with the BAND6 sources (srl.fits). Bottom: msss\_field.finding-chart-detection.pdf. This field has a bright source in the South-Western corner severely degrading the image quality and increasing the local rms so few sources are detected here

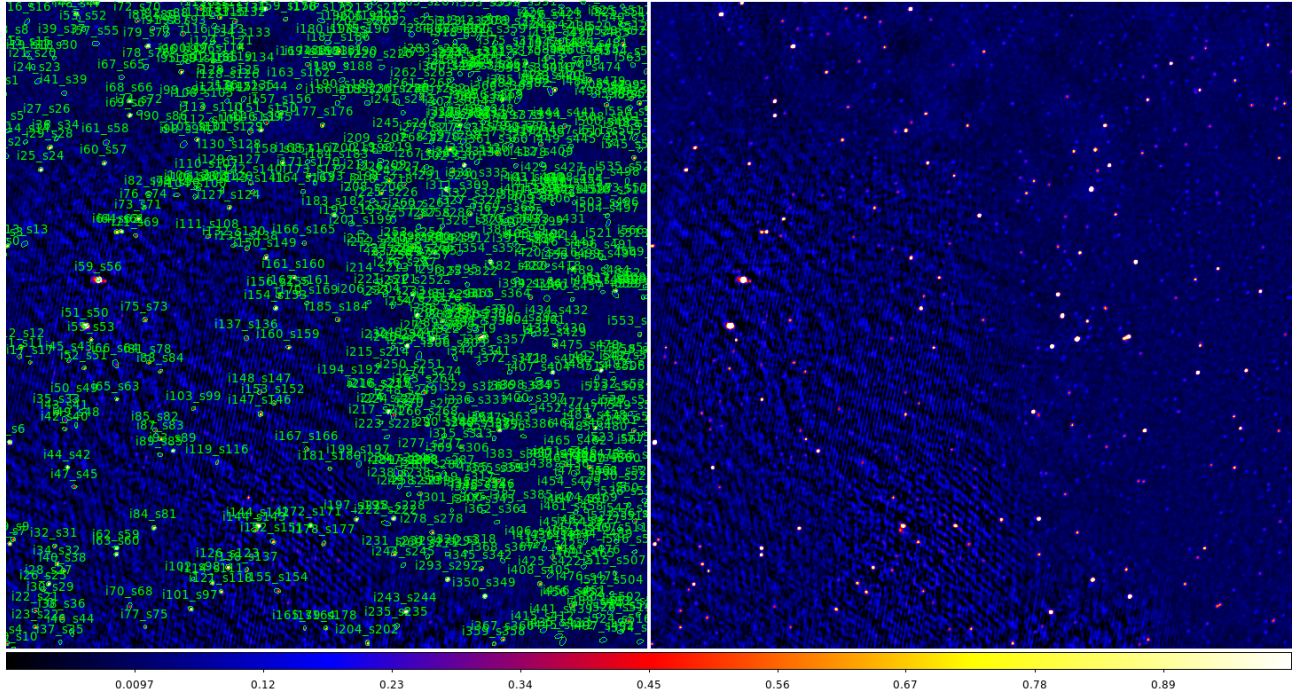


Figure 2: M006+33: Top: ds9 view of the averaged map, overlaid on the left with the BAND6 sources (srl.fits). Bottom: msssfld\_finding\_chart\_detection.pdf

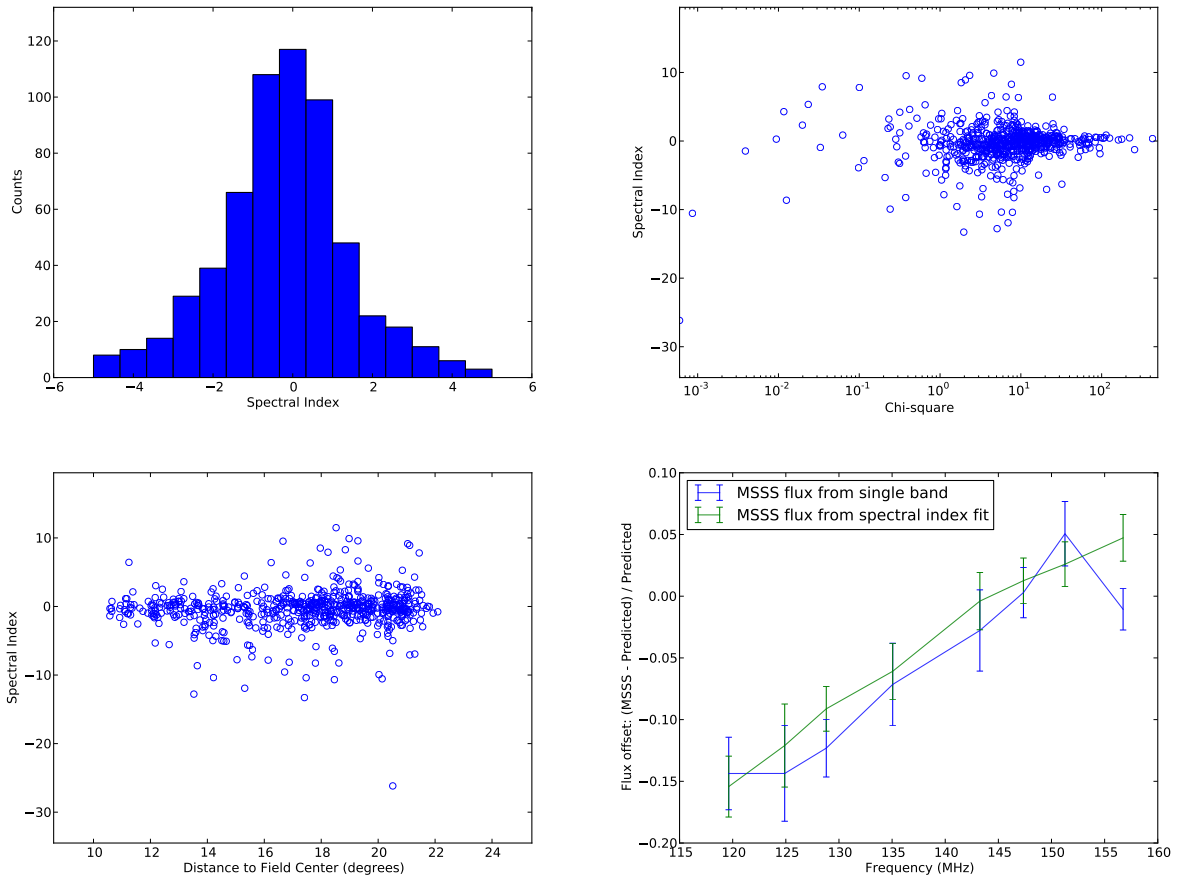


Figure 3: M006+33:

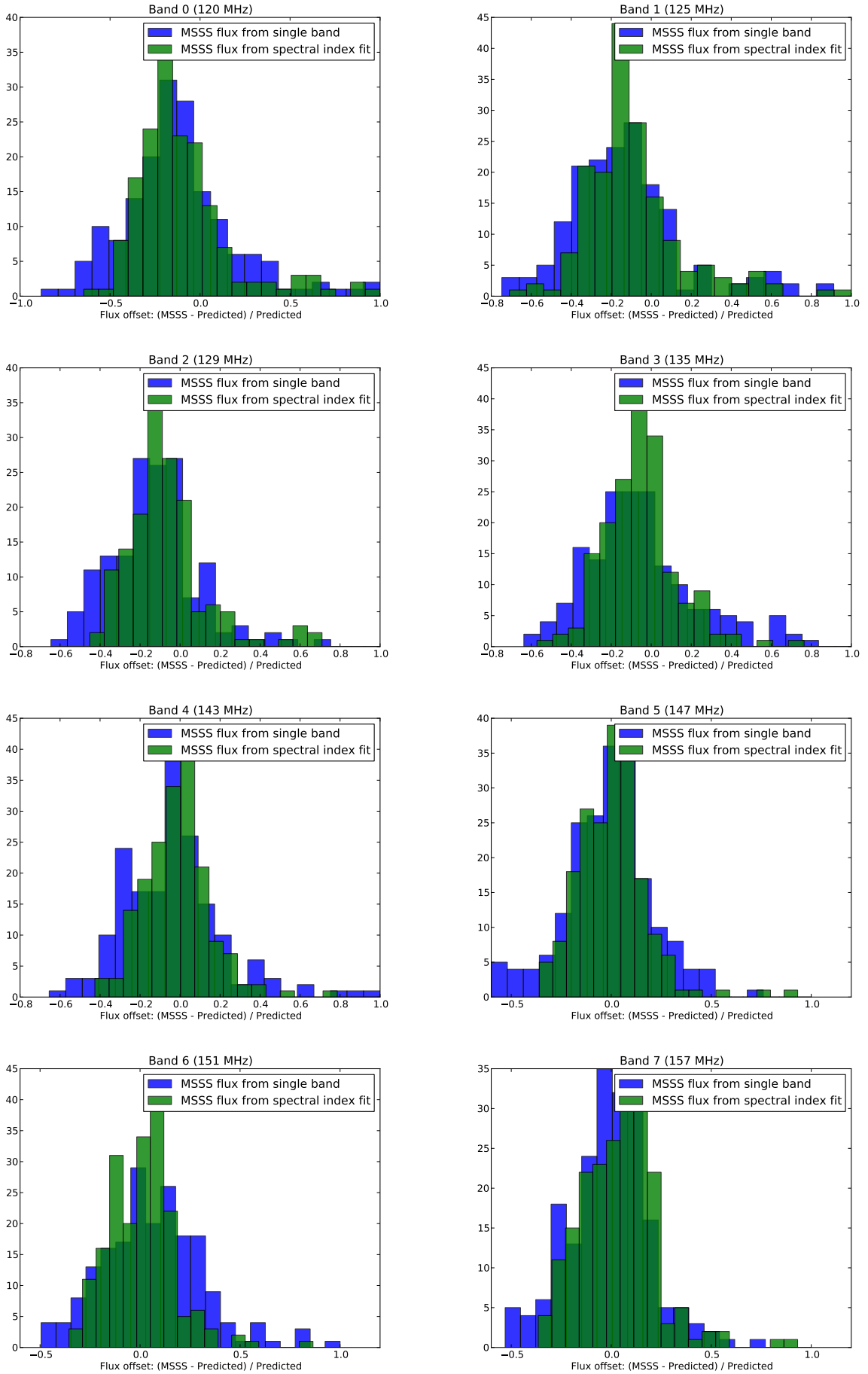


Figure 4: M006+33: mss.field.offset.hist plots for all bands.

## Notes

- Some lower declination fields lie outside the coverage of WENSS, which means no matches are found for any MSSS sources within the NVSS-WENSS-VLSS catalogue which is used in the field\_analyzer script, and thus causes the script to crash. The traceback is included here:

```
#####  
Running the MSSS Field Analyzer, version=0.41  
#####  
Will be processing 8 files  
Tolerance for the cross-matching is 60.000 arcsec  
  
RA, Dec of center estimated from coordindates 344.862658004 22.8840035661  
Reading NVSS-WENSS-VLSS matched catalog from: /home/velzen/msss/catalogs/  
Matching 872 MSSS sources to 25108 catalog sources ...  
... found 0 matches.  
File sub-mosaic-band0.pybdsm.srl.fits contains 470 sources  
File sub-mosaic-band1.pybdsm.srl.fits contains 545 sources  
File sub-mosaic-band2.pybdsm.srl.fits contains 608 sources  
File sub-mosaic-band3.pybdsm.srl.fits contains 591 sources  
File sub-mosaic-band4.pybdsm.srl.fits contains 595 sources  
File sub-mosaic-band5.pybdsm.srl.fits contains 602 sources  
File sub-mosaic-band6.pybdsm.srl.fits contains 622 sources  
File sub-mosaic-band7.pybdsm.srl.fits contains 620 sources  
  
Found a total of 872 different sources  
  
written: msss_field_finding_chart_band.pdf  
written: msss_field_finding_chart_detection.pdf  
  
# sources with a successful fit to a spectral index:      705  
# sources that pass min number of detection cut:         872  
# sources that pass signal-to-noise cut:                 872  
# sources (in all bands) for used for diagnostic plots: 705  
Traceback (most recent call last):  
  File "/home/bretonr/msss/msss_field_analyzer.py", line 721, in <module>  
    these_cats = allcat[m2]  
  File "/opt/cep/lofar/external/lib/python/site-packages/pyfits-3.0.7-py2.6-linux-x86_64.egg/pyfits/tables.py", line 100, in view  
    out = self.view(np.recarray).__getitem__(key).view(subtype)  
  File "/opt/cep/lofar/external/lib/python/site-packages/numpy/core/records.py", line 457, in __getitem__  
    obj = ndarray.__getitem__(self, indx)  
IndexError: arrays used as indices must be of integer (or boolean) type
```

- An error occurred when trying to use the field\_analyzer script with a self-made gsm.py catalogue.