

LOFAR MSSS

MULTIFREQUENCY SNAPSHOT SKY SURVEY

UPDATE

Chiara Ferrari (OCA, Nice - FR)

on behalf of **G. Heald** (MSSS Project Leader) & the **MSSS team**

LSM, 26 June 2013



MSSS OBSERVING STATUS

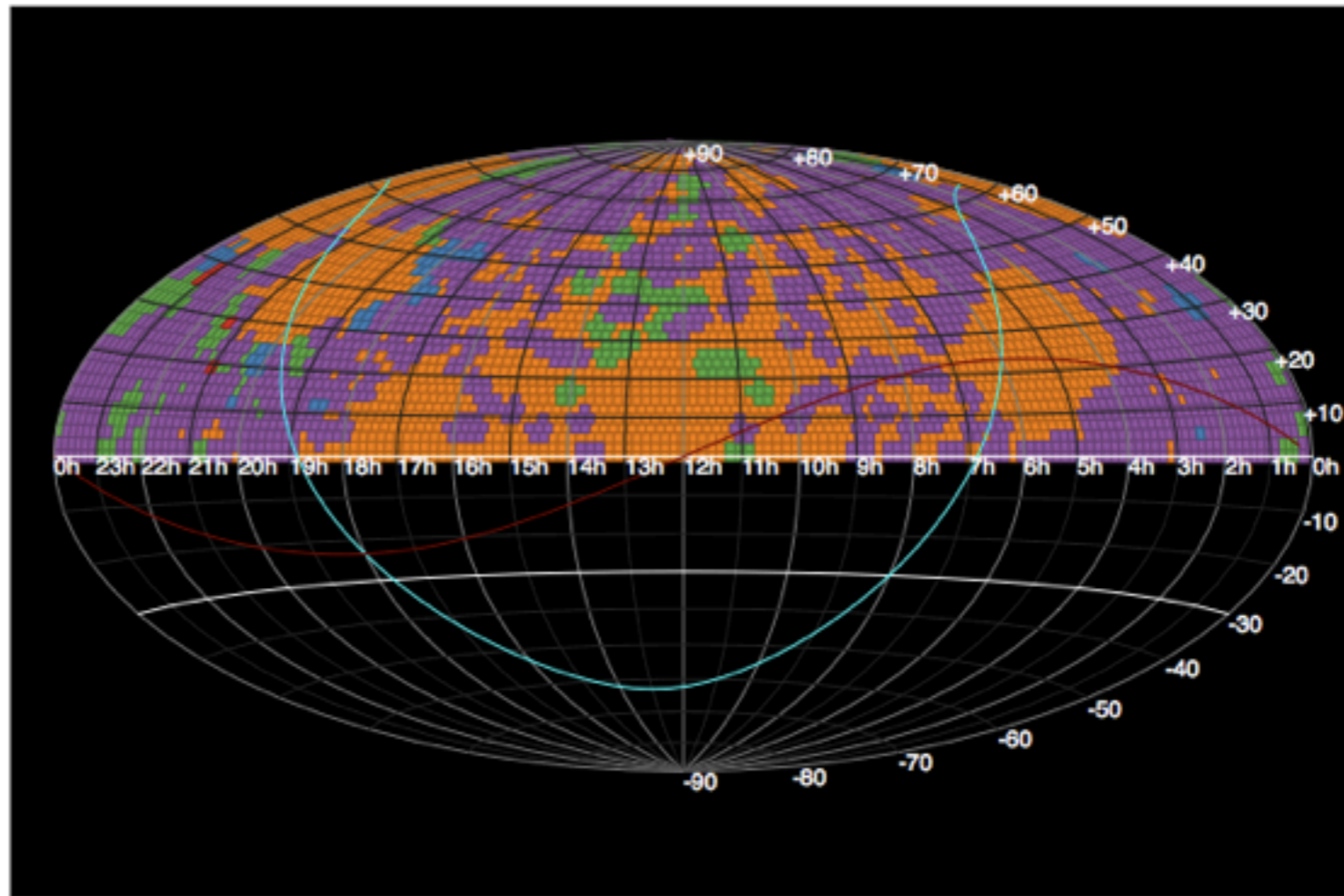
MSSS-HBA IS NOW > 50% COMPLETE !

LOFAR Observation Database

MSSS HBA

Number of Targets	3616
Number of Calibrators	8
Start Date	8 Feb. 2013
Stop Date	21 June 2013
Completed Fields	2078 (57.5%)
Information collected	24 June 2013

Show me the data »



Hammer Projection

Map based on code from [this project](#).

Data available on CEP (7.3%)

Data archived (50.2%)

Partial data available (1.4%)

Data missing (0.1%)

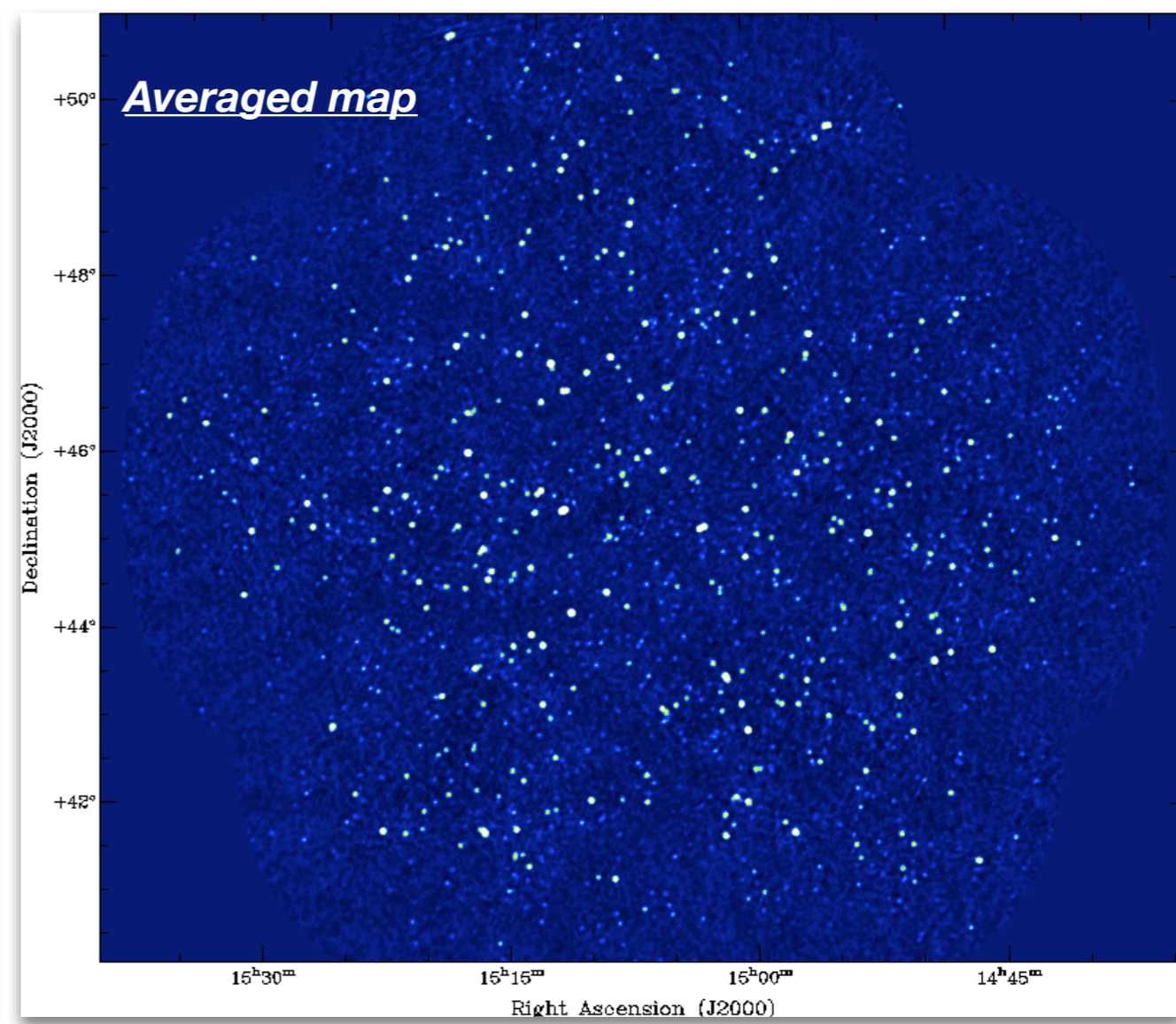
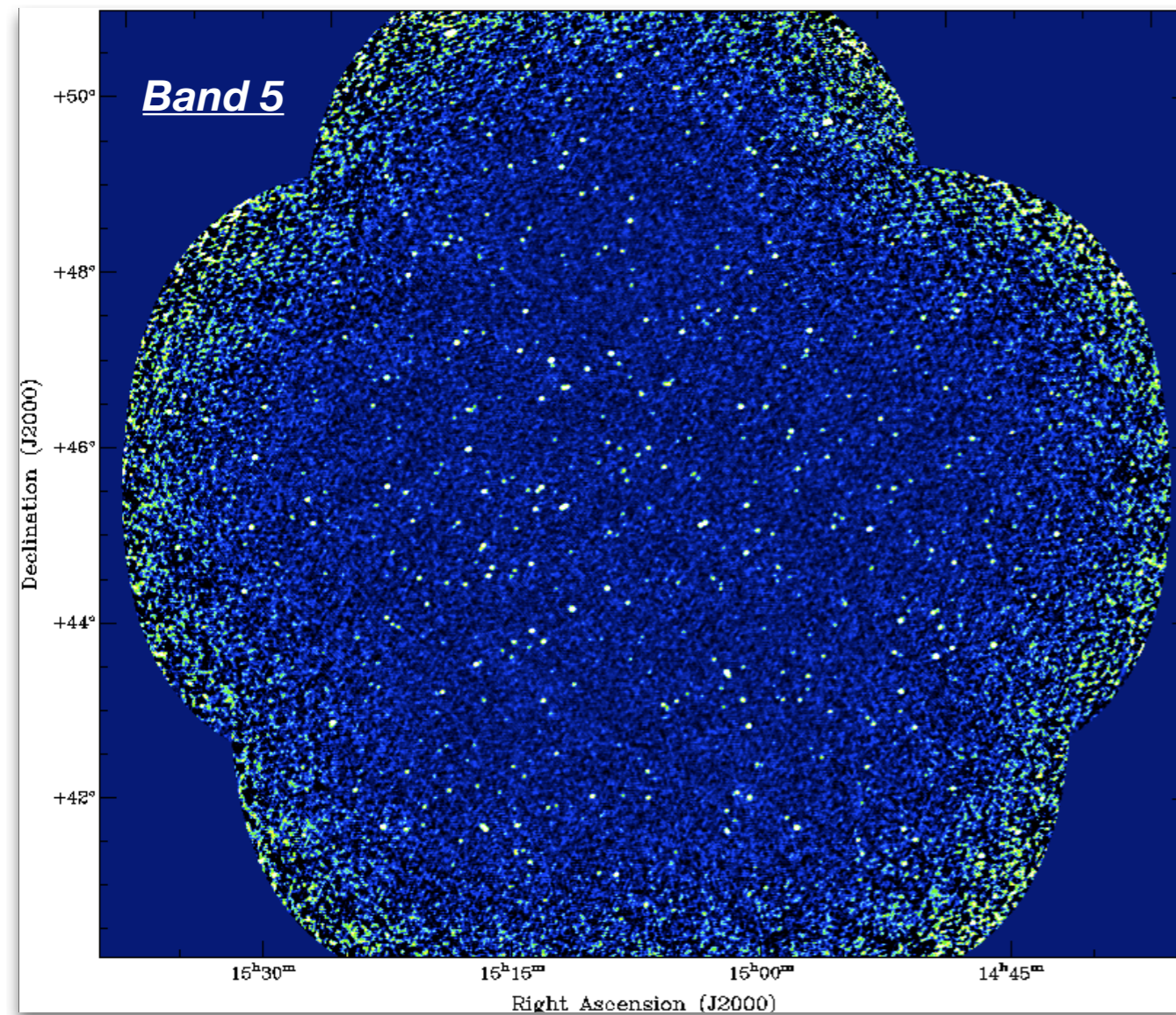
Not yet observed (41.0%)

MSSS SOURCE FINDING UPDATE

PYBDSM EXTRACTION STRATEGY

Corrected for primary beam = Analysis map

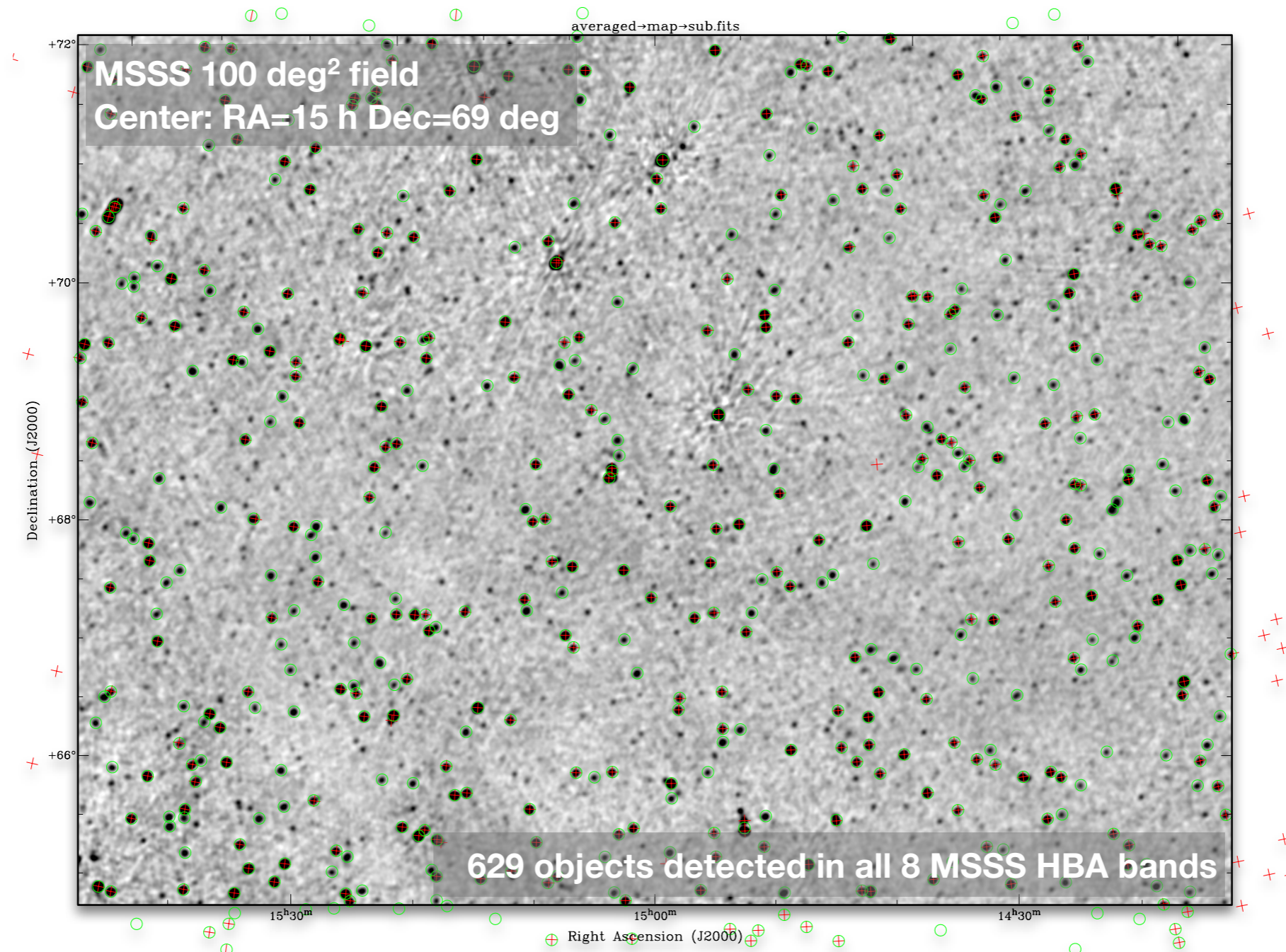
Not corrected for primary beam = Detection image



See MSSS Report Week 8 by *C. Ferrari & G. Macario* - PyBDSM developments by *D. Rafferty*

MSSS SOURCE FINDING UPDATE

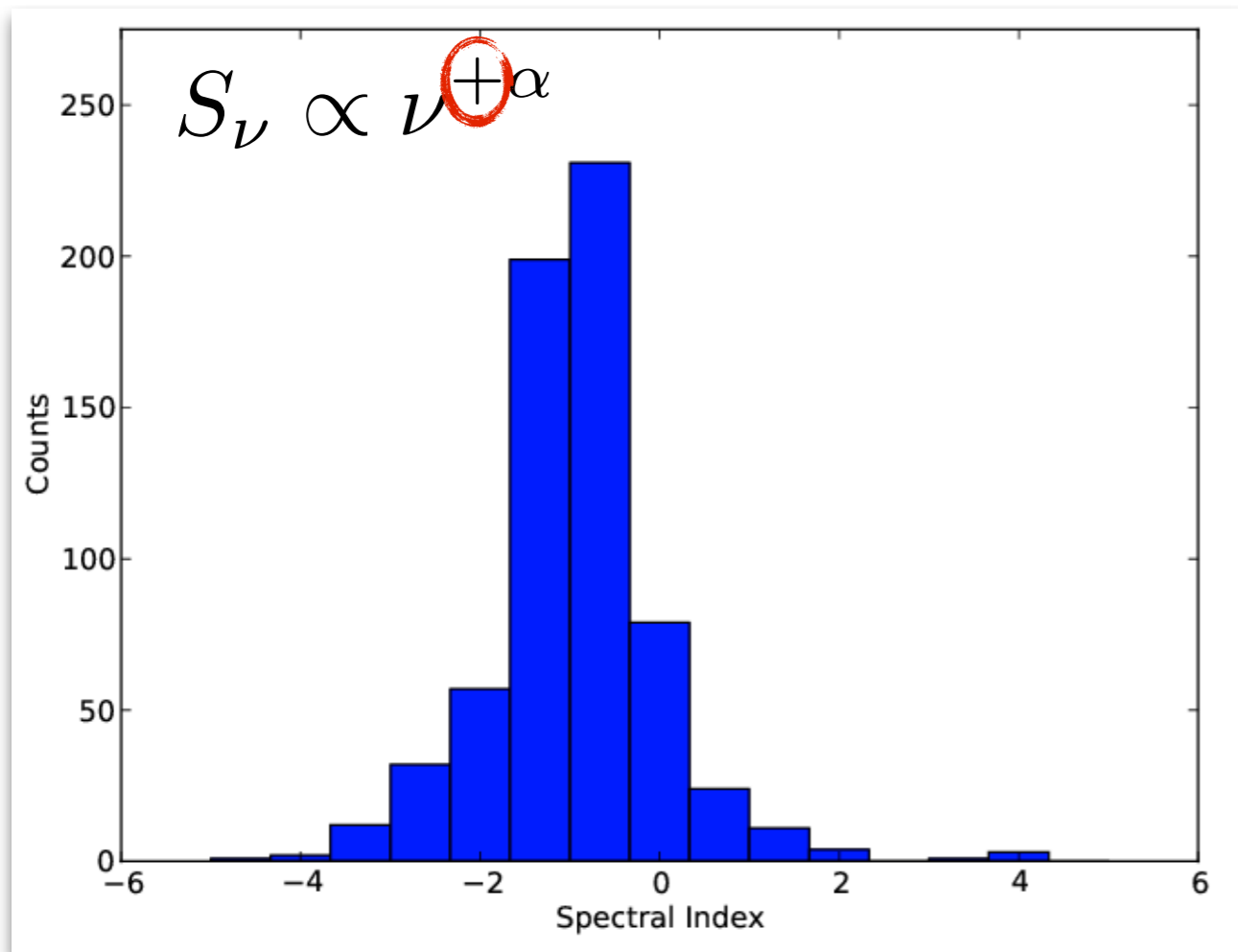
PYBDSM TESTS & RESULTS



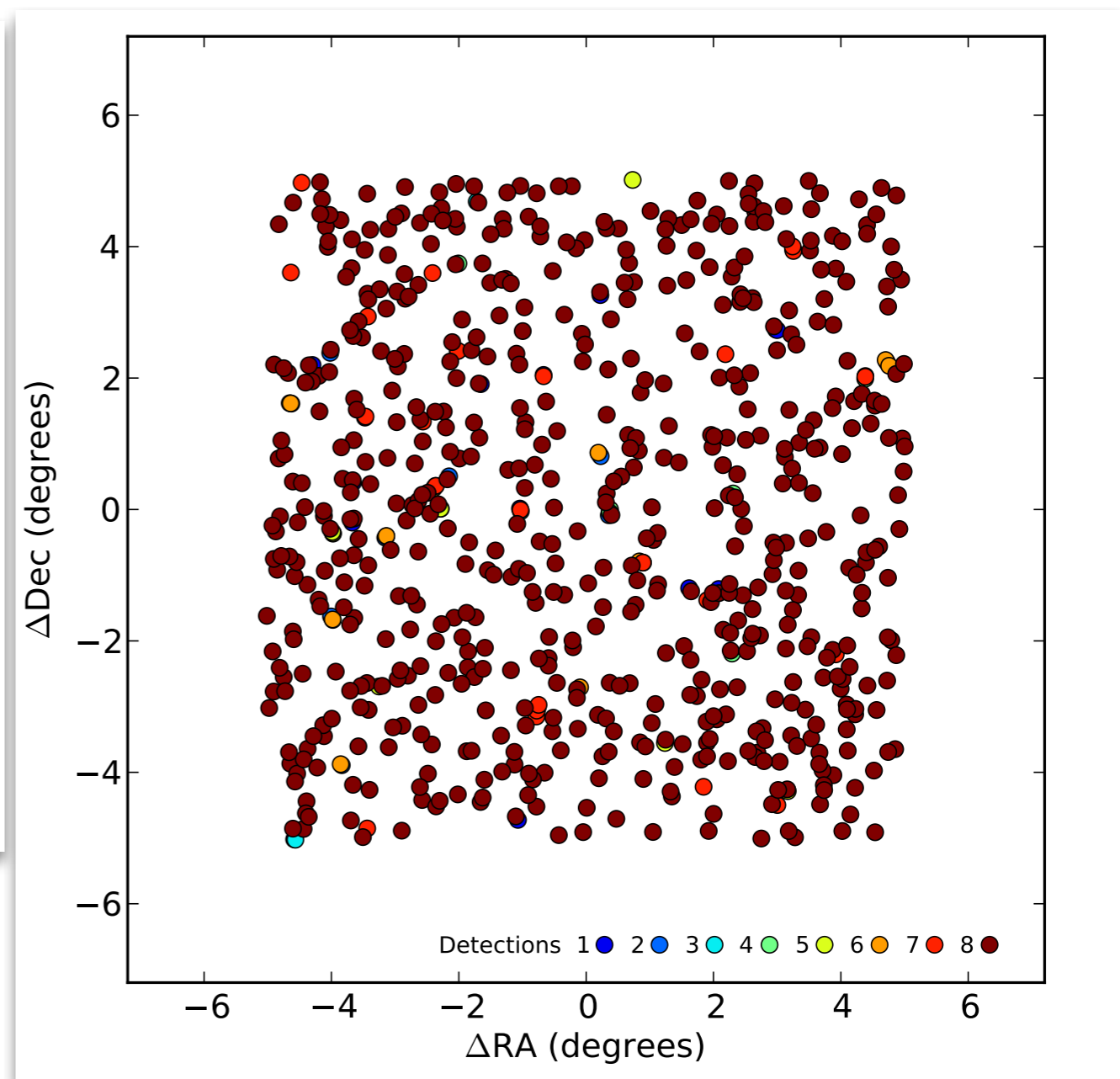
See MSSS Report Weeks 18-19 by *C. Ferrari & A. Rowlinson*

MSSS SOURCE FINDING UPDATE

PYBDSM TESTS & RESULTS



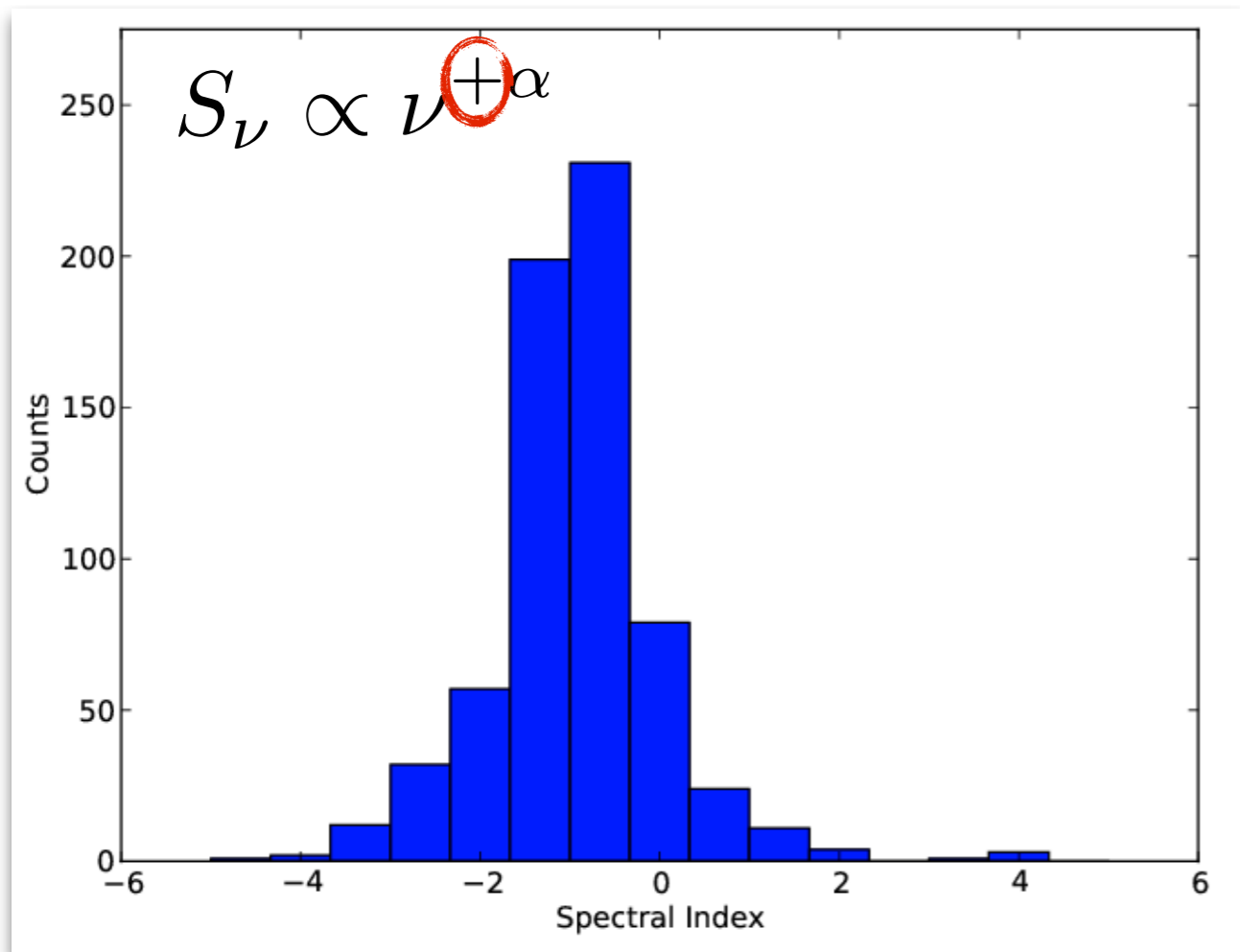
- ➔ Mean spectral index = -0.94
- ➔ Std.dev. = 0.84



See MSSS Report Weeks 18-19 by *C. Ferrari & A. Rowlinson*

MSSS SOURCE FINDING UPDATE

PYBDSM TESTS & RESULTS



- ➔ Mean spectral index = -0.94
- ➔ Std.dev. = 0.84

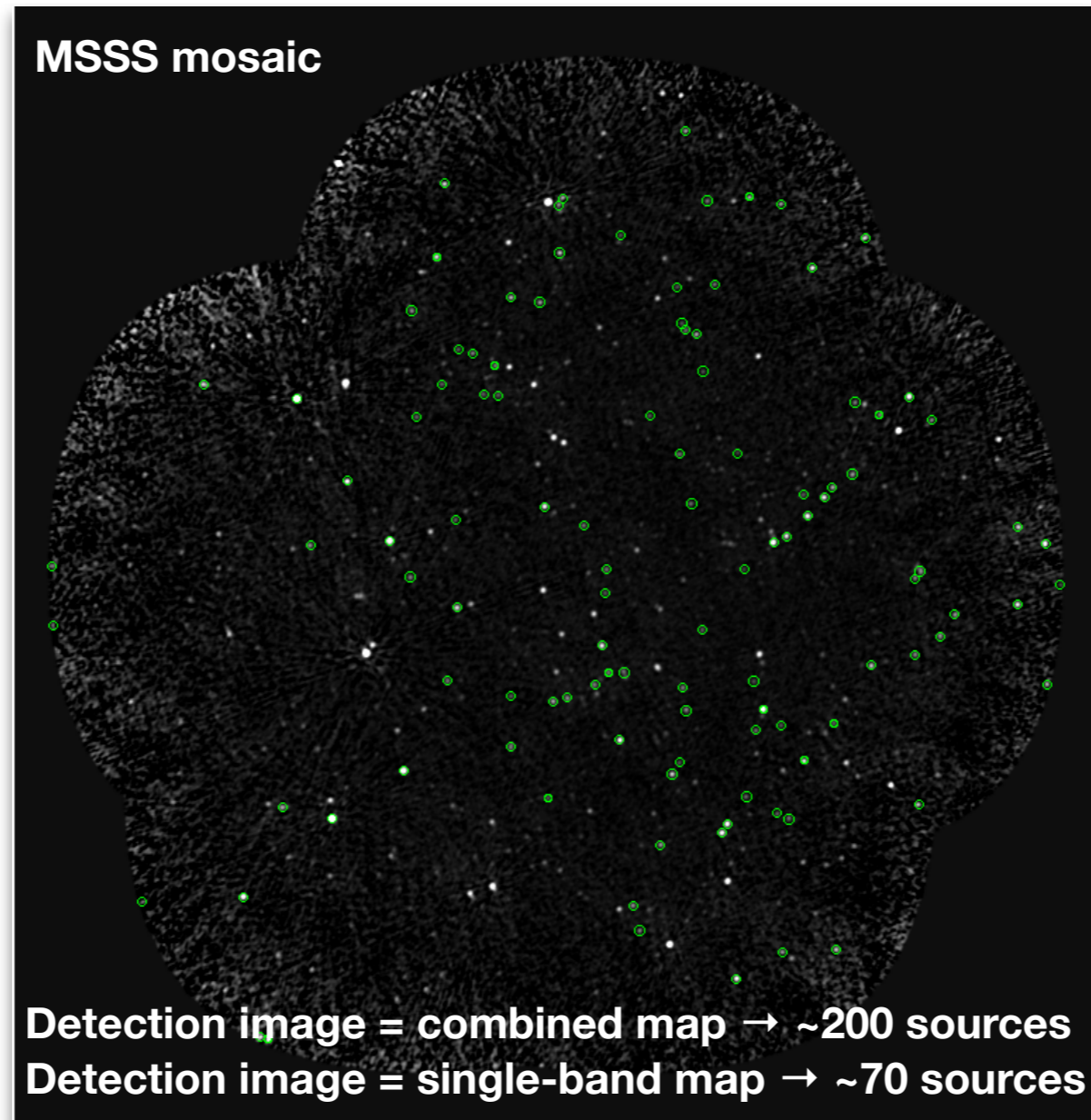
***Too high/low spectral indexes :
visual inspection conclusions***

- ✓ faint sources affected by noise
- ✓ sources close to the edge of the map
- ✓ fitted ellipses change of size in different bands:
force the gaussian to have the shape of the
restoring beam (currently done by Transients KSP)?
But not only point sources...
- ✓ spectra more complex than a simple power-law

See MSSS Report Weeks 18-19 by *C. Ferrari & A. Rowlinson*

MSSS SOURCE FINDING UPDATE

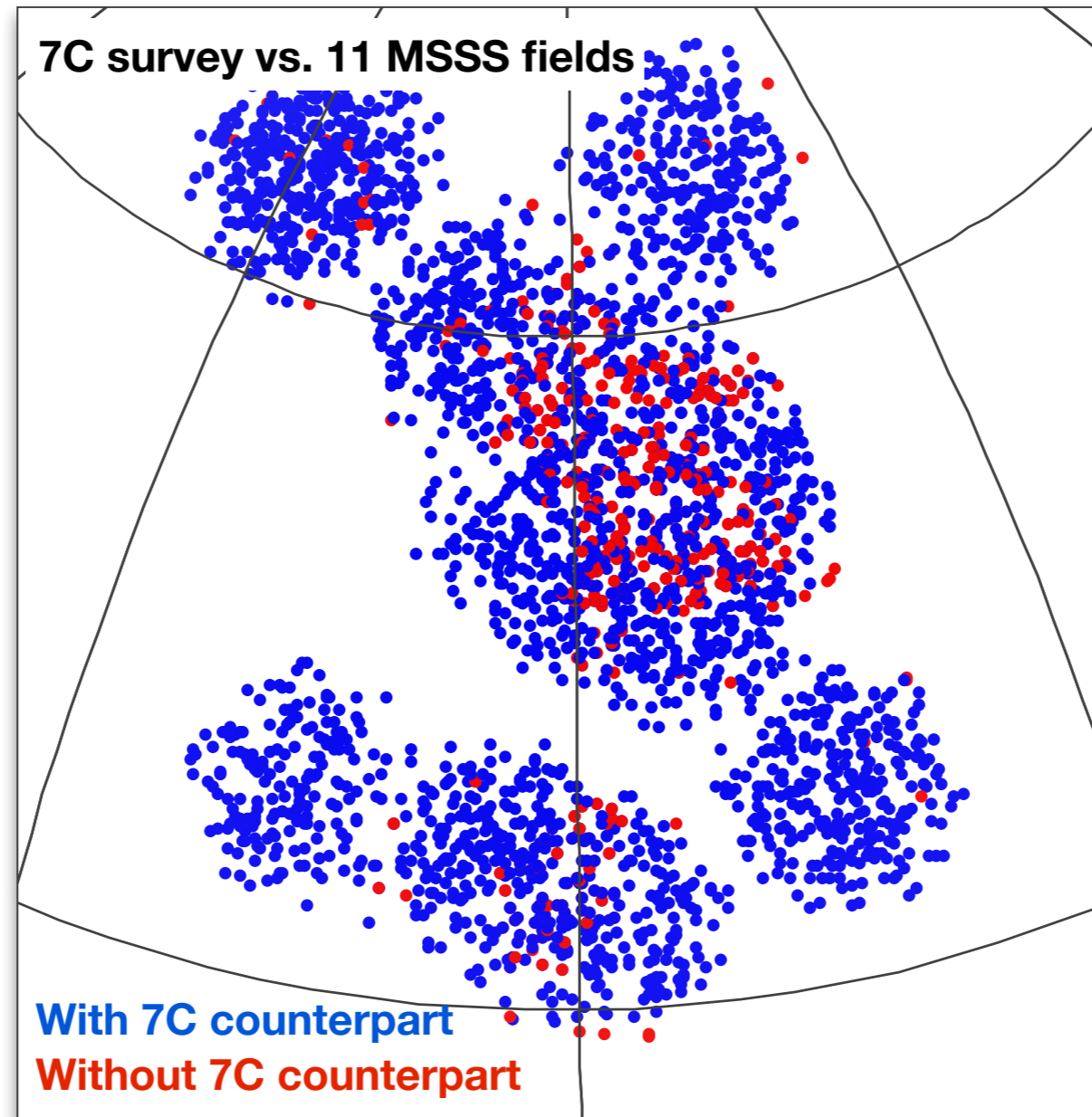
PYSE TESTS & RESULTS



See MSSS Report Week 24 by *M. Hardcastle* - **PySE** developments by *J. Swinbank*

MSSS SOURCE FINDING UPDATE

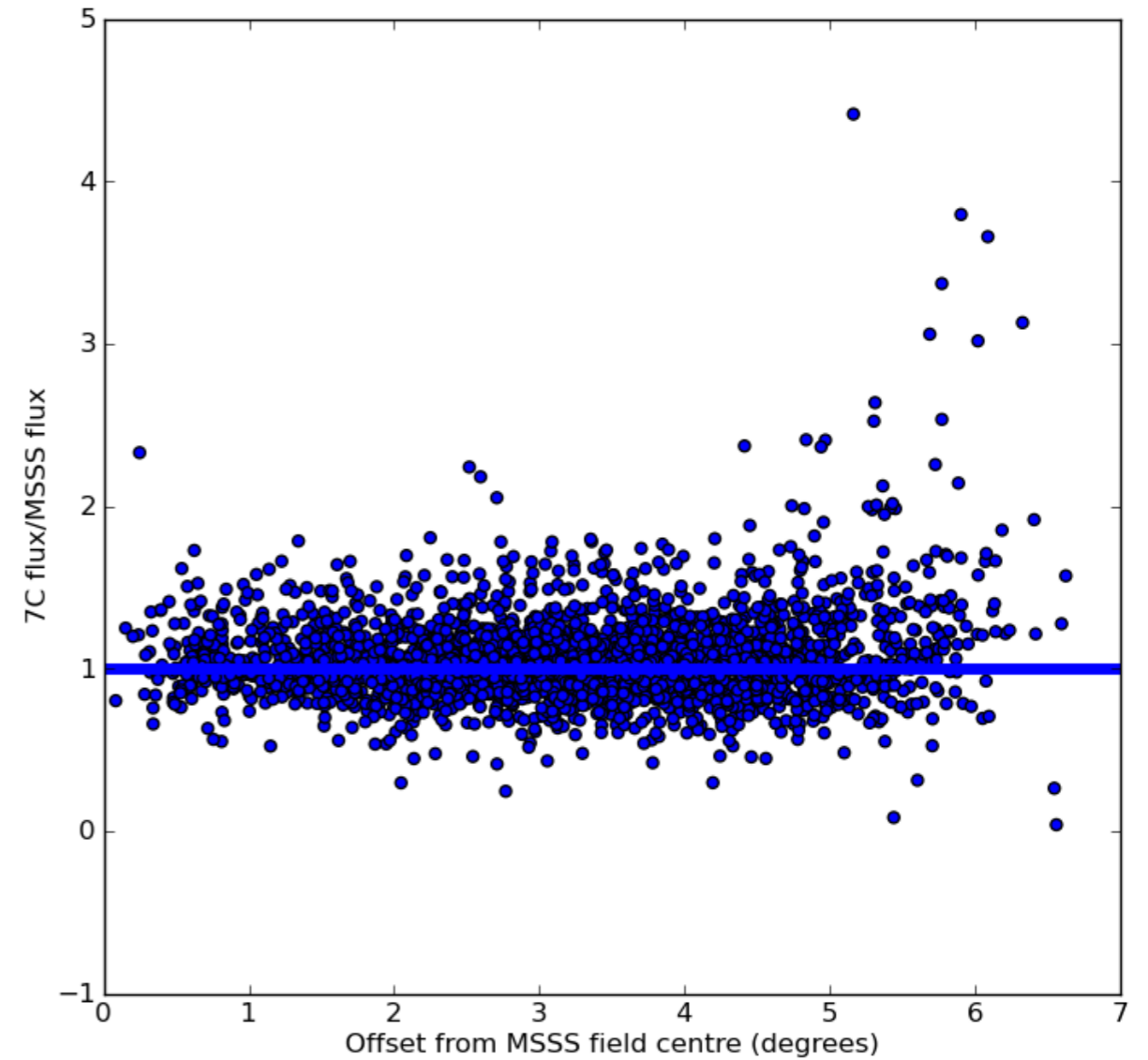
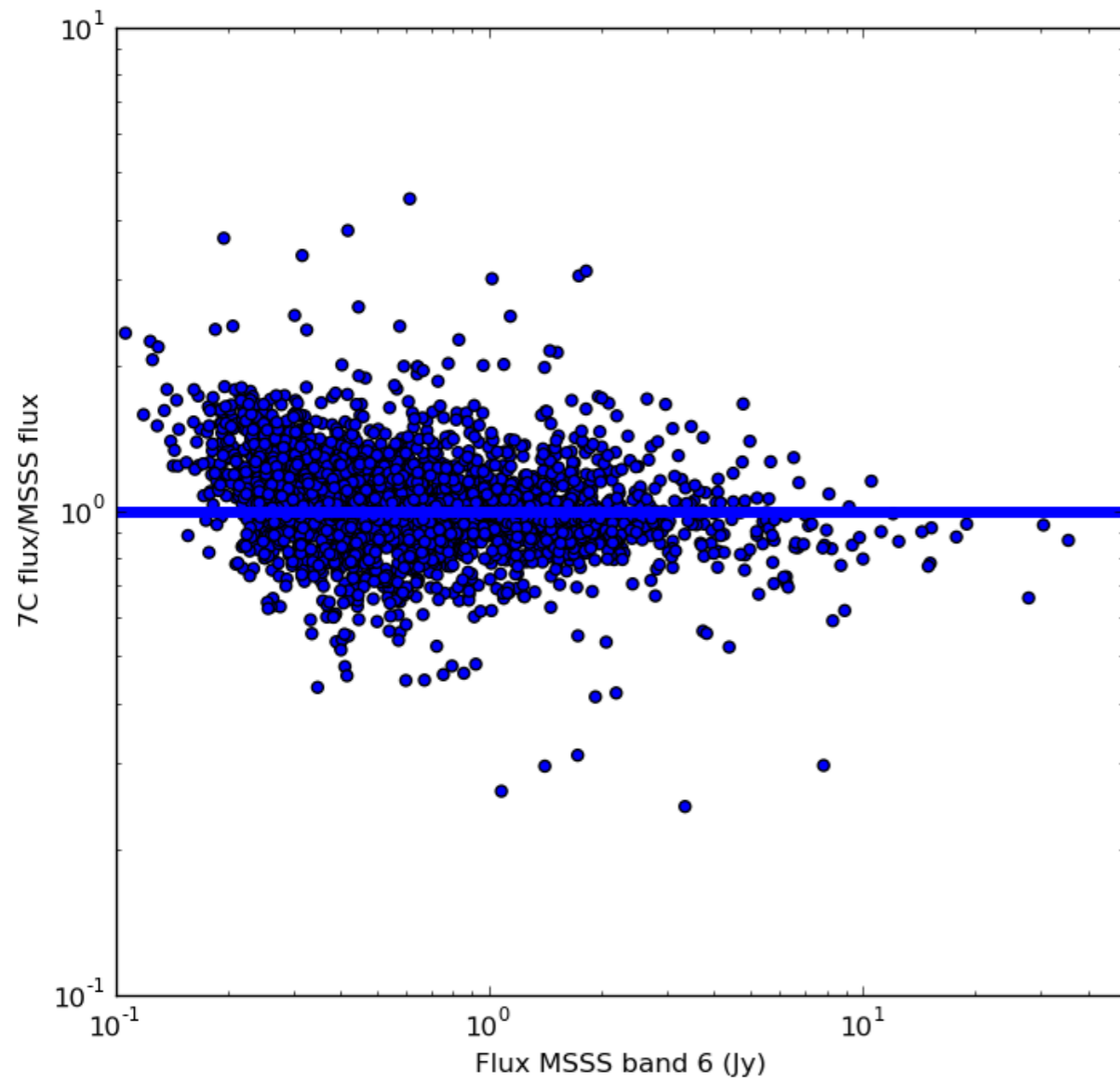
PYSE TESTS & RESULTS



See MSSS Report Week 24 by *M. Hardcastle*

MSSS SOURCE FINDING UPDATE

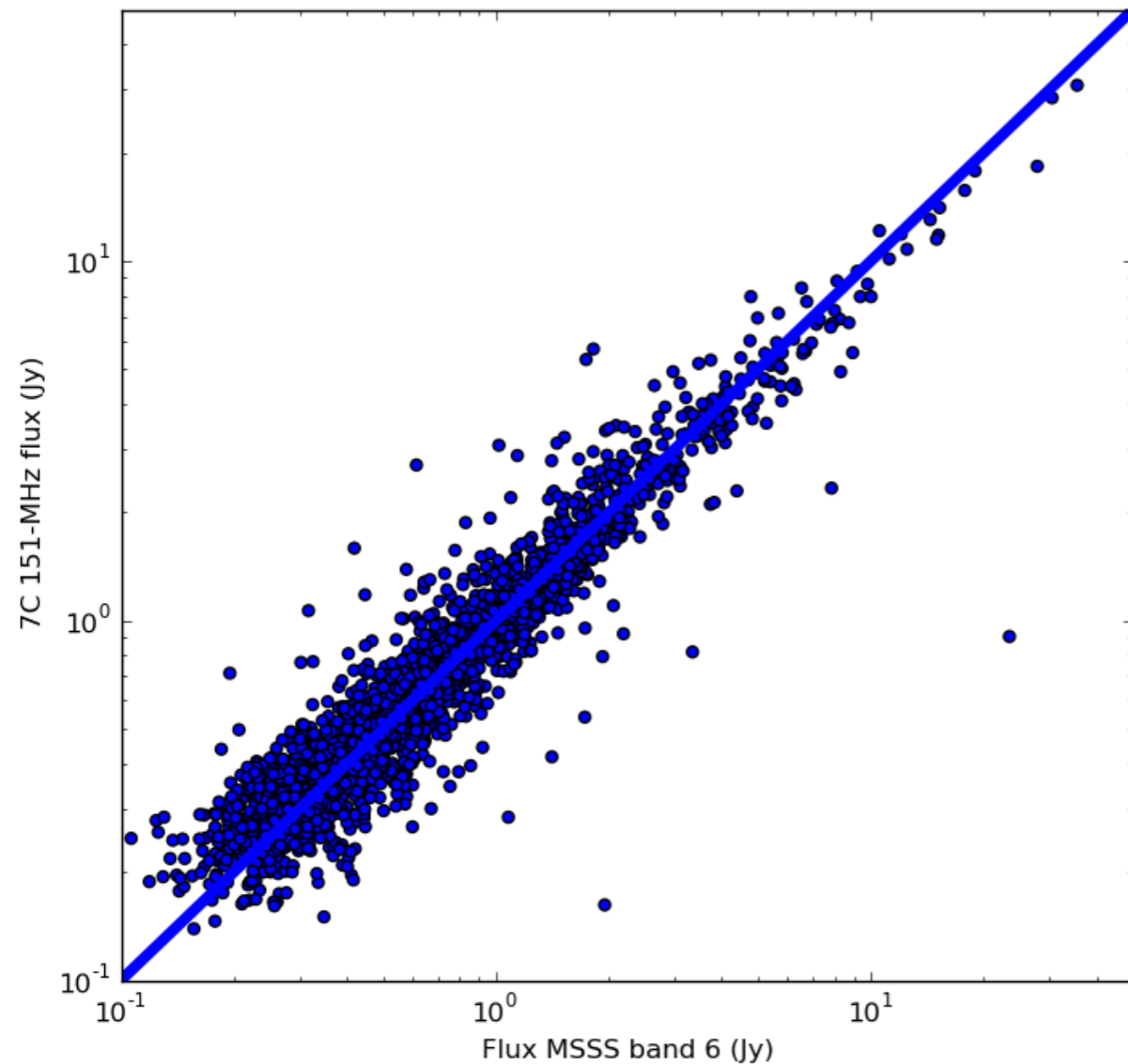
PYSE TESTS & RESULTS



See MSSS Report Week 24 by *M. Hardcastle*

MSSS SOURCE FINDING UPDATE

PYSE TESTS & RESULTS



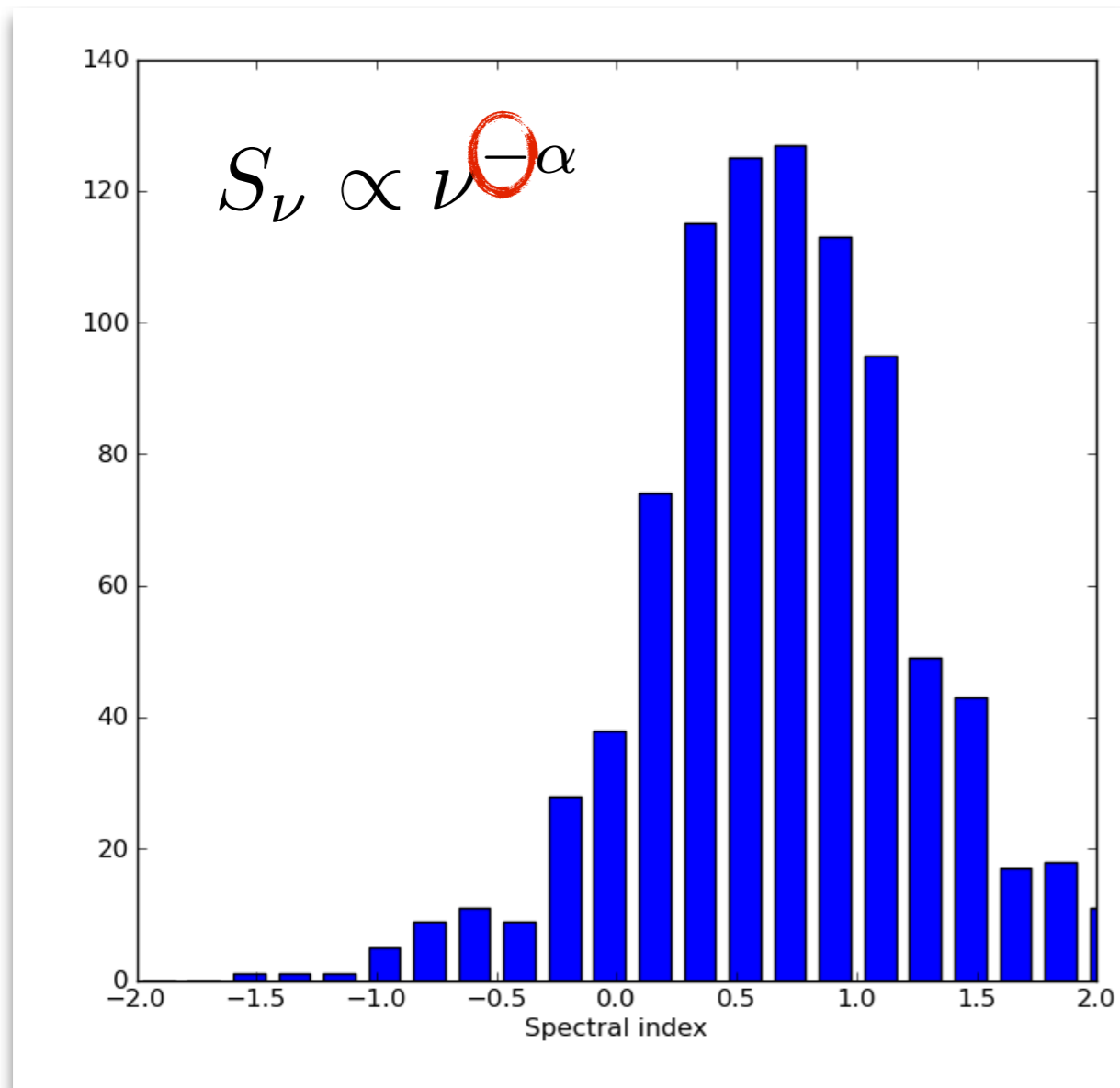
Mean flux ratio

- ✓ All matching sources: 1.06
- ✓ Sources within 4 deg of the field edge: 1.04
- ✓ Sources with MSSS Band-6 flux > 1 Jy: 1.00

See MSSS Report Week 24 by *M. Hardcastle*

MSSS SOURCE FINDING UPDATE

PYSE TESTS & RESULTS



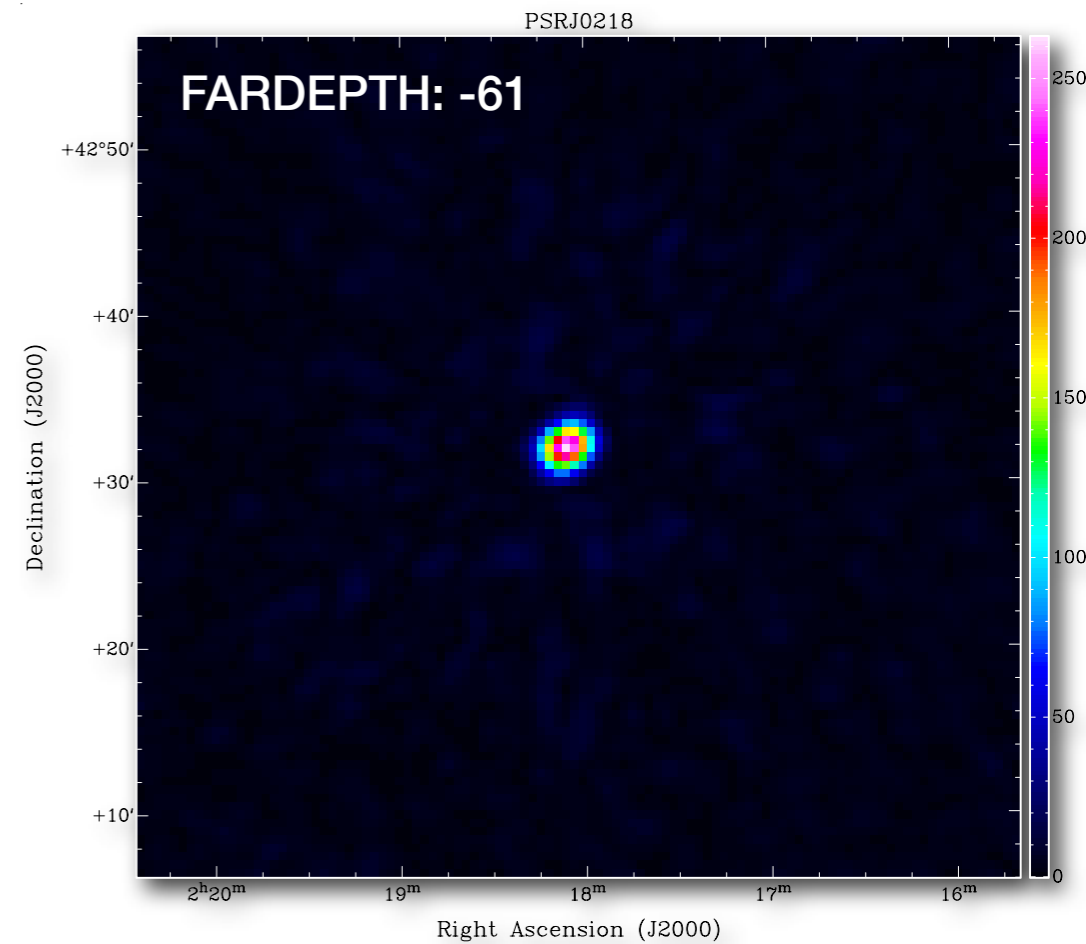
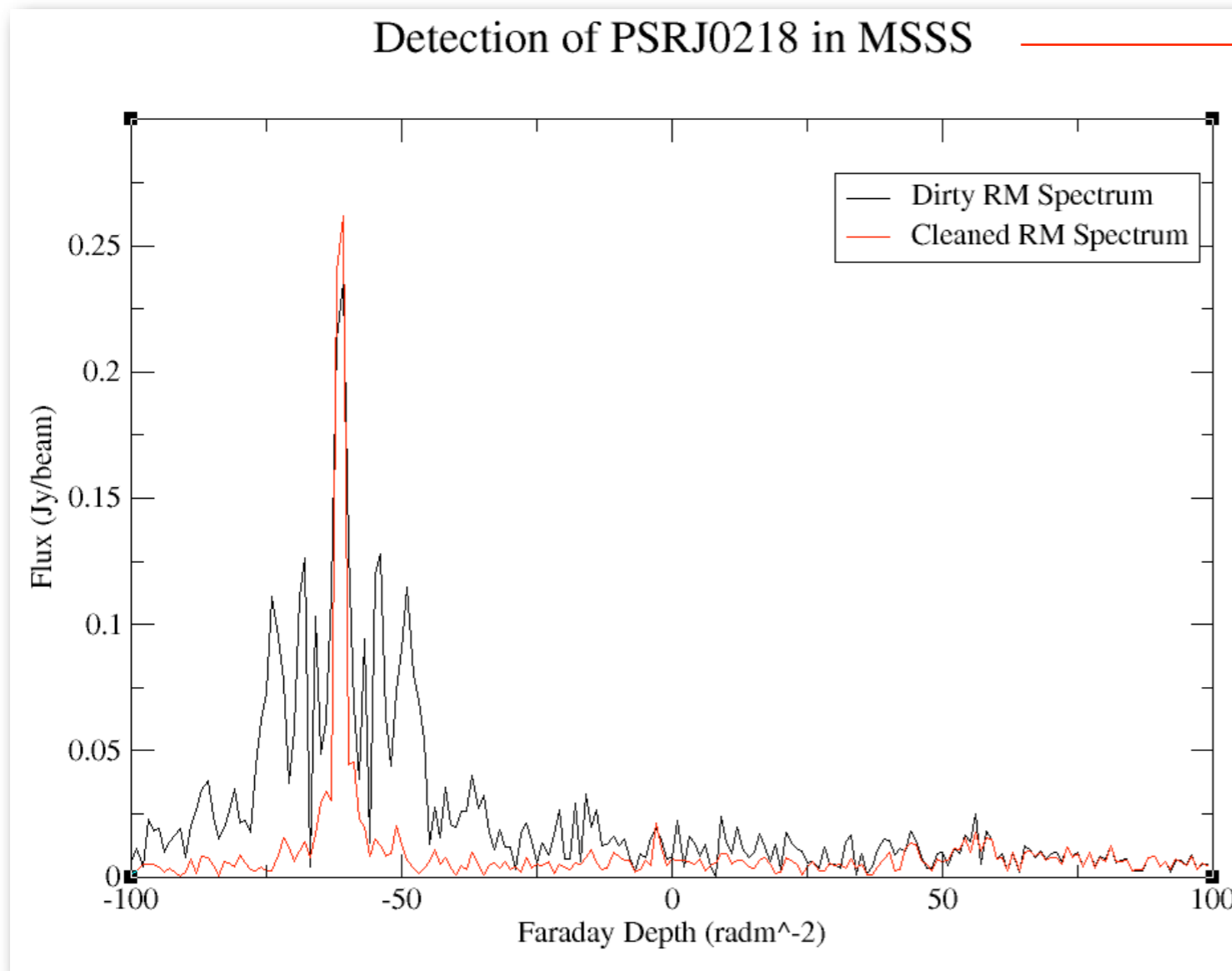
911 MSSS sources

- ✓ detected in all 8 bands
- ✓ averaged flux densities > 1 Jy
- ✓ spectral index of fitted single power law
- ➔ Mean spectral index = 0.711
- ➔ Median spectral index = 0.675
- ➔ Median spectral index error = ± 0.29

See MSSS Report Week 24 by *M. Hardcastle*

MSSS POLARIZATION UPDATE

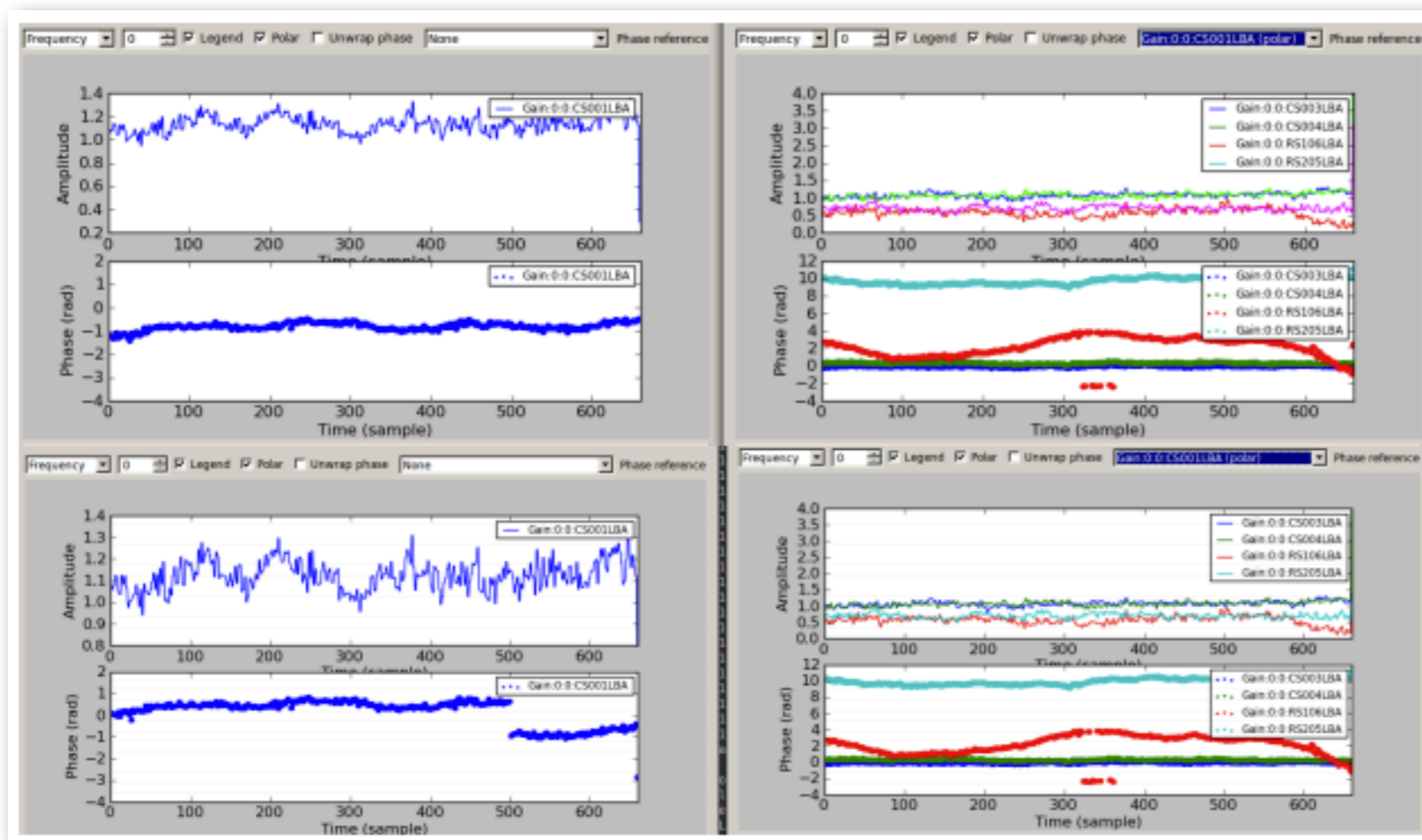
- ✓ Polarized pulsar (PSRJ0218) detected with MSSS image data!
- ✓ 51% polarized, and with correct RM of -61 rad m^2 (ionospheric RM correction was applied to the data)



David Mulcahy

MSSS IONOSPHERIC UPDATE

- ✓ Direction independent gain stability substantially improved thanks to B. van der Tol, A. Stroe & J. Harwood
- ✓ Plot below shows gain solutions, illustrating effect of solving for CommonRotationAngle (bottom) or not (top)
- ✓ Next step: use these to obtain robust direction dependent gains (with existing script) and apply in *awimager* (stay tuned)



Stroe & Harwood