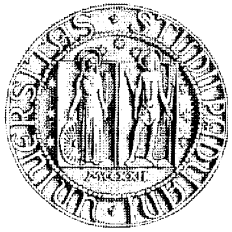
ISO Extragalactic Surveys

Data Reduction with the LARI Method



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Scuola Nazionale di Astrofisica *Cetraro, 3-7 Giugno 2002*

ISO Data

Observing strategy:

- Raster sky scanning
- Low redundancy

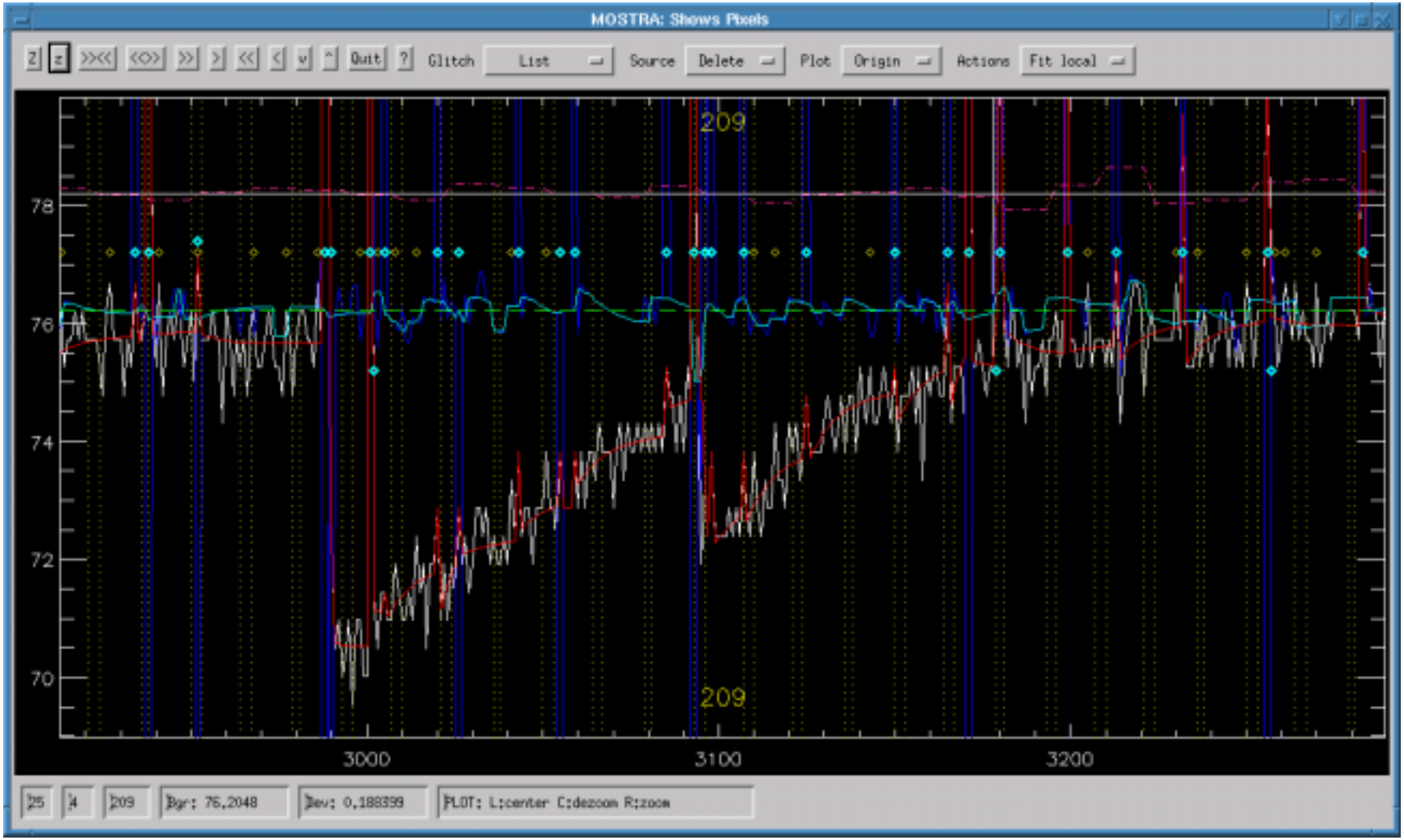
Detectors:

- Transient behaviour
- Cosmic ray hits

$\Downarrow$

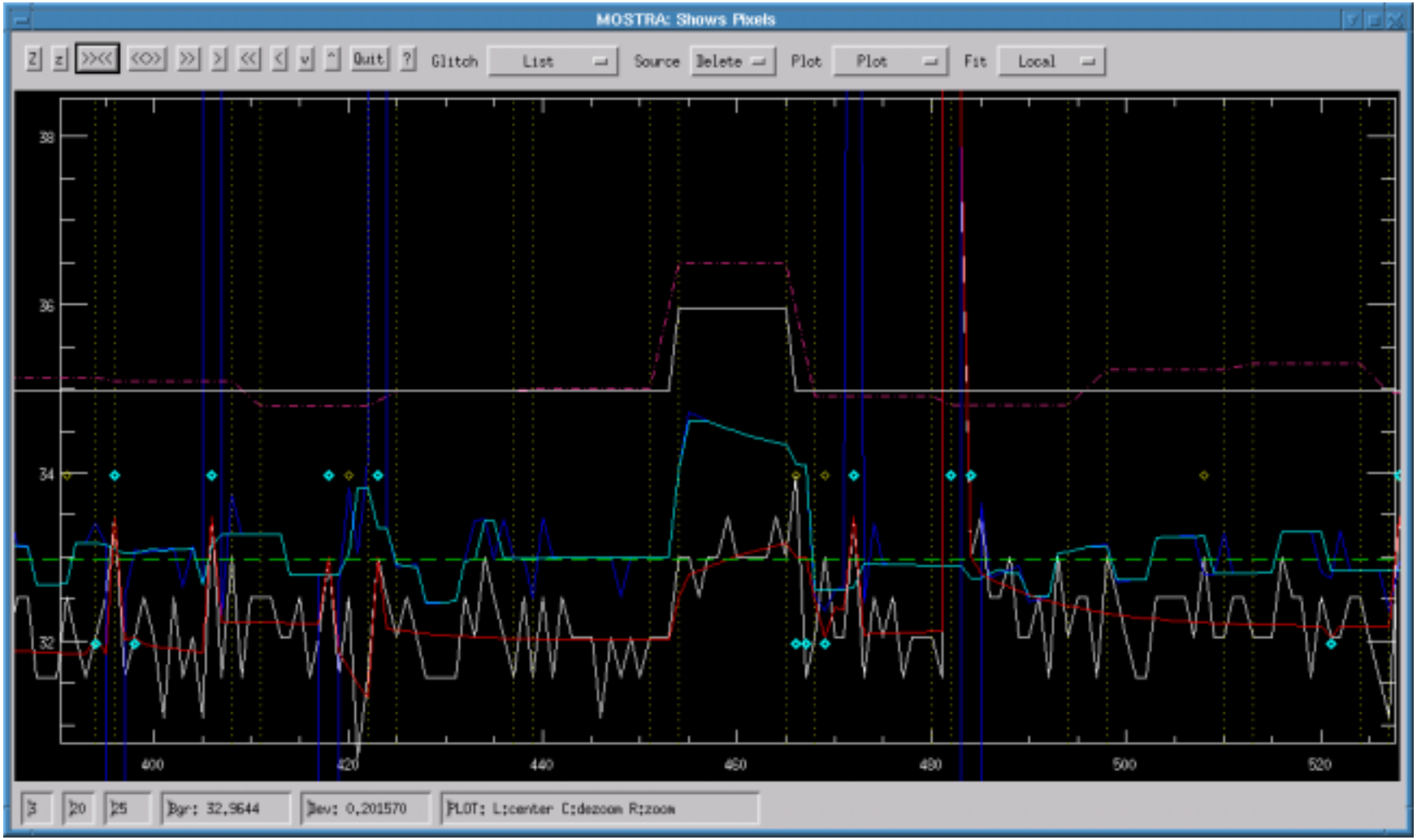
Source detection is tricky!

The LARI Method (1)



- Cosmic ray hits identification and background determination
- Cosimc ray hits and transient behaviour modeling
- Source detection and simulation of detected source fluxes

The LARI Method (2)



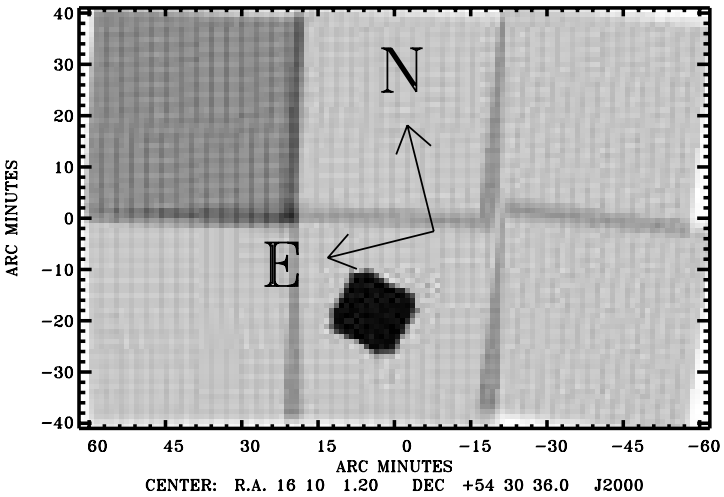
- Home-made IDL software: all reduction routines and a widget-based GUI
- Different stages of interactive "repairs" are carried out
- Uttermost reliability ensured by multiple consistency checks

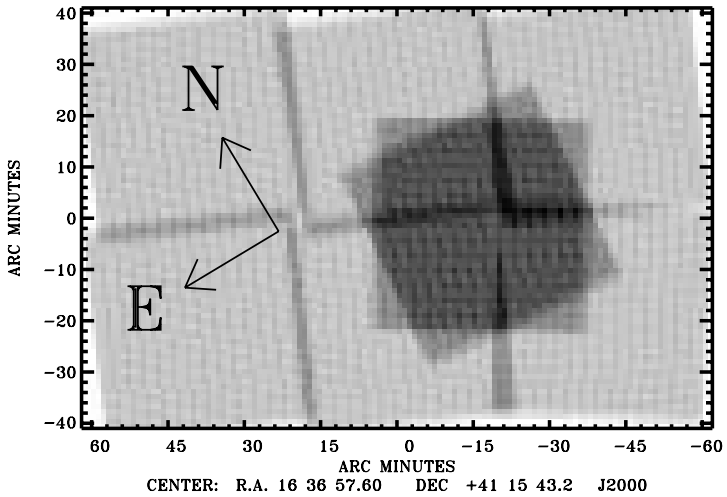
ISO Extragalactic Surveys

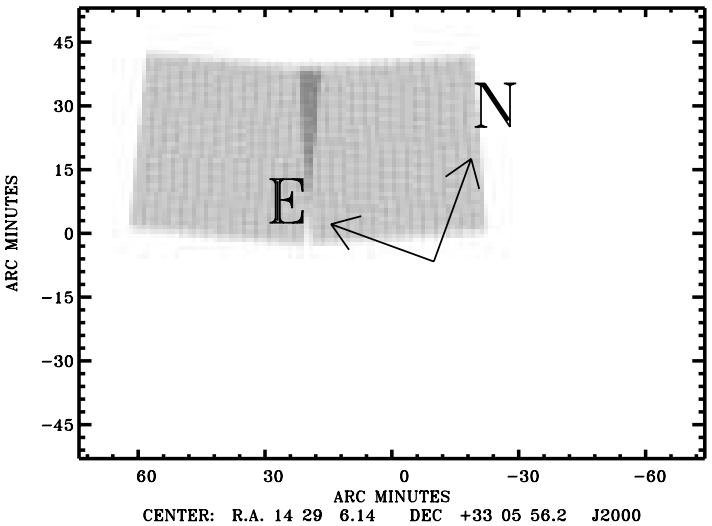
Name	λ (μm)	Integration (s)	Area (deg^2)
PHT Serendipity Survey	175	0.5	7000
CAM Parallel Mode	6.7	150	33
ELAIS	6.7, 15, 90, 175	40, 40, 24, 128	6, 11, 12, 1
CAM Shallow	15	180	1.3
FIRBACK	175	256, 128	1, 3
IR Back	90, 135, 180	23, 27, 27	1, 1, 1
SA 57	60, 90	150, 50	0.42, 0.42
CAM Deep	6.7, 15, 90	800, 990, 144	0.28, 0.28, 0.28
Comet fields	12	302	0.11
CFRS	6.7, 15, 60, 90	720, 1000, 3000, 3000	0.067, 0.067, 0.067, 0.067
CAM Ultra-Deep	6.7	3520	0.013
ISOHDF South	6.7, 15	> 6400, > 6400	$4.7 \cdot 10^{-3}$, $4.7 \cdot 10^{-3}$
Deep SSA13	6.7	34000	$2.5 \cdot 10^{-3}$
Deep Lockman	6.7, 90, 175	44640, 48, 128	$2.5 \cdot 10^{-3}$, 1.2, 1
ISOHDF North	6.7, 15	12800, 6400	$1.4 \cdot 10^{-3}$, $4.2 \cdot 10^{-3}$

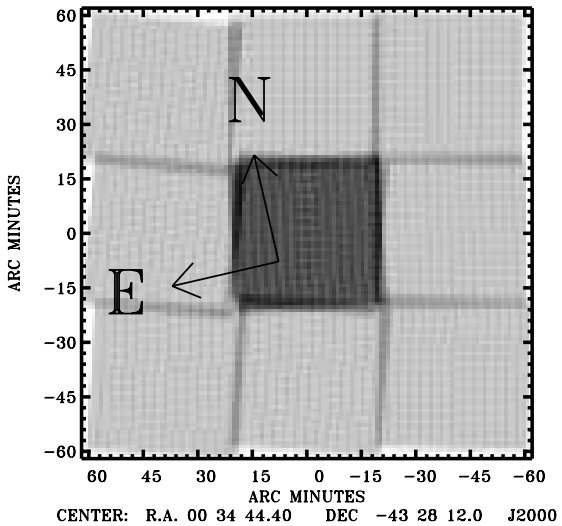
Different surveys are complementary in exploring the Depth-Area plane

ELAIS CAM 15 μm Dataset









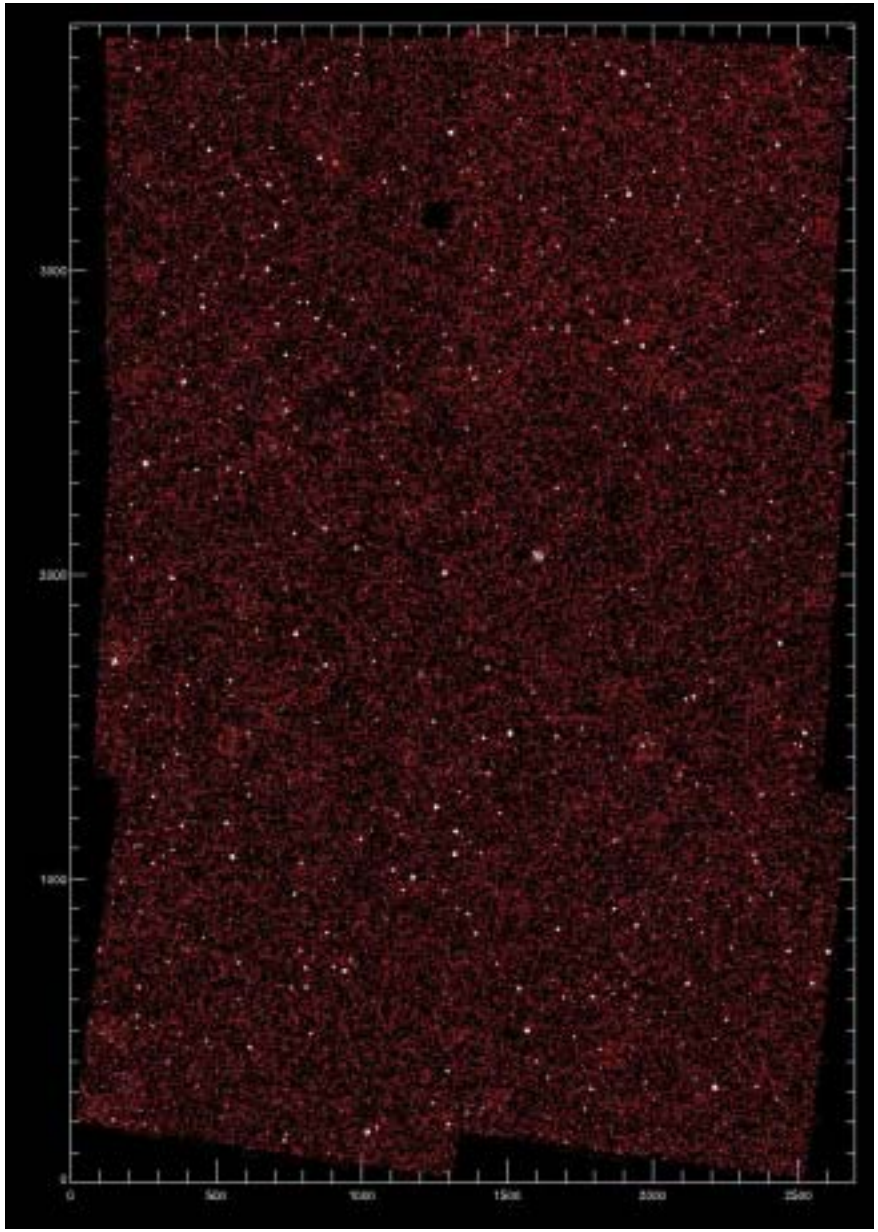
S1	4.9 deg^2
S2	0.15 deg^2
N1	3.25 deg^2
N2	3.25 deg^2
N3	1.1 deg^2
Total	13 deg^2

X $\cdots$ Radio wavelength coverage

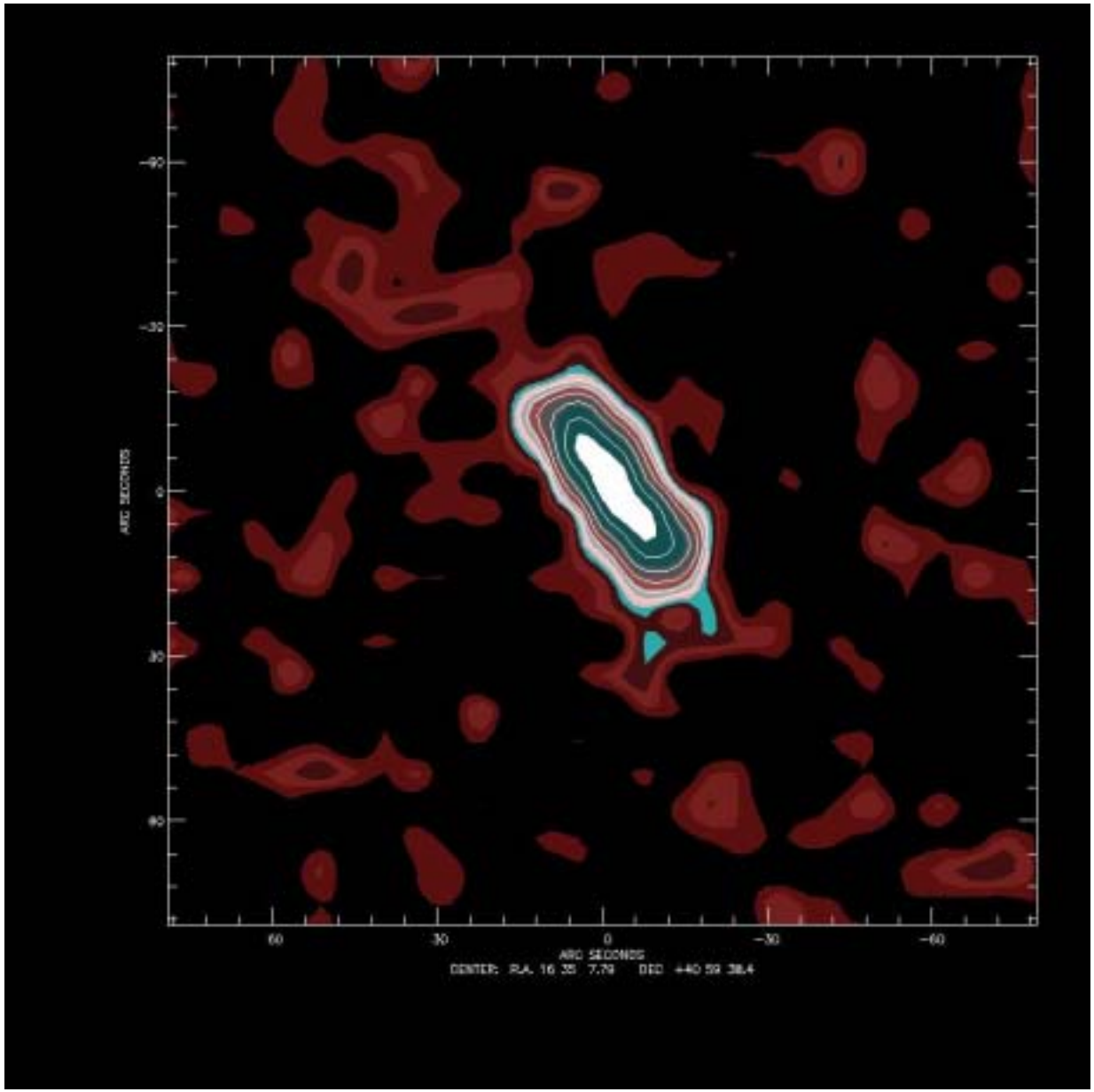
Mosaiced Mapping and Source Extraction

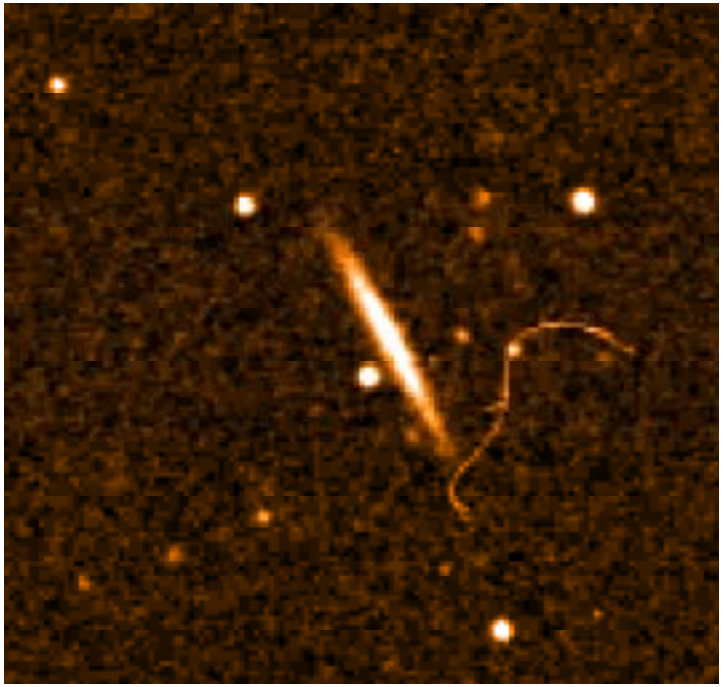
- 5-σ detections down to $\simeq 0.5$ mJy
- > 85 % completeness at 2 mJy
- FA-II $\simeq 150$ sources/deg^2

	S1	N1	N2	Total
PA	189	129	141	459
FA-I	$\simeq 450$	$\simeq 350$	$\simeq 400$	$\simeq 1200$
FA-II	$\simeq 700$	$\simeq 600$	$\simeq 600$	$\simeq 1900$



Individual Sources



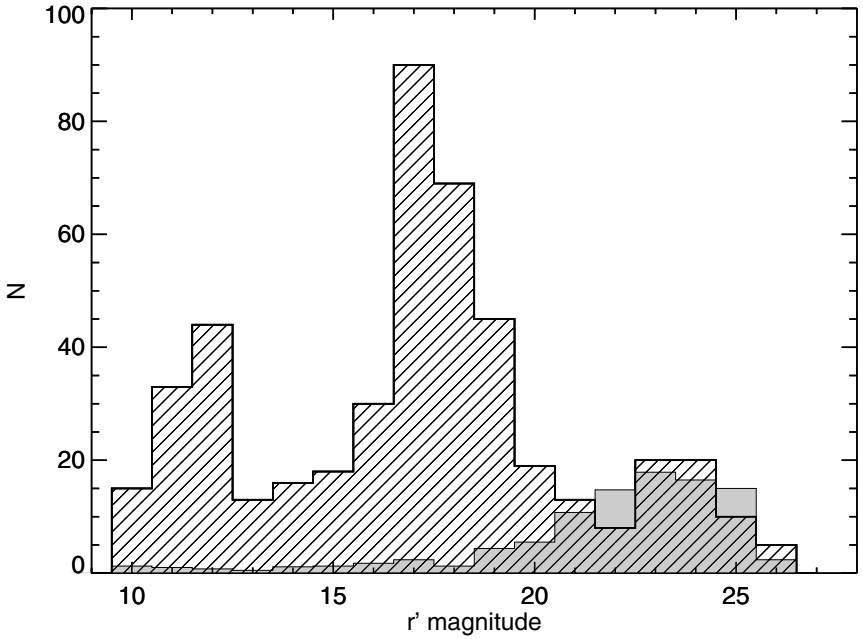


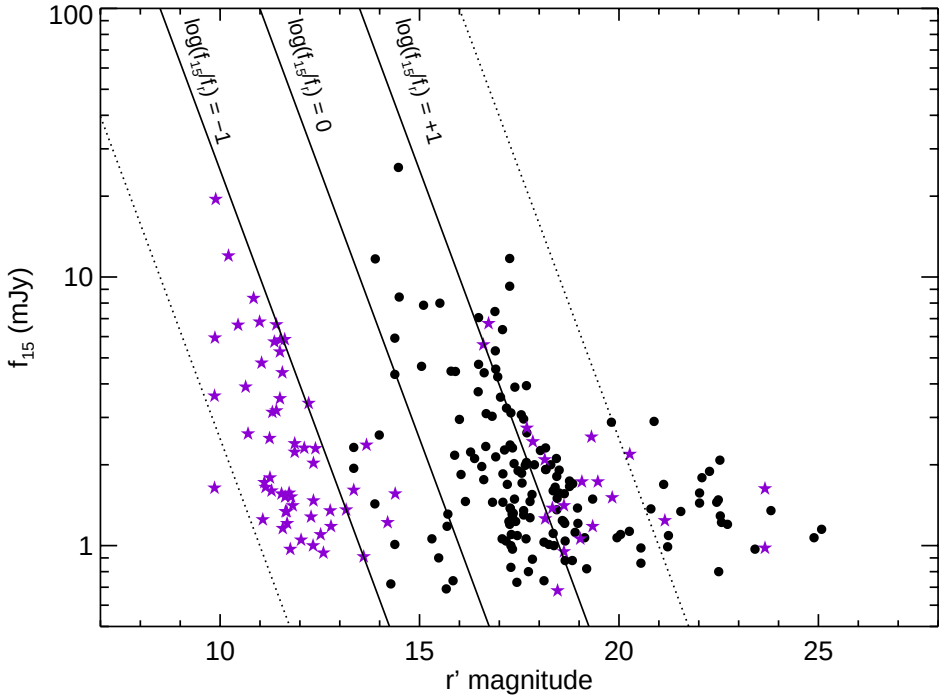
⇑

UGC 10459 (with "Cosmic Hair":-)

⇐ **ELAISC15_J163525+405542**

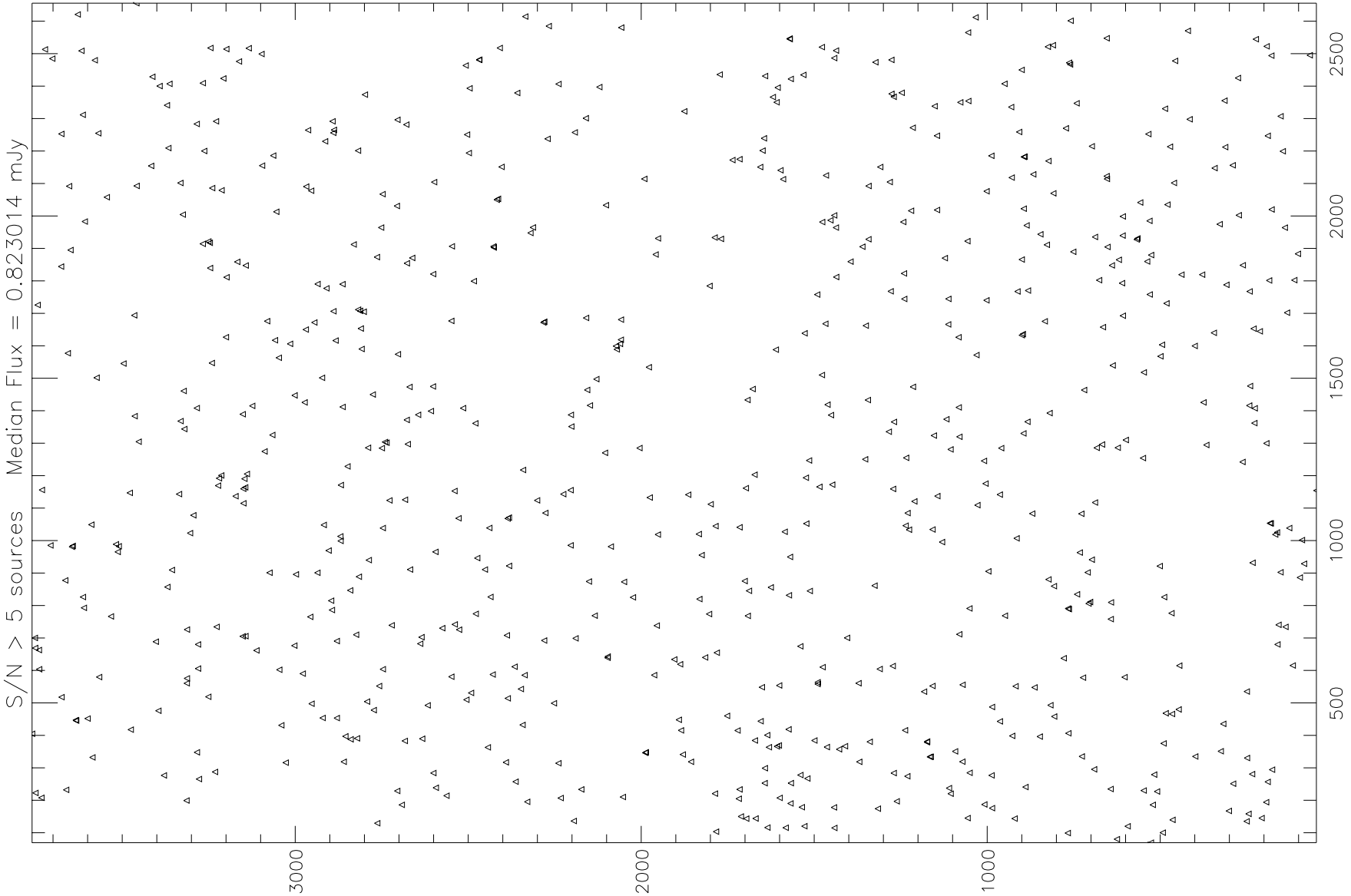
Optical Identifications



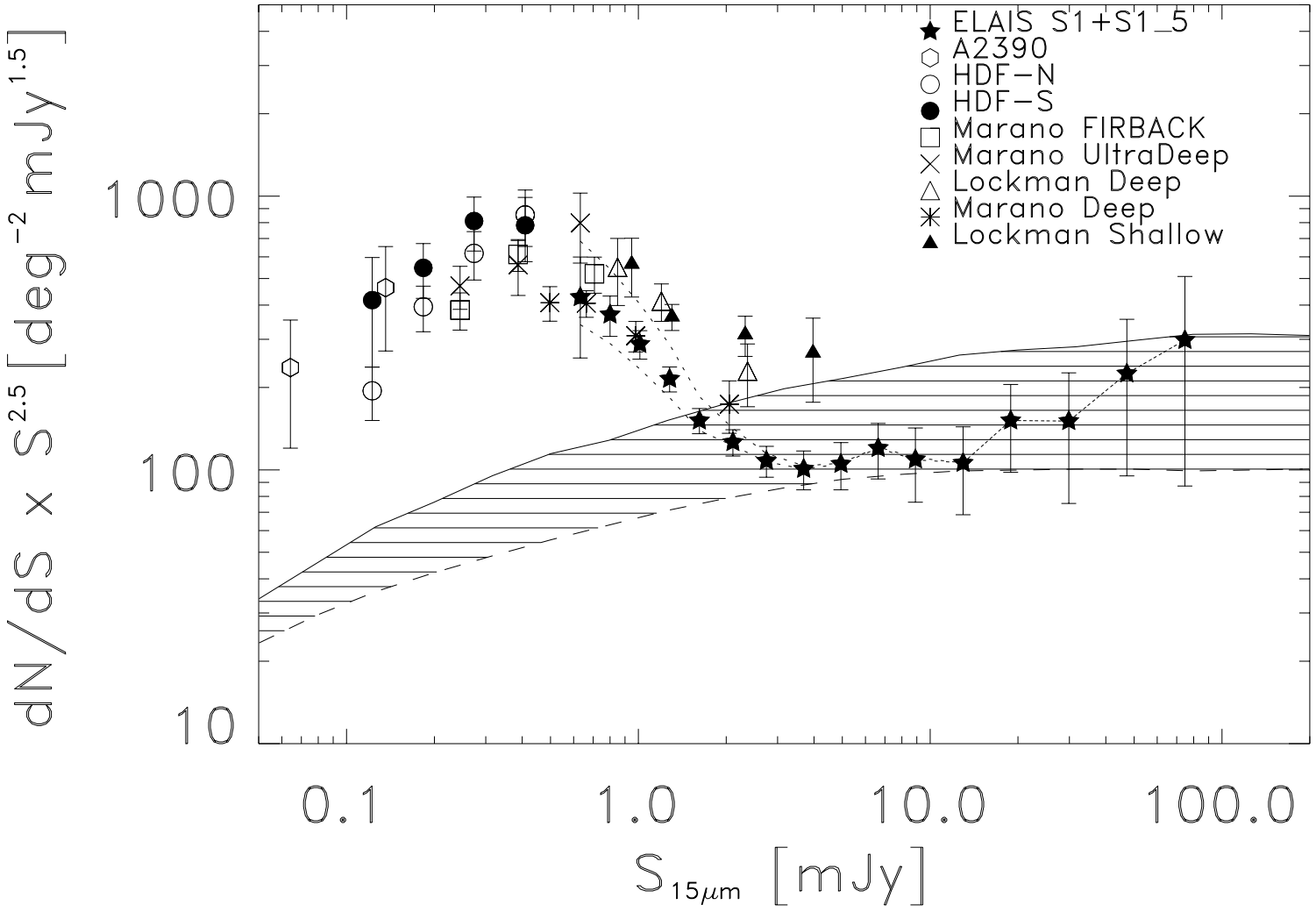


- At least 90 % of MIR sources have unambiguous optical counterparts

Is there Clustering out there?

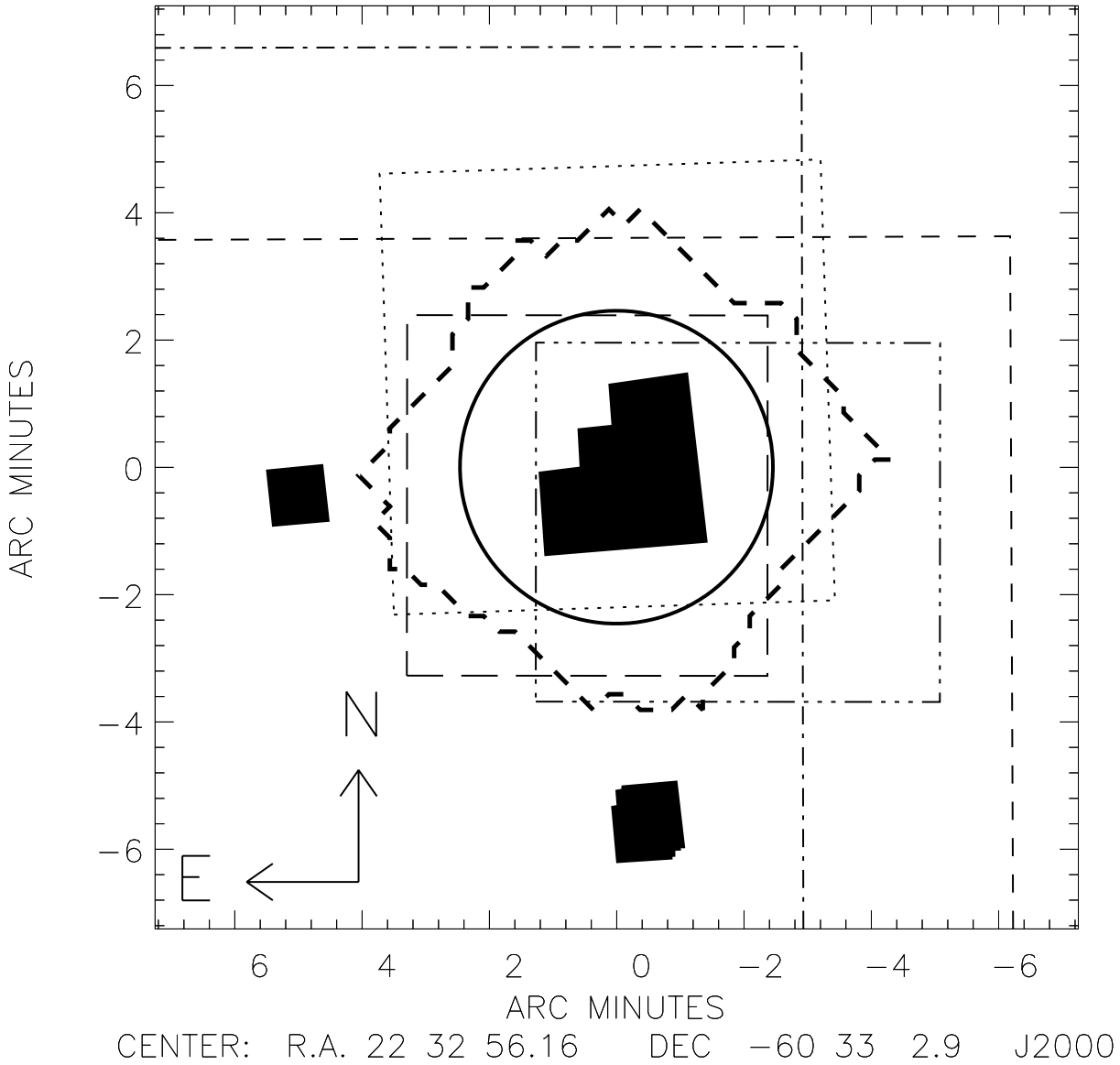


Extragalactic Source Counts



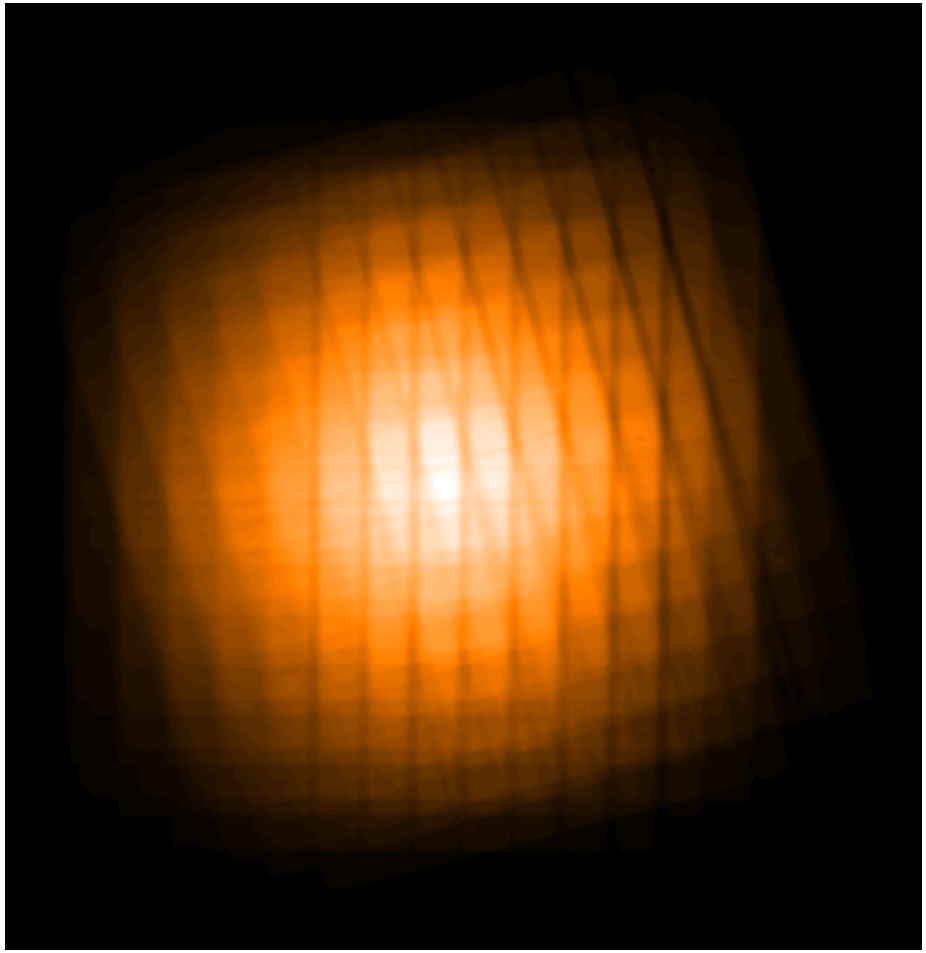
Abrupt slope change at $S_{15\,\mu\mathrm{m}} \simeq 2$ mJy

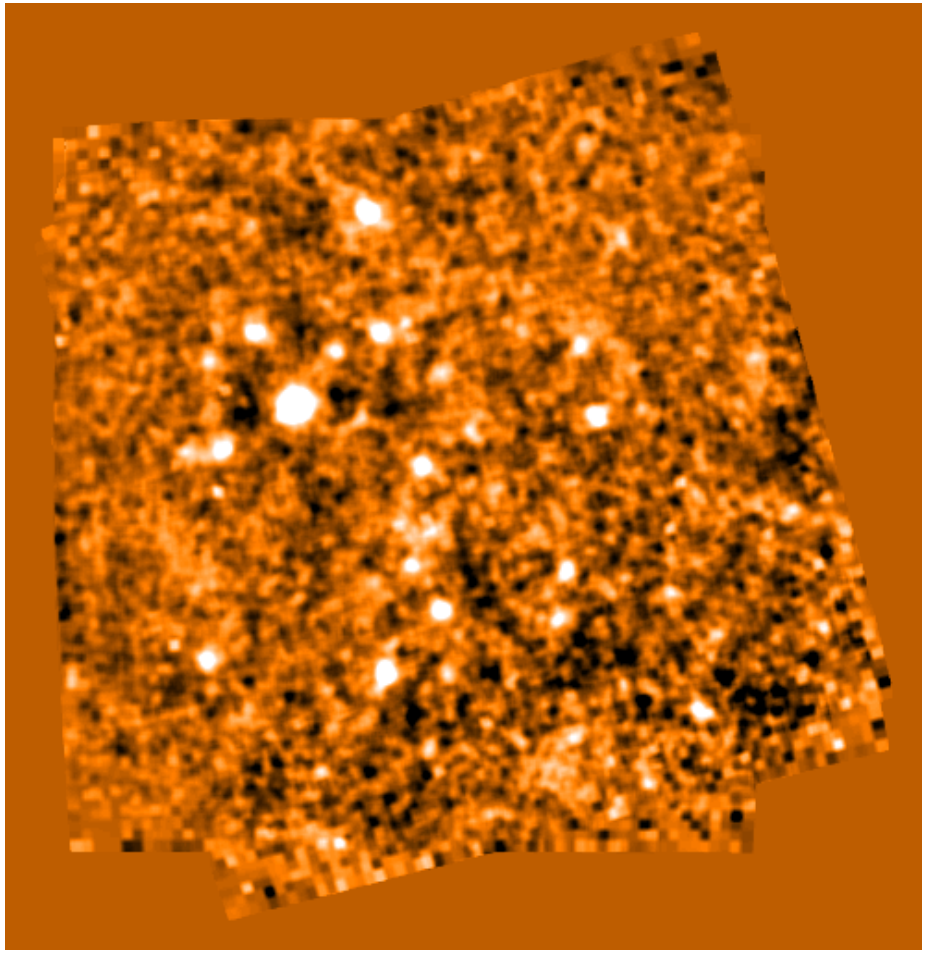
HDFS



- 7 and 15 μm data
- 4+4 superposed rasters
- $\simeq 5'$ diameter
- Higher Redundancy

HDFS





- $\simeq$ 50 4-σ sources down to $S_{15\,\mu\mathrm{m}} \simeq 0.1$ mJy
- Work in progress...

Results

- Well-tested software with a user-friendly GUI
- Source lists of great reliability and completeness
- Good astrometric and photometric accuracy

Future Work

- Finalization of ELAIS 15 μm catalogues
- Reduction of 15 μm deep fields
- Multi-wavelength identifications
- Statistical studies
- Clustering
- NB: Data reduction at other ISO wavelengths as well!