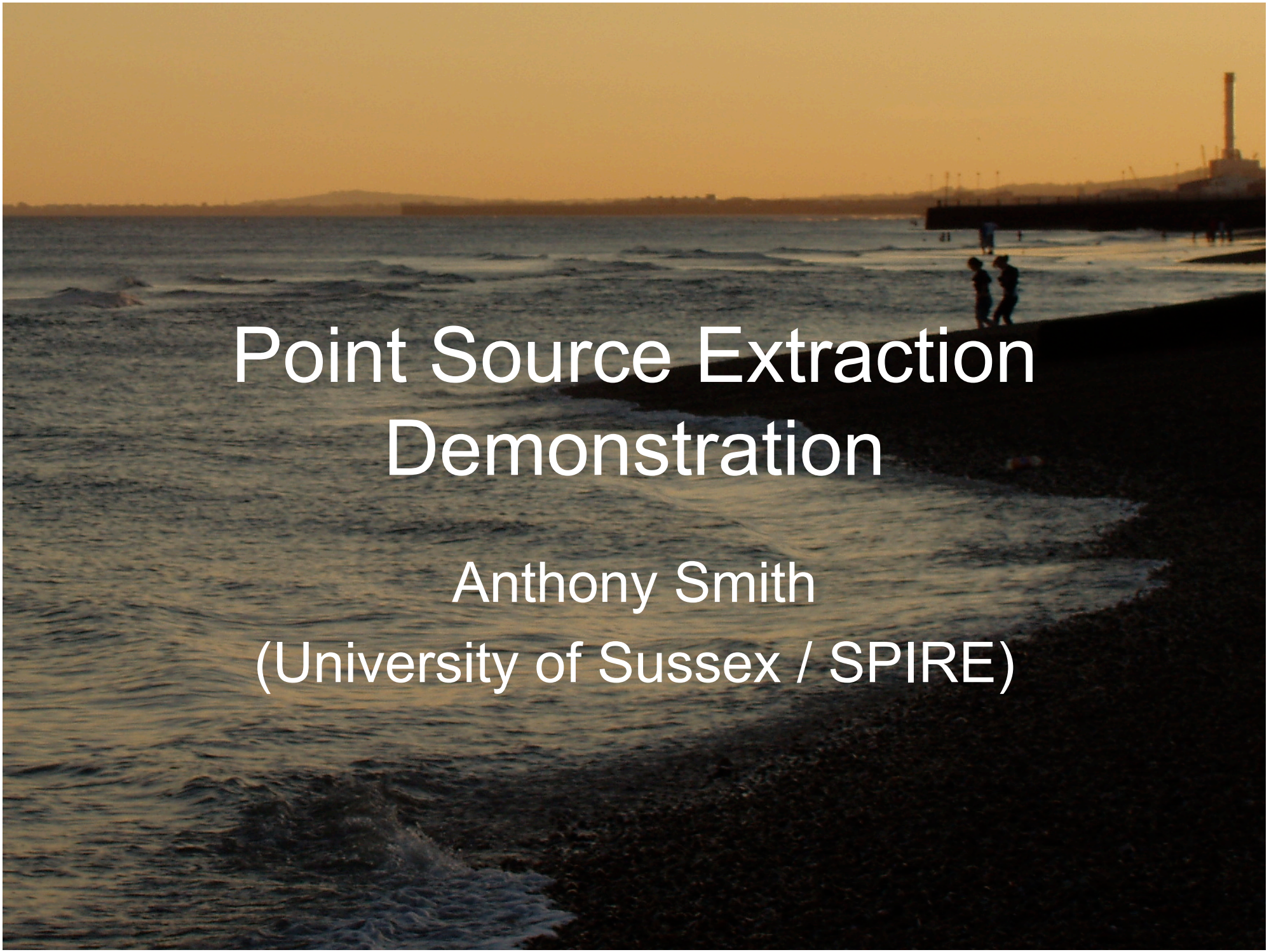


Point Source Extraction Demonstration

Anthony Smith
(University of Sussex / SPIRE)

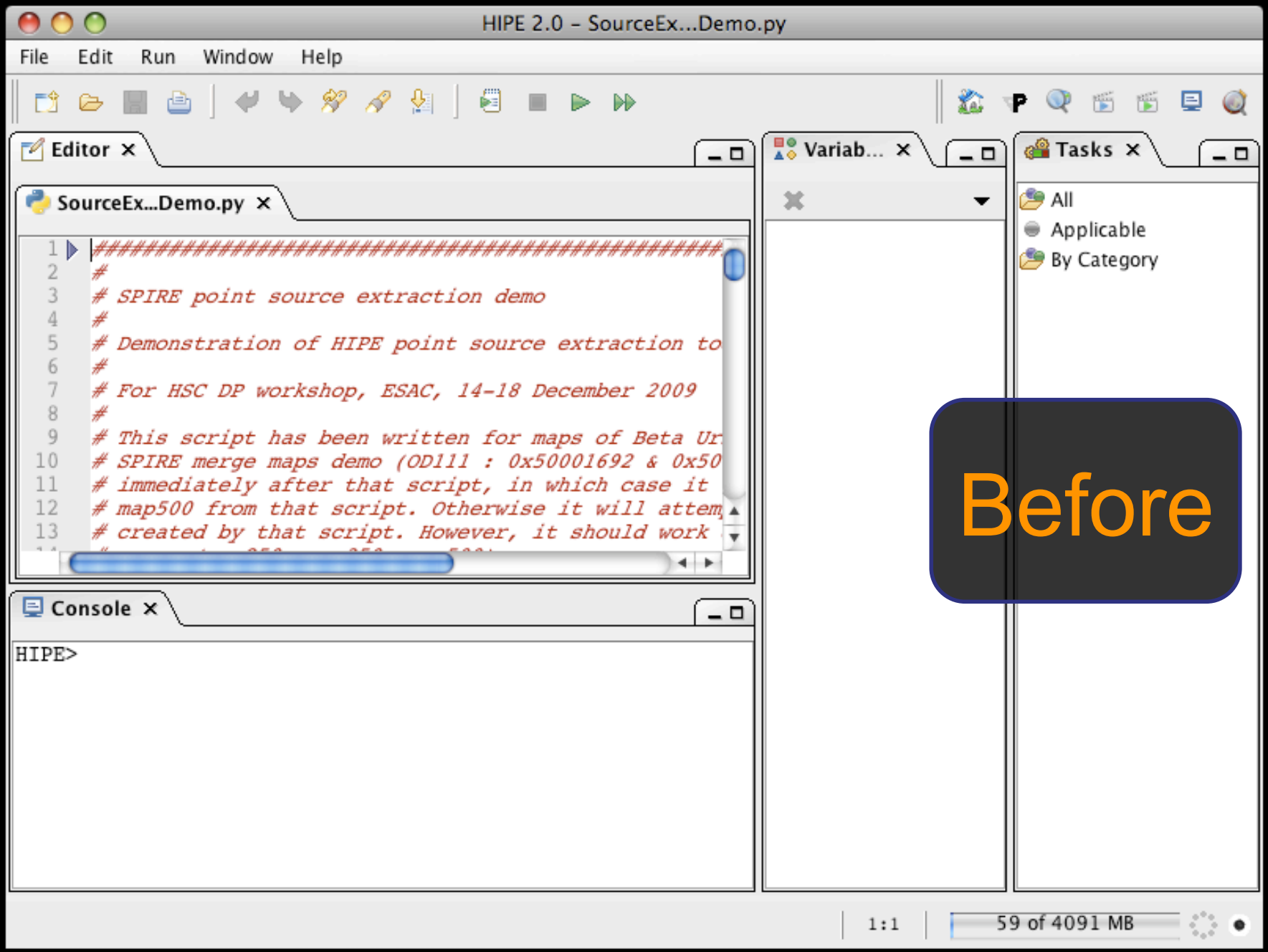
HIPE's source extractors

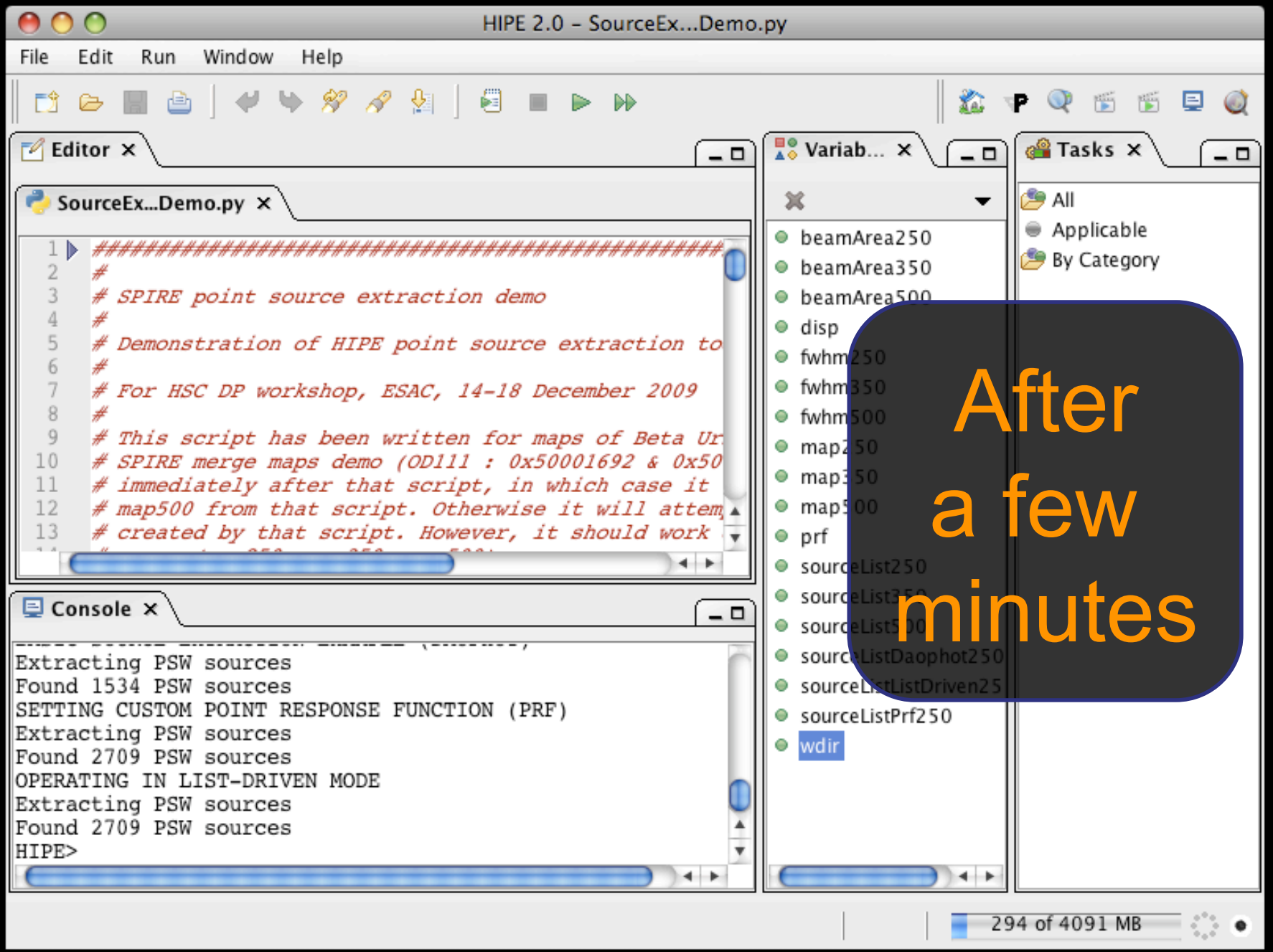
- Tools for extracting point sources in regions with little extended emission
- sourceExtractorSussextractor(…)
  - Point source fitting and peak finding
  - Simultaneous background fitting (or assume zero background)
- sourceExtractorDaophot(…)
  - DAOPHOT-1 filtering and peak finding
  - DAOPHOT-1 aperture photometry

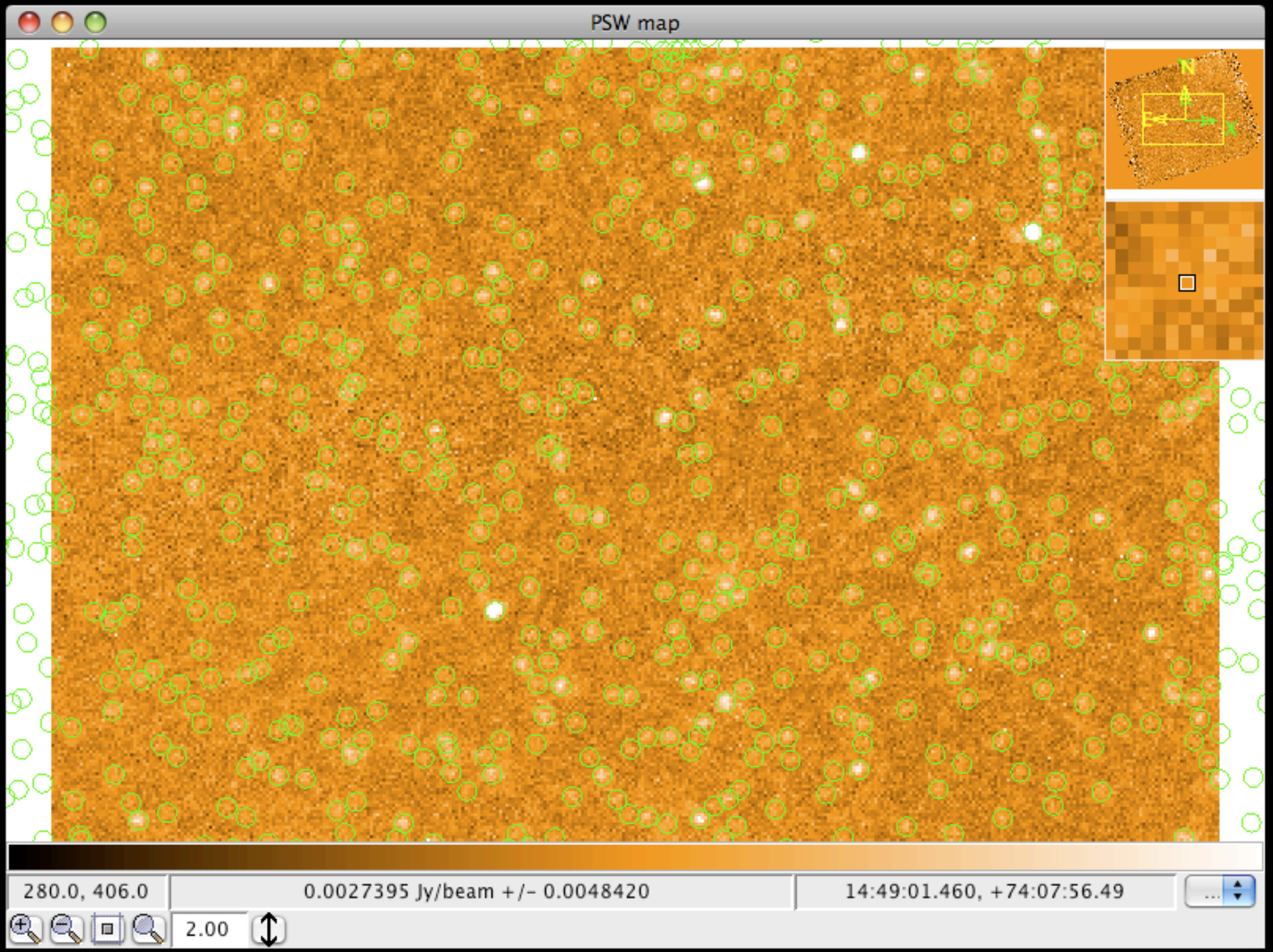
Coming up…

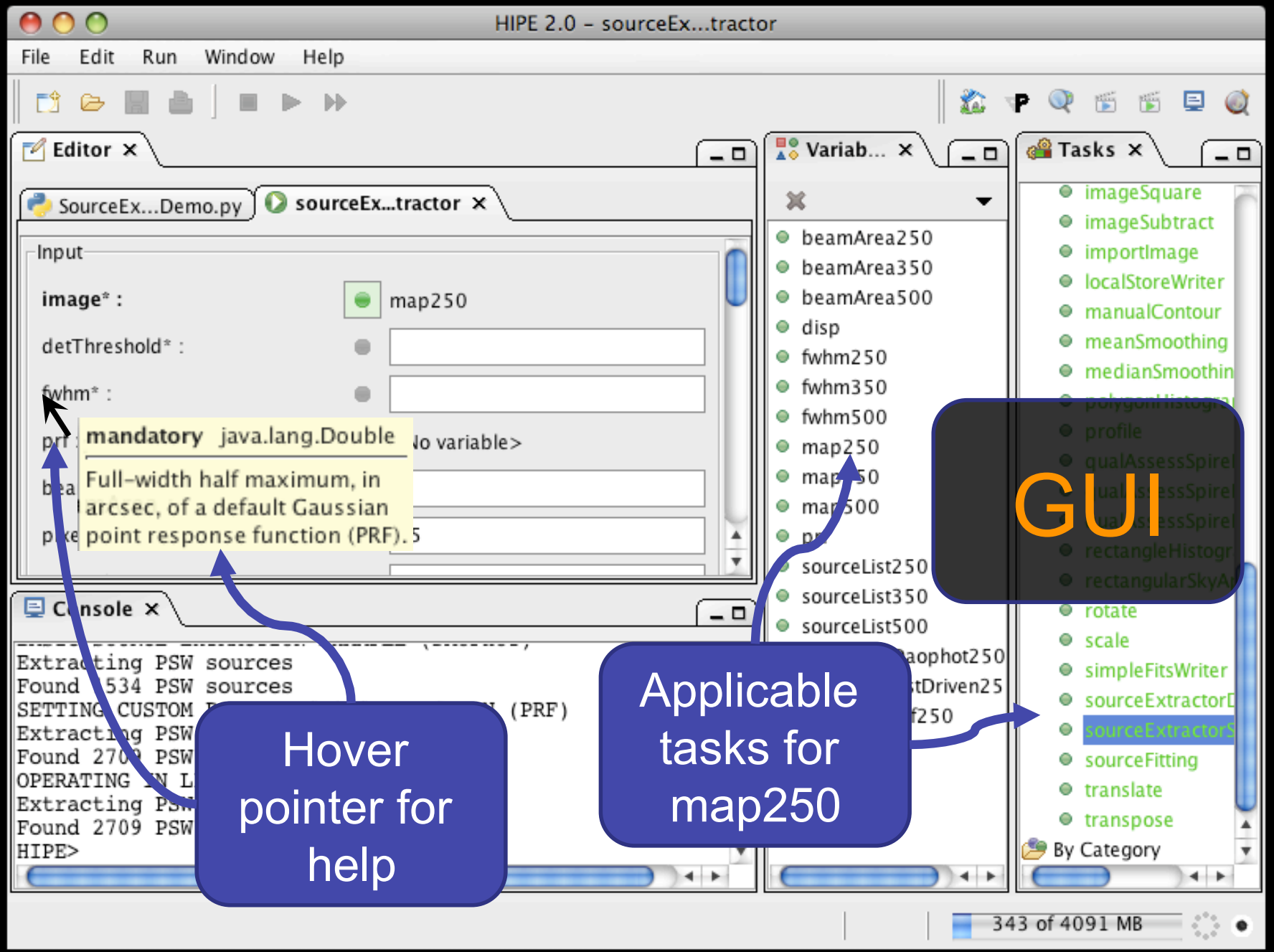
1. Executing the demo script

   SPIRE_photometer_source_extraction_dec09.py
2. Running from the GUI and finding help
3. Viewing results
4. A closer look at the demo script


HIPE 2.0 – SourceEx...Demo.py
File
Edit
Run
Window
Help
Editor
SourceEx...Demo.py
Variab...
Tasks
All
Applicable
By Category
Console
HIPE>
1:1
59 of 4091 MB
Before


HIPE 2.0 – SourceEx...Demo.py
File Edit Run Window Help
Editor
SourceEx...Demo.py
SPIRE point source extraction demo
Demonstration of HIPE point source extraction to
For HSC DP workshop, ESAC, 14-18 December 2009
This script has been written for maps of Beta Ur
SPIRE merge maps demo (OD111 : 0x50001692 & 0x50
immediately after that script, in which case it
map500 from that script. Otherwise it will attem
created by that script. However, it should work
Console
Extracting PSW sources
Found 1534 PSW sources
SETTING CUSTOM POINT RESPONSE FUNCTION (PRF)
Extracting PSW sources
Found 2709 PSW sources
OPERATING IN LIST-DRIVEN MODE
Extracting PSW sources
Found 2709 PSW sources
HIPE>
Variab...
beamArea250
beamArea350
beamArea500
disp
fwhm250
fwhm350
fwhm500
map250
map350
map500
prf
sourceList250
sourceListDaophot250
sourceListPrf250
wdir
Tasks
All
Applicable
By Category
After a few minutes
294 of 4091 MB


PSW map
N
E
X
280.0, 406.0
0.0027395 Jy/beam +/- 0.0048420
14:49:01.460, +74:07:56.49
2.00


HIPE 2.0 - sourceEx...tractor
File Edit Run Window Help
Editor
SourceEx...Demo.py
sourceEx...tractor
Input
image* :
map250
detThreshold* :
fwhm* :
mandatory java.lang.Double
Full-width half maximum, in arcsec, of a default Gaussian point response function (PRF).
Console
Extracting PSW sources
Found 534 PSW sources
SETTING CUSTOM
Extracting PSW
Found 2709 PSW
OPERATING IN L
Extracting PSW
Found 2709 PSW
HIPE>
Variab...
beamArea250
beamArea350
beamArea500
disp
fwhm250
fwhm350
fwhm500
map250
sourceList250
sourceList350
sourceList500
Tasks
imageSquare
imageSubtract
importImage
localStoreWriter
manualContour
meanSmoothing
medianSmoothin
profile
rectangleHistogr
rotate
scale
simpleFitsWriter
sourceExtractorS
sourceFitting
translate
transpose
By Category
343 of 4091 MB
GUI
Hover pointer for help
Applicable tasks for map250

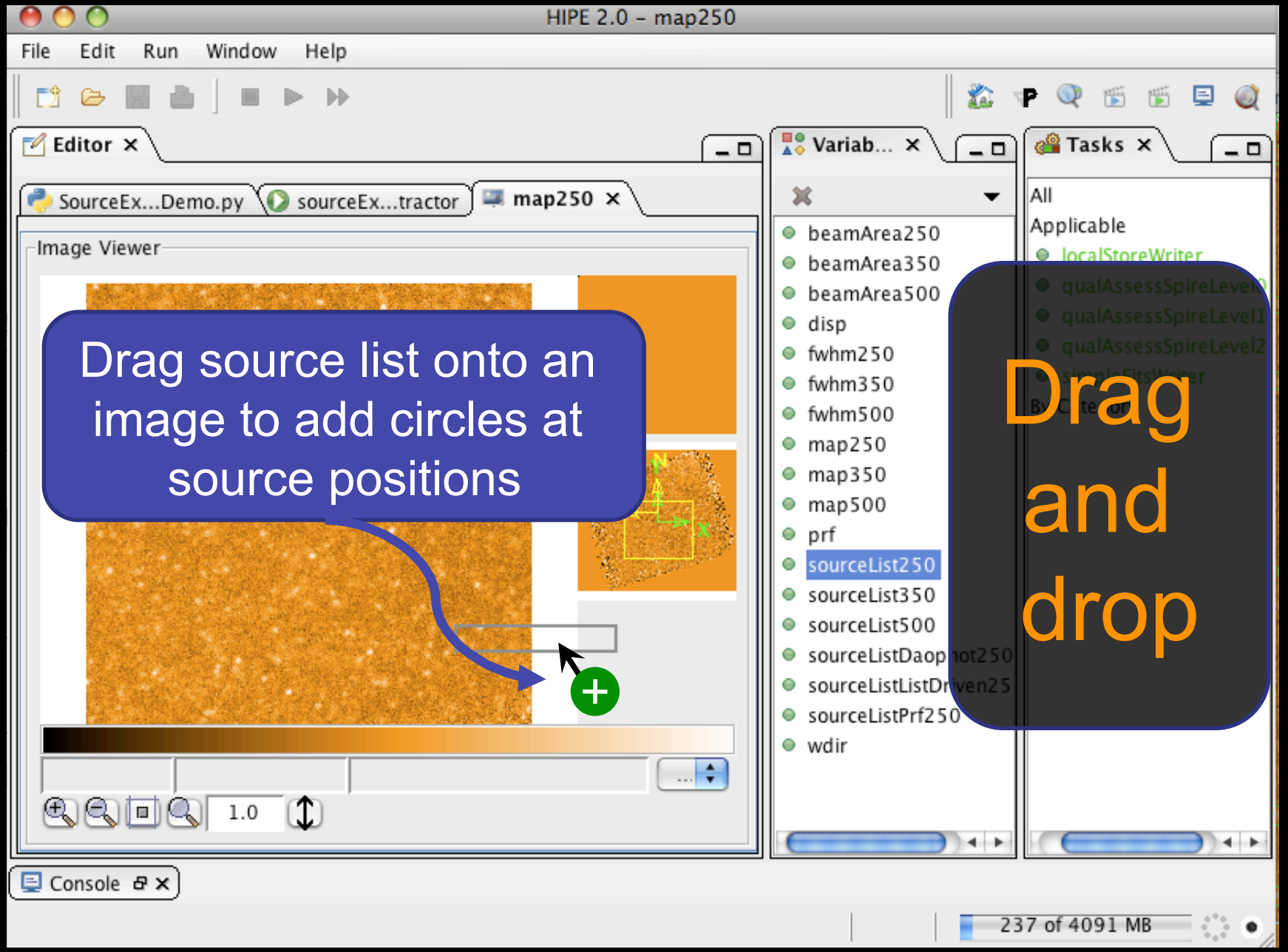
Detailed help in the URM

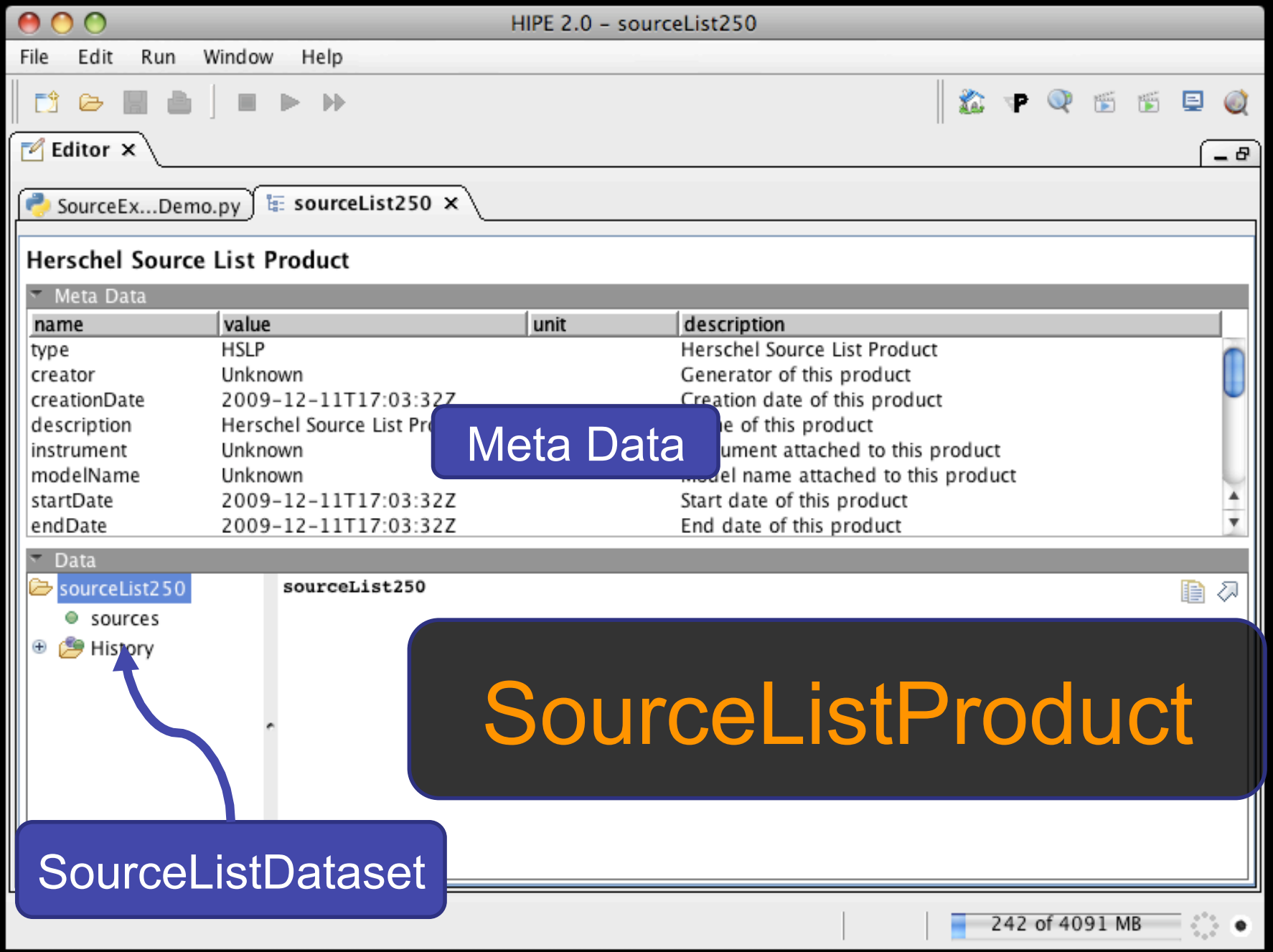
- Select the task name
- Help → Help in URM (F1)

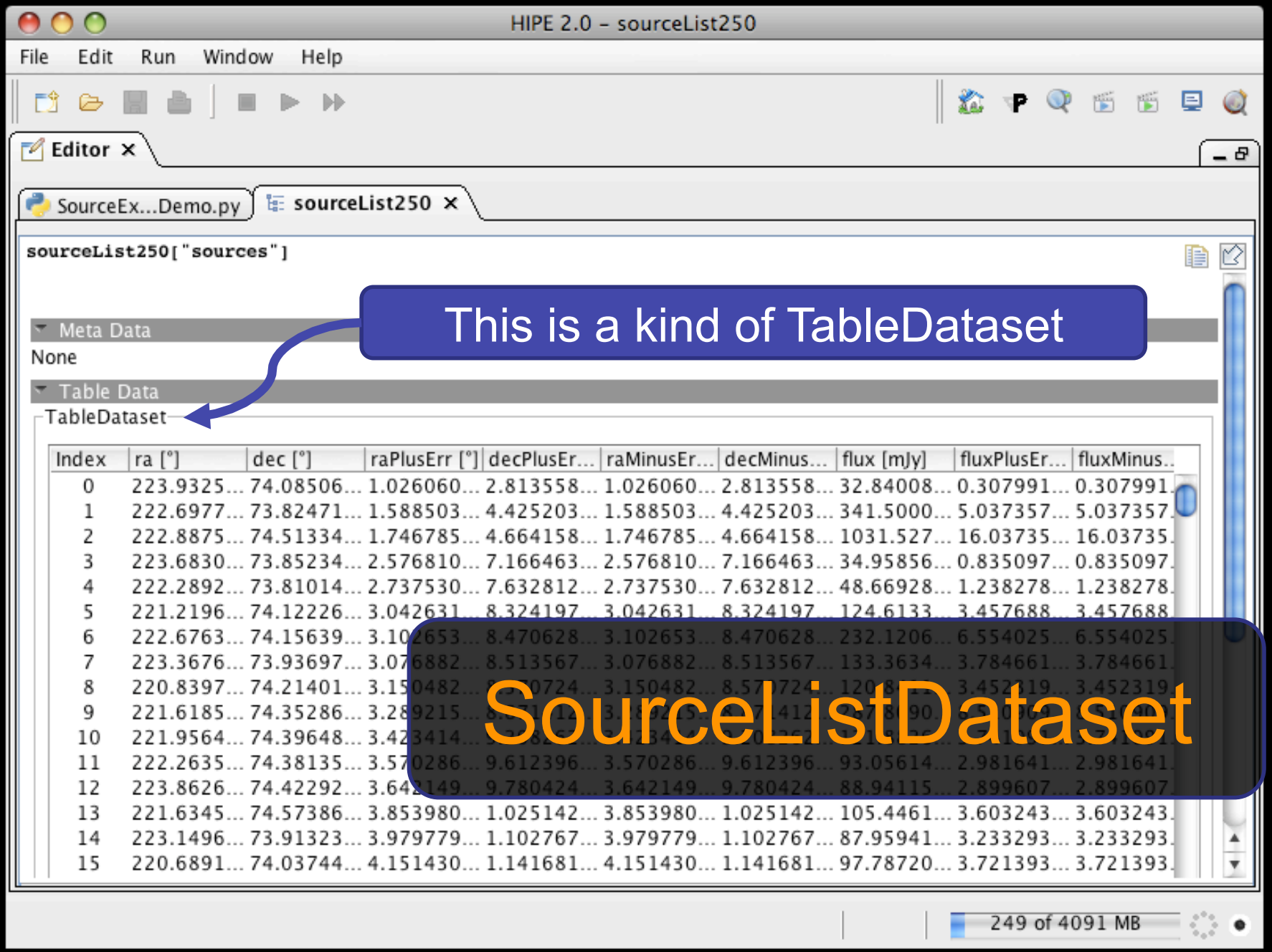
2.352. SourceExtractorSussextractorTask

Full Name:	herschel.ia.toolbox.srcext.SourceExtractorSussextractorTask
Type:	Java Task -
Import:	from herschel.ia.toolbox.srcext import SourceExtractorSussextractorTask
Category:	task

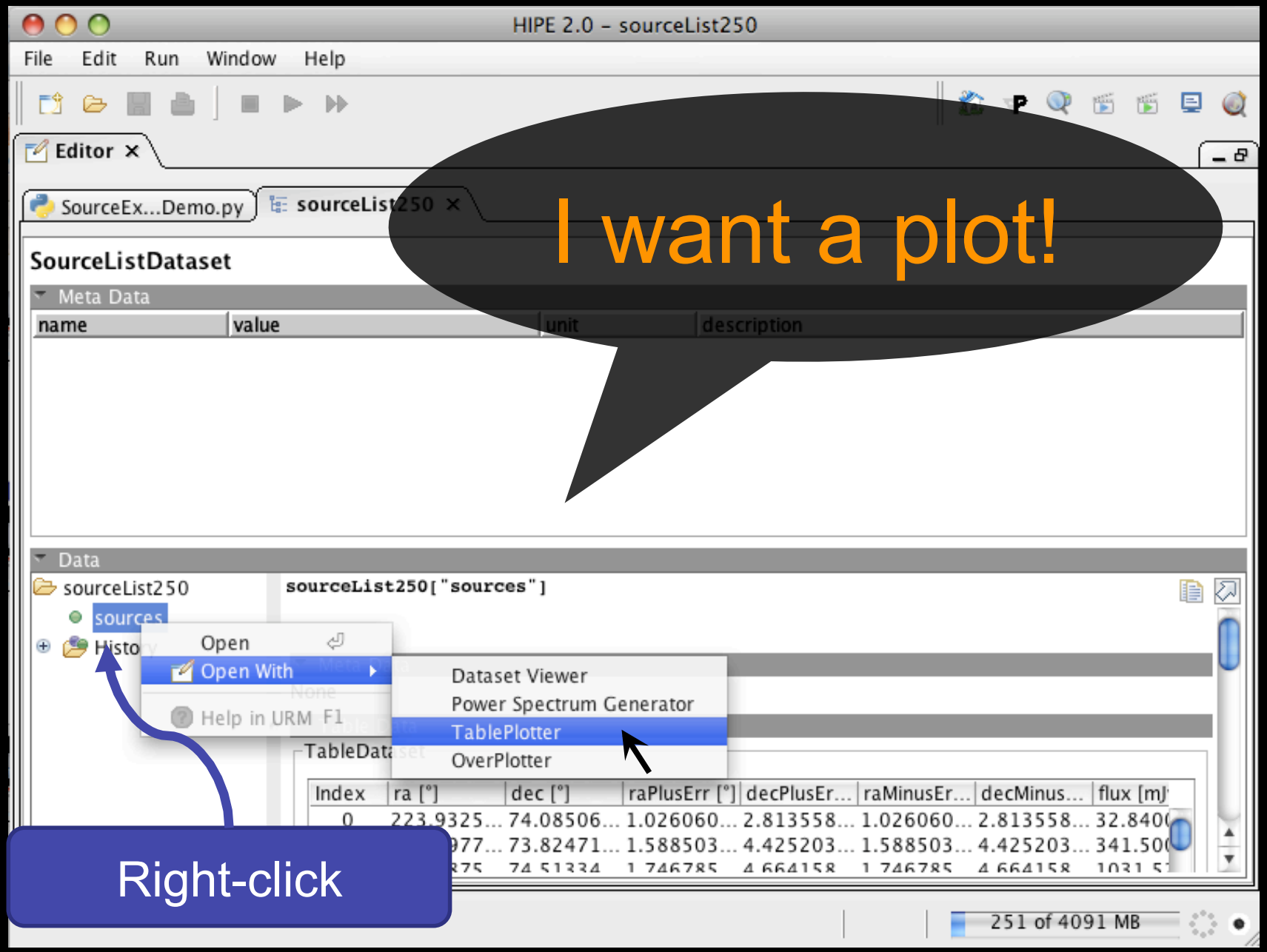
Description

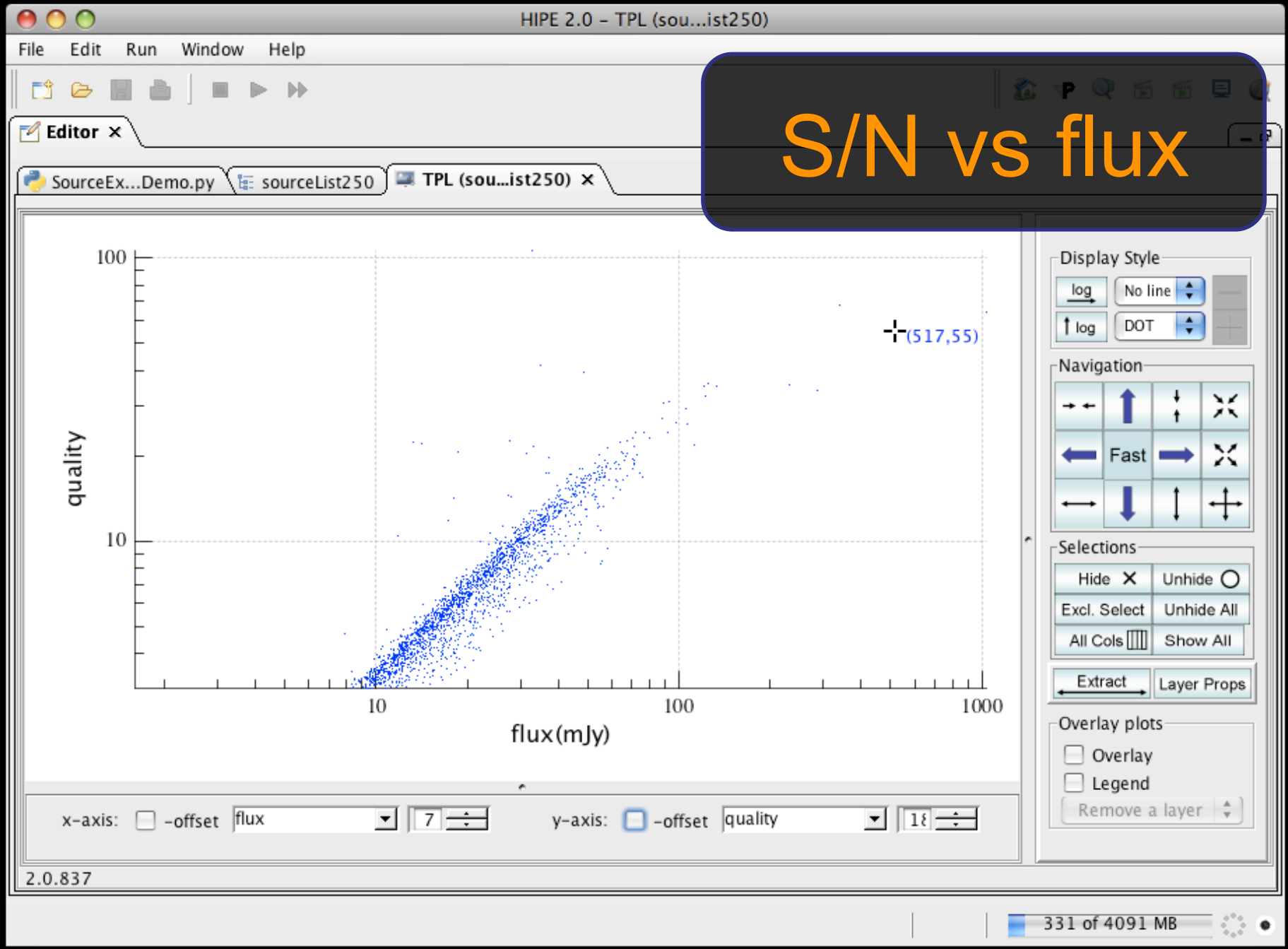

HIPE 2.0 - map250
File Edit Run Window Help
Editor
SourceEx...Demo.py
sourceEx...tractor
map250
Image Viewer
Drag source list onto an image to add circles at source positions
Variab...
beamArea250
beamArea350
beamArea500
disp
fwhm250
fwhm350
fwhm500
map250
map350
map500
prf
sourceList250
sourceList350
sourceList500
sourceListDaophot250
sourceListListDriven25
sourceListPrf250
wdir
Tasks
All
Applicable
Drag and drop
1.0
Console
237 of 4091 MB


HIPE 2.0 - sourceList250
File Edit Run Window Help
Editor
SourceEx...Demo.py
sourceList250
Herschel Source List Product
Meta Data
name value unit description
type HSLP Herschel Source List Product
creator Unknown Generator of this product
creationDate 2009-12-11T17:03:32Z Creation date of this product
description Herschel Source List Pr e of this product
instrument Unknown ument attached to this product
modelName Unknown del name attached to this product
startDate 2009-12-11T17:03:32Z Start date of this product
endDate 2009-12-11T17:03:32Z End date of this product
Data
sourceList250
sources
History
sourceList250
242 of 4091 MB
Meta Data
SourceListProduct
SourceListDataset



Index	ra [°]	dec [°]	raPlusErr [°]	decPlusEr...	raMinusEr...	decMinus...	flux [mJy]	fluxPlusEr...	fluxMinus...
0	223.9325...	74.08506...	1.026060...	2.813558...	1.026060...	2.813558...	32.84008...	0.307991...	0.307991...
1	222.6977...	73.82471...	1.588503...	4.425203...	1.588503...	4.425203...	341.5000...	5.037357...	5.037357...
2	222.8875...	74.51334...	1.746785...	4.664158...	1.746785...	4.664158...	1031.527...	16.03735...	16.03735...
3	223.6830...	73.85234...	2.576810...	7.166463...	2.576810...	7.166463...	34.95856...	0.835097...	0.835097...
4	222.2892...	73.81014...	2.737530...	7.632812...	2.737530...	7.632812...	48.66928...	1.238278...	1.238278...
5	221.2196...	74.12226...	3.042631...	8.324197...	3.042631...	8.324197...	124.6133...	3.457688...	3.457688...
6	222.6763...	74.15639...	3.102653...	8.470628...	3.102653...	8.470628...	232.1206...	6.554025...	6.554025...
7	223.3676...	73.93697...	3.076882...	8.513567...	3.076882...	8.513567...	133.3634...	3.784661...	3.784661...
8	220.8397...	74.21401...	3.150482...	8.570724...	3.150482...	8.570724...	120.8...	3.452319...	3.452319...
9	221.6185...	74.35286...	3.289215...	8.[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
10	221.9564...	74.39648...	3.423414...	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
11	222.2635...	74.38135...	3.570286...	9.612396...	3.570286...	9.612396...	93.05614...	2.981641...	2.981641...
12	223.8626...	74.42292...	3.642149...	9.780424...	3.642149...	9.780424...	88.94115...	2.899607...	2.899607...
13	221.6345...	74.57386...	3.853980...	1.025142...	3.853980...	1.025142...	105.4461...	3.603243...	3.603243...
14	223.1496...	73.91323...	3.979779...	1.102767...	3.979779...	1.102767...	87.95941...	3.233293...	3.233293...
15	220.6891...	74.03744...	4.151430...	1.141681...	4.151430...	1.141681...	97.78720...	3.721393...	3.721393...


HIPE 2.0 – sourceList250
File Edit Run Window Help
Editor
SourceEx...Demo.py
sourceList250
I want a plot!
SourceListDataset
Meta Data
name value unit description
Data
sourceList250
sources
sourceList250["sources"]
Open
Open With
Help in URM F1
Dataset Viewer
Power Spectrum Generator
TablePlotter
OverPlotter
Index ra [°] dec [°] raPlusErr [°] decPlusEr... raMinusEr... decMinus... flux [mJ
251 of 4091 MB
Right-click


HIPE 2.0 - TPL (sou...ist250)
File Edit Run Window Help
Editor
SourceEx...Demo.py
sourceList250
TPL (sou...ist250)
S/N vs flux
100
10
quality
10
100
1000
flux(mJy)
(517,55)
Display Style
log
No line
log
DOT
Navigation
Fast
Selections
Hide
Unhide
Excl. Select
Unhide All
All Cols
Show All
Extract
Layer Props
Overlay plots
Overlay
Legend
Remove a layer
x-axis:
-offset
flux
7
y-axis:
-offset
quality
2.0.837
331 of 4091 MB

Examples in the script

- SUSSEXtractor, PSW, PMW and PLW
- PSW only:
  - DAOPHOT
  - Custom PRF
  - List-driven (fluxes at known positions)

Basic parameters

- image
  - SimpleImage (with error for SUSSEXtractor)
- detThreshold
  - S/N (or alternative: see “useSignalToNoise”)
- fwhm
  - In arcsec
- beamArea
  - In arcsec^2 (required for Jy/beam maps)
- pixelRegion
  - For peak finding (1.5 = surrounding pixels only)

Providing your own point response function (PRF)

- In the sourceExtractors, the PRF is essentially a smoothing kernel
- Gaussian by default, or provide your own using the prf parameter
- Deep maps: could use narrow PRF (e.g., delta function) to detect the sources, and then…

Operating in list-driven mode

- … once you have some source positions (as a SourceListProduct)
- The sourceExtractors can find fluxes at those positions
- Using the inputSourceList parameter

For more information

- See the documentation
  - Data Analysis Guide (HowTo) §4.2.8
  - Users Reference Manual
- Find me or contact me (A.J.Smith@sussex.ac.uk)