DataLink & Activation in TOPCAT

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Outline

- TOPCAT Activation Action overhaul
- DataLink in TOPCAT

Activation Actions

"Activation Action": TOPCAT's term for configurable per-row action

- Invoked per row by user action:
  - Select row in table view
  - Click on point in scatter plot
- Does something relating to that row:
  - Display cutout image from service (near sky coordinates in row)
  - View image in window (from URL/filename given in row)
  - Send image/spectrum via SAMP (from URL/filename given in row)
  - Send sky position via SAMP (from sky coordinates in row)
  - Send row index via SAMP (to client looking at same table)
  - Open resource in web browser (from URL/filename given in row)
  - Execute arbitrary code/run script (using any values in row)

  ... etc?

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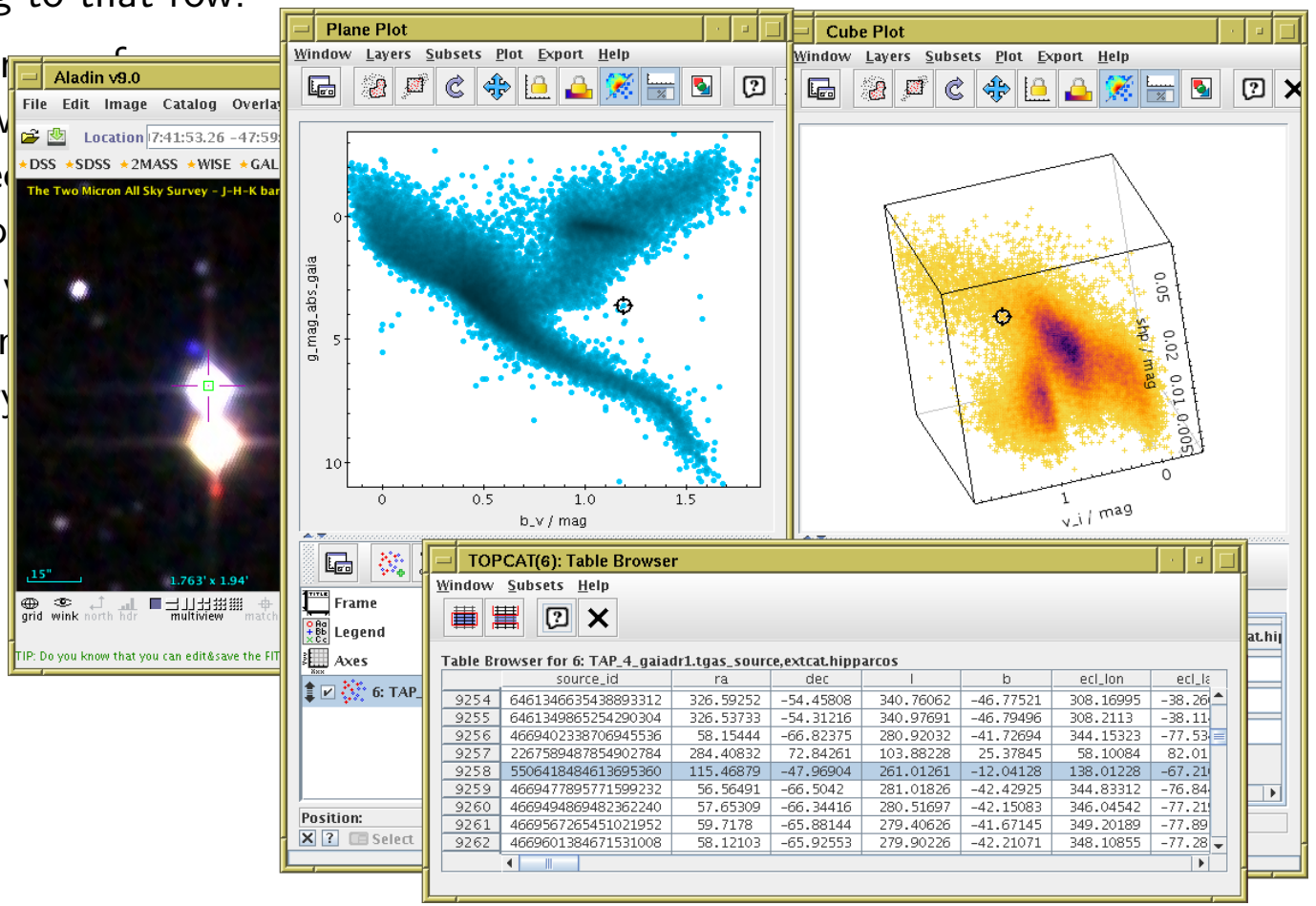
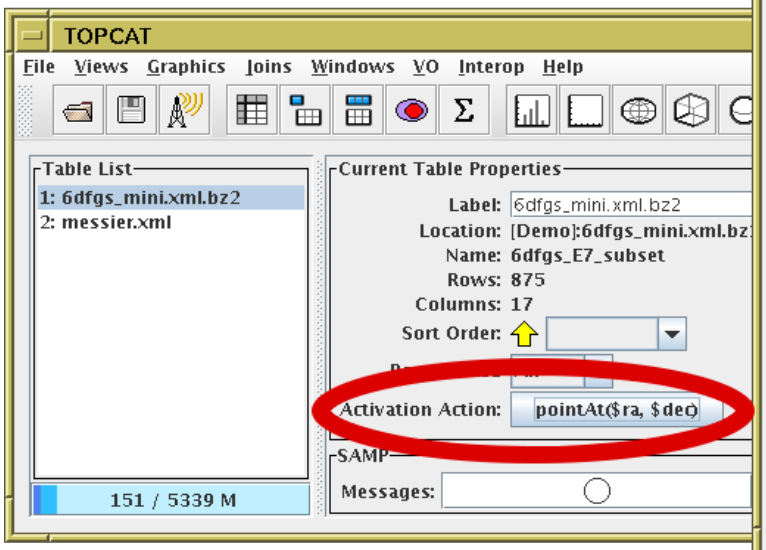


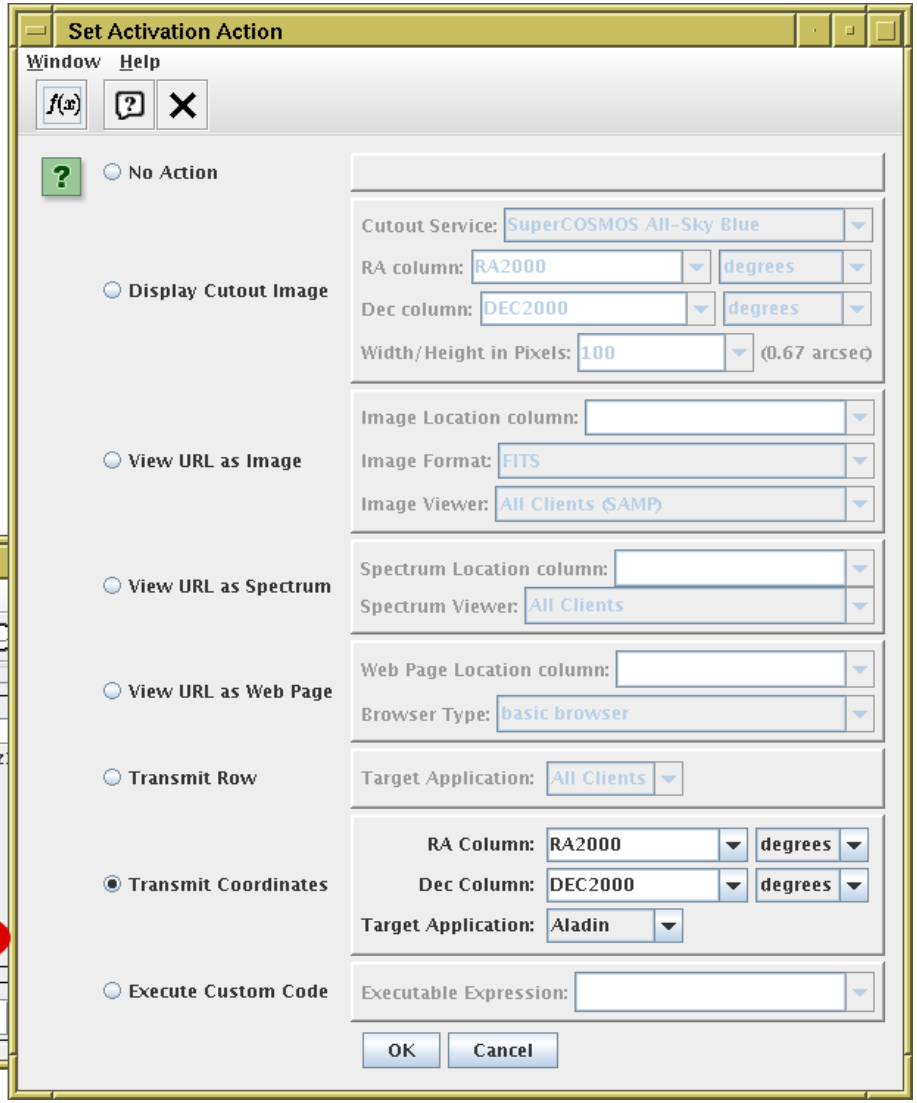
Existing Activation Window

Various issues

- Limited number of options
- Only one option at a time
- Too tall!
  - ▷ Cramped configuration GUI
  - ▷ Not extensible
- No Datalink
- Poor feedback on action outcome (stdout)
- Not persisted

Due for an overhaul

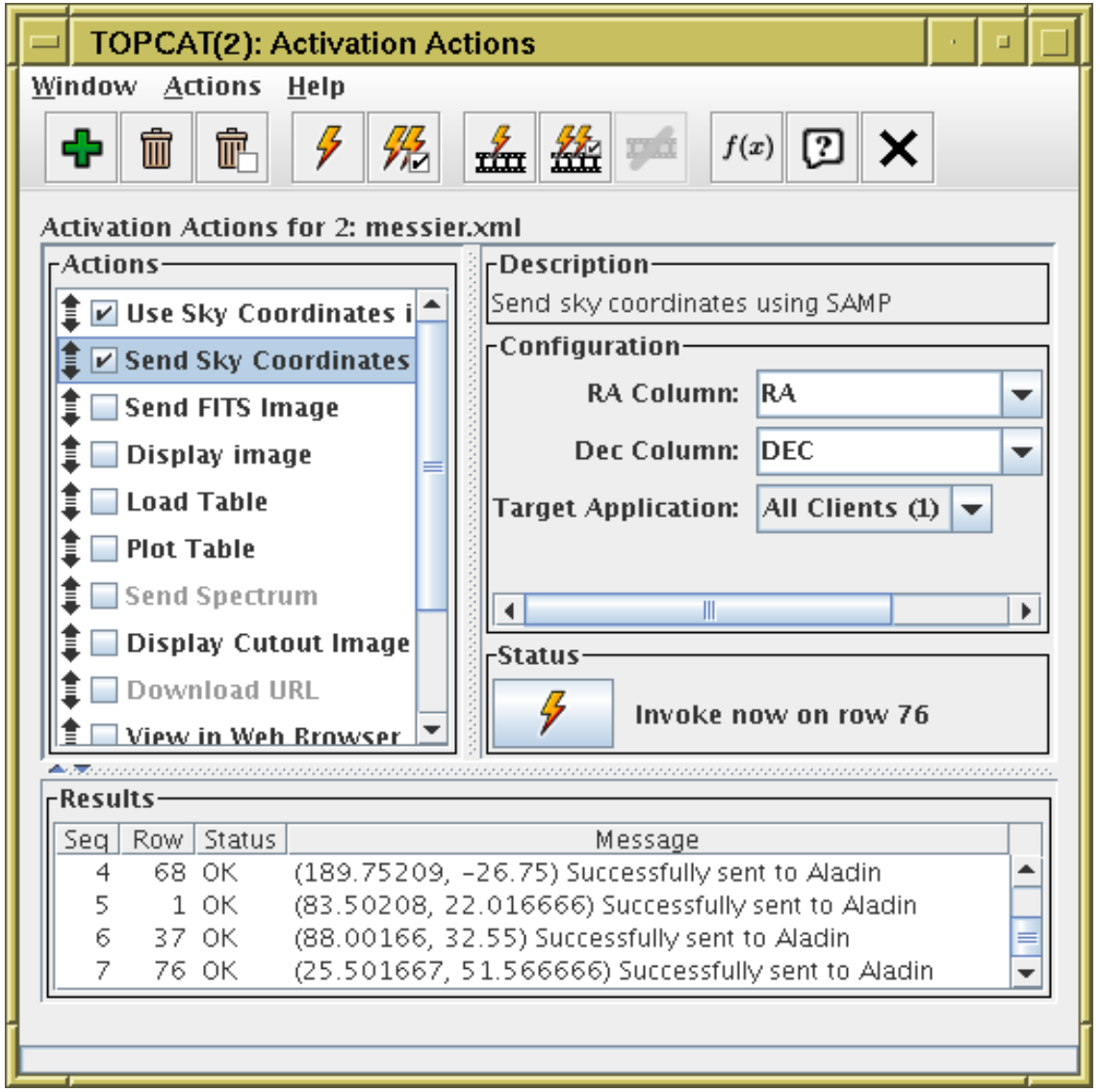




New Activation Window

From TOPCAT v4.6 (04/2018), improved v4.6-1 (05/2018)

- Better configurability
- Visual report of action outcome
- SAMP action response reported
- Better explanation of capabilities
- Can have multiple actions at once
- Better feedback on available/useful options
- Invoke directly or by row selection
- Can schedule activation for all rows (or selected row subset)
- Pluggable interface
- Many more options



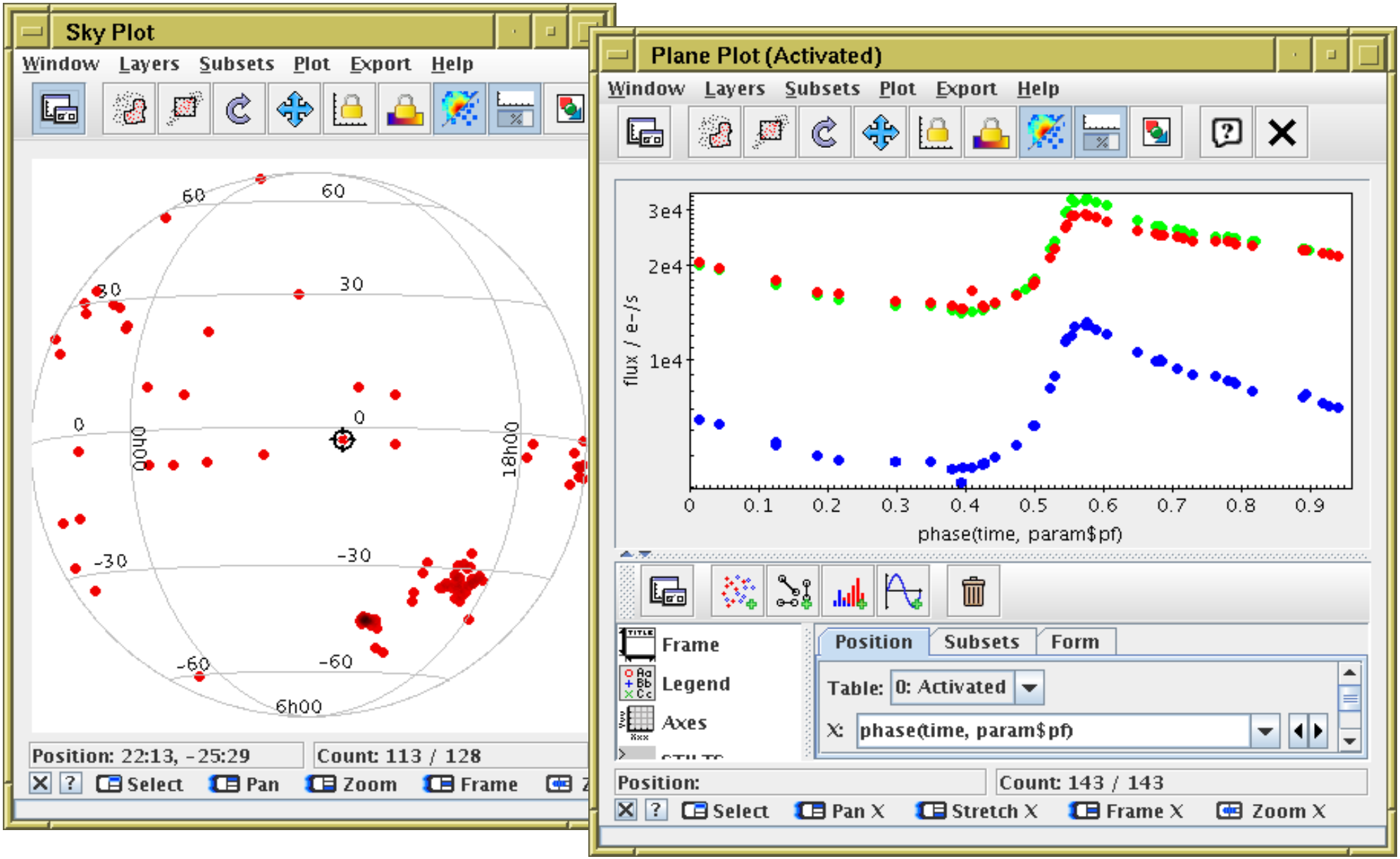
Activation Options

- Use Sky coordinate columns:
  - Use coordinates in TOPCAT (e.g. update Cone Search parameters)
  - Send coordinates (`coord.pointAt.sky`)
  - Display cutout image near coordinates (SuperCOSMOS, 2MASS, SDSS)
- Use URL column:
  - Image URL: View image internally, Send FITS image (`image.load.fits`)
  - Spectrum URL: Send spectrum (`spectrum.load.ssa-generic`)
  - Table URL: Load Table, Plot Table, Send VOTable (`table.load.votable`)
  - Generic URL: View in web browser, Download to local file
- DataLink-related:
  - View DataLink table (for a URL pointing to {links}-response table)
  - Invoke DataLink row (for rows in a {links}-response table)
  - Invoke Service (defined by a Service Descriptor)
- Other
  - Send row index (`table.highlight.row`)
  - Execute custom code (expression language expression)
  - Run system (shell) command

New options in red

Activation Example: Plot Table

Plot Table action with Gaia DR2 `epoch_photometry_url` column



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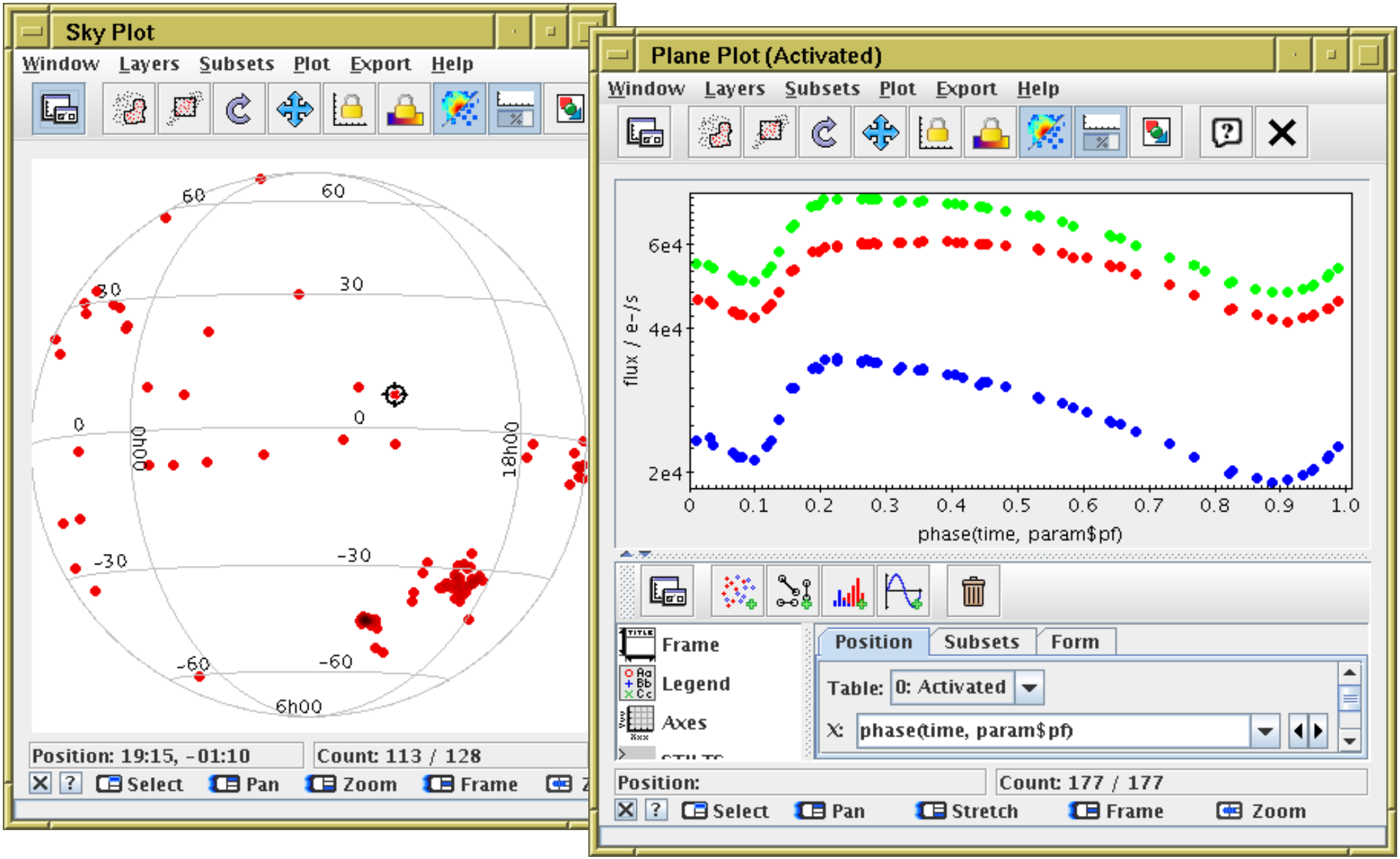

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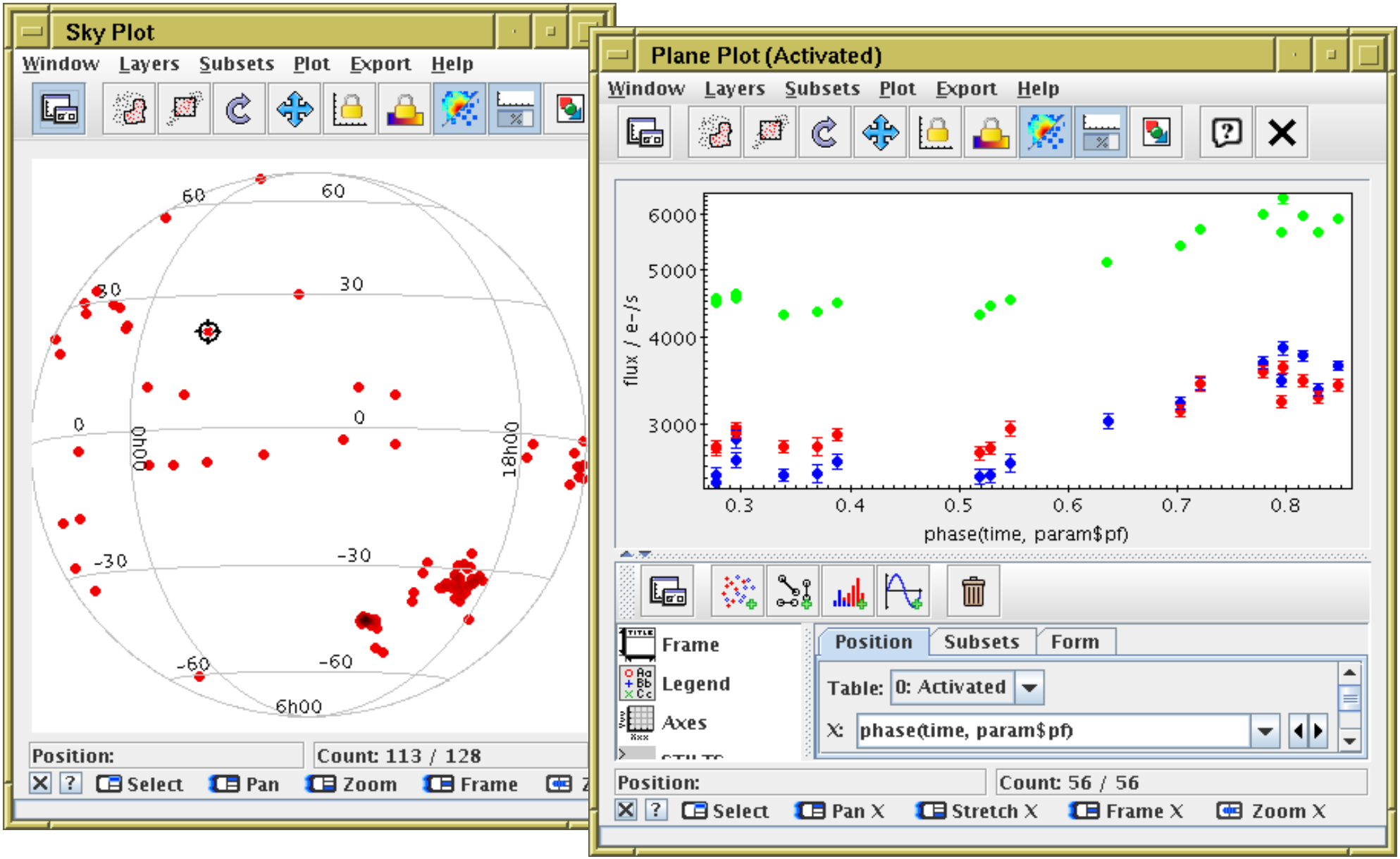

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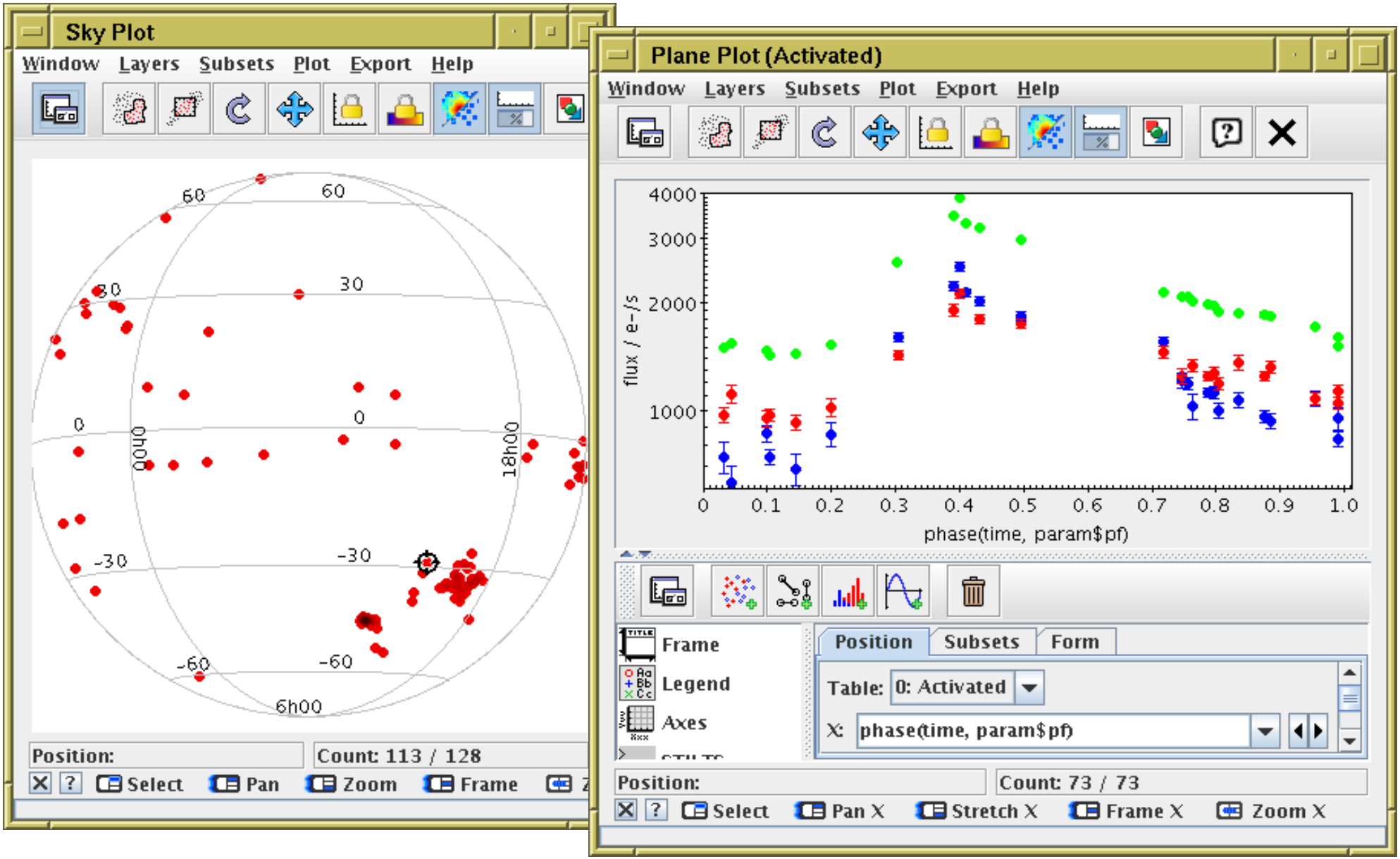
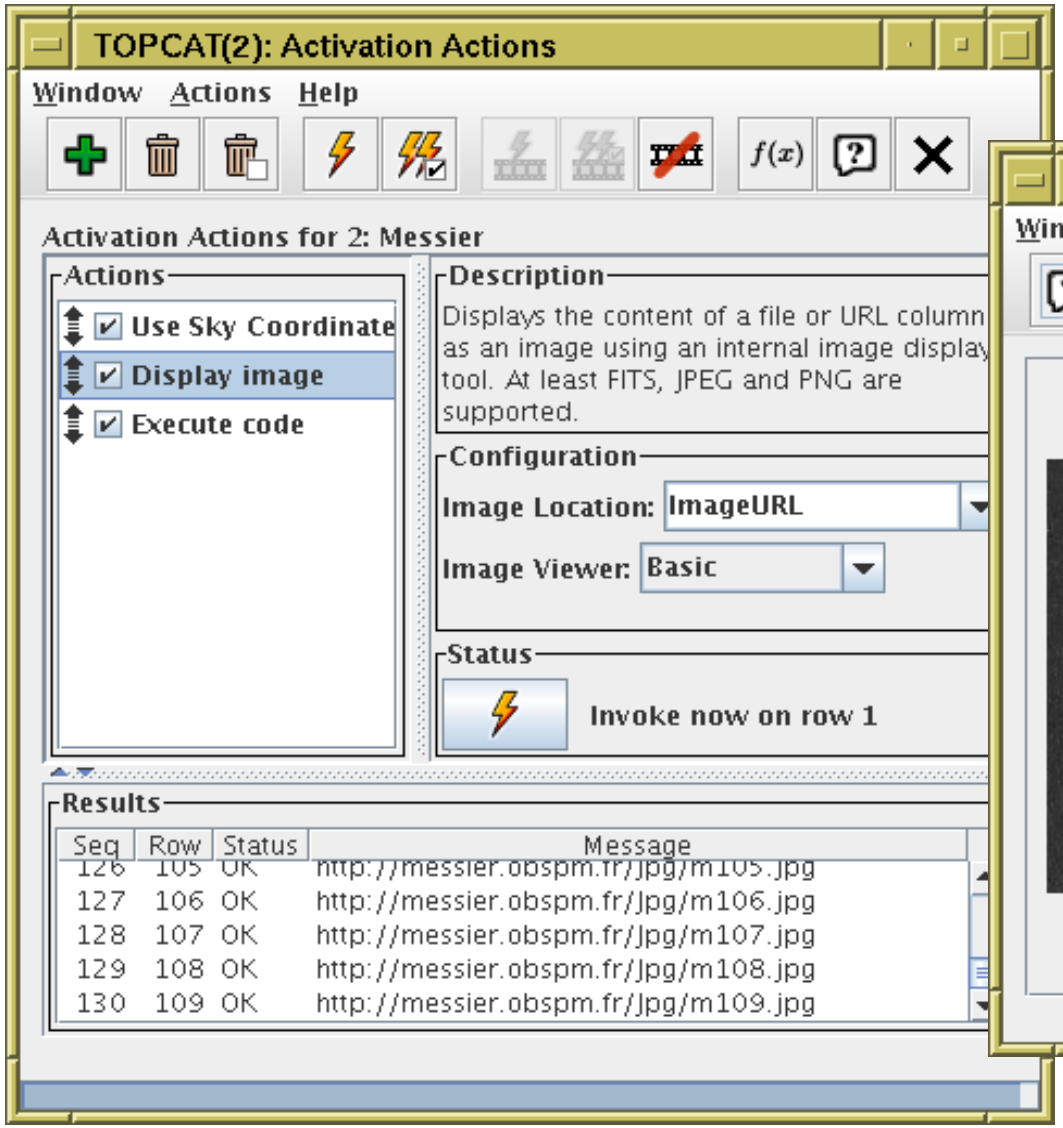


Activation Example: Sequence

Sequence for Messier objects

- **Display Image** action using internal viewer
- **Execute Code** action with command `sleep(5)`



DataLink Refresher

DataLink defines (approximately) 2 things:

1. {Links} service — response is a table of a fixed form

name	description	required	UCD
ID	Input identifier	yes	meta.id;meta.main
access_url	link to data or service	one only	meta.ref.url
service_def	reference to a service descriptor resource		meta.ref
error_message	error if an access_url cannot be created		meta.code.error
description	human-readable text describing this link	no	meta.note
semantics	Term from a controlled vocabulary describing the link	yes	meta.code
content_type	mime-type of the content the link returns	no	meta.code.mime
content_length	size of the download the link returns	no	phys.size;meta.file

Table 1: Required Fields for Links

2. Service Descriptors — define how to invoke a service from a row

```
<RESOURCE name="EpochPhotom" type="meta" utype="adhoc:service">
  <DESCRIPTION>Epoch photometry</DESCRIPTION>
  <PARAM name="accessURL" ucd="meta.ref.url" arraysize="*" datatype="char"
         value="http://gaia.ari.uni-heidelberg.de/timeseries/gaiadr1"/>
  <GROUP name="inputParams">
    <PARAM name="sourceid" datatype="long" value="" ref="source_id_col"/>
    <PARAM name="resolution" datatype="double" unit='d' value="20"/>
    <PARAM name="band" datatype="double" value=""/>
  </GROUP>
</RESOURCE>
```

DataLink in TOPCAT

View table as DataLink table

Datalink activation actions:

- View DataLink table (identified by URL in row)
- Invoke row in {links}-response table (using {links}-response format)
- Invoke Service Descriptor

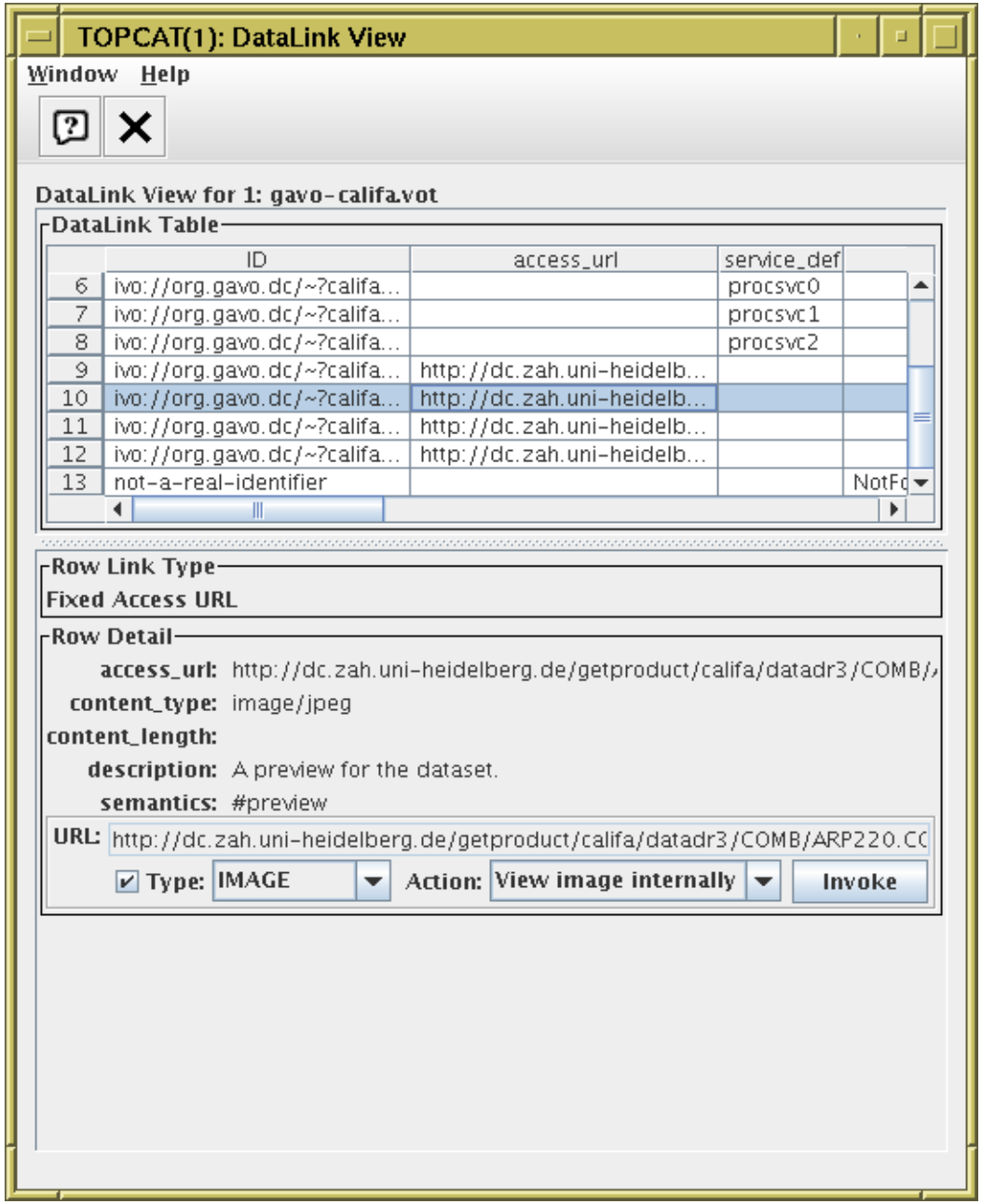
View Service Descriptors in Parameter window

Service Descriptors survive TOPCAT/STILTS save→load cycle

DataLink Window

Datalink View Window

- For use with {links}-response tables
- Top panel displays row data
- Bottom panel shows indicated link:
  - ▷ fixed URL
  - ▷ service descriptor
  - ▷ error
  - ▷ non-compliant
- For URL-like links, you can perform some configurable action
- For service descriptors, you can view/edit service parameters
  currently only provides basic GUI
- Available from top-level **Views** menu (not very prominent)



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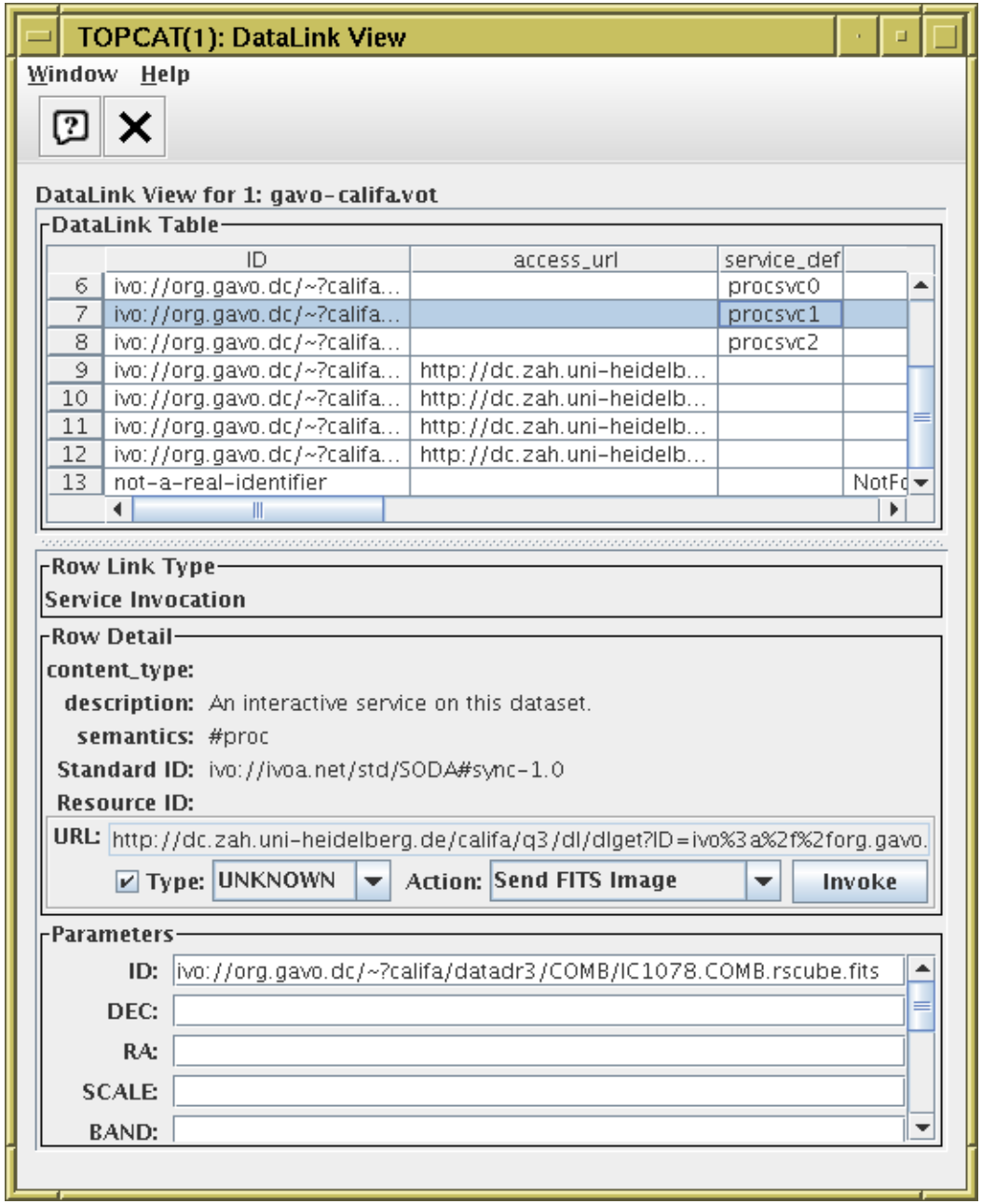

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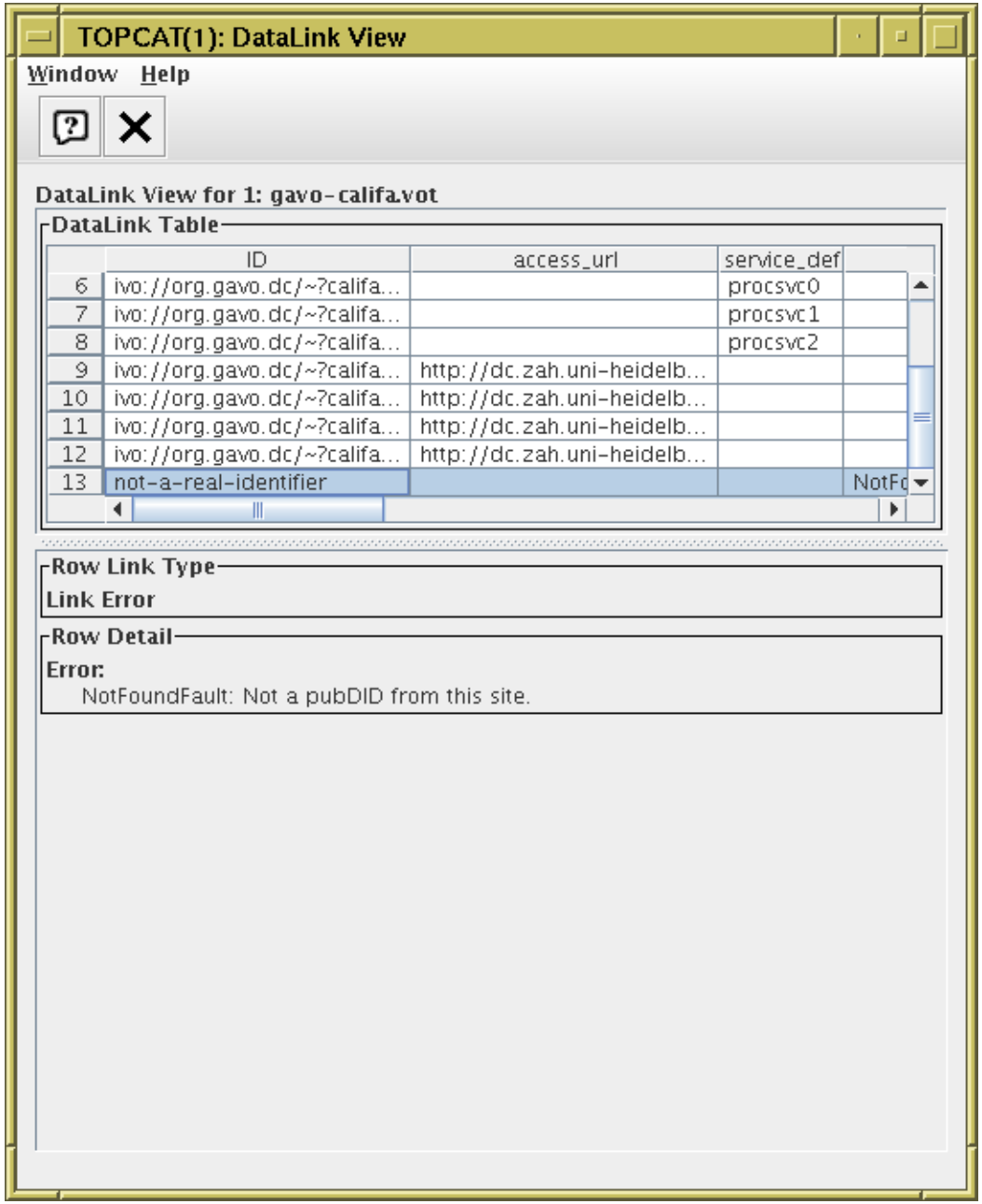
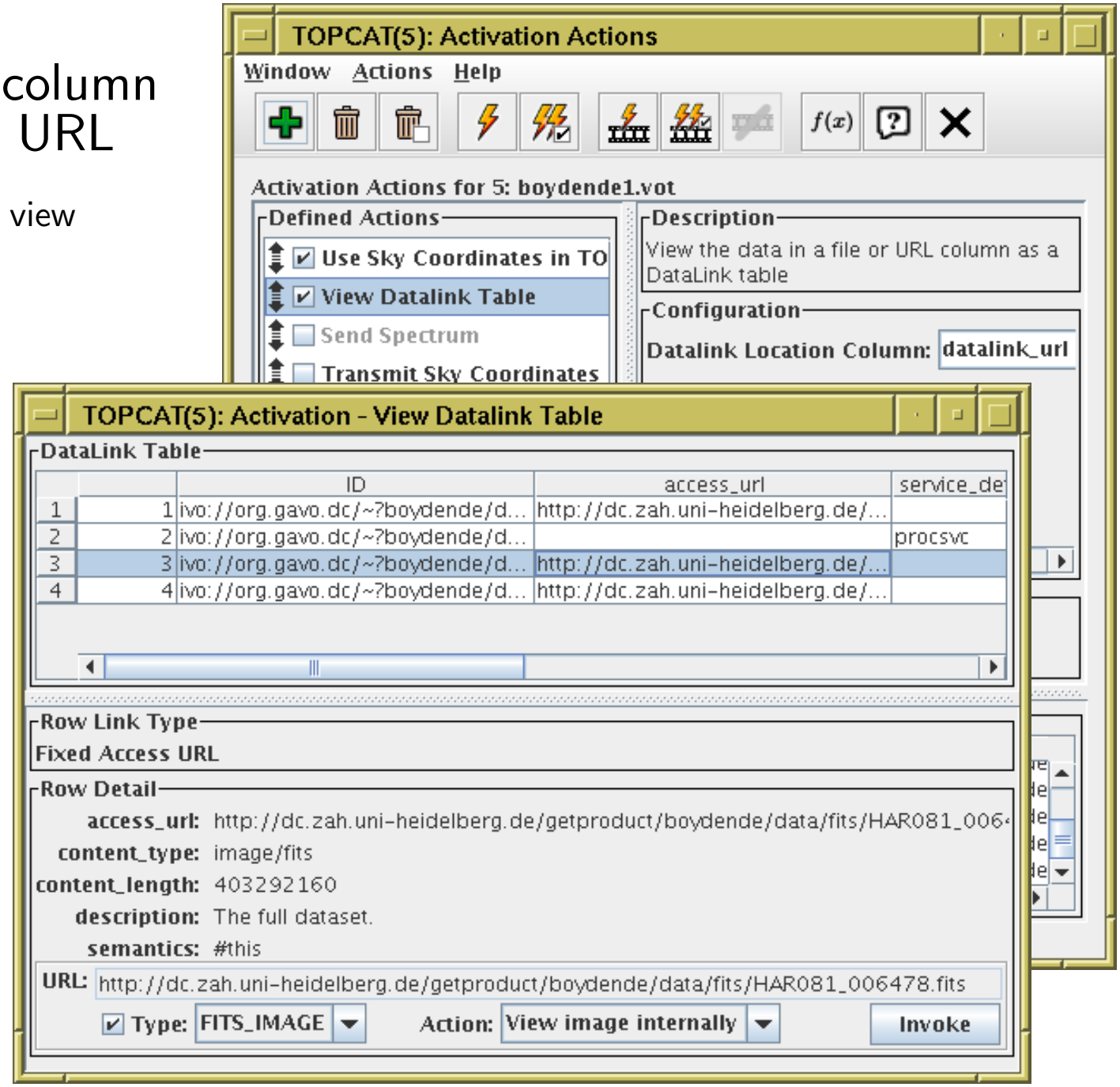


View DataLink Activation Action

Activation action for column with {links}-response URL

- Pops up Datalink table view on activation
- From that window links can be invoked (configurable ations)
- Q: How to identify a datalink URL column?



Invoke DataLink Row Activation Action

Activation action for rows of {links}-response table

- Pops up window for activated row's link:
  - fixed URL
  - service descriptor
  - error
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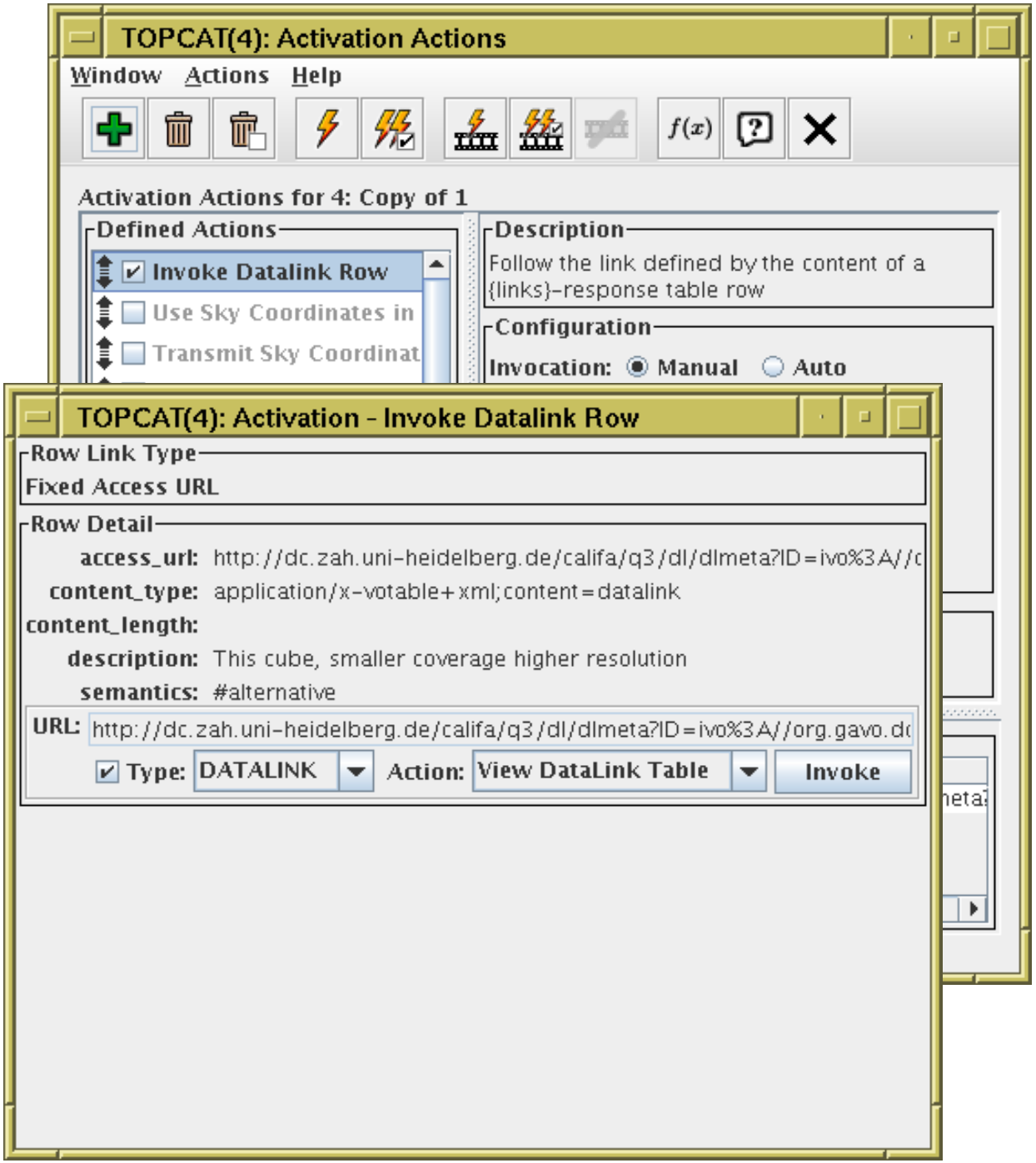
DataLink window (similar functionality) may be more convenient than this activation action



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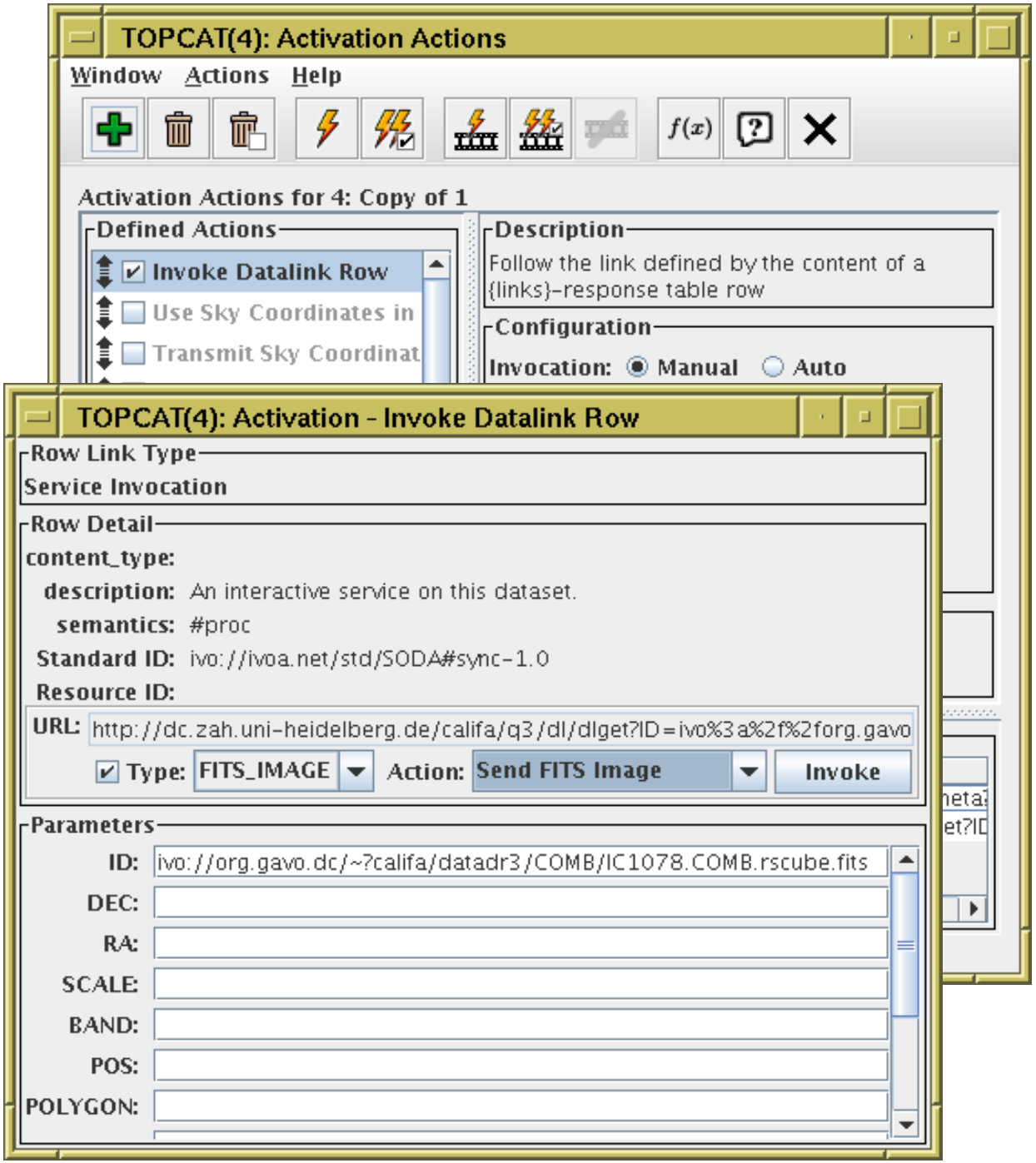

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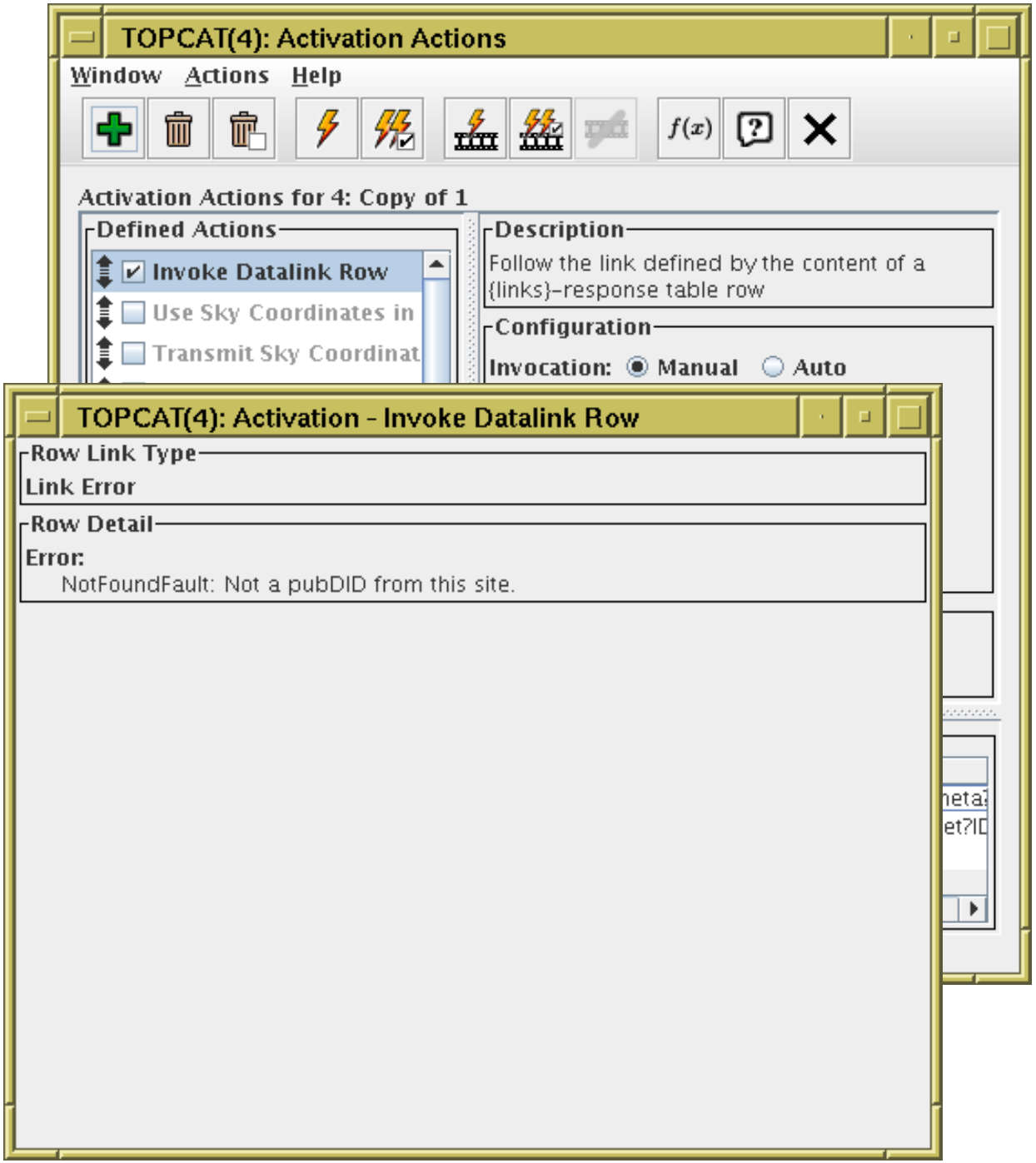
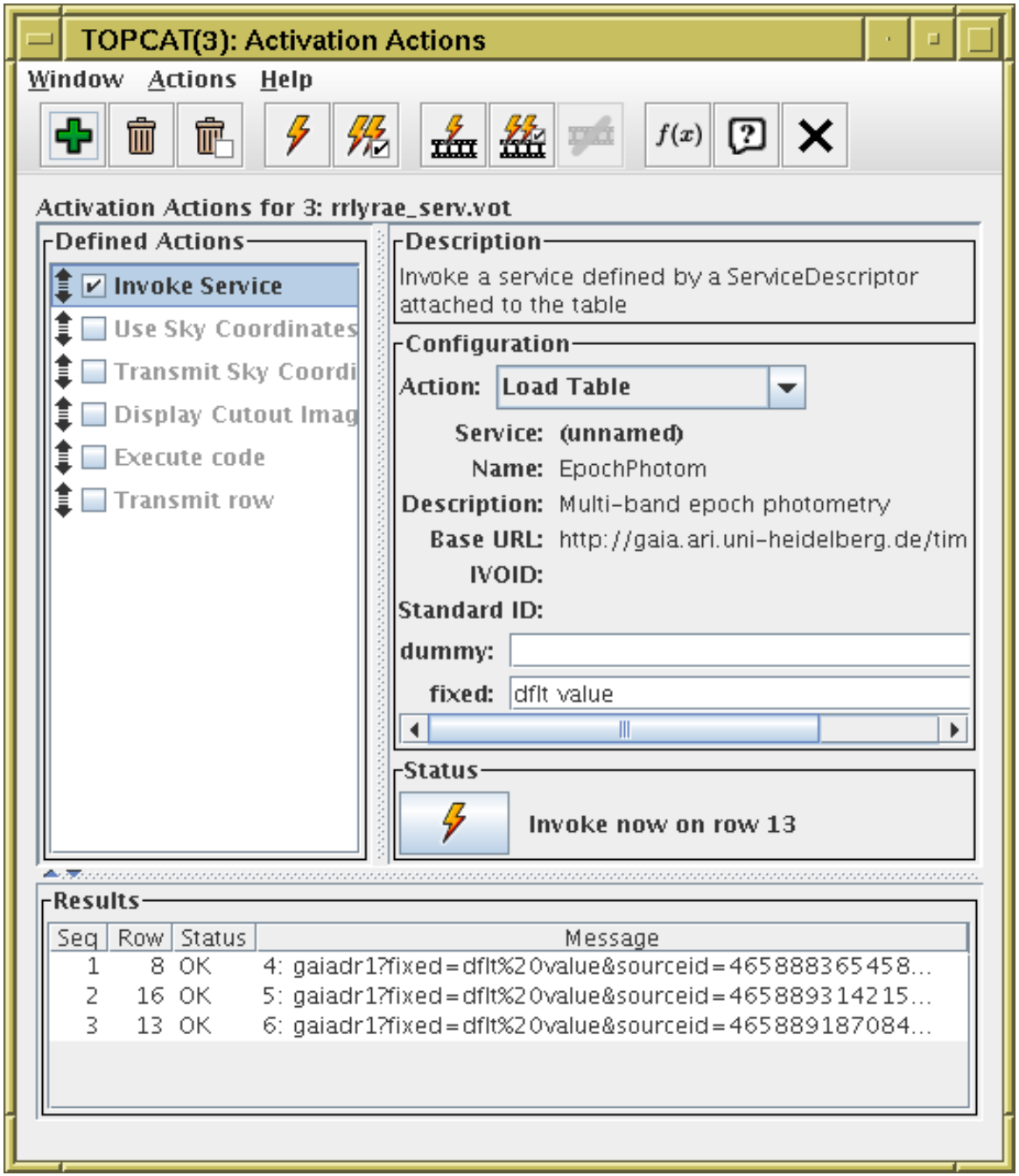


Invoke Service Activation Action

Activation action for non-{links}-response table with Service Descriptor(s)

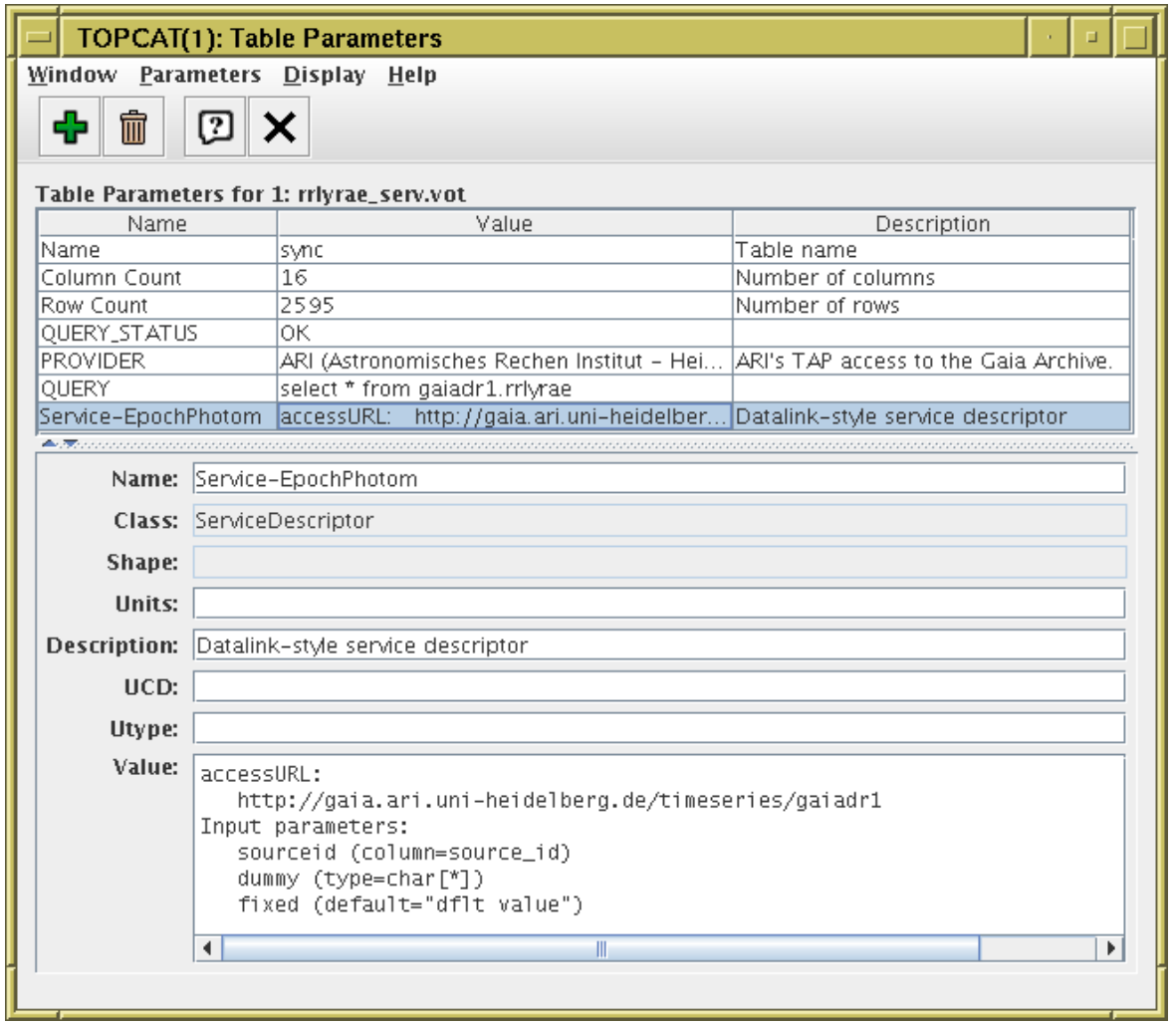
- Fills in service inputParams
  - ▷ column-referenced values filled in from table
  - ▷ fixed/defaulted values displayed for possible editing
  - ▷ undefaulted values can be filled in
    currently only has basic GUI
- Configurable options to invoke the resulting URL
- Q: Are there services out there serving this kind of table?



Service Descriptors as Parameters

Service Descriptors are now considered table *Parameters*

- Can be viewed in TOPCAT Parameters Window
  - ▷ Most useful for non-{links}-response tables with Service Descriptors
- Can be saved and loaded
  - ▷ VOTable-like formats only
- Done by STIL VOTable handler
  - ▷ Available to third-party applications code



Future

- More activation options
  - Improve Display Cutout Image action
  - Reload Table?
  - Others?
- Improve service descriptor parameter GUI
- Feedback welcome!