# GAIA: version 4 demo

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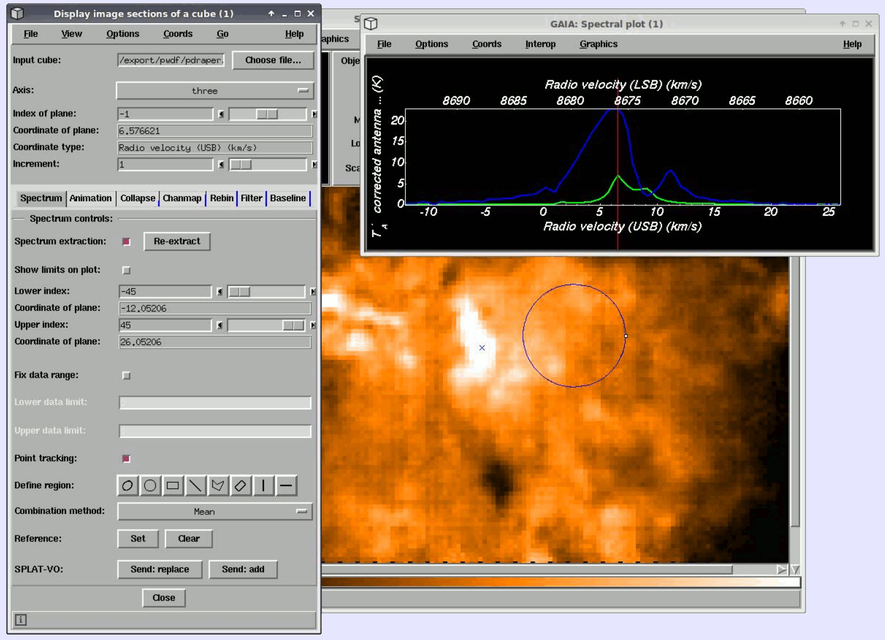
In recent years Starlink GAIA has been extended mainly in the area of datacube handling. These changes have been introduced to support the inspection and analysis of the large datacubes produced by the JCMT's heterodyne instrumentation, but also have more general application as they work on FITS and NDF data.

Support for datacubes is provided in two basic forms, the traditional movement through slices, with interactive spectral extraction, plus full 3D visualisation.

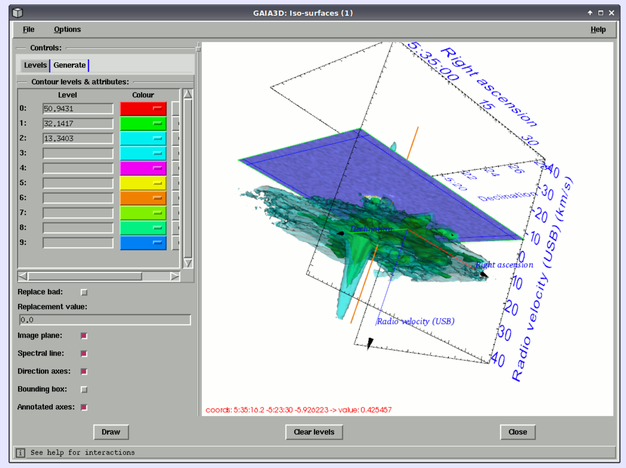
The most basic operation when handling datacubes is displaying image slices. GAIA version 4 extended this existing feature so that moving between slices is a very fast operation. Support for displaying the coordinates of the extracted slice was also added, along with spectral extraction.

Using GAIA extracting and displaying a spectrum from a cube is very simple, just click on an image position and drag around. The spectrum will be interactively updated.

In addition to single-point extraction you can also extract spectra that are averaged over regions: circles, rectangles, ellipses, polygons and lines of various kinds. You can also mark an extracted spectrum as the reference spectrum for simple point-to-point and region-to-region comparisons. Some of these features are shown below.




More recent changes support 3D visualisation, proving isophotal and volume rendering, these are coupled to the more traditional cube handling, so the slice and spectrum interact. Special features like astronomical coordinate grids, the possibility to overlay isophotes from other cubes (in various coordinate systems, conversion is handled automatically) are also provided.




## Adding VO facilities to GAIA.

The development of GAIA continues, as we plan to add VO support for accessing the JCMT Science Archive, which will contain a variety of data products. Progress so far includes VOTable support, querying registries and access to images using the SIA protocol. We also plan to add cone search, before starting more ambitious work, in conjunction with CADC, to support datacube queries since they are a primary product of our heterodyne instrumentation.

Submillimetre images and cubes are typically full of amorphous emission, so we plan to also extend GAIA to overlay the outlines of the clump emission, in 2D and 3D using STC regions. The regions of emission will be detected by the CUPID (http://www.starlink.ac.uk/cupid) application, whose outputs will form part of the JCMT Science Archive.

## Acknowledgements

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## Obtaining GAIA:

GAIA is part of the Starlink JAC release which is available from:

http://starlink.jach.hawaii.edu/