

User's manual of VO_IMPAT

1. What is VO_IMPAT?

Imaging processing and analysis tool for china_vo is abbreviated to VO_IMPAT. It is an interactive imaging processing tool developed and maintained by Chinese Virtual Observatory for the identification of astronomical sources through visual analysis of digital survey images. It allows the user to visualize digitized images of any part of the sky and to interactively access related data and information from BADC. It is particularly useful for multi-band astronomical data federation, currently it provides four bands: namely optics, infrared, radio and X-ray. It also implements essential imaging processing measures.

VO_IMPAT fully benefits from the environment of BADC database and services, and is designed as a multi-purpose service for use by the public and professional astronomical community.

VO_IMPAT is currently available as a stand alone version, which is to be installed on the user's machine. It can be downloaded at the following address:<http://badc.lamost.org>

2. Functionalities

VO_IMPAT is a java application that display sky images centered on a given sky coordinate position. The default action is to return 20' * 20' DSS images, as these images are available for the whole sky. It allows the users to interactively make queries for images, catalogues, and data. Images may be manipulated with a set of functions including zooming, changing color-maps pixel-resampling. Catalogues may be displayed with various colures and symbols. Other graphical functions such as contours, drawings, histogram, smooth, sharpen, rotate, tag and select are also available.

3. VO_IMPAT View panels

The VO_IMPAT interface comprises the following windows and panels: (Fig.1)

- View window: the main window used for displaying the image or catalogue projections.
- Location window: the small rectangular panel above the View window is used for typing the center position of DSS image and searching radius.
- Position window: located to the right of the view window, it is used for displaying the current position of the cursor.
- Tool bar: a set of icons located to the left of the view window, it gives access to control function.
- Zoom window: the square window at the bottom right corner displays a quick view of the magnifier field
- Measurement window: the rectangle panel at the bottom is used for displaying data related to objects selected (with mouse and cursor)in the View window.

----Navigator window: the square window at the top right corner displays a quick view of the complete field

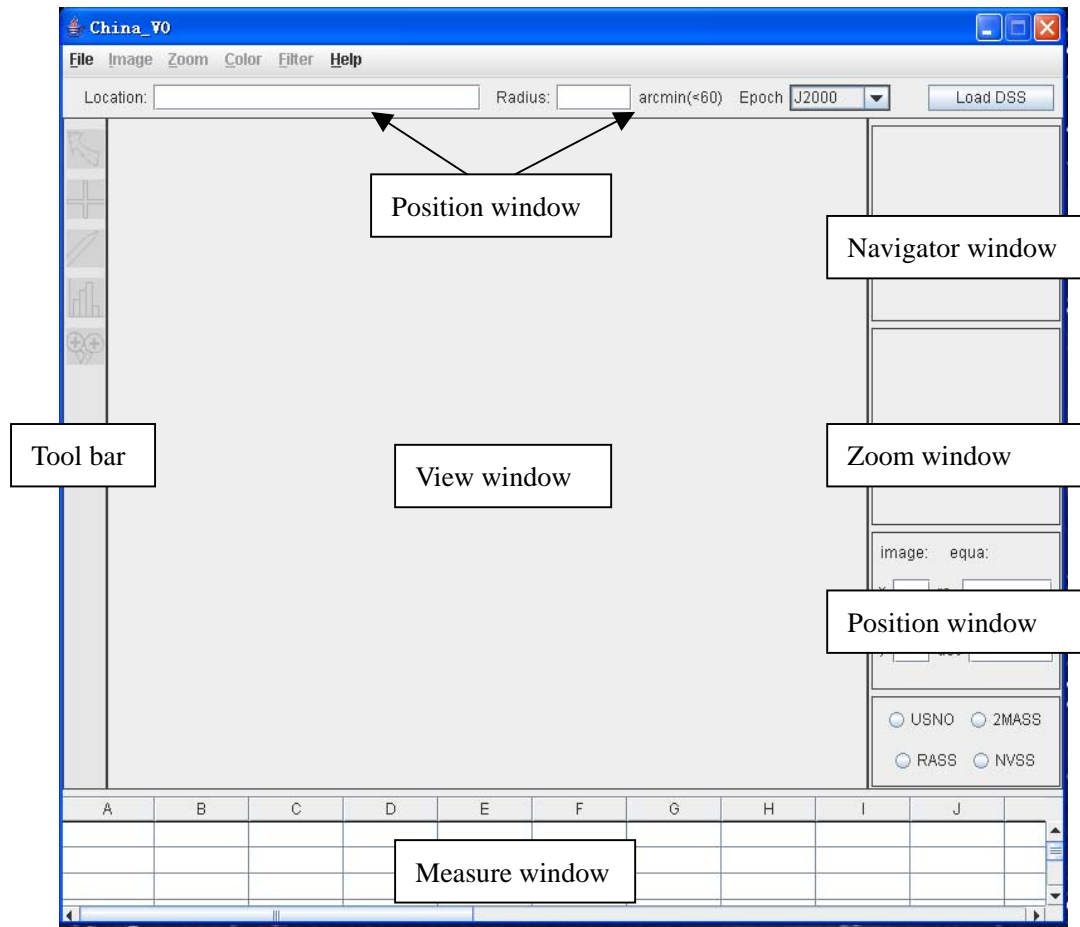


Fig.1. Layout of the VO_IMPAT interface window

4. Getting started

The typical usage scenario starts with a request of the digitized image for an area of the sky defined by its central position. This is done by respectively typing the coordinate and proper searching radius in the “Location” box and “Radius” box and pushing the “Load DSS” button. It can display the corresponding DSS image and USNO catalogues on the “View window”. (Fig.2)

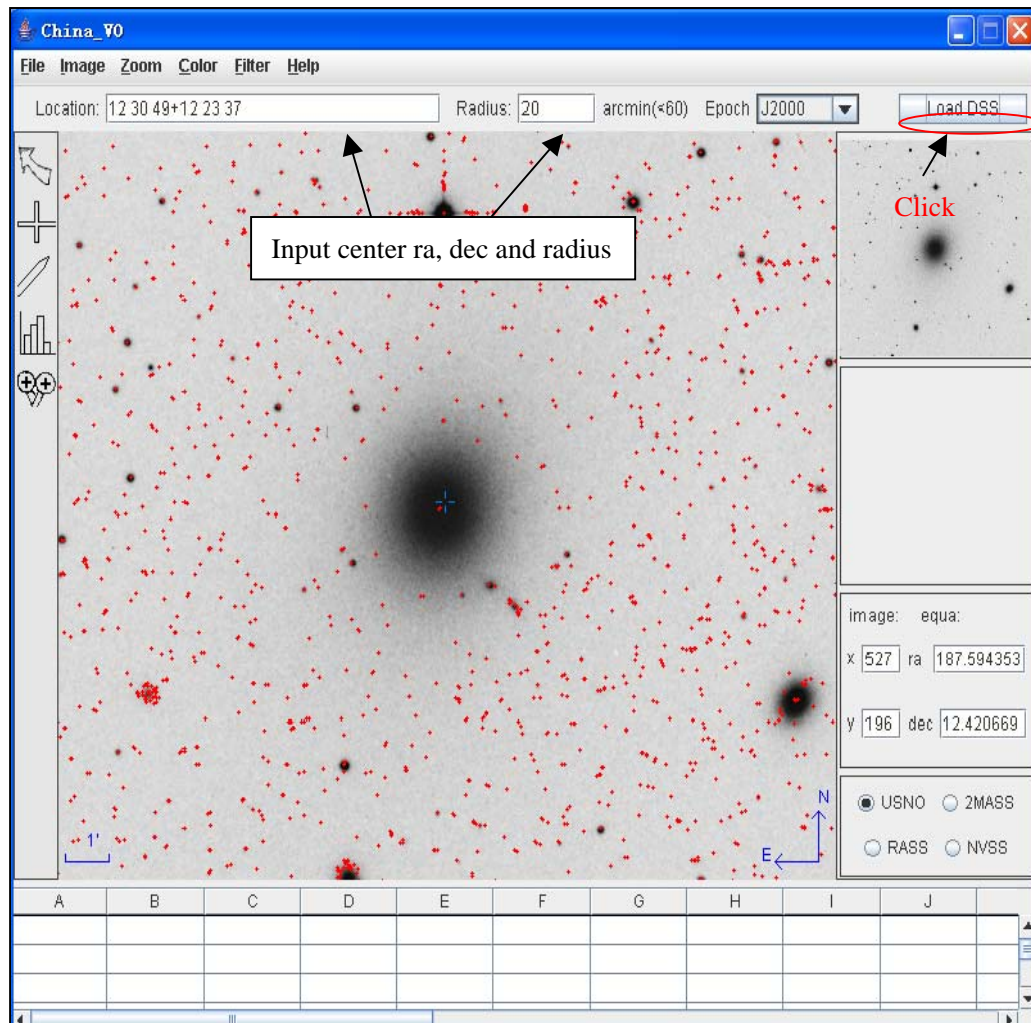


Fig.2.Display DSS and USNO

5. Select Button

VO_IMPAT is possible to select with the cursor all objects in a rectangular area; the corresponding objects are listed in the Measurement window. (Fig.3)

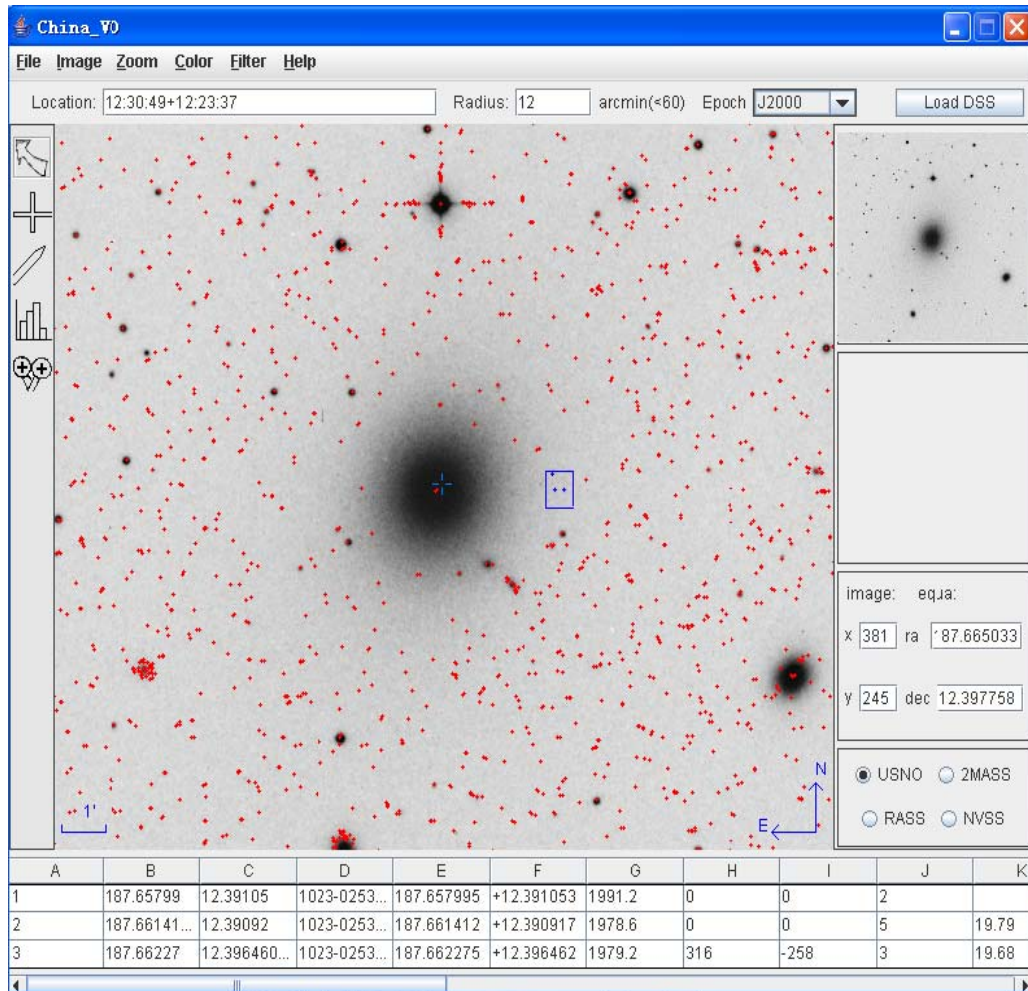


Fig.3 Select more objects once

When object are selected as explained above, the data for these objects are listed in the Measurement window; on the bottom of the VO_IMPAT window. This list includes basic information (name, position number of bibliographical references, etc).You can scroll up/down/left/right the contents of the measurement window just by clicking-and-dragging on it.

6. Tag Button

You can mark objects with tags by pushing the related Tag button, summary information is displayed in the Measurement panel. (Fig.4)

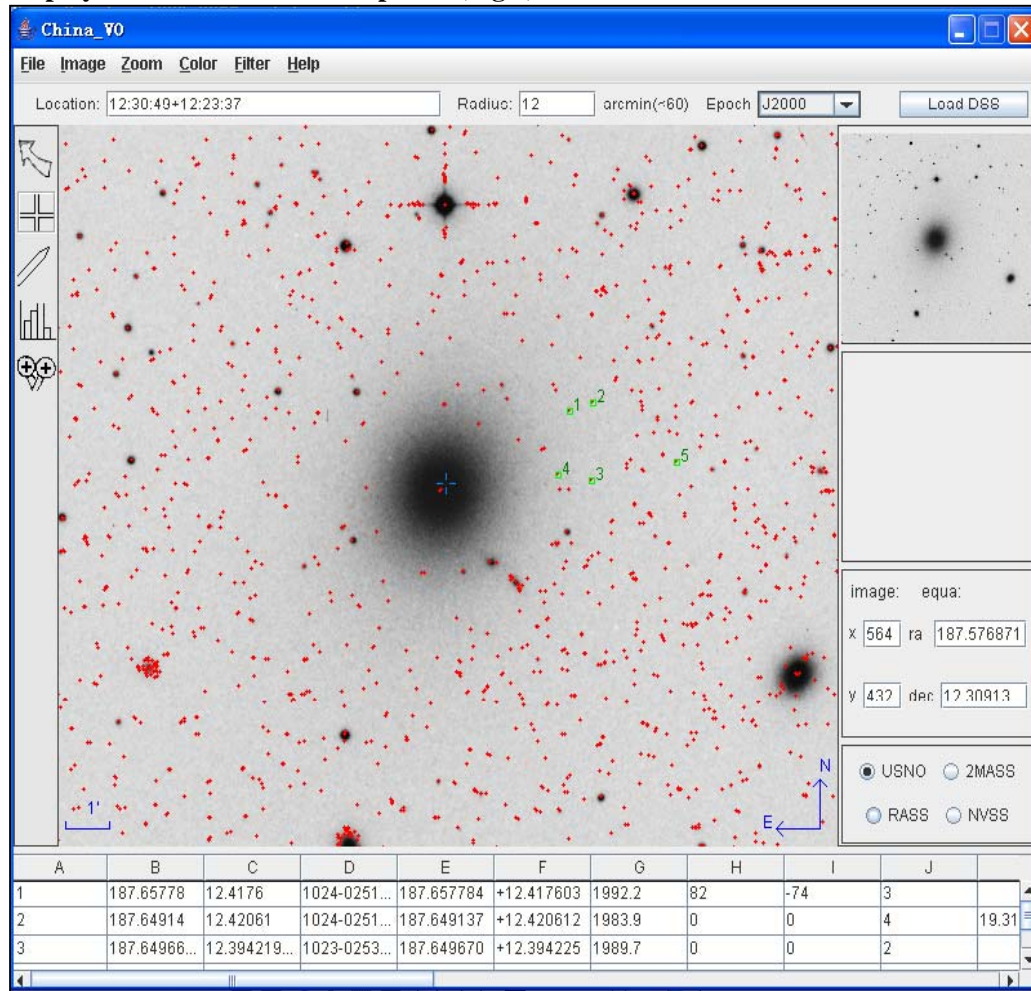


Fig.4 Tag several objects

7. Draw button

To draw lines, use the Draw button. You can use click-and-drag mode, draw a “hand-line”. (Fig.4)

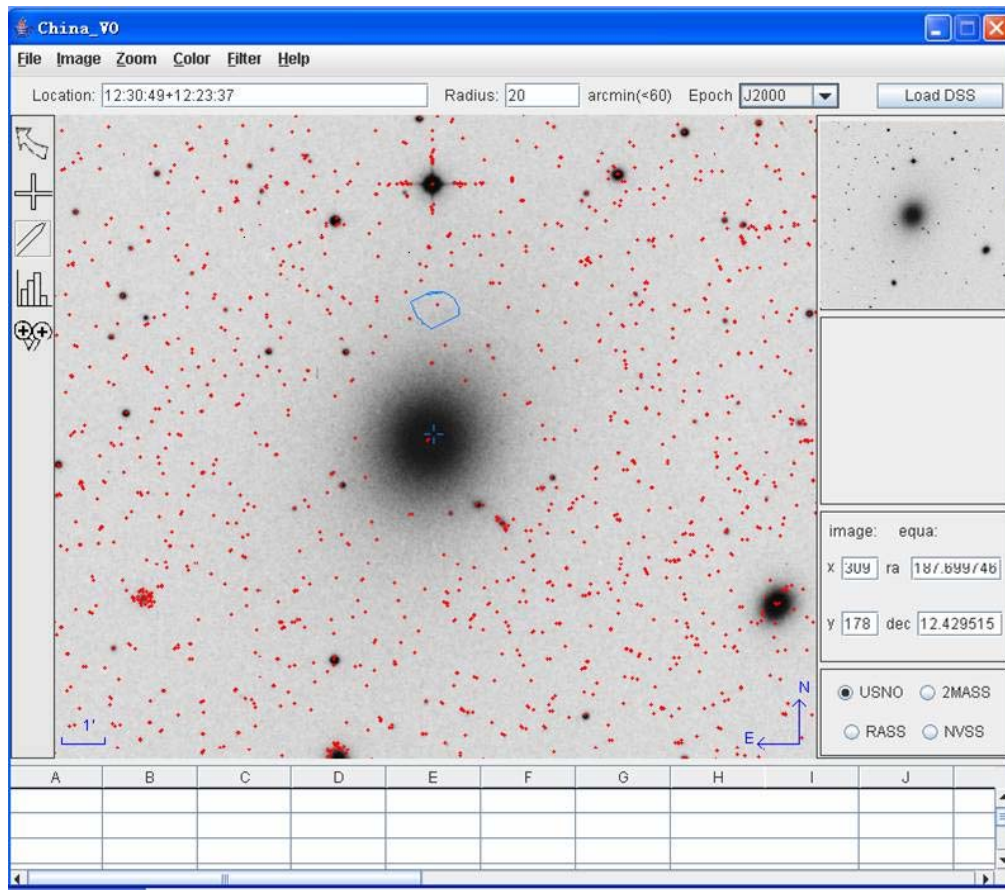


Fig.4 Draw a “hand-line”

8. Histogram button

To draw a histogram, click “histogram” button. A sample histogram is shown in Fig.5.

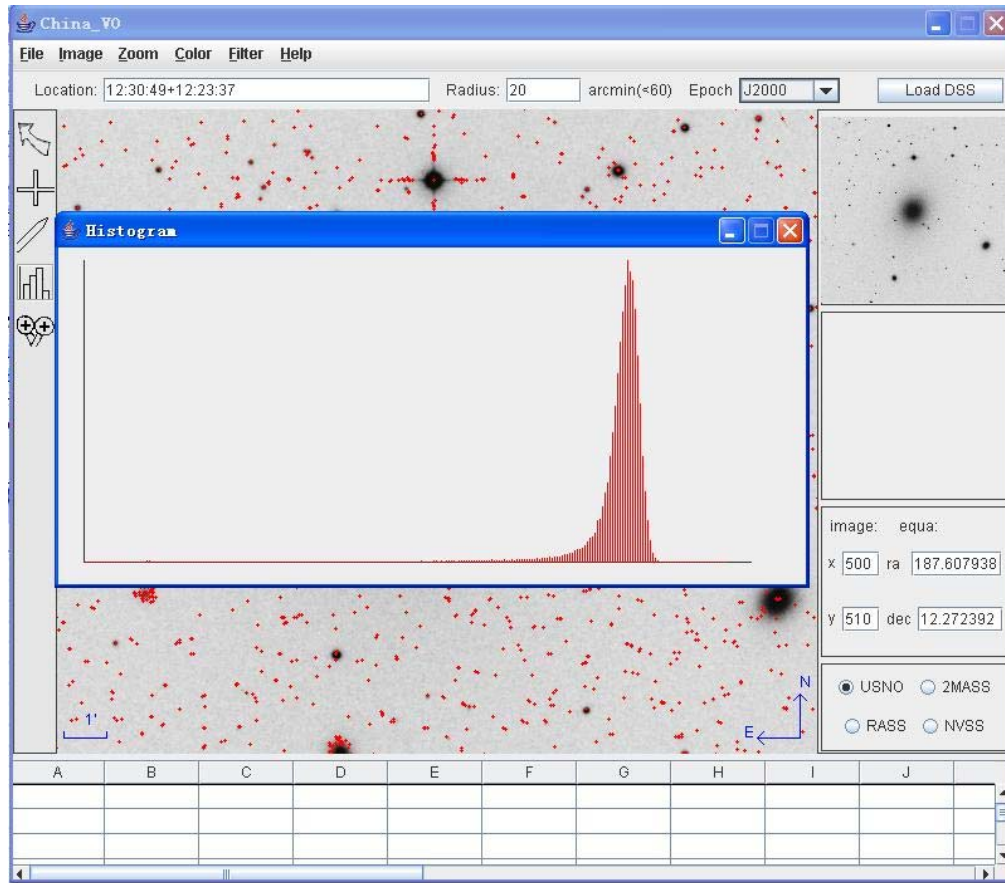


Fig.5 Display histogram

6. Contour button

The contour button can be used to draw contours. (Fig.6)

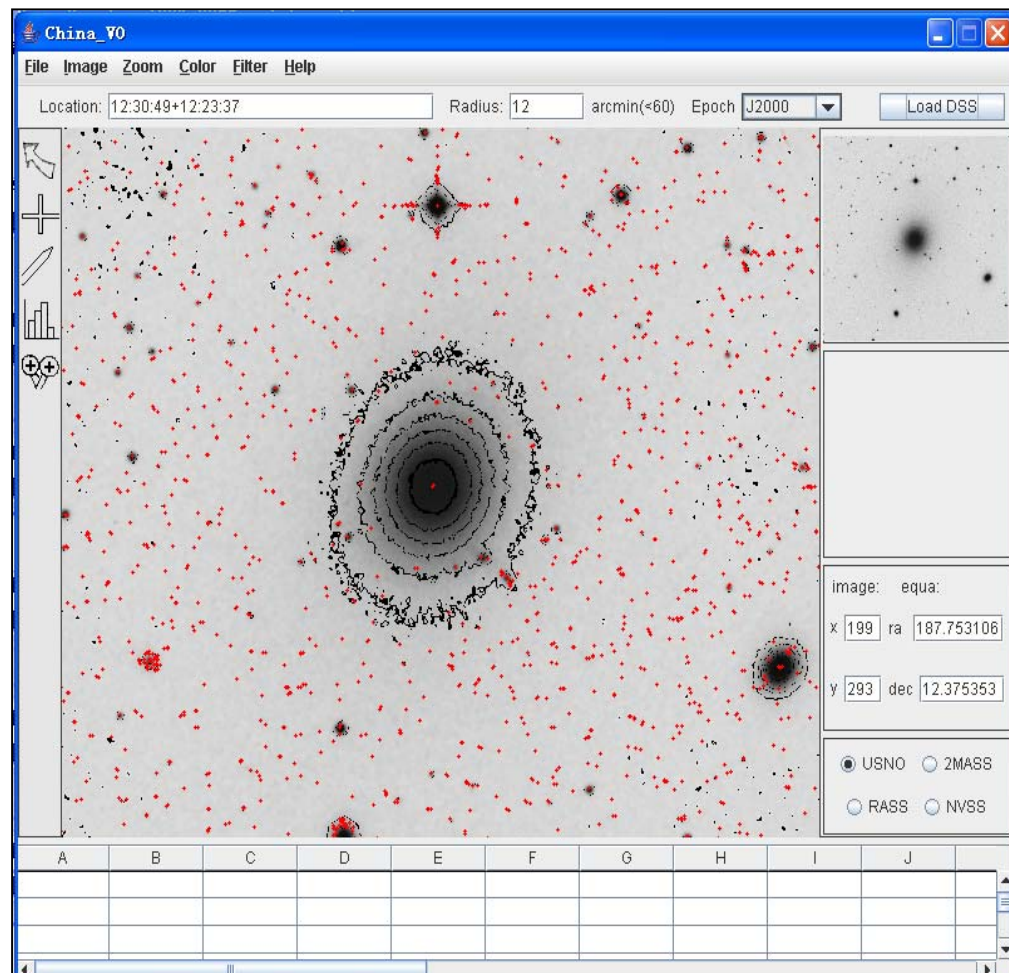


Fig.6 Contour plot of M 87

7. Loading local fits file

Local user fits files can also be overlaid, just specify a filename, a URL or a directory. The open menu provides a number of control tools to help visualize the data and analyze the images. (Fig.7)

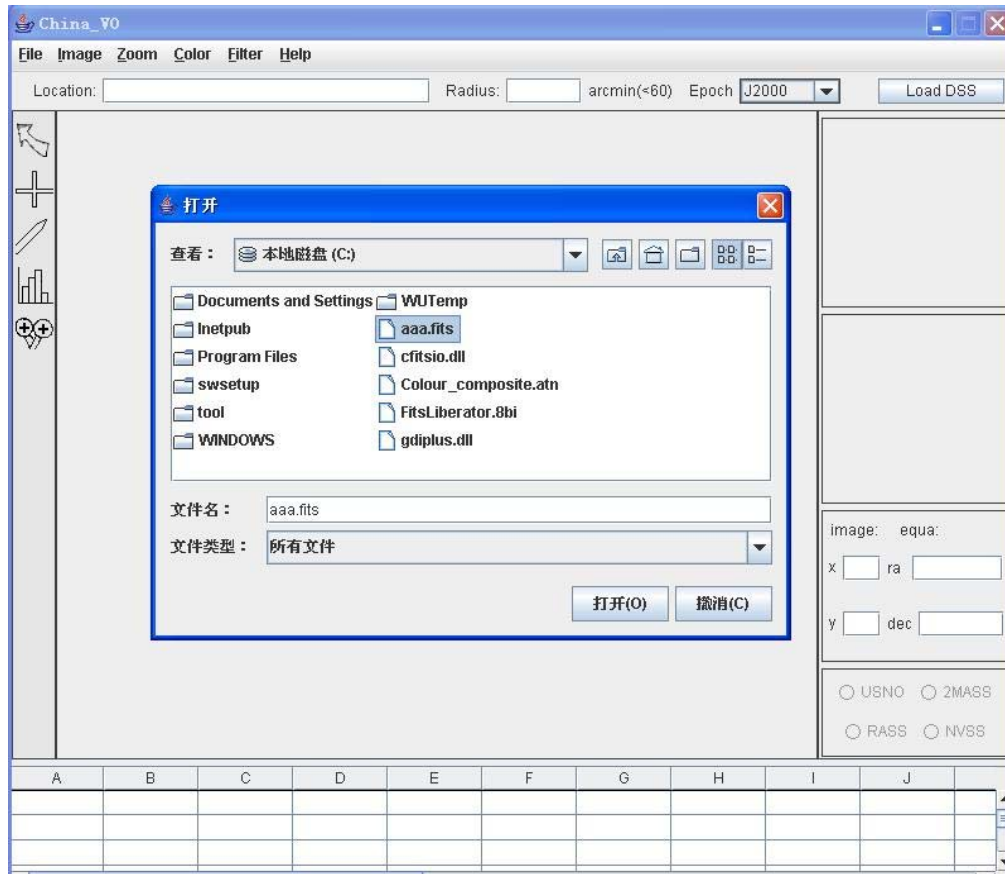


Fig. 7 loading local fits file

8. Save menu

It is possible to save image as .fits or .jpg format. (Fig.8)



Fig.8 saving an image

9. Display fits header

VO_IMPAT allows user to see DSS fits file's header. (Fig.9)

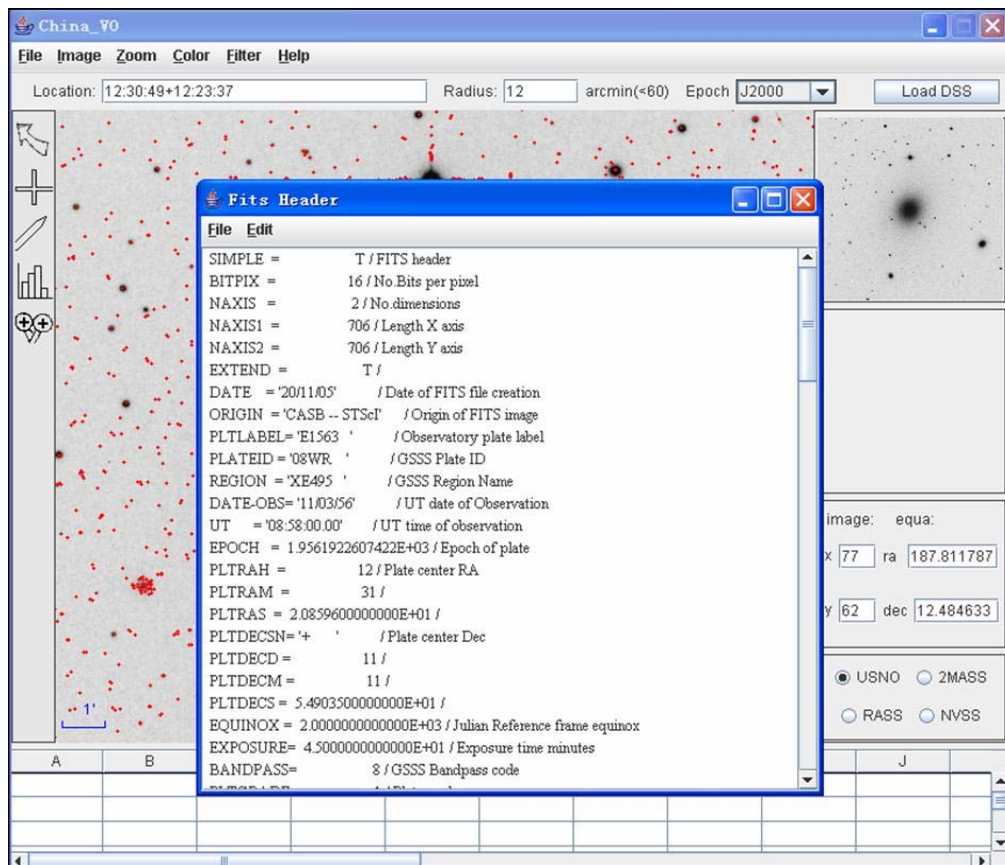


Fig.9 Header file of M 87

10. Brighten and Contrast

Users can move the slider to change the brightness or contrast of image file.

11. Histogram menu

VO_IMPAT provides four drawing histogram methods, namely linear, normalize, piecewise and equalize. The one in the tool window use linear algorithm to implement.

12. Zoom menu

Two different zoom manipulations of images are available, either using the magnifying button in the tool bar, or the Zoom menu in the menu bar.

Push the magnifier button and move the cursor in the view window: you can zoom a selected area; the zoomed image is displayed within the Zoom window situated at the bottom right of the main VO_IMPAT interface. (Fig.10)

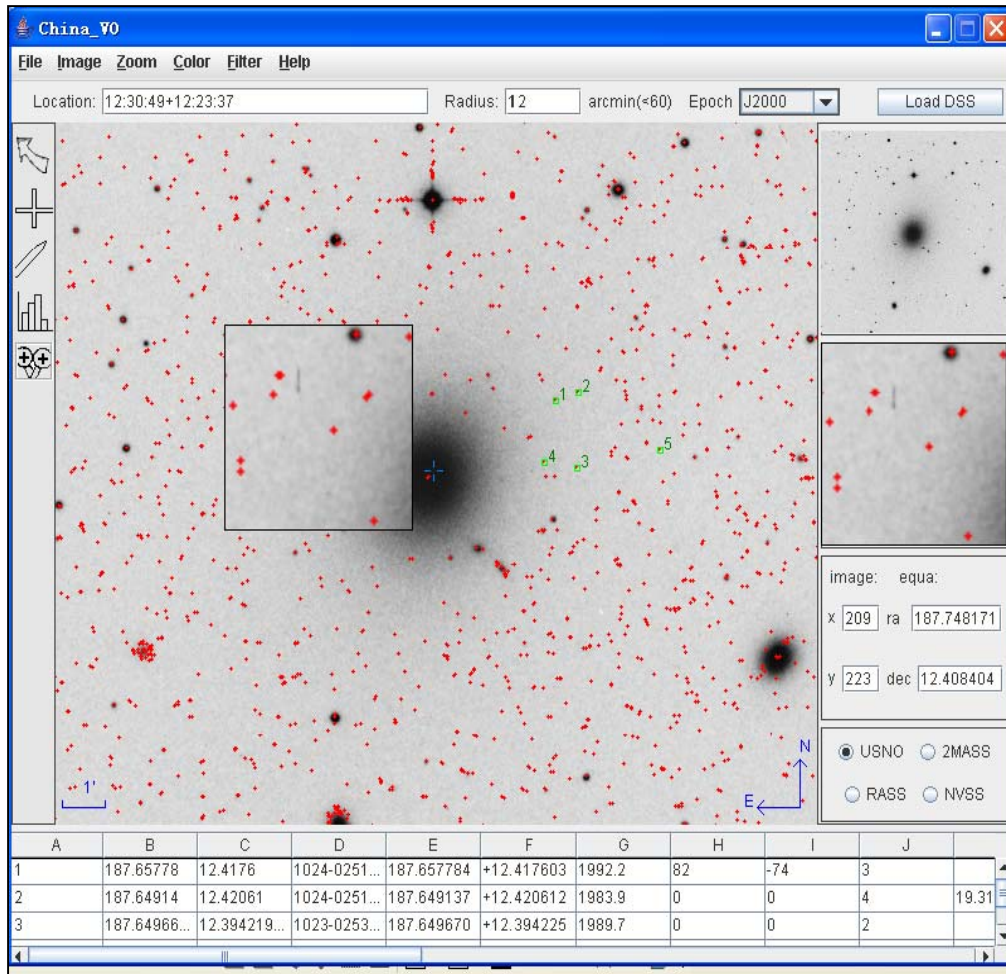


Fig.10 magnifier

13. Rotate menu

Four-angle rotate methods are available, 0 degree rotation, 90 degree rotation, 180 degree rotation and 360 degree rotation.

14. Color menu

Users can reverse colors (Invert Colortable), apply false colors (Gray, Red, Green, Blue and Pseudo, similar to the corresponding features of DS9).

15. Filter menu

VO_IMPAT provides two filter modes: Sharpen and Smooth.

16. Federation of multi-band astronomical data

VO_IMPAT federates four-band (optics, infrared, radio, X-ray) data. Every band uses different symbols and color to display. (Fig.11)

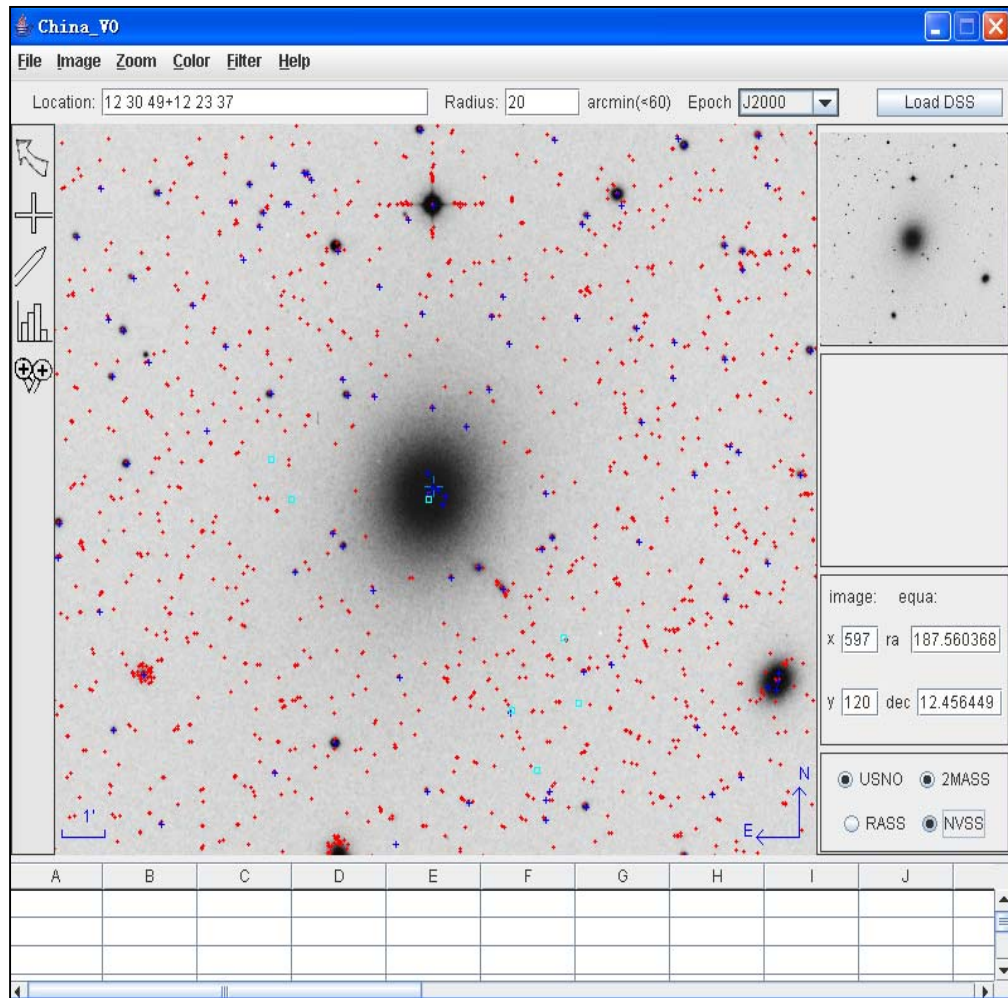


Fig.11 Three-band data federation

The above sample has federated three bands data, namely optical (USNO), infrared (2MASS) and Radio (NVSS). Red point represents USNO; blue cross indicates 2MASS and cyan square stands for NVSS.