Spitzer-Pride
Software for Analyzing Spitzer Data

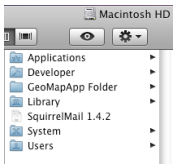
Introduction

The Spitzer Science Center, located at Cal Tech University, in Pasadena, CA, has developed a suite of software that is used by scientists to analyze data collected by the Spitzer Space Telescope. We can use this software as well to learn how infrared astronomy has led to many important recent discoveries about our universe.

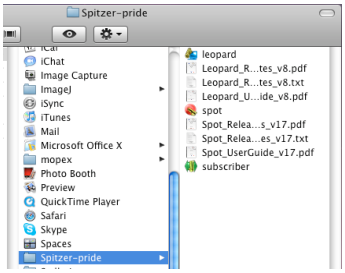
Spitzer-Pride includes spot and leopard. Additional software we will be using includes MOPEX, APT, and Excel.

Part One: Accessing Spot & Leopard

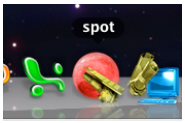
1. Log in on your eMac.
2. Open the Macintosh HD.
3. Find the Applications folder. Open it.



4. In the Applications folder you will find a folder titled Science Applications. Inside this folder you will find the Spitzer-Pride folder. Open it.

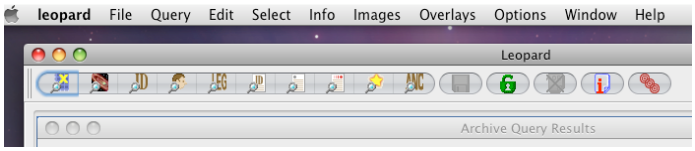


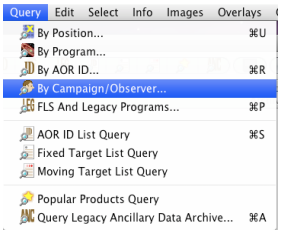
5. Drag the icons for Spot and Leopard to your dock. You will be using these programs a lot in the next few weeks. Once they are on your dock, you will be able to start them from there and not have to search for them on the hard drive.



Part Two: Getting Spitzer Data

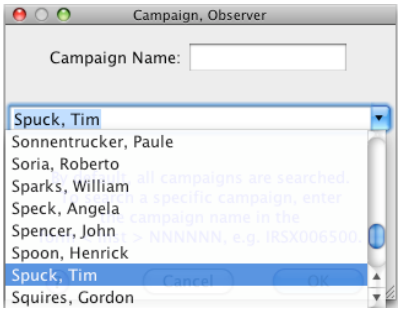
1. Open Leopard.
2. We will need to do a query – a request for data – to get the data that was taken of our research team's 2 targets, imaged in May and July of this year for us by the Spitzer Space Telescope. Our data is part of an observing program under the direction of our lead teacher, Tim Spuck from Oil City, PA. Go to the menu bar for Spot.



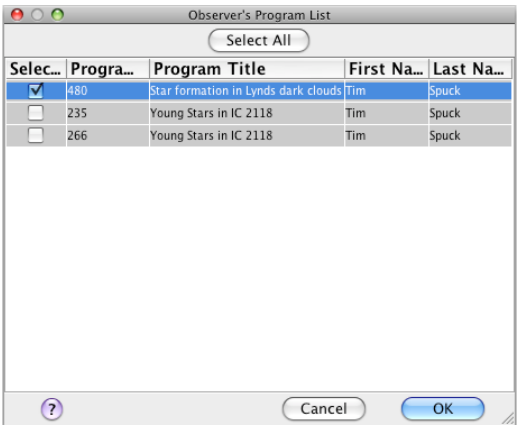


3. Click on Query. Query by Campaign/Observer. A working window will pop up as the program queries the server at the Spitzer Science Center for access to the Campaign/Oberver list.

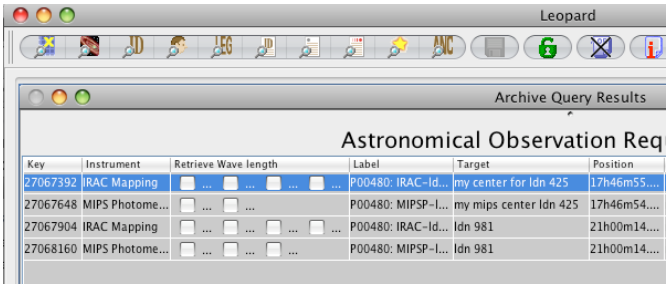
4. Scroll down the list of observers and select Spuck, Tim.



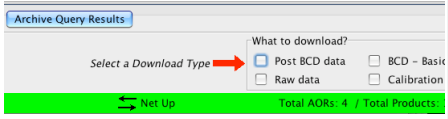
5. Mr. Spuck has been working with Spitzer data with his students for several years. There are 3 observing programs found under his name. Program 480 – Star Formation in Lynds dark clouds – is our program.



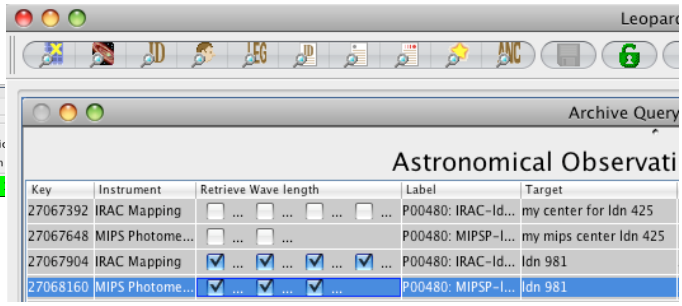
6. Select Program 480 and click the OK button.
7. The AOR (Astronomical Observation Request) window that opens allows you to request data from the servers at the Spitzer Science Center that are available for this program. You will be requesting data for LDN 981 from 2 instruments – IRAC and MIPS. IRAC is the **I**nfra**R**ed **A**rray **C**amera – a device that records images in 4 different wavelengths - 3.6, 4.5, 5.8, and 8.0 microns. MIPS is the **M**ulitband **I**maging **P**hotometer for **S**IRTF (the former name of the Spitzer Space Telescope). It images objects at 24, 70, and 160 microns.
**In the Retrieve Wavelength checkboxes, select all the available wavelengths from both IRAC and MIPS for LDN 981.

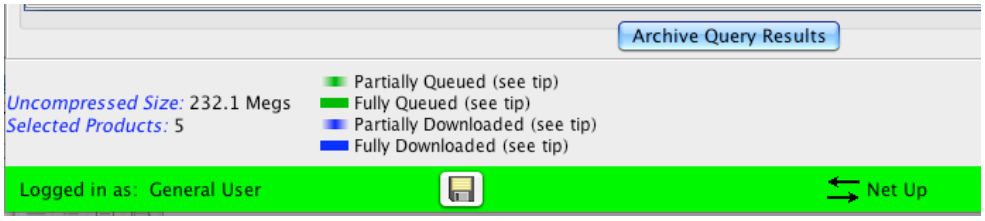


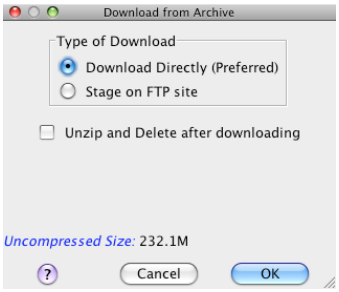
8. Under *Select Download Type* choose **Post BCD Data**.



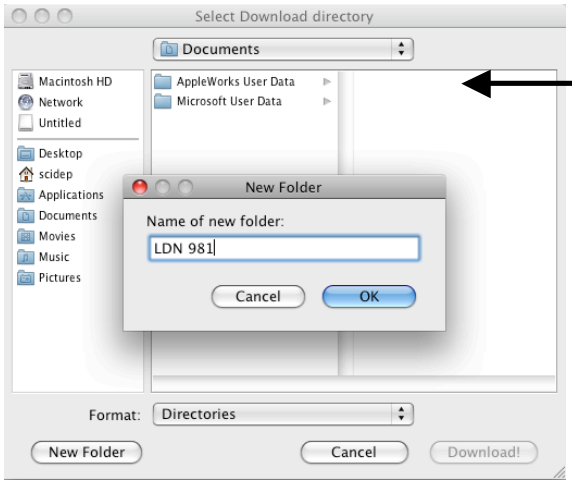
9. A floppy disk icon will appear a little left of center near the bottom of the Leopard window. Click it.





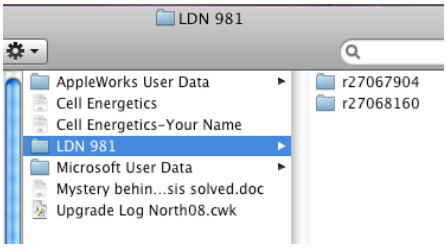


10. In the ***Download from Archive*** window that opens, leave ***Download Directly*** selected but be sure to click on the check box to **Unzip and Delete after downloading**. The data comes from the Spitzer archive as zip files. These are compressed files that need to be "unzipped" to make the data they contain available for you to use. Now click the **OK** button.
11. A window title ***Select Download Directory*** will open. Make sure that this new directory will be made in your Documents folder. Change this location to your Documents folder if necessary. Also click on the **New Folder** button in the lower left corner of the Select Download Directory window. Name this new folder **LDN 981** and click the **OK** button.

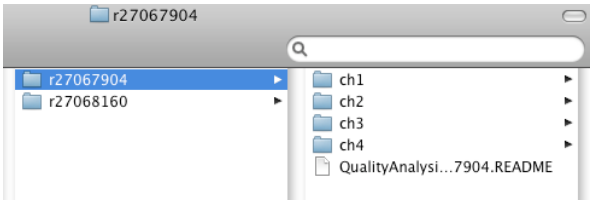


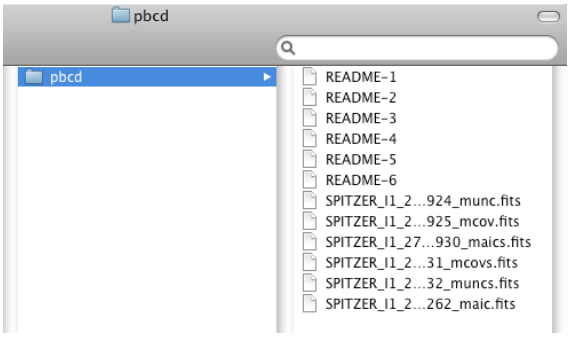
Change where you are creating this new folder to Documents.

12. Find your new folder (LDN 981) in your documents folder.
13. Open the LDN 981 folder.



14. The LDN 981 folder contains 2 folders. One contains the files from IRAC. The other contains the files from MIPS. Open folder r27067904. This folder contains the data from the 4 different channels used by the IRAC instrument aboard the Spitzer Space Telescope. Channel 1 is data taken at a wavelength of 3.6 microns. Channel 2 is at 4.5 microns. Channel 3 is at 5.8 microns. Channel 4 is at 8 microns.
15. Click on the Ch1folder in r27067904. You will see a folder titled PBCD. This stands for Post batch Calibrated Data. Computers at the Spitzer Science Center have already processed the raw data from the telescope. This will make your job much easier!





16. The file you will want to open has the suffix "maic.fits".
17. Fits files cannot be opened by "generic" image processing software. This file will need to be opened from any of the Spitzer software products – Spot, Leopard, or MOPEX.
18. Close any open windows and return to Leopard. We will use this make a 3-color image of LDN 981 next.