Analysis Methods in Atmospheric and Oceanic Science

AOSC 652

# Introduction to IDL

Week 8, Day 2

19 Oct 2016





## AOSC 652: Analysis Methods in AOSC

**Input/Output**

**To sort data in IDL, use the "sort" command**

```
xsort=sort(variables(1,*))
```

**"sort" outputs an array of indices that allows you to re-order the original array.**

```
sorted_data=variables(1,xsort)
```

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**Input/Output**

**Now take a look at test3b.pro**

**What is the major difference between test3a.pro and test3b.pro?**




# AOSC 652: Analysis Methods in AOSC

**Input/Output**

**Now take a look at test3b.pro**

**What is the major difference between test3a.pro and test3b.pro?**

**Earlier, we added a program to your an idl directory called read_file.pro.**

**Just as load_header_data.m read files into MATLAB, read_file.pro reads "Ross & Tim" formatted files into an IDL program.**

**read_file,filename,variables,headers**

**"variables" contains the data contained in the file**
**"headers" contains the names of the data in each column**

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**Manipulating data:**

**Please copy**

**~tcanty/AOSC652/2016/WEEK_08/plot_temp.pro**
**~tcanty/AOSC652/2016/WEEK_08/10yr_ave.pro**
**~tcanty/AOSC652/2016/WEEK_08/beltsville.dat**
**~tcanty/AOSC652/2016/WEEK_08/beltsville_10yr_mean_sd.dat**

**What does the program test4.pro do?**




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**Manipulating data:**

**The "where" command, like the "find" command in MATLAB, determines the indices of an array that satisfies a logical argument**

**p1=where(month eq 12 and tave ne –999.00)**

**dec_mean=mean(tave(p1))**
**dec_sdev=stddev(tave(p1))**

| | |
|---|---|
| ne | not equal |
| eq | equal |
| lt | less than |
| le | less than or equal to |
| gt | greater than |
| ge | greater than or equal to |

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**Data visualization:**

**First,**

**Copy ~tcanty/IDL/symbols.pro**
**~tcanty/IDL/oploterror.pro**
**~tcanty/IDL/colorbar1.pro**

**into your idl directory.**

**These programs will make it easier to plot different types of symbols, error bars, and a color bar.**

**Copy ~tcanty/IDL/generic.pro into your working directory**

**This program can be thought of as a customizable "stncl" file that you can use to plot data.**




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**Data visualization:**

**Please take a look at plot_temp.pro**

```
filename1='beltsville.dat'
read_file,filename1,v1,h1                  read in data from first file

p1=where(v1(3,*) ne –999.0)                find indices where there is missing data
year=v1(1,p1)                              assign data to specific variable names
month=v1(2,p1)
tave=v1(3,p1)
tave_c=(tave–32.)*5./9.                    Convert temperature to Celsius
year_frac=year+month/12.                   Calculate the year fraction

pq=where(year ge 1951 and year le 1980)    Find the subset of years to calculate baseline temperature
baseline=mean(tave_c(pq))                  Determine the baseline mean temperature
t_anom=tave_c–baseline                     Calculate the temperature anomaly


filename2='beltsville_10yr_mean_sd.dat'    Read in data from second file
read_file,filename2,v2,h2
p2=where(v2(2,*) ne –999.0)
year2=v2(0,p2)
temp_mean=v2(1,p2)
temp_sd=v2(2,p2)
temp_mean_c_anom=((temp_mean – 32.)*5./9.) – baseline
temp_sd_c =(temp_sd – 32.)*5./9.
```

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## Data visualization:

```
; Load std. gamma II color table
loadct,5                                  Loads the color table we want to use

; determines size of plot,background color, color of bounding box
!p.position = [0.15,0.15,0.95,0.95]       Determines size of plotting window
!p.charthick=1.8                          Character thickness
!p.charsize=1.6                           Character size
!p.thick=2
!p.background=255                         Background color
!p.color=0

;determines x range, number of ticks,axis label,thickness of x axis
!x.range=[1861,2010]                      Range of the x- axis
!x.tickv=[1900,2000]                      The major tick marks on the x-axis
!x.ticks=1                                The number of intervals between major ticks (count the # of commas)
!x.minor=10                               The number of minor tick marks
!x.title='!5YEAR'                         Title of x-axis
!x.thick=2.0

; same as for x axis
!y.style=0
!y.range=[-20,20]                         Range of the y-axis
!y.tickv=[-20,-10,0,10,20]                The major tick marks on the y axis
!y.ticks=4                                The number of intervals between major ticks (count the # of commas)
!y.minor=5                                The number of minor tick marks

!y.title='!5T (ave)'                      Title of y-axis
!y.thick=2.0
```





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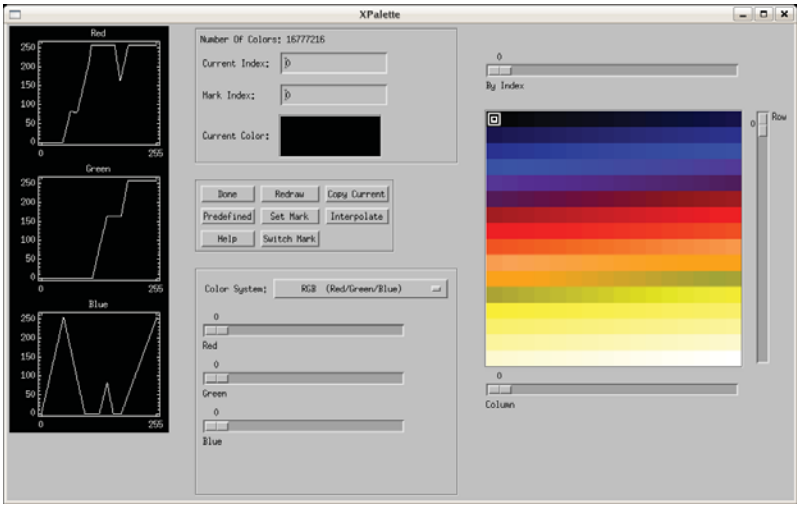
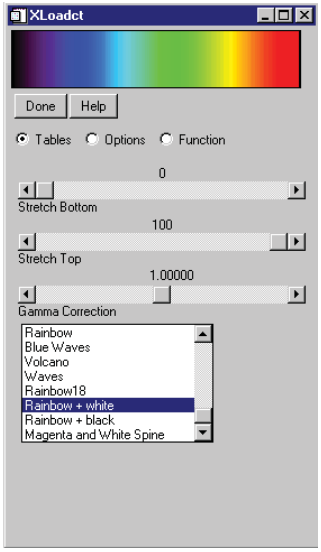
Typing xloadct at the IDL command prompt will show you the list of color tables available. Each color table has 256 colors.

The xpalette command will show you the "index number" associated with each color in the color table



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**Data visualization:**

```
; plot data with the plot command
; plots x vs. y

plot,year,t_anom,linestyle=1                                    plots the data as a dotted line

oplot,year2,temp_mean,linestyle=0,color=40                      plots mean t as solid blue line over the raw data
oploterror,year2,temp_mean,temp_sd*1.e-20,temp_sd,errcolor=40,psym=3   plots blue error bars in Y-direction

if ila eq 1 then begin
device,/close
set_plot,'x'
ila=0
endif
read,'input 1 for laser plot, 0 for not: ',ila
if ila eq 1 then goto,ils
;



end
```

| Index | Linestyle |
|---|---|
| 0 | Solid |
| 1 | Dotted |
| 2 | Dashed |
| 3 | Dash Dot |
| 4 | Dash Dot Dot |
| 5 | Long Dashes |





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**"Fitting" Data**

**There are many curve and surface fitting routines in IDL and this can be very confusing. Here's the list of routines available in IDL**

**http://www.harrisgeospatial.com/docs/routines-47.html**

**One of the most commonly used routines are**

**linfit**
**ladfit**
**polyfit**

**On the webpage above, click on the link to poly_fit.**

**This webpage is in the standard IDL html format that explains the functionality of a routine. These pages take some practice to understand.**

**Let's practice using the polyfit command**