XMGR - Grace Graphics

Refresher Training & Reference Guide

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XMGR - Grace Graphics

- The Basics
- Features & Capabilities - Old & New
- Examples
- Sample Graphics
- Tricks & Suggestions
- Reference Material &Hyperlinks

Xmgr-Grace Basics

- Xmgr-Grace is an XY plotting tool for workstations
- User defined graph type, appearance, scaling, symbols, line styles, colors, labels, tick marks, text strings and more
- Well adapted to work with scripting languages
- Can Read and Write Parameter settings for uniformity in graphics

Xmgr-Grace Basics

- Data transformations possilbe:
  - Polynomial regression, splines, running averages, cross and auto correlations and more
- Batch mode capable for unattended plotting
  - HSM scripts generate PM Graphics in grbatch mode
- Hardcopy support for Post Script
  - Grace supports many formats: jpeg, pdf, png, ps(several formats)

<u>Xmgr-Grace References Material</u>

- Grace Homepage (5.1.9):
  - *http://plasma-gate.weizmann.ac.il/Grace/*
- Xmgr 4.1.2
  - *ftp://plasma-gate.weizmann.ac.il/pub/xmgr4/src/xmgr-4.1.2.tar.gz*
  - */vol/hsm/apps/xmgr/xmgr-4.1.2/doc/*

Xmgr Set-up

- setenv GR_HOME /vol/hsm/bin/solaris/xmgr4
- setenv GR_EDITOR textedit
  - You can select the texteditor you prefer as your default
- setenv GR_PS_PRSTR lp –c –d hsmlj4k
  - You can select the printer you prefer as your default

Tip: create an alias (e.g. v4) to xmgr4 to execute an xmgr "*.fig" file in a "HSM" favorable format and size:

alias v4 "/vol/hsm/bin/solaris/xmgr4 -landscape - geometry =1140+870+0+0"

Xmgr Utilities

- Xmgr *.fig file viewer **pm4** automates opening *.fig files
  - Run ***/net/ibis/usr1/cwhite/bin/pm4*** in the directory containing *fig files or copy pm4 to your own /bin

- Date conversion utilities: greg2jul_ymd

  echo 1965 01 01 | greg2jul_ymd ==➔ 2438762 (julian)

- Date conversion utilities: jul2greg

  echo 2451910 | jul2greg ==➔ 2000 12 31 (gregorian)

- NOTE: MS Excel julian dates are different !!!!!

Xmgr-Grace Terminology

- Sets – collection of points and associated values
  - Values can be used to diplayed error bars, high-low open-closed plots among others
  - Sets are numbered from 0 onwards (29 Xmgr, unlimited Grace)
  - Number of points in a set limited by virtual memory size
  - **Plot/Symbols** pop-up menu

Xmgr-Grace Terminology

- Graphs – collection of data sets, tick marks, titles, etc. drawn to display the data
  - 10 graphs w/up to 30 sets each Xmgr, Grace unlimited
  - Graphs are number 0-9 (Xmgr), Grace unlimited
  - Graphs arranged in rows & columns or user defined locations
  - **Graphs/Graph operations** pop-up menu

Xmgr-Grace Terminology

- Regions – sections of graphs
  - defined by the interior or exterior of a polygon
  - defined by an area above-below-left-right of a line
  - **Data/Region operations** pop-up menu

- To implement features, characteristics & changes to graphs, parameter files, written sets and MORE, YOU MUST “Click” the ACCEPT button/icon or they will not be SAVED. It is easy to lose edits by missing this!

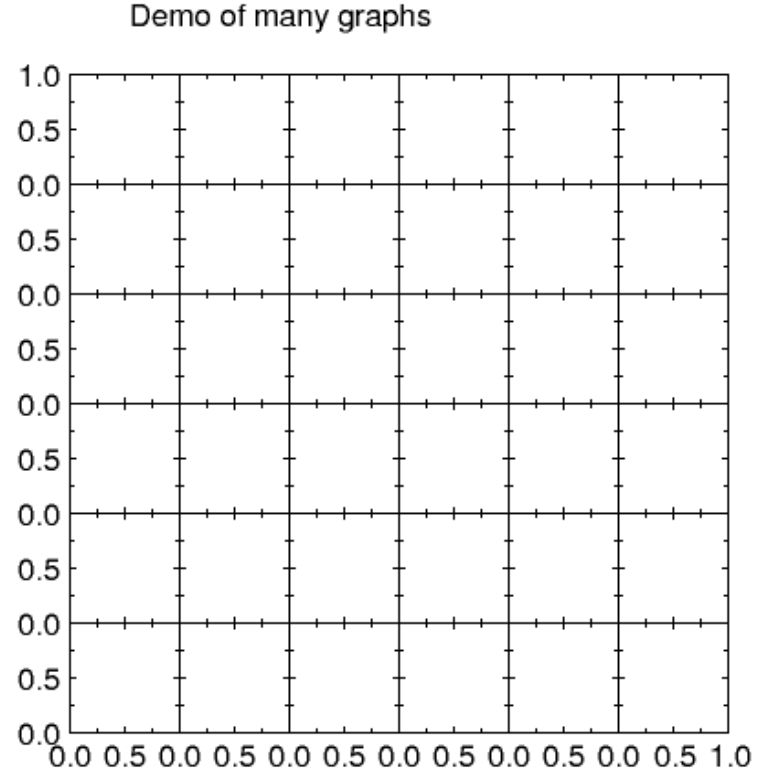
Xmgr & Grace Graphing Capabilities

- Grace
  - unlimited # of sets
  - unlimited # of graphs
- Xmgr
  - 30 set limit per graph
  - 10 graph limit

- Graphs can arrange in layers, side by side, stacked or mixed to suit graphing needs

WEAKNESSES

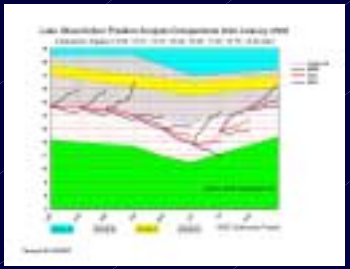
- No Undo Feature
- Must “Accept” Changes

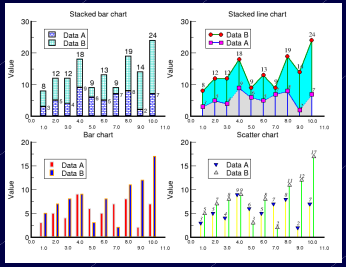


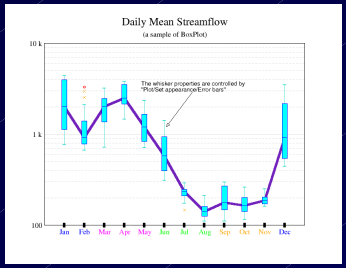
Grace no longer has limits on the number of graphs or the number of sets in a graph. This demo is a matrix of graphs 6x6 for a total of 36.

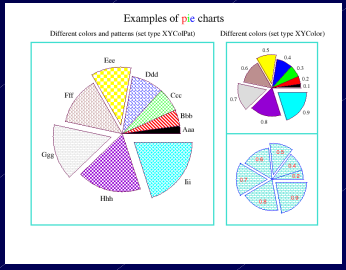
Xmgr-Grace Graph Types

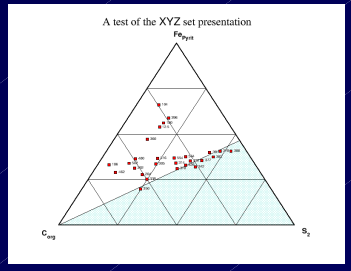
- Graph Types
  - XY graph
  - Log-linear
  - Log-log
  - Bar Chart
  - Stacked Bar
  - Horizontal Bar
  - Horizontal Stacked Bar
  - Polar Chart
  - Smith Chart
  - Scatter
  - XYZ

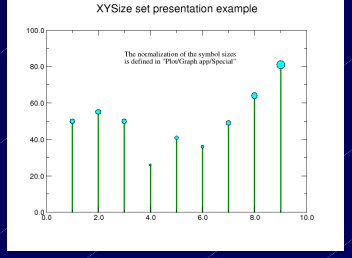


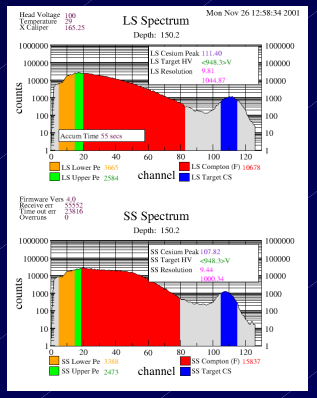


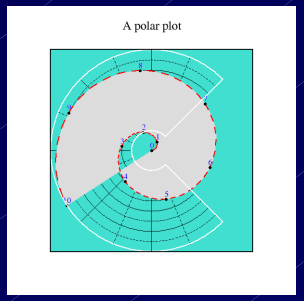


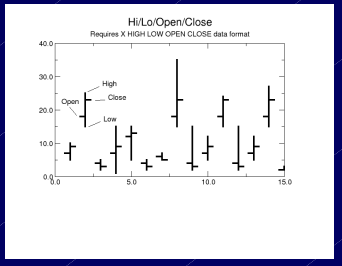


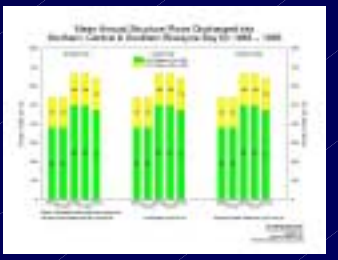


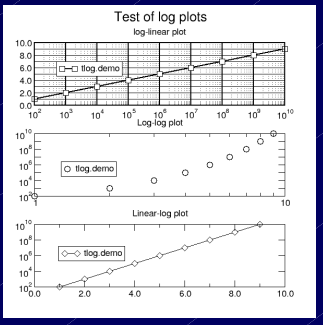


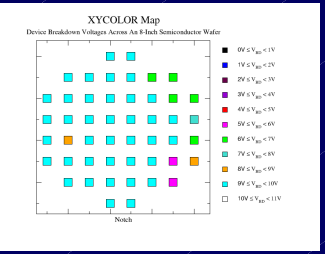


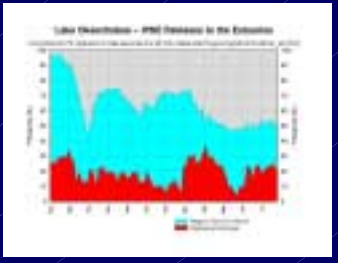






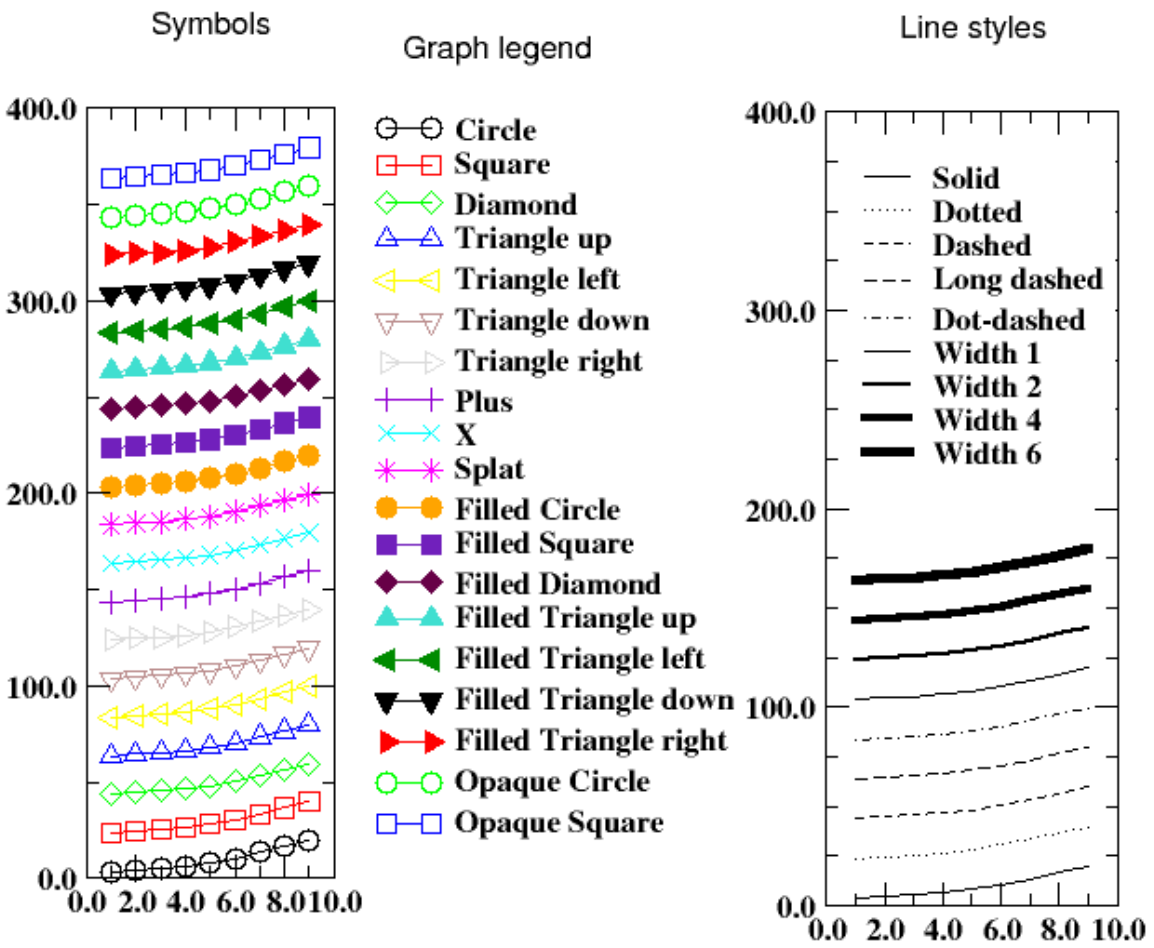






Xmgr - Grace Features

Line & Symbol Colors and Characteristics

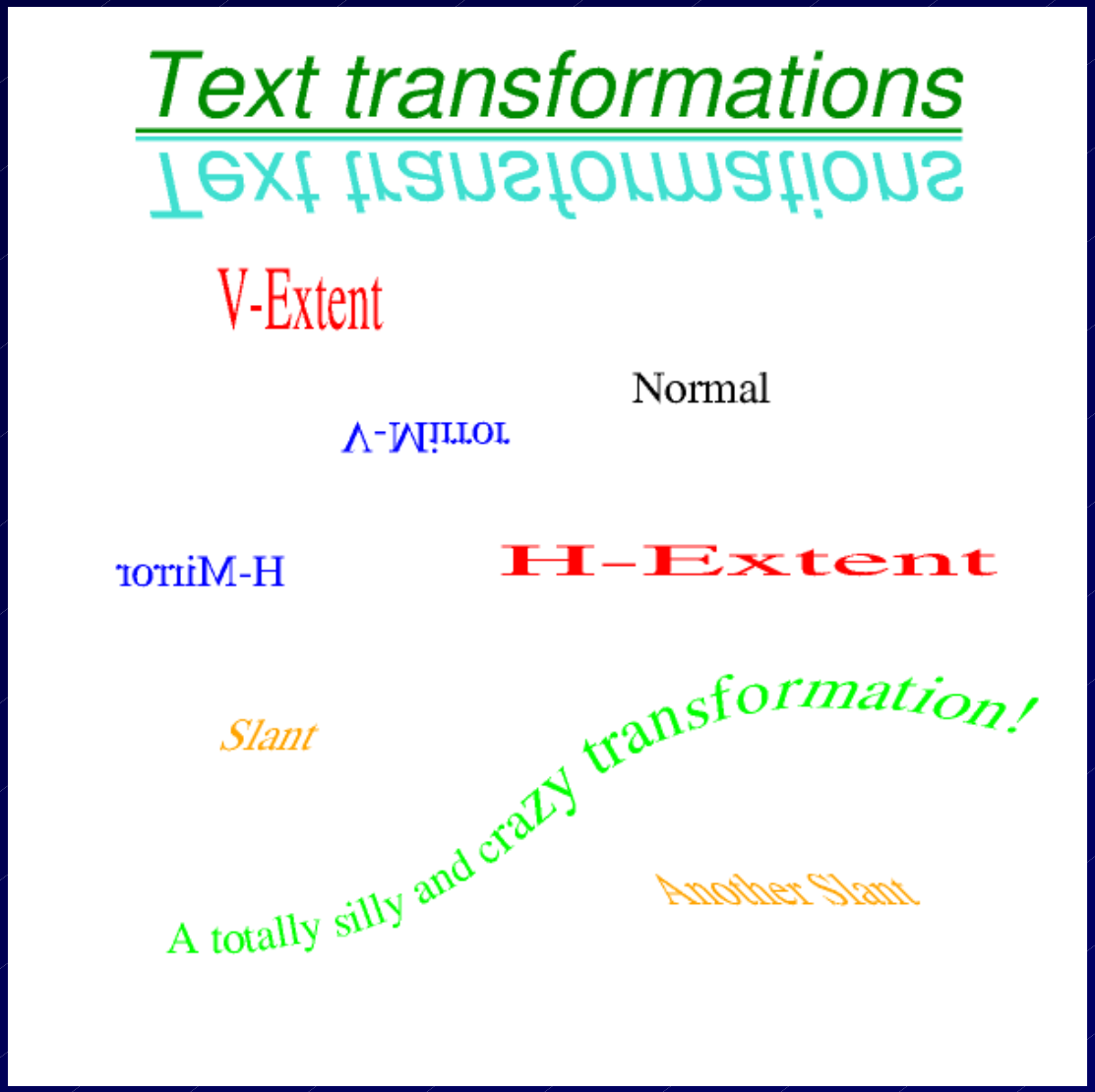


Xmgr - Grace Font Types

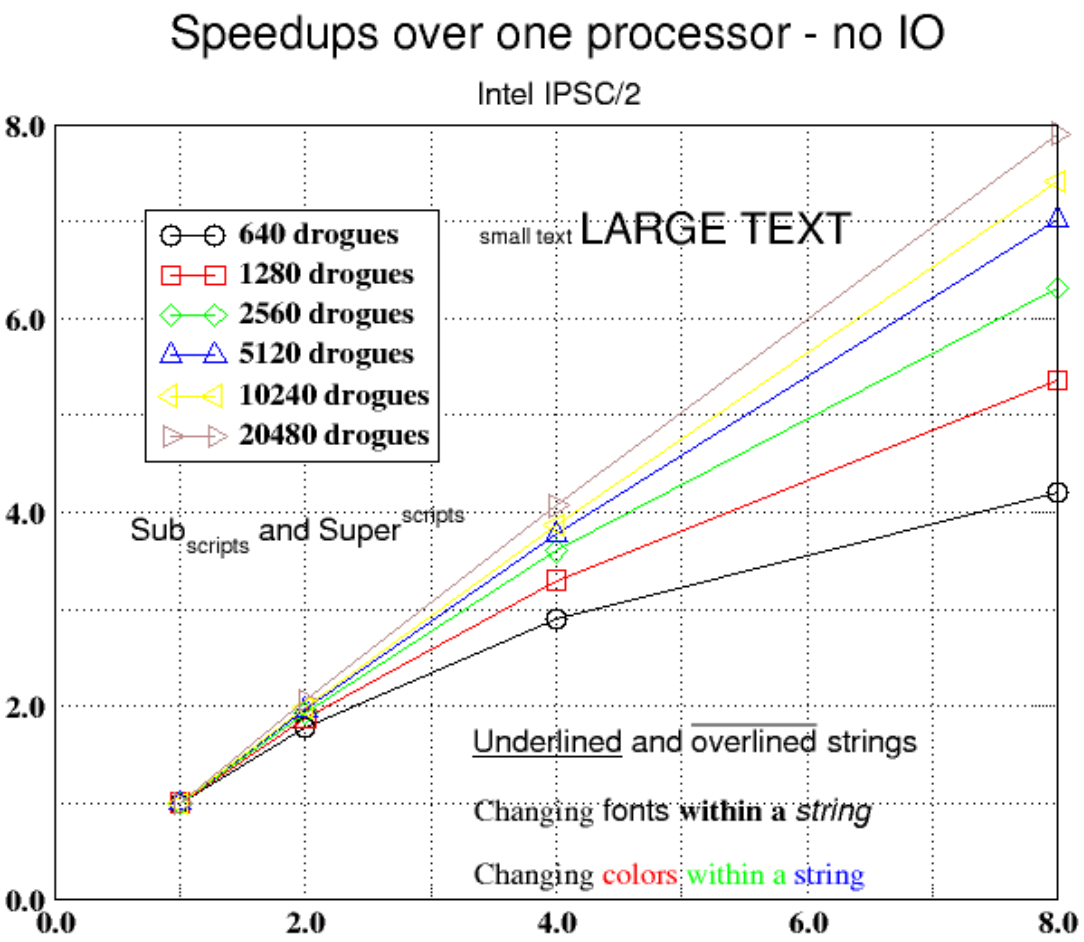
Use sans-serif fonts (Helvetica) & avoid serif fonts (Times)

Grace supports mixed font styles, size and colors

Grace Enhancements to Text



Grace Enhancements to Strings



Xmgr-Grace Data Transformations

- Histograms
- Fourier Transforms
- Running Averages
- Regressions
- Non-linear curve fitting
- Differences
- Interpolation
- Splines
- Linear convolution
- Geometric Transforms
- others
- Cross/auto correlations

Data types available

xy, nxy, xydx, xydy, xydxdx, xydydy, xydxdy, xyr, xyz, xybox, xyhilo boxplot, netCDF

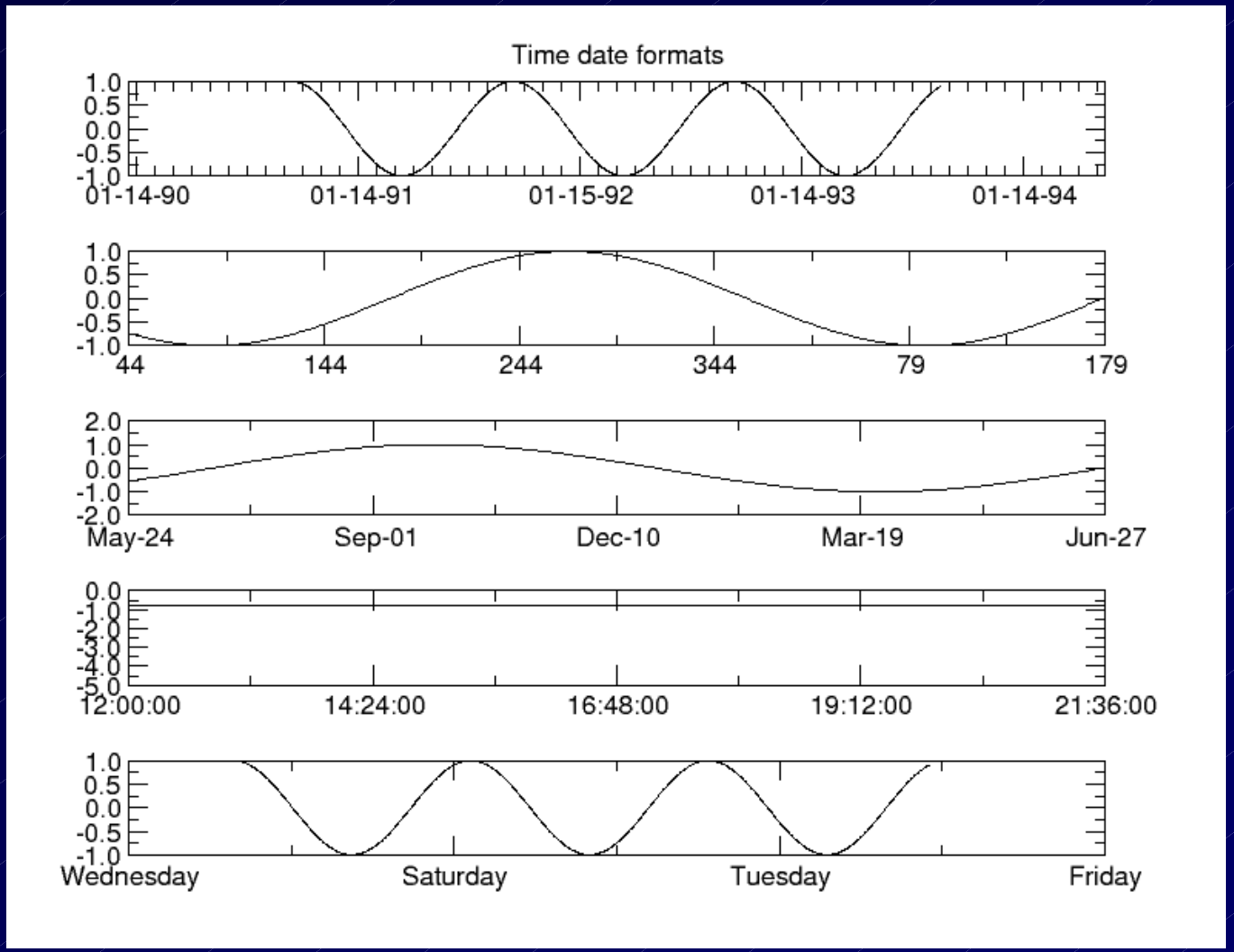
Data Set Operations

- De-Activate
- Re-Activate
- Set length
- Set type
- Copy set
- Move set
- Activate
- Join
- Split
- Kill set -- Kill All
- Sort
- Reverse
- Swap
- Pack

Executed from the **Status Window** pop-up or **Set Operations** pop-up

Xmgr - Grace Time & Date Formats*

- Decimal
- Exponential
- Power
- General
- DD-MM-YY
- YY-MM-DD
- Day(abrev)
- Month
- Degrees (lat) or (lon)
- DD MM’
- DD MM’ SS”

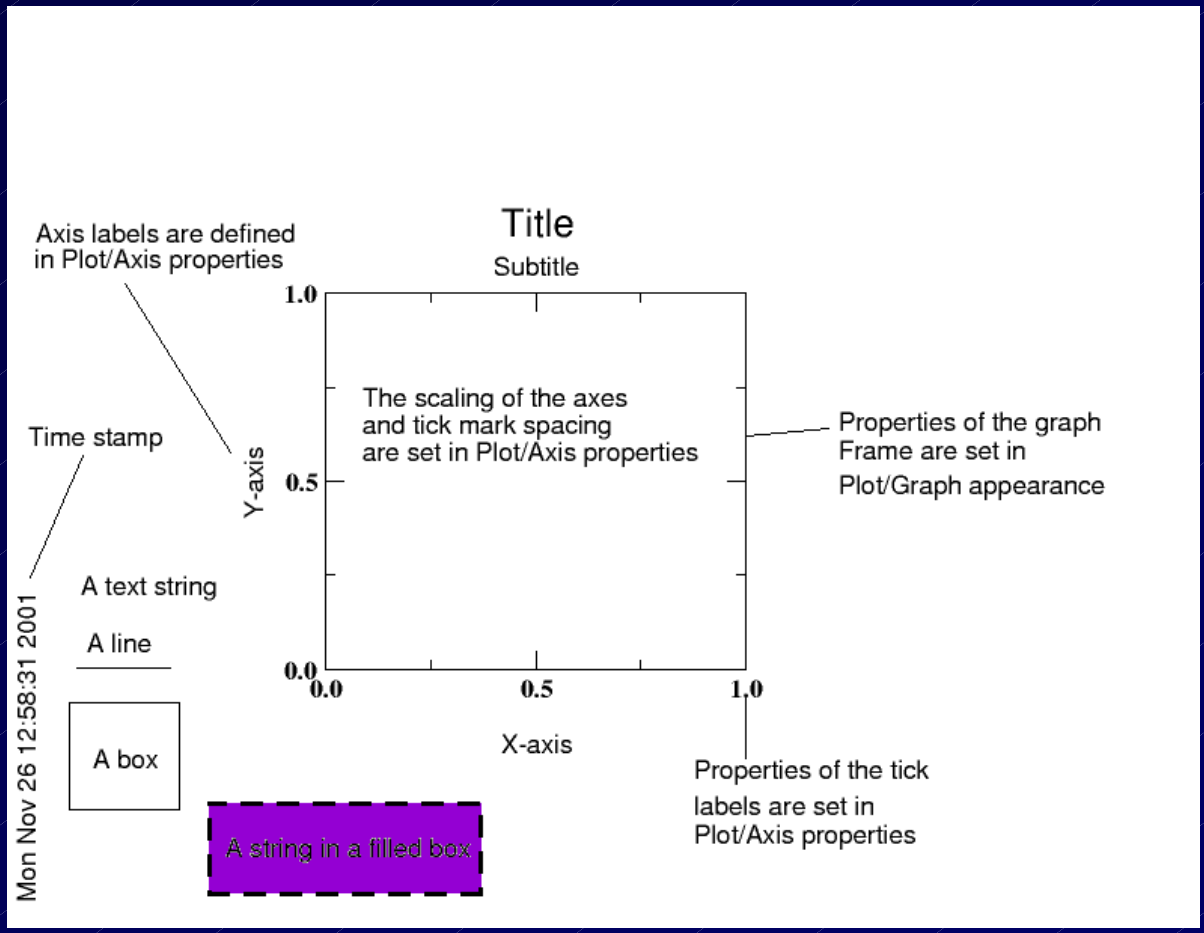


*Julian date data format required for most date formats

Use utility **greg2jul_ymd** to convert YYYY MM DD to julian 7 digit date

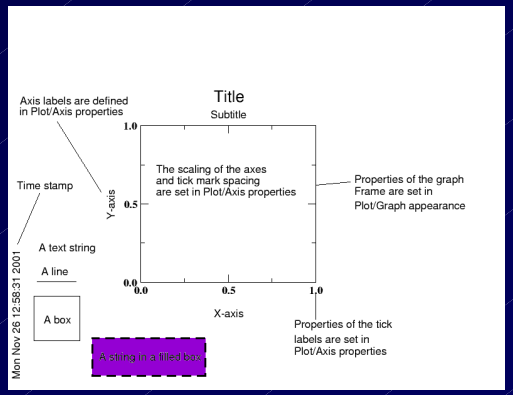
Graph Labels & Text Strings

Xmgr Plot
Strings & Things Menu

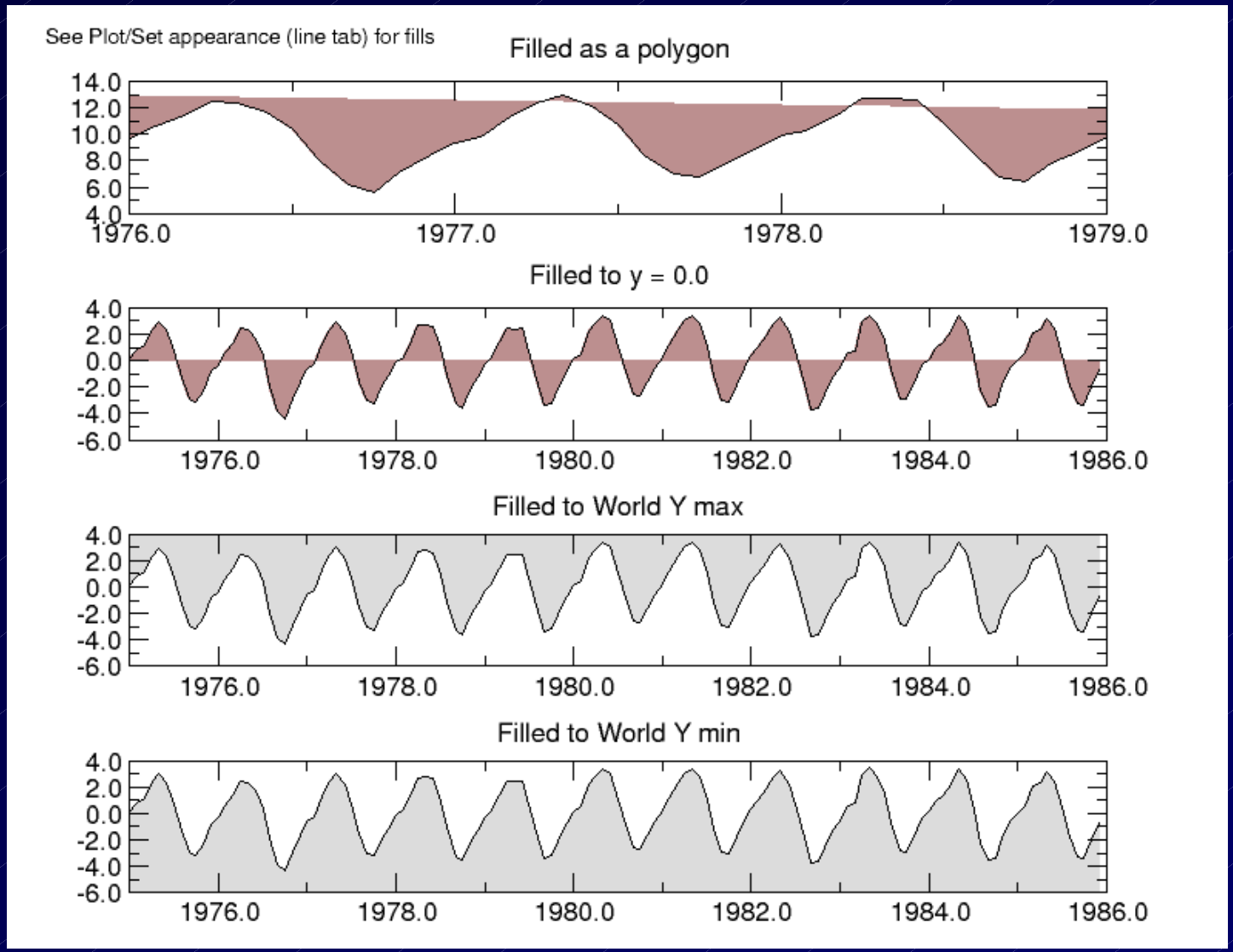


Xmgr Strings & Things “Pop-up” Menu

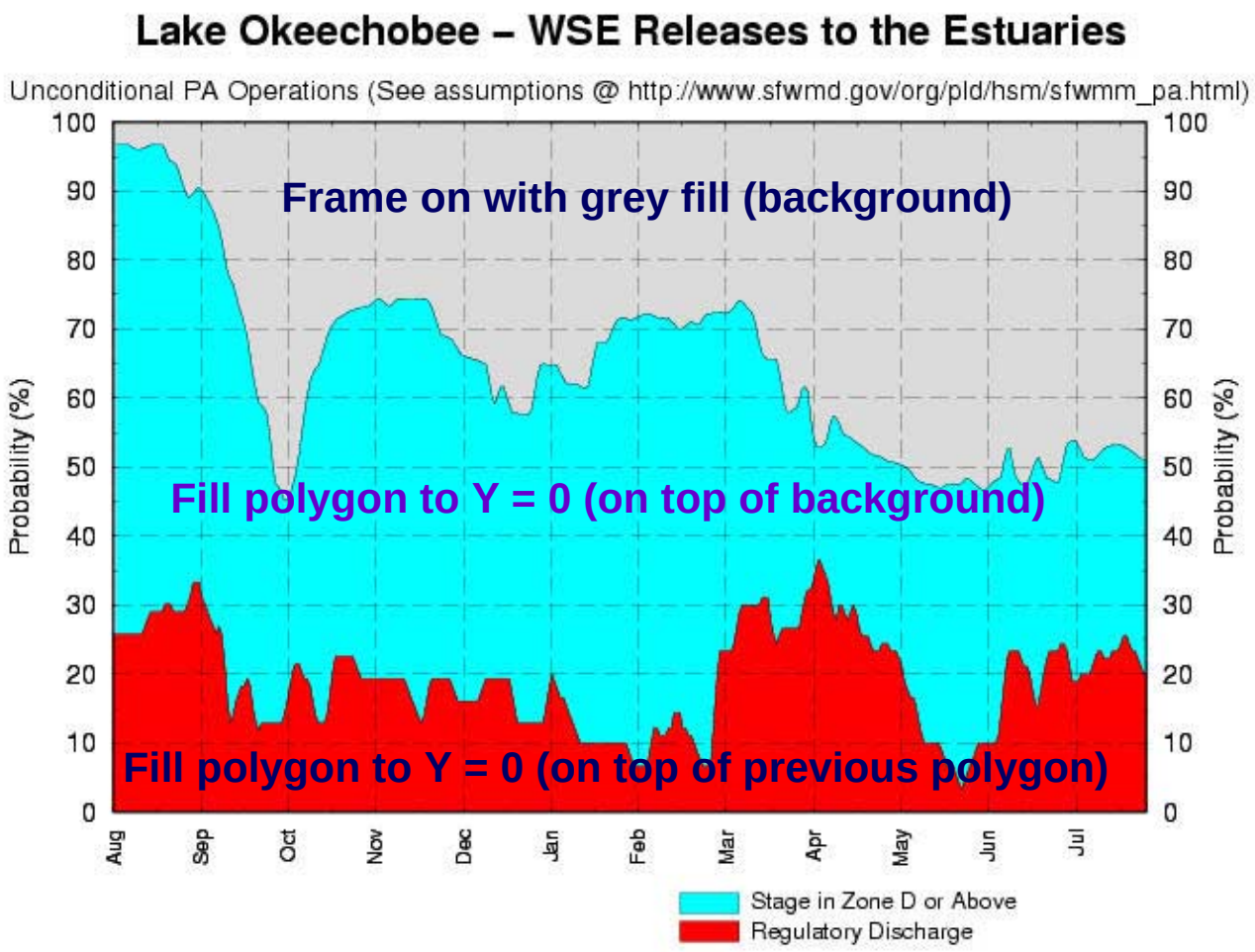
- Insert Text
  - Font, Color, Size and Justification
  - Text Orientation 0 to 360 degrees
  - Line properties
  - Style, Color, Thickness, Arrows
- Insert Boxes & or Ellipses
  - Line thickness, Color and Fill
- Editing Strings and Things
  - Text properties & locations
  - Copying Objects
  - Deleting Objects



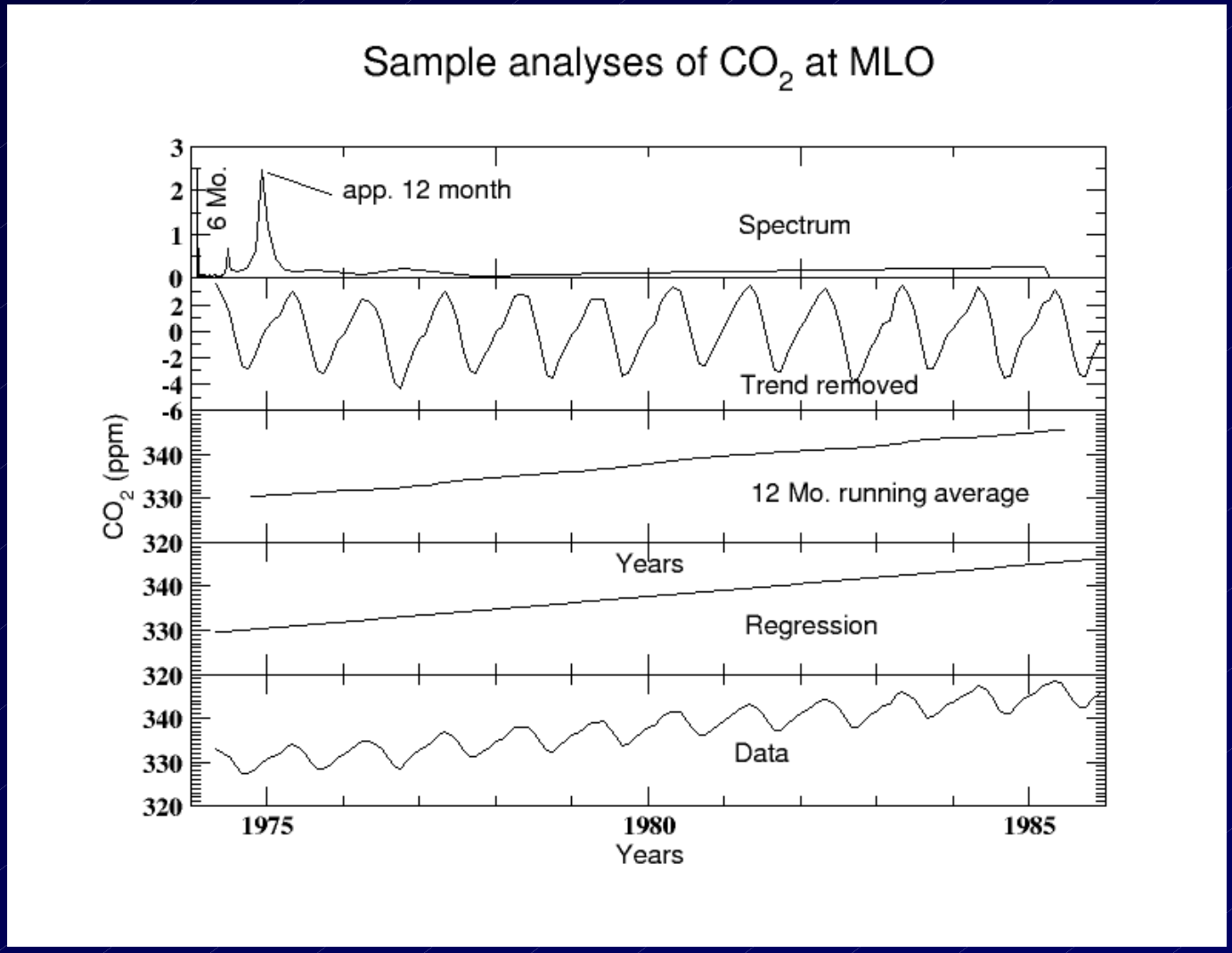
Using Fill in XY Line Graphs



Xmgr XY Line Plot with Polygon Fill

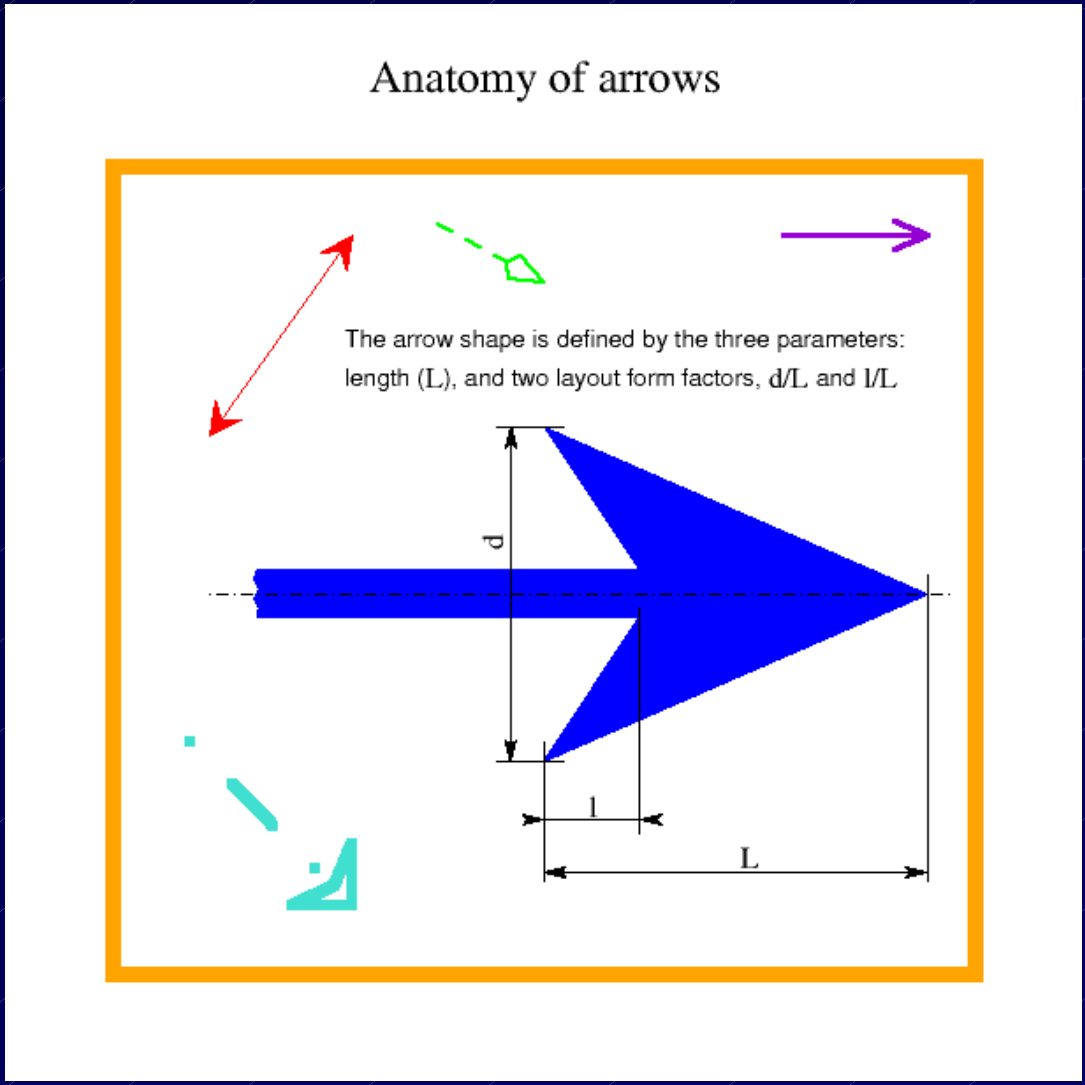


Multiple Graphs Arranged in a Stack



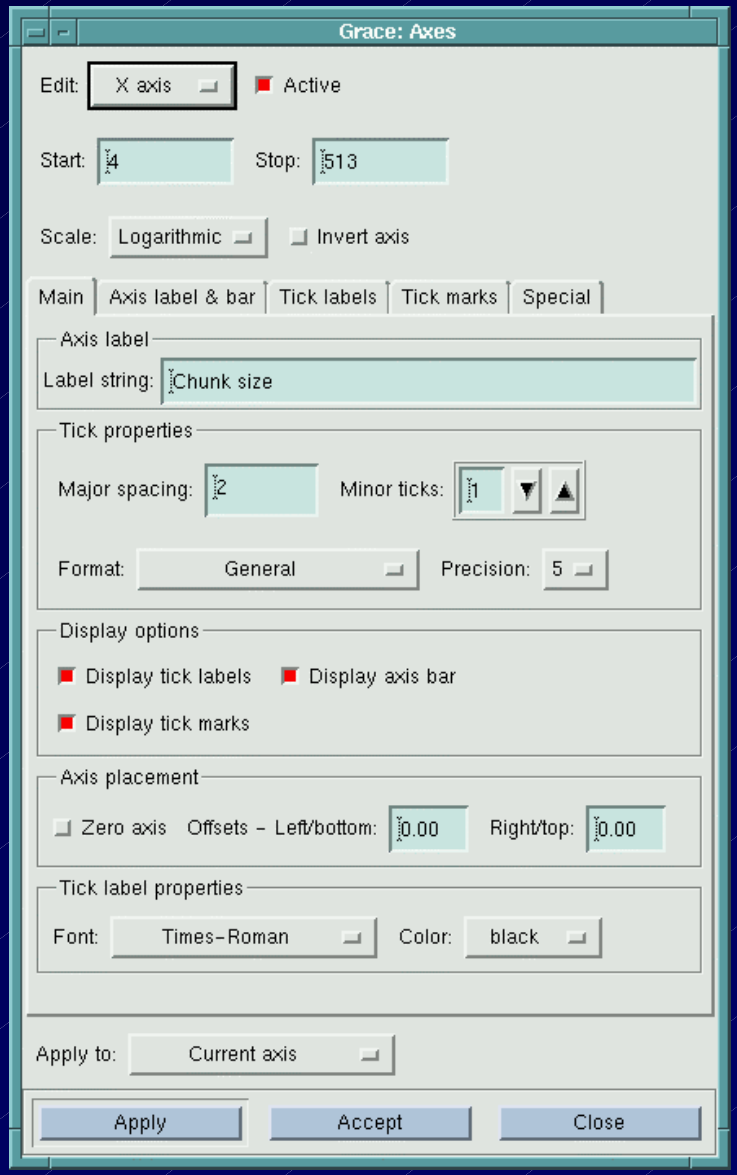
XMGR - Grace Graphics

- Grace arrows illustrated
- Xmgr arrows can not define (L) and the layout factors d/L or I/L shown



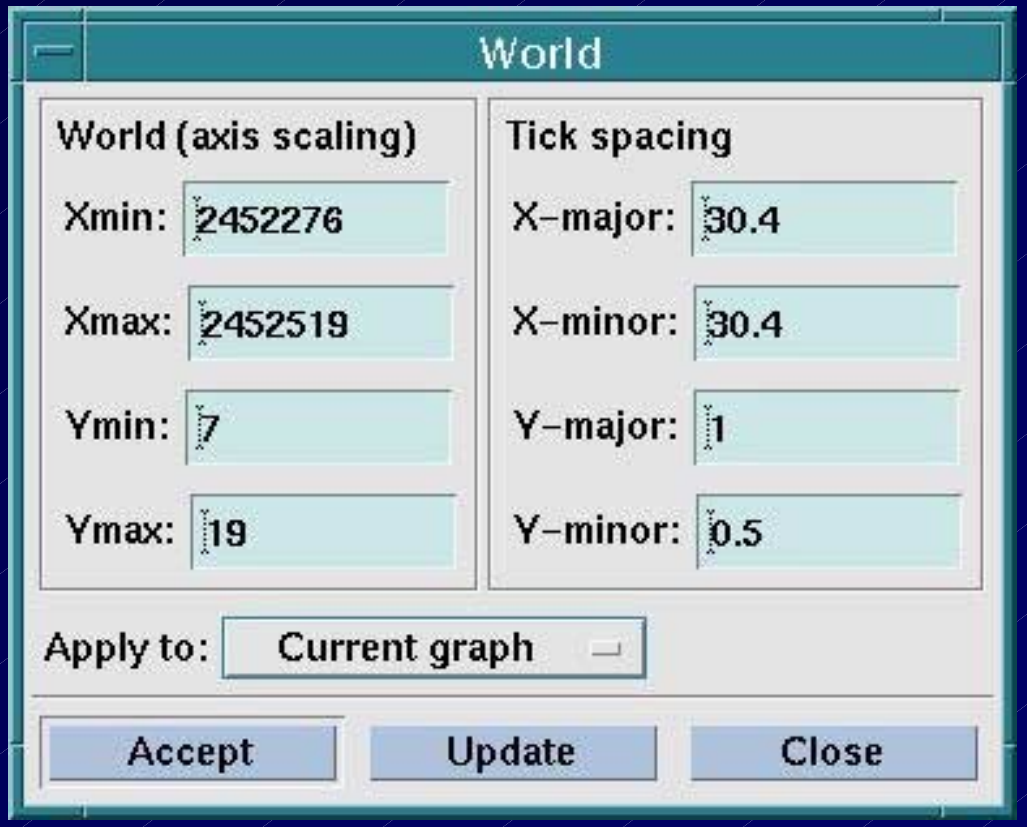
Xmgr & Grace Axes Menus

Many graph characteristics can be modified from these windows or their pop-up menus



Xmgr-Grace World Scaling

- Define Xmin & Xmax
  - Julian dates shown
- Define Ymin & Ymax
- Define Tick Spacing
  - X-major & X-minor
  - Y-major & Y-minor
- Apply to:
  - Current graph
  - X current graph
  - X all graphs
  - Y current graph
  - Y all graphs
- Accept – to implement

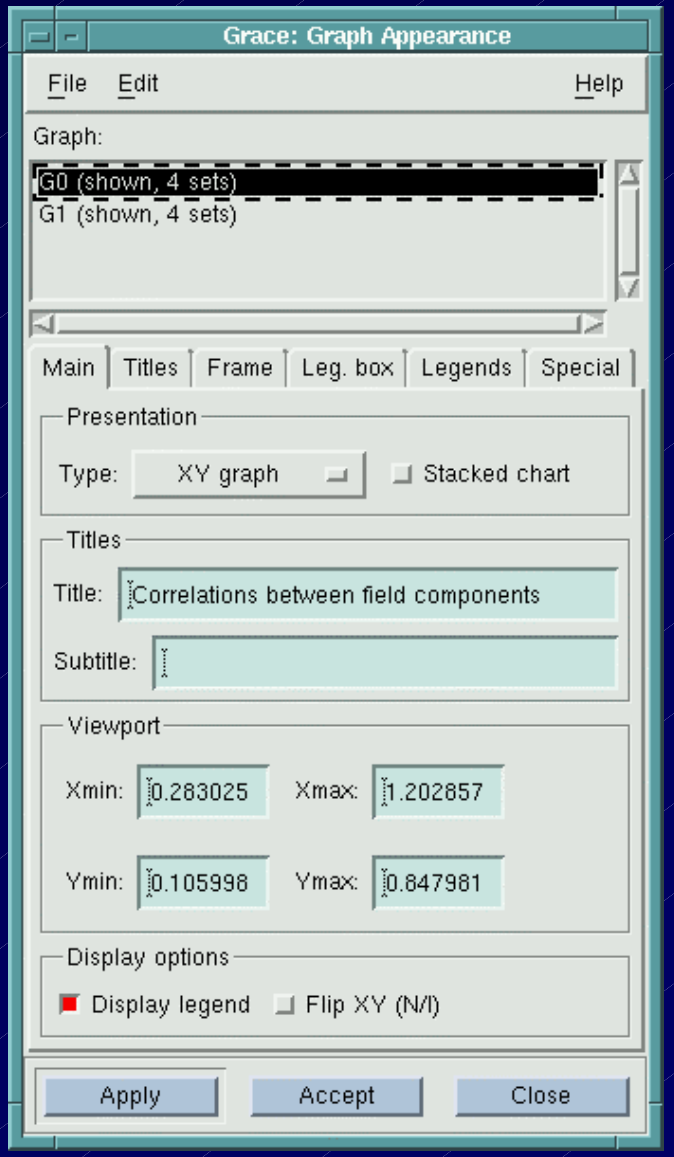


Saving Data From Graphics

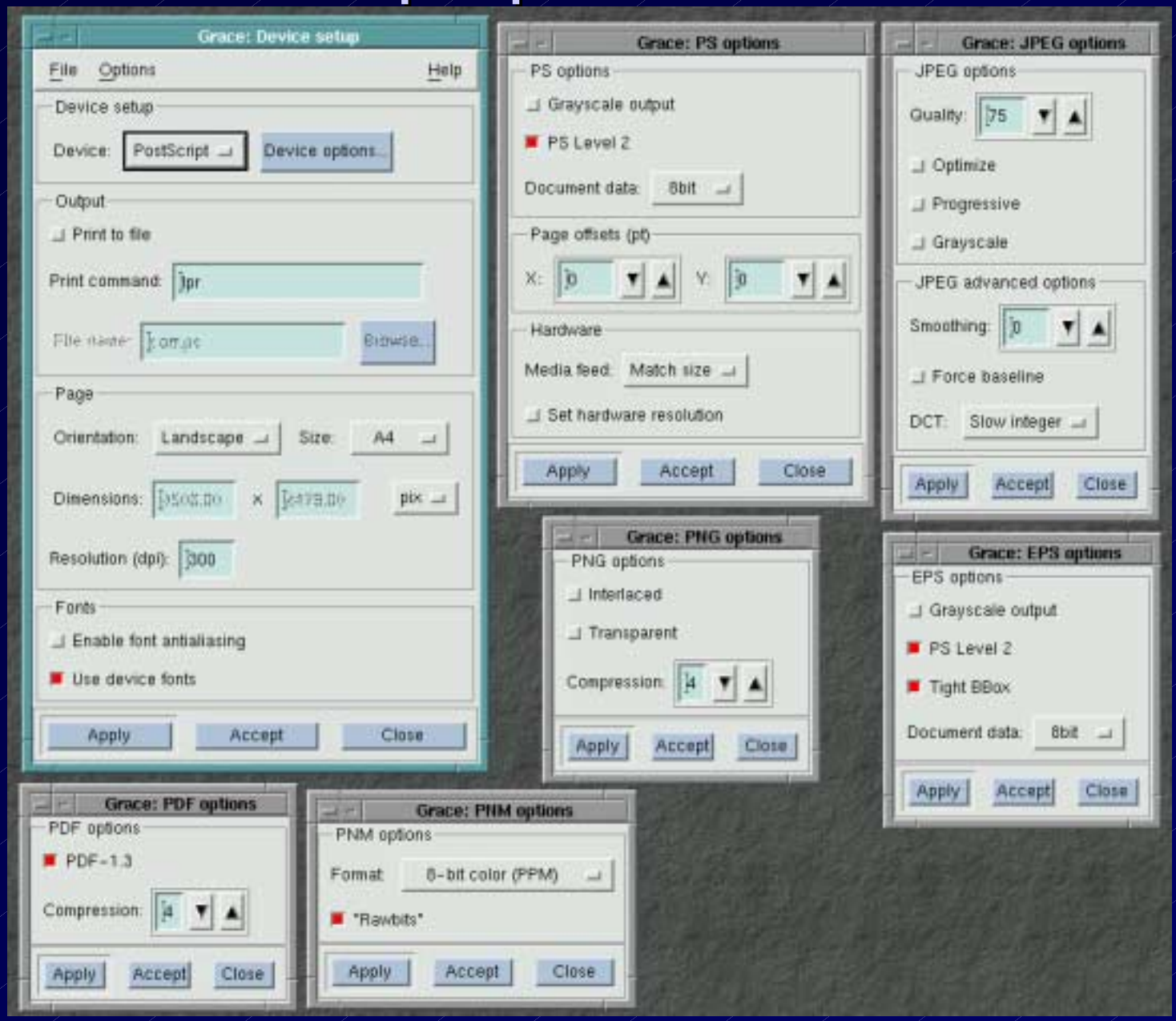
- Select sets to save
- Select graph
  - Often more than one
- Embed Parameters
  - be careful with this
- Format

Grace Graph Appearance Menu

- Grace Graph Menu with pop-ups included
  - User friendly & efficient



Grace “Pop-up” Menu Windows



Reading/Loading Data Sets into Graphs

- Xmgr-Grace data sets
  - Read directly
- ASCII Block data
  - Data read by selecting x axis and y axis from columns in block data

<u>Block Data Example</u>

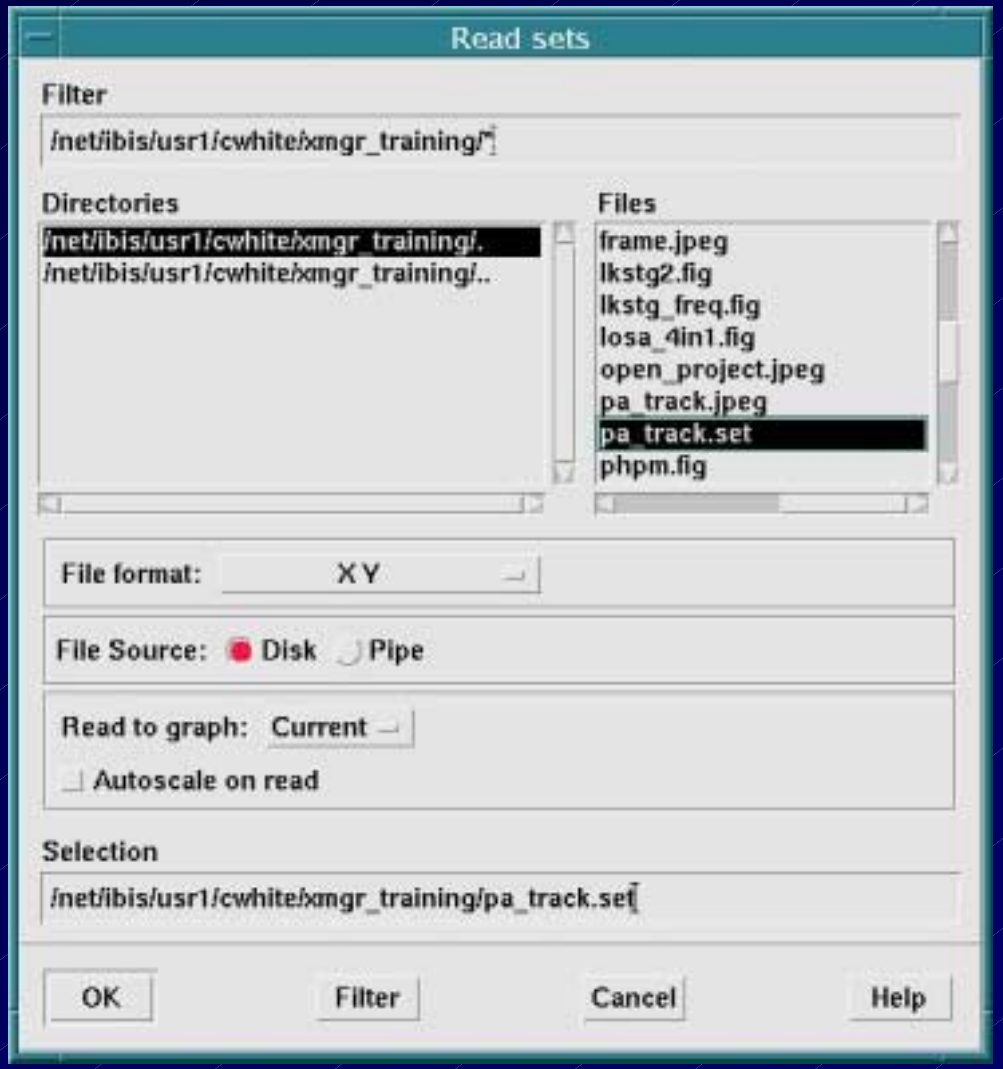
x = column 0

y_1 = column 1

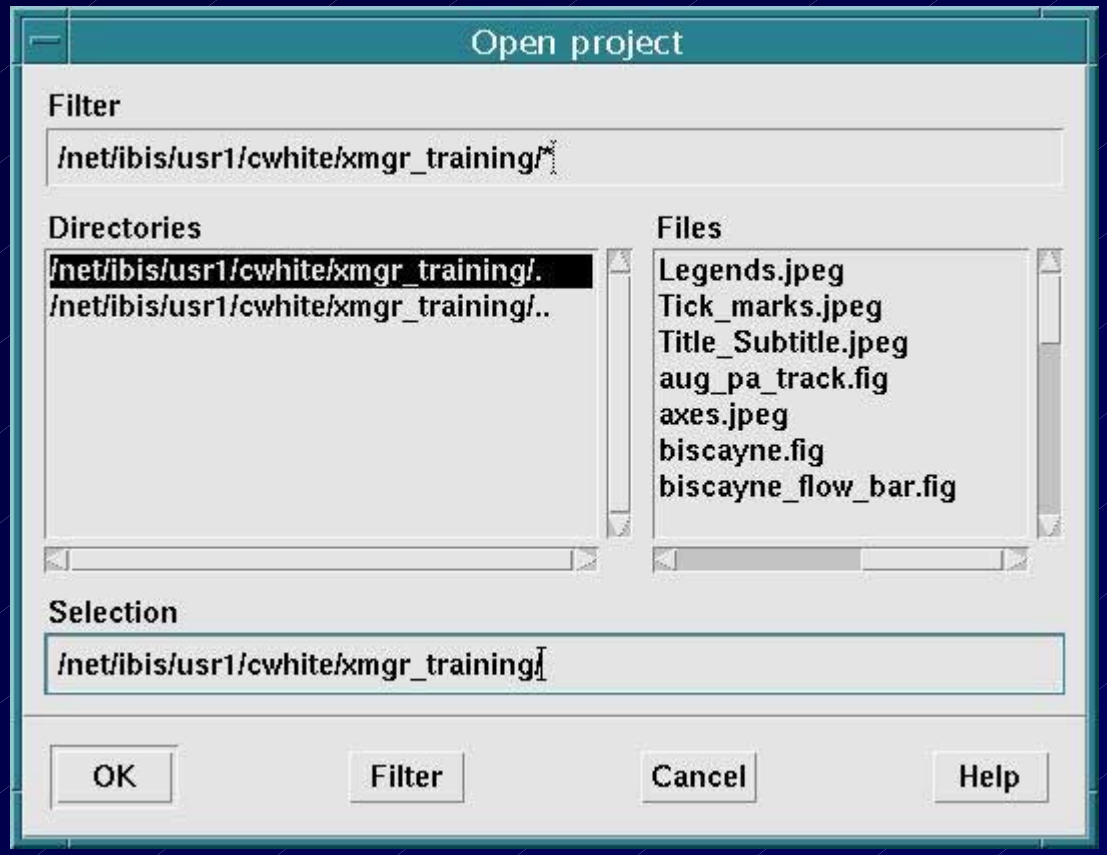
x = column 0

y_2 = column 2

Yields two xy sets



Xmgr-Grace Graphics are “.fig” Files



Xmgr-Grace “.fig” files
aug_pa_track.fig
biscayne.fig
biscayne_flow_bar.fig

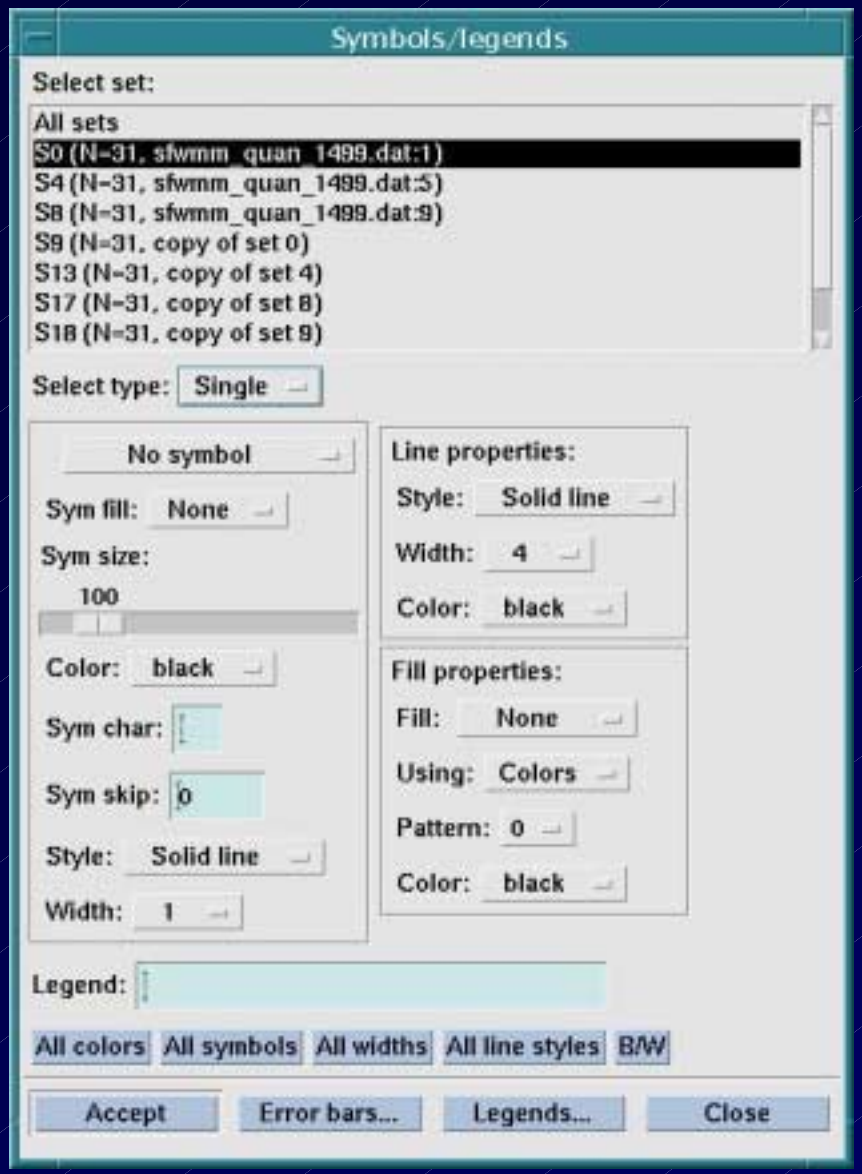
Xmgr Print File “Pop-up” Menu

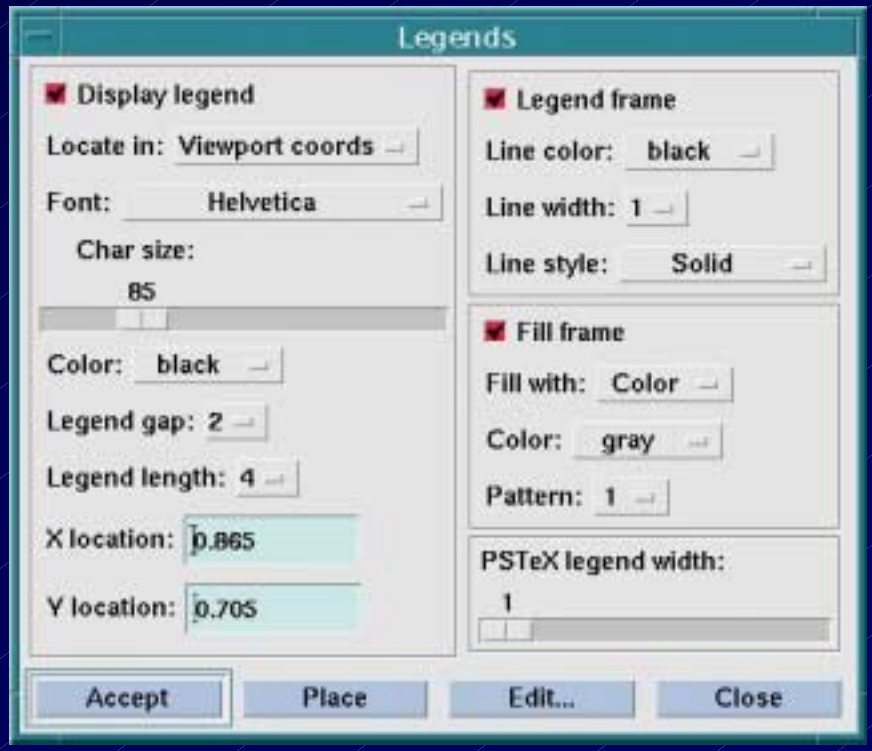
- “Fig” files can sent to printer directly
- “Fig” files can be printed to a post script file
- Grace is capable of printing multiple formats:
  - “fig”, ps, pdf, jpeg directly

Xmgr Tick Marks & Labels Menus

Major & minor tick grid lines are often useful references:
Suggest using dashed or dotted line styles, line width 1 and grey, red, or turquoise color to give “shadow” or “ghost” image

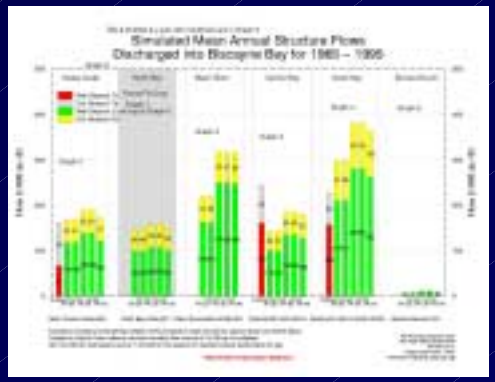
Xmgr Symbols/Legends & Legend Menu

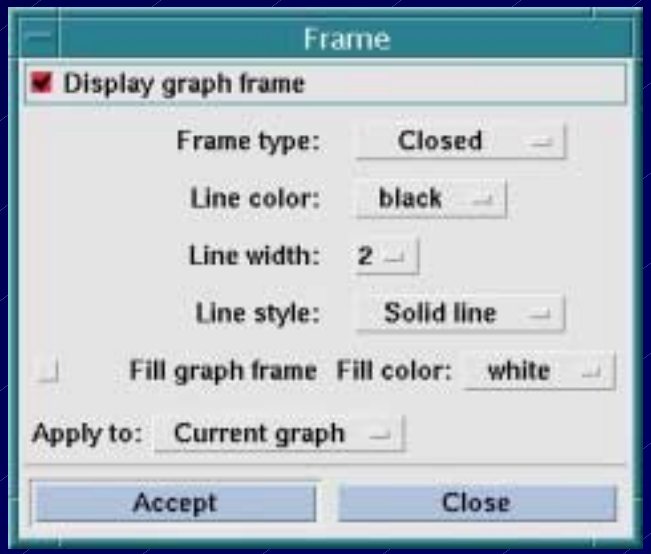


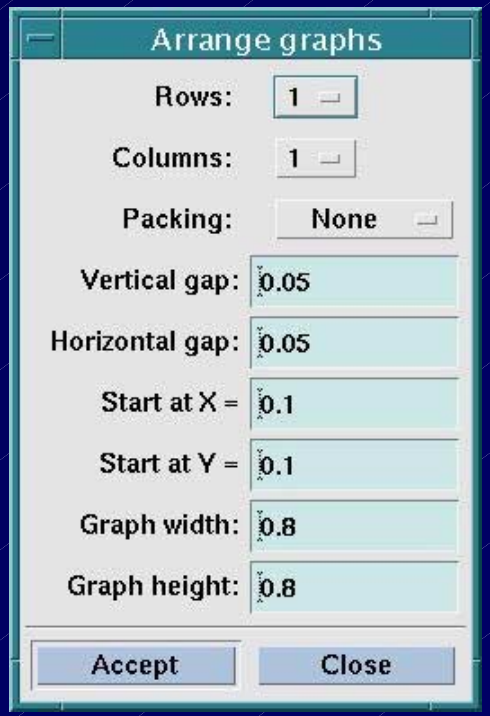


Xmgr Graph Setup

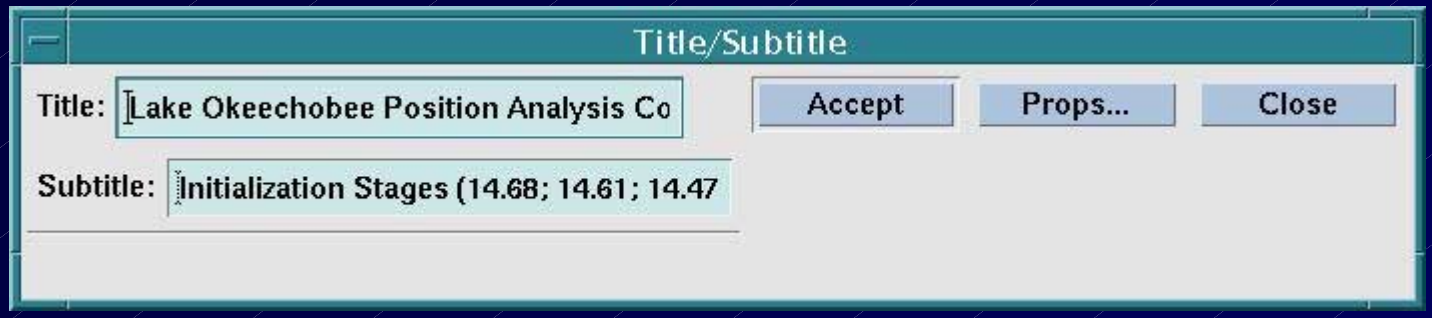
- **Viewport**
  - origin (0,0) lower left corner
  - max at (1,1) upper right corner
- **Frame**
  - Outline for graph
  - Fill color for graph interior
- **Arrange graphs**
  - Size, space, and orientation

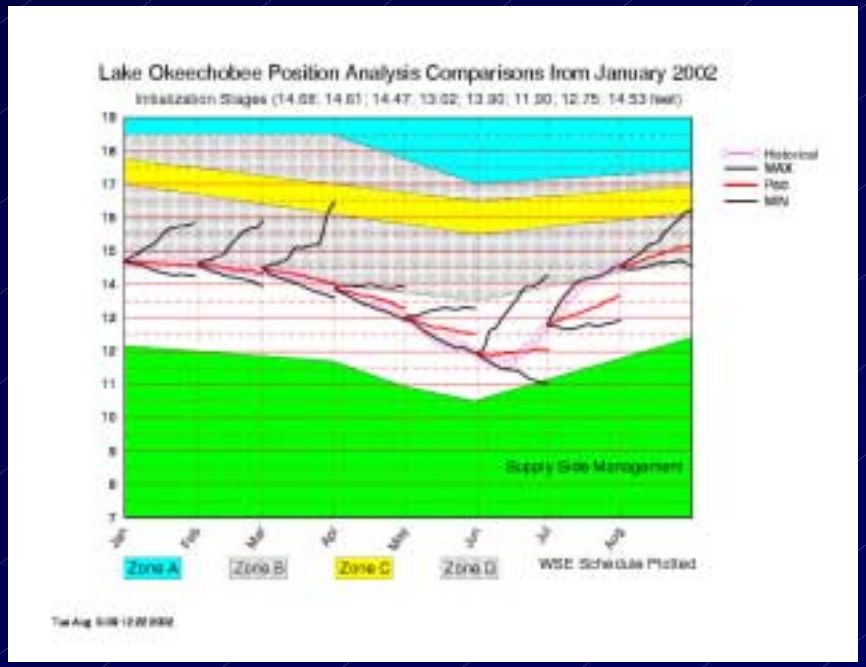


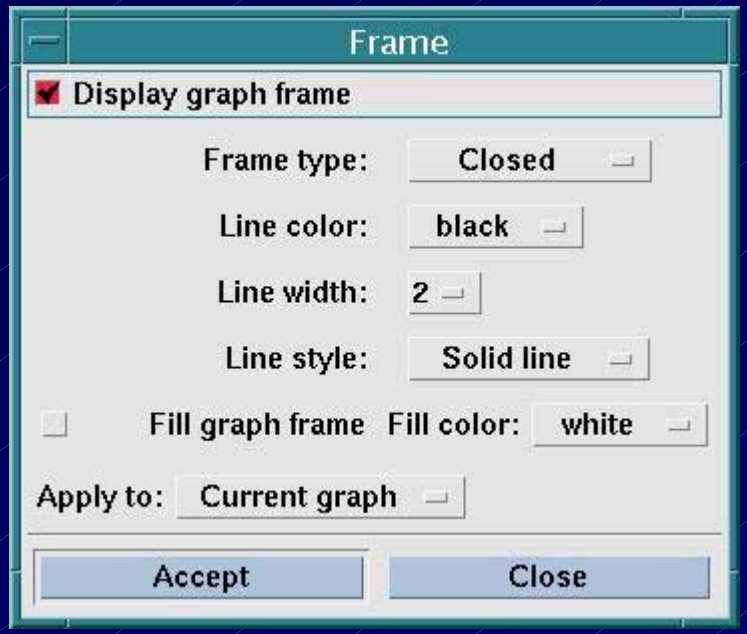




Xmgr Graph Titles







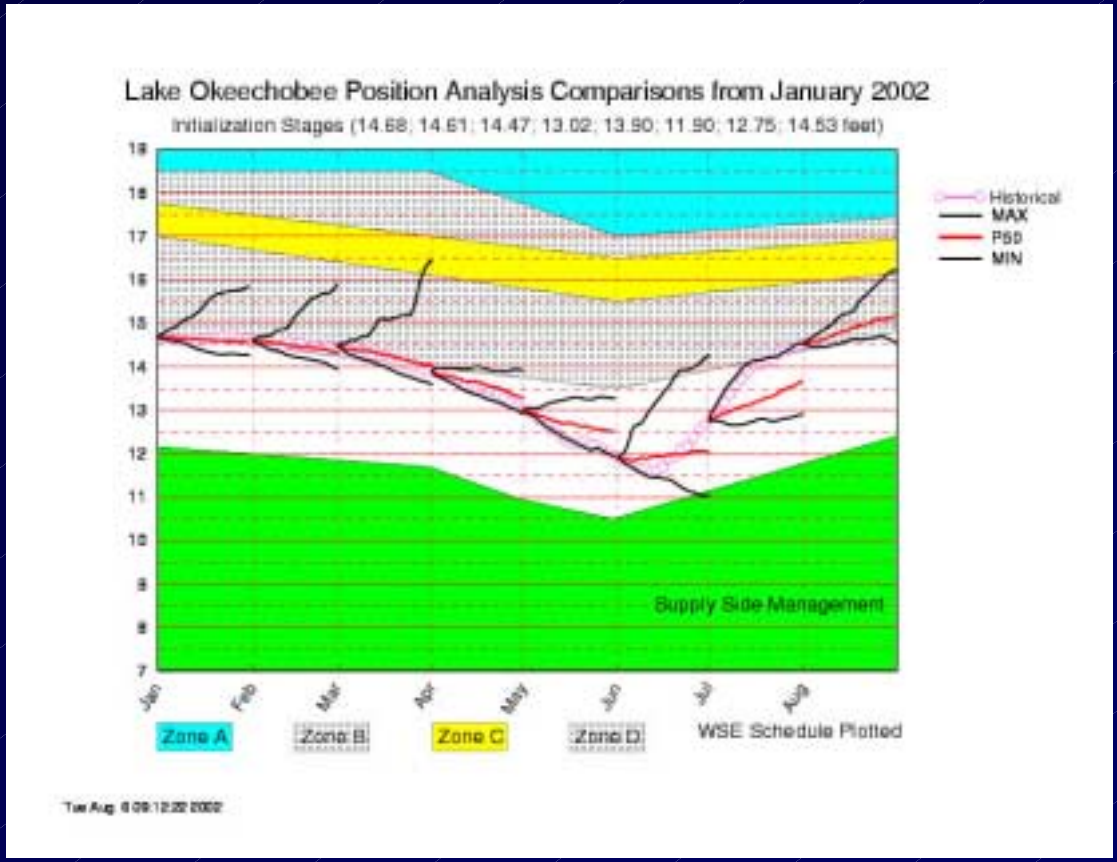
Xmgr-Grace Write Parameters/Sets

Xmgr-Grace Batch process

- To batch process figures in Xmgr you have to link to grbatch
  - e.g. ln -s /vol/hsm/bin/solaris/grbatch grbatch
- To plot consistent figures use the desired xmgr parameter file
  - parameter files can be written/created from a template graph which contains the graph style, format and other characteristics you want saved. Conventional parameter file extension is ".par"
- Hard copies or xmgr figure ".fig" files can be batch processed
- The c-shell code below checks to see if hard copies are desired, if YES, it prints hard copies at the default printer, if NO, it writes ".fig" files to the /Output/ directory

```
# do you want to make hard copies?
if($graph_yesno == "Y") then
echo "Sending hard copy to Printer"
#                                                    to print hard copy & save "fig" files
grbatch -noask -device 1 -p bar.par flow.out. -saveall /Output/flow_bar.fig
else
#                                                    to print "fig" files only
grbatch -noask -device 1 -printfile /dev/null -p bar.par flow.out.$$ -saveall /Output/flow_bar.fig
endif
#
```

Xmgr Special Tick Marks/Labels



Special tick marks used for irregular month lengths in example
Note X axis tick mark orientation is specified at anble (55 degrees)

Checking Graphs Using the “Stack”

Each graph allows up to 20 different world and tick settings to be pushed onto the world stack.

Pu = Push the current world

PZ = Push the current world and pick a zoom area

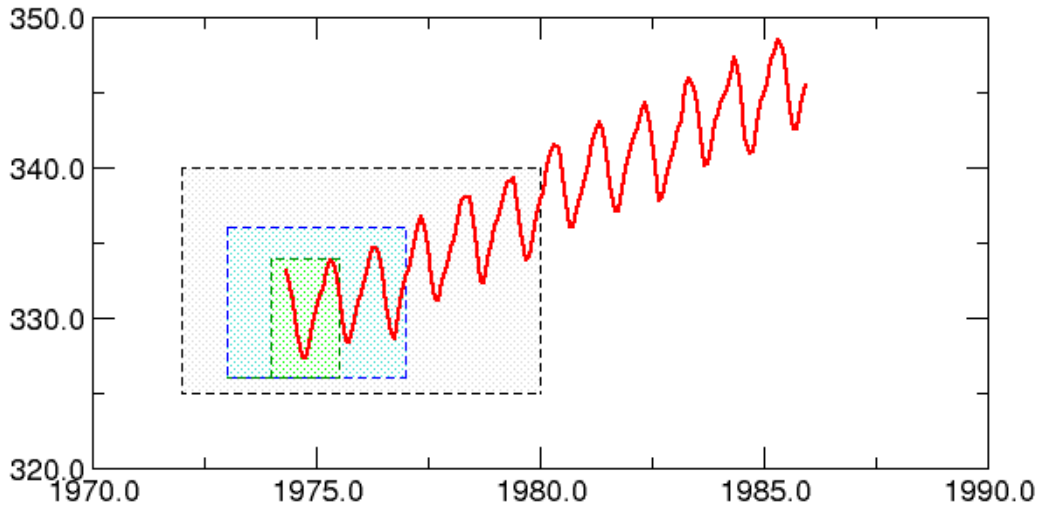
Po = Pop the top of the stack and make the new stack top the current setting

Cy = Cycle through the world stack

Use these buttons for stack manipulations

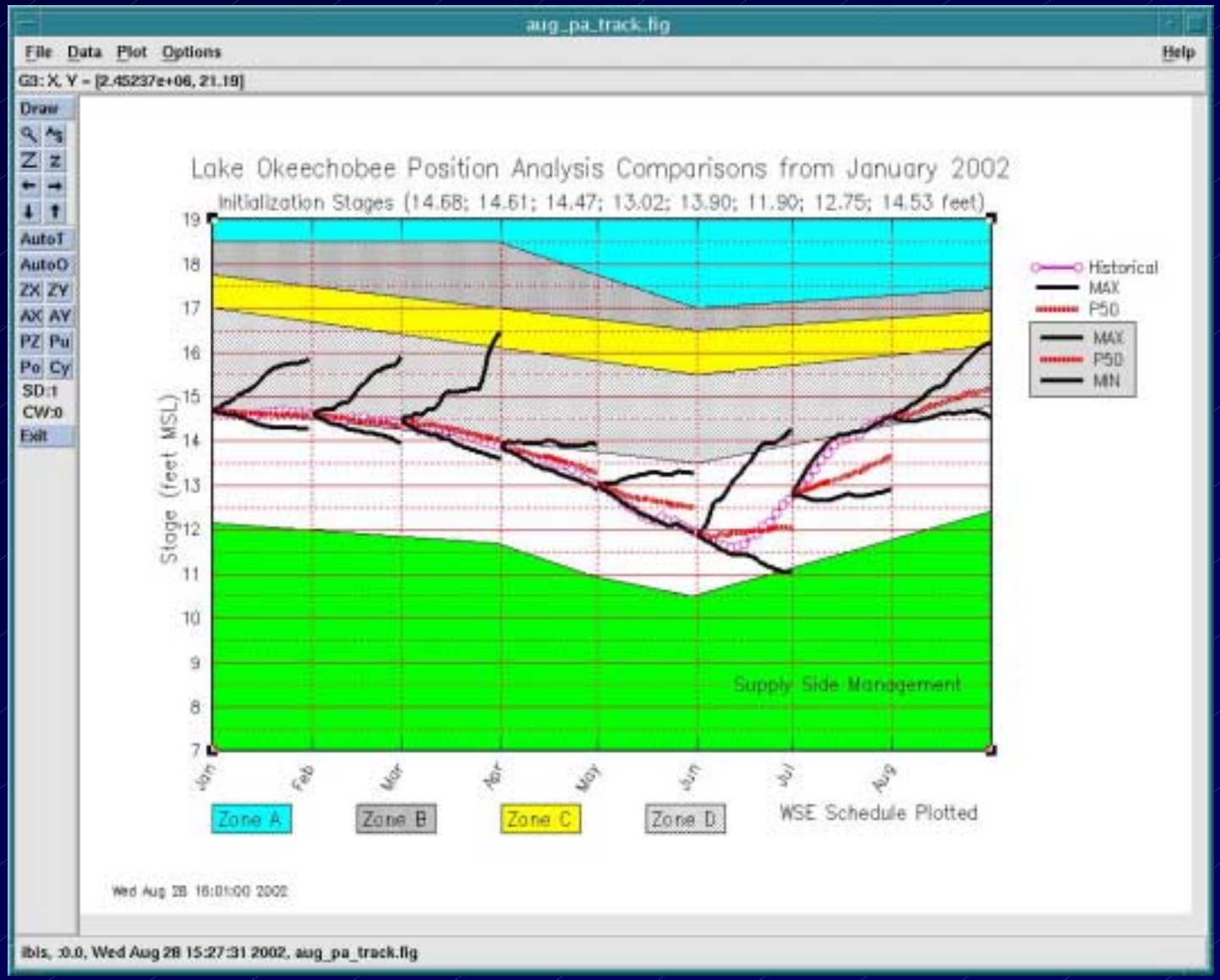
The SD: item indicates the current stack depth

The CW: item indicates the stack entry with the current world settings

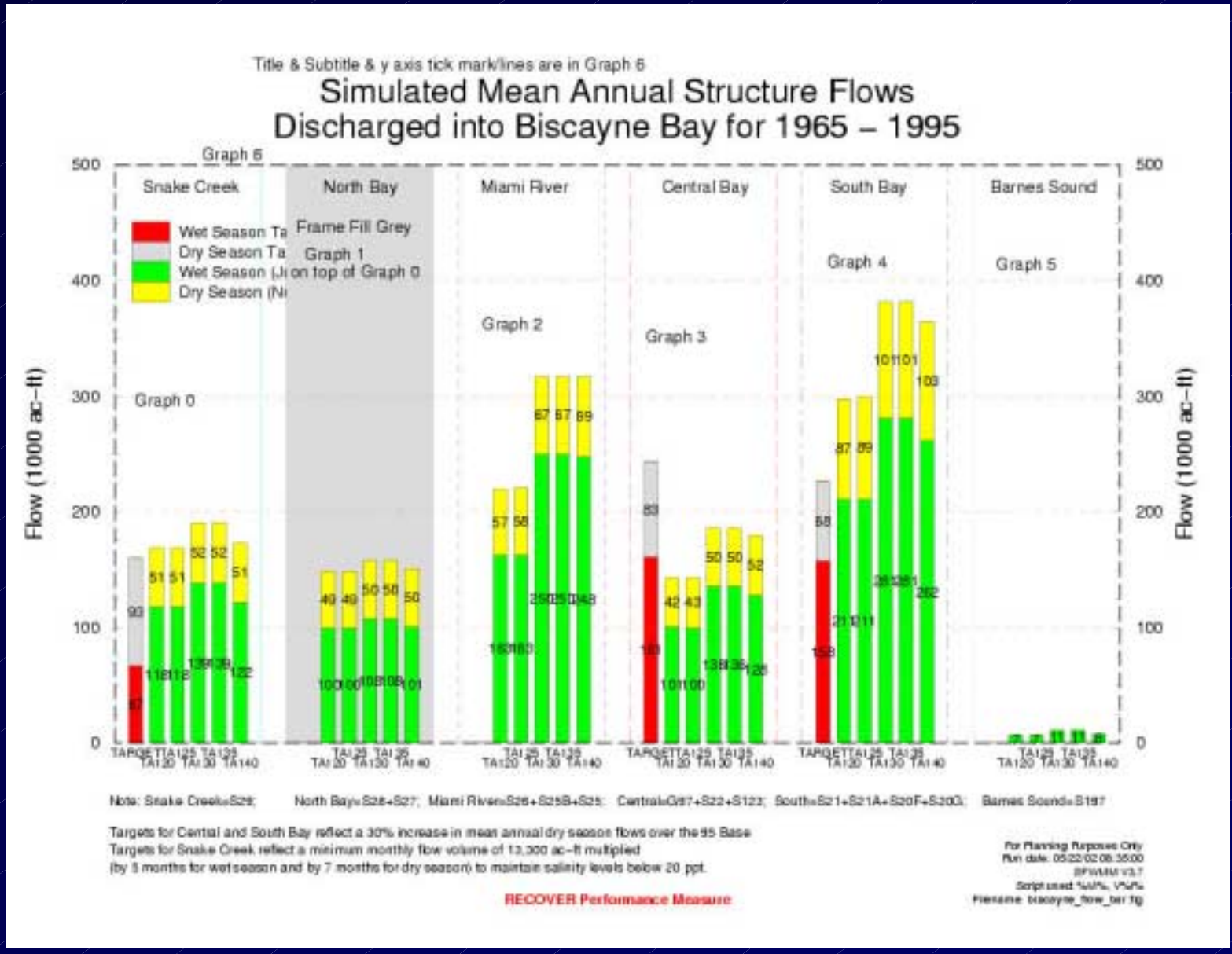


In this example, the stack depth is 4, indicating 4 different settings for the axis scaling. Use the Cy button to cycle through them.

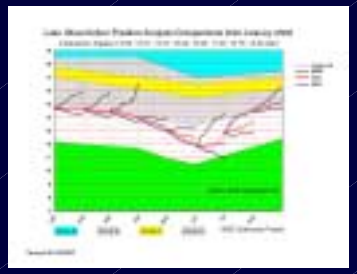
Xmgr Multiple Layered Graphs

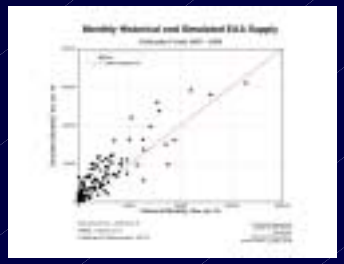


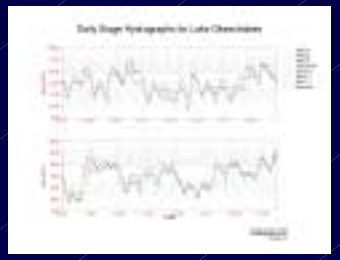
Xmgr Multiple Stacked Bar Plot Explained

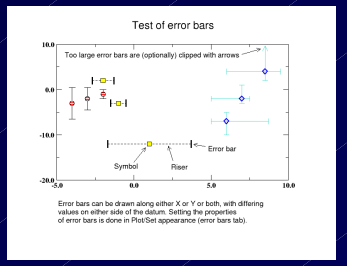


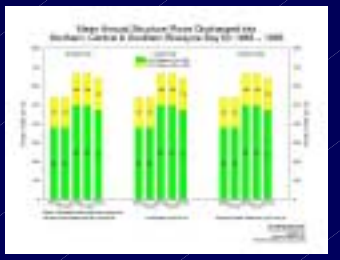
Xmgr-Grace Sample Graphs

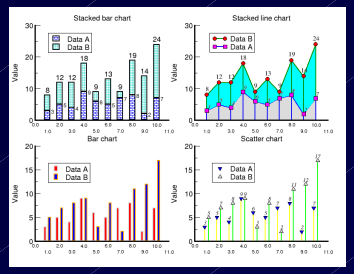


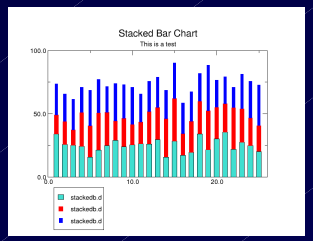


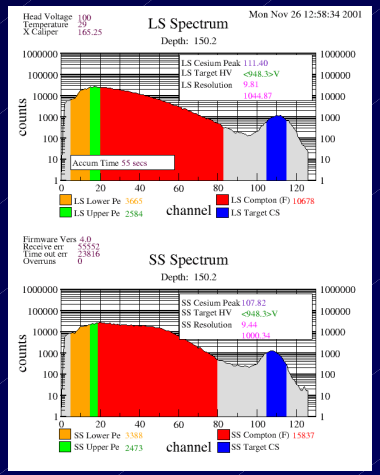


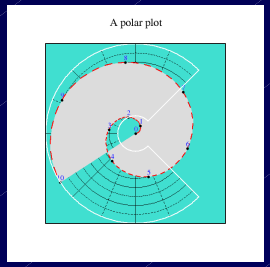


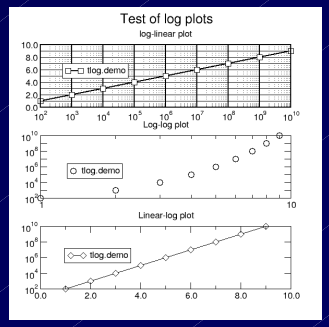


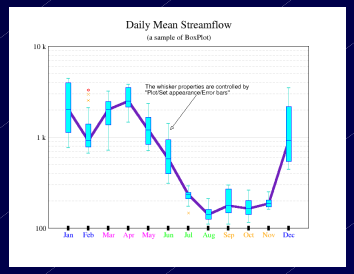


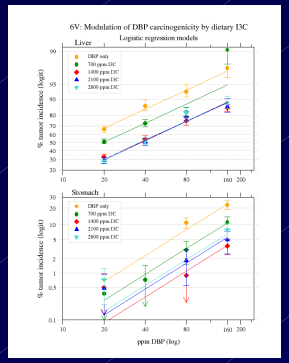


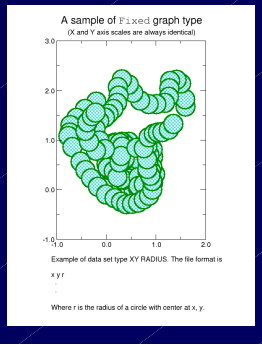


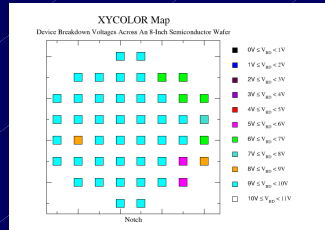


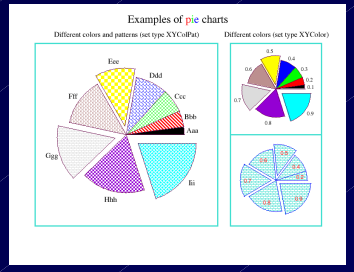


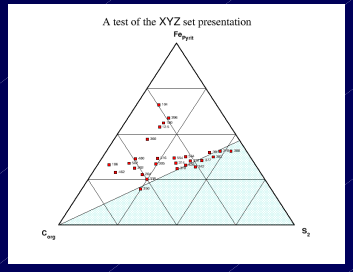


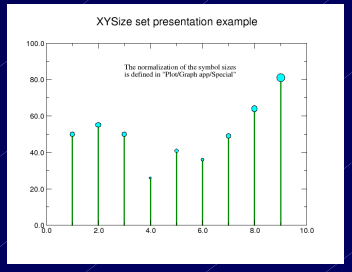


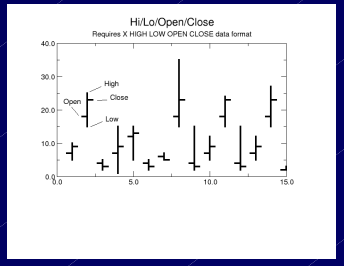


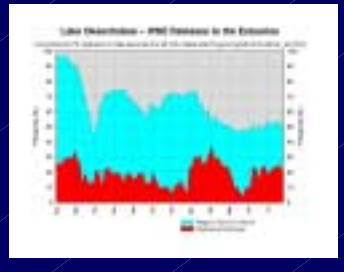




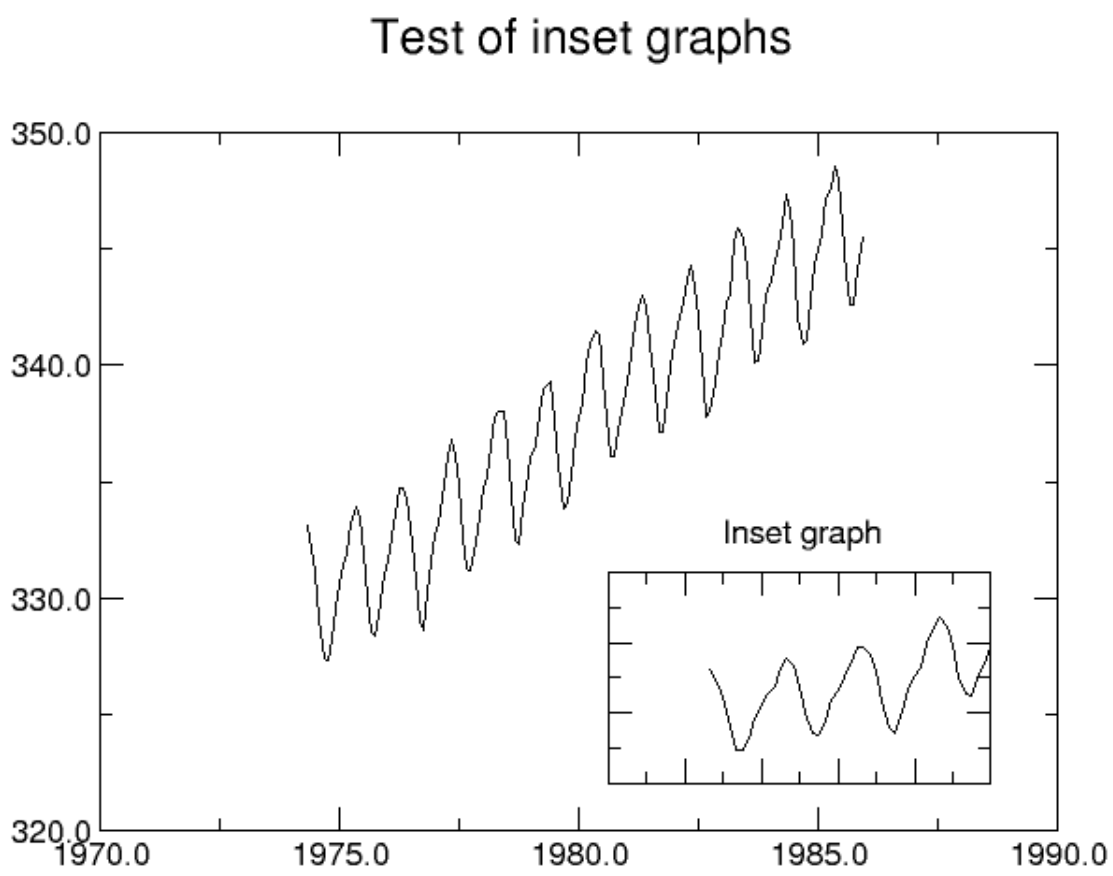






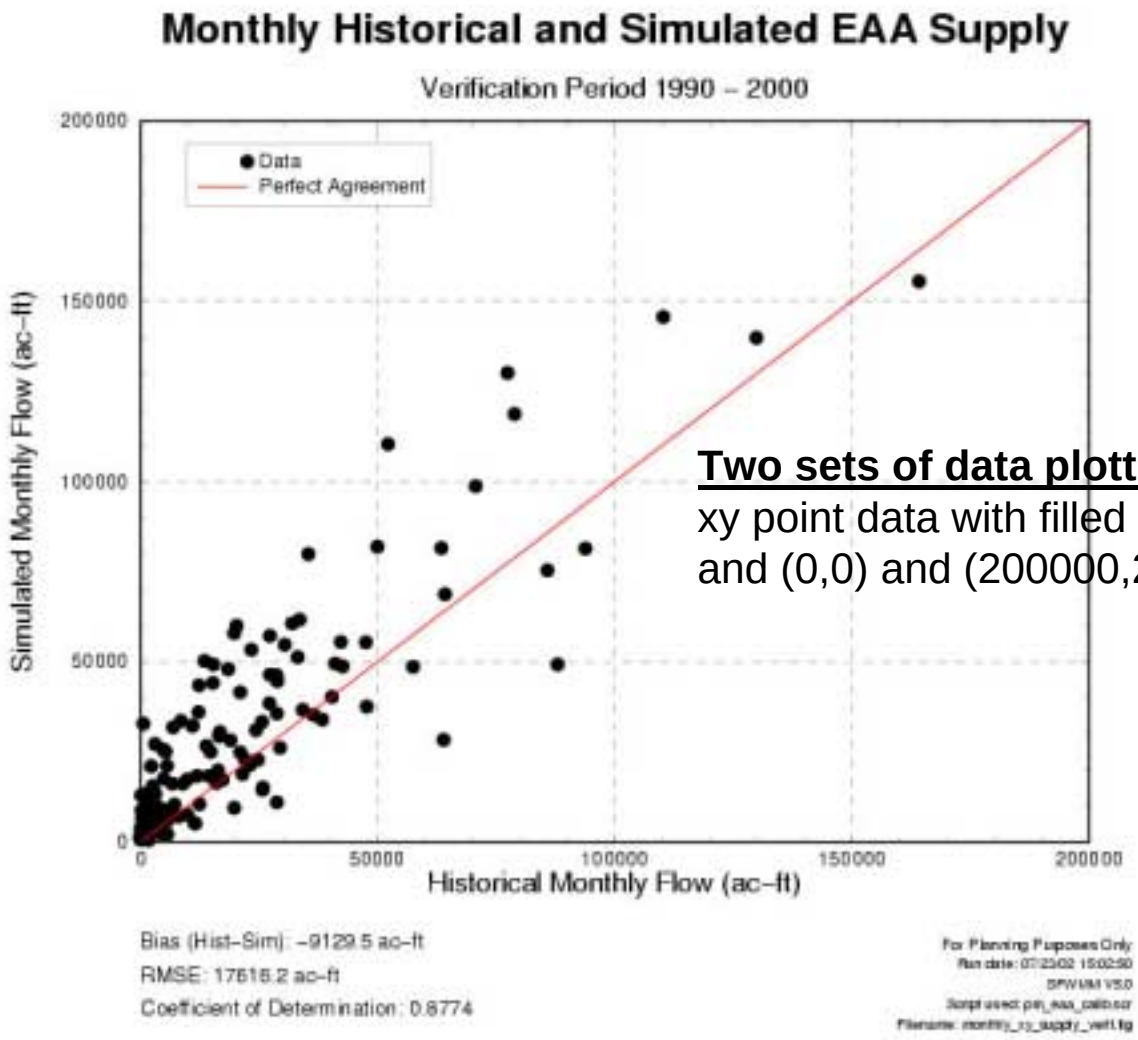


Sample Graph with Inset Graph



To make a graph within a graph, simply activate a graph and set the viewport to the desired location. Some problems may arise with getting/setting the graph focus, use the popup menu of any graph selector (e.g. in Plot/Graph appearance) to set the focus to a particular graph.

Xmgr-Grace Scatter Plot

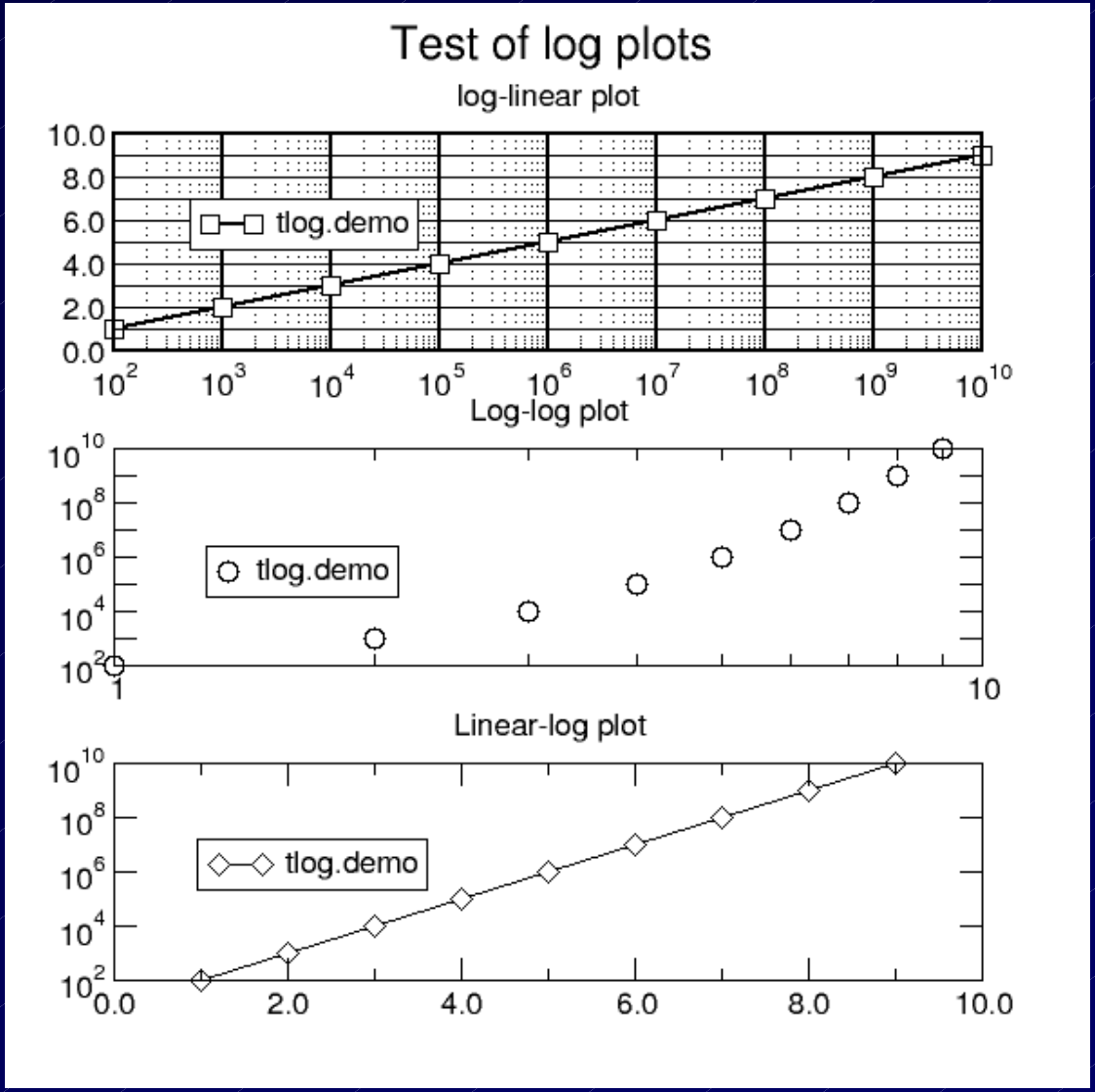


<u>Two sets of data plotted</u>

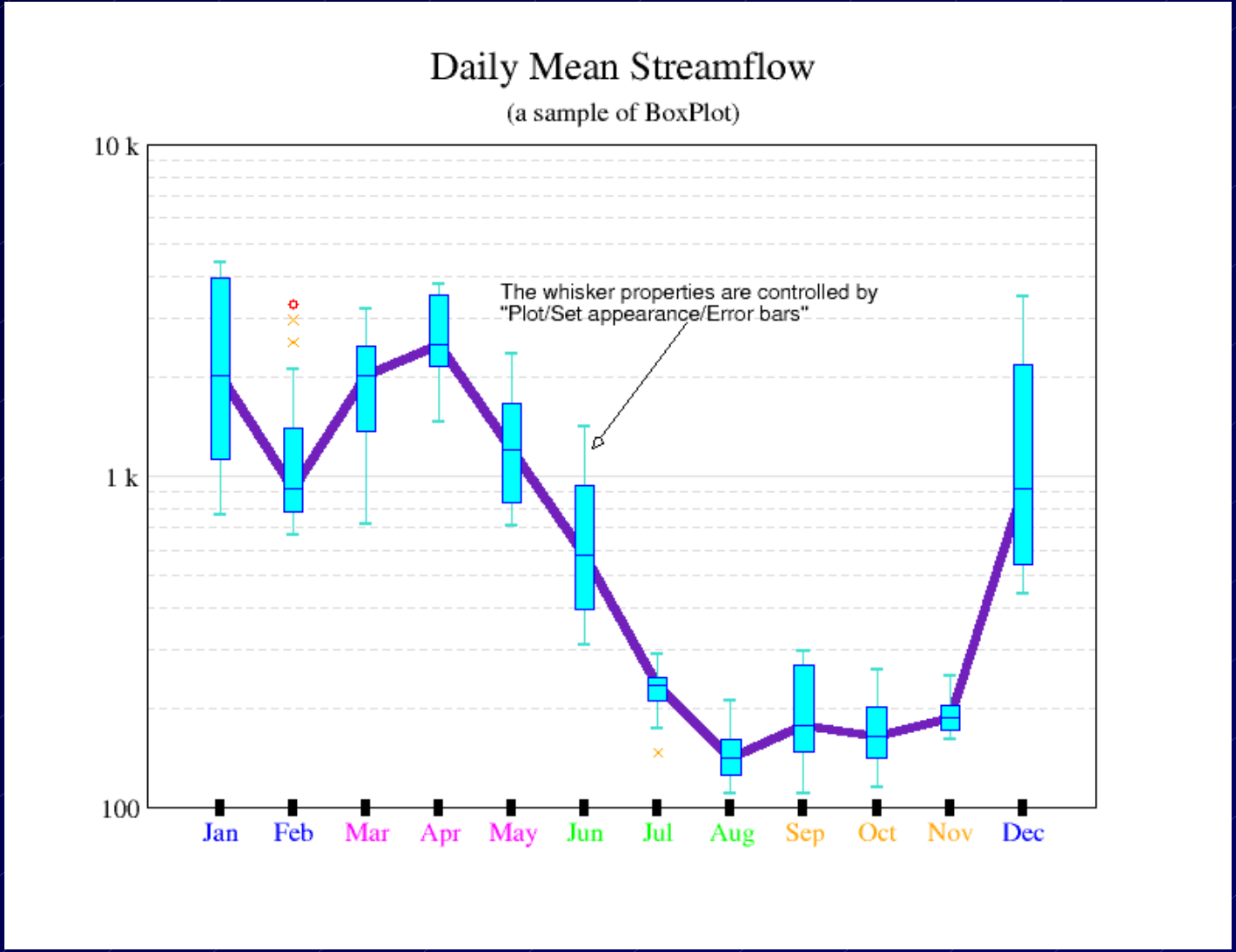
xy point data with filled symbols and (0,0) and (200000,200000)

Xmgr-Grace Log Plots

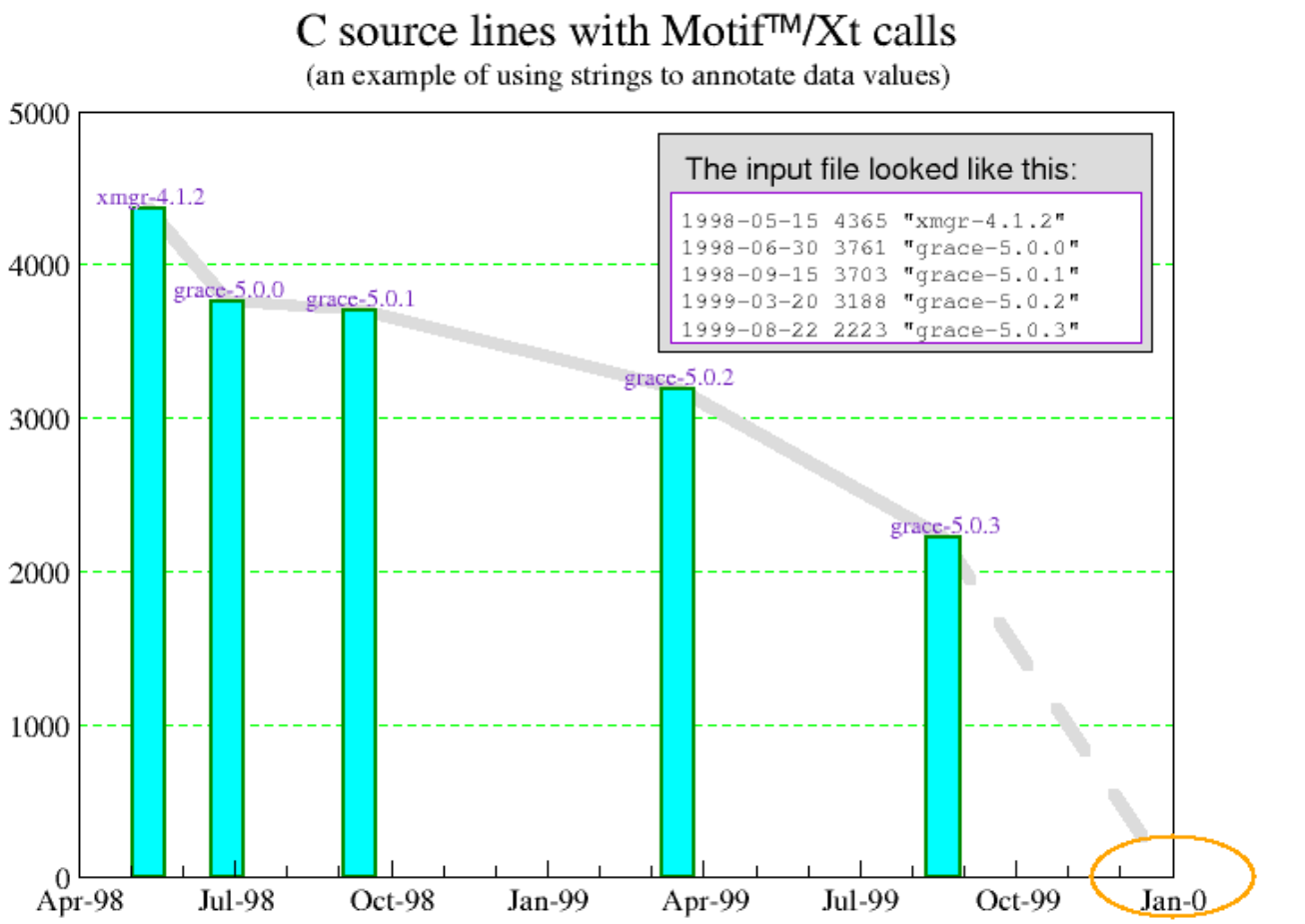
- Log-Linear
- Log-Log
- Linear Log



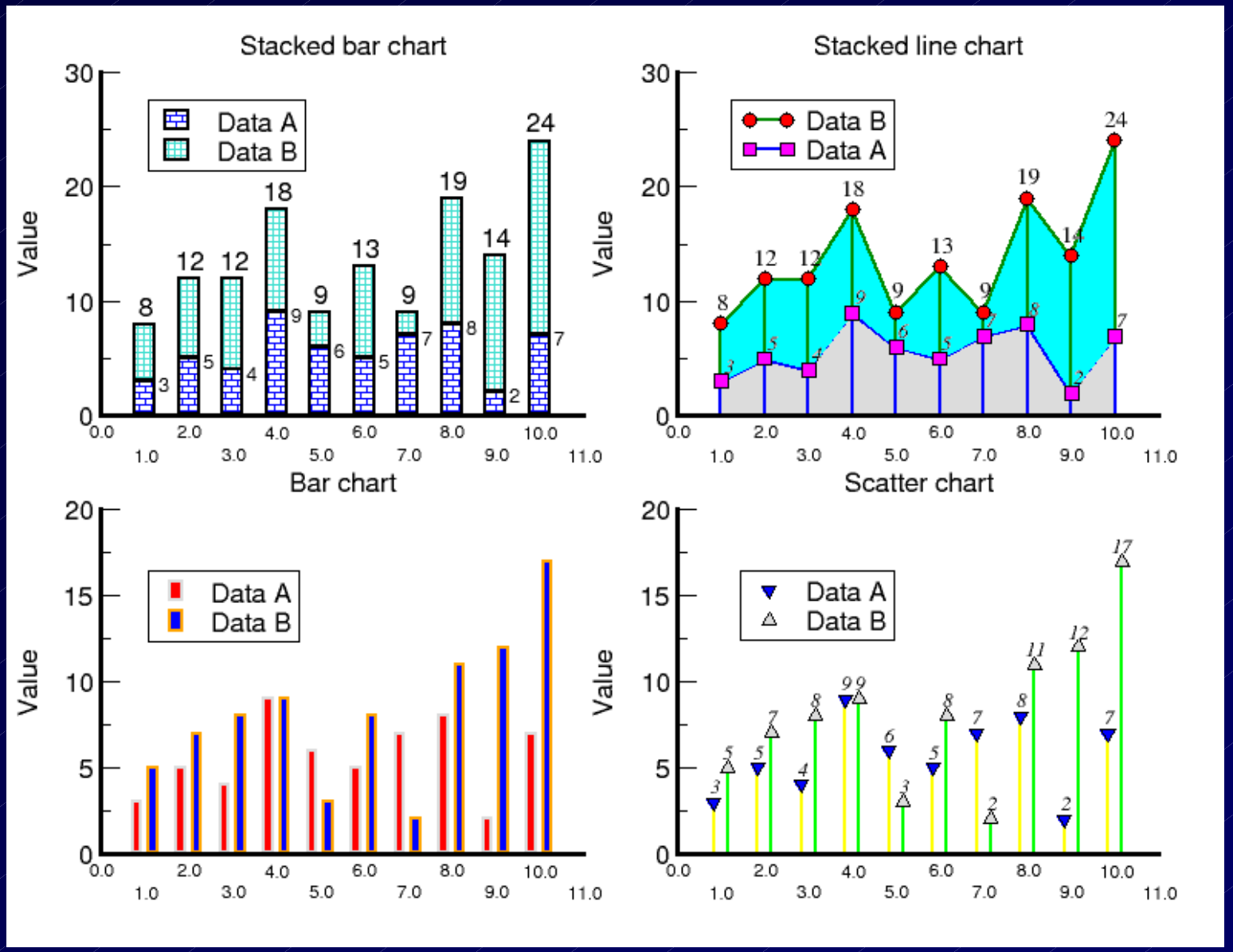
XMGR - Grace Graphics Whisker Plot



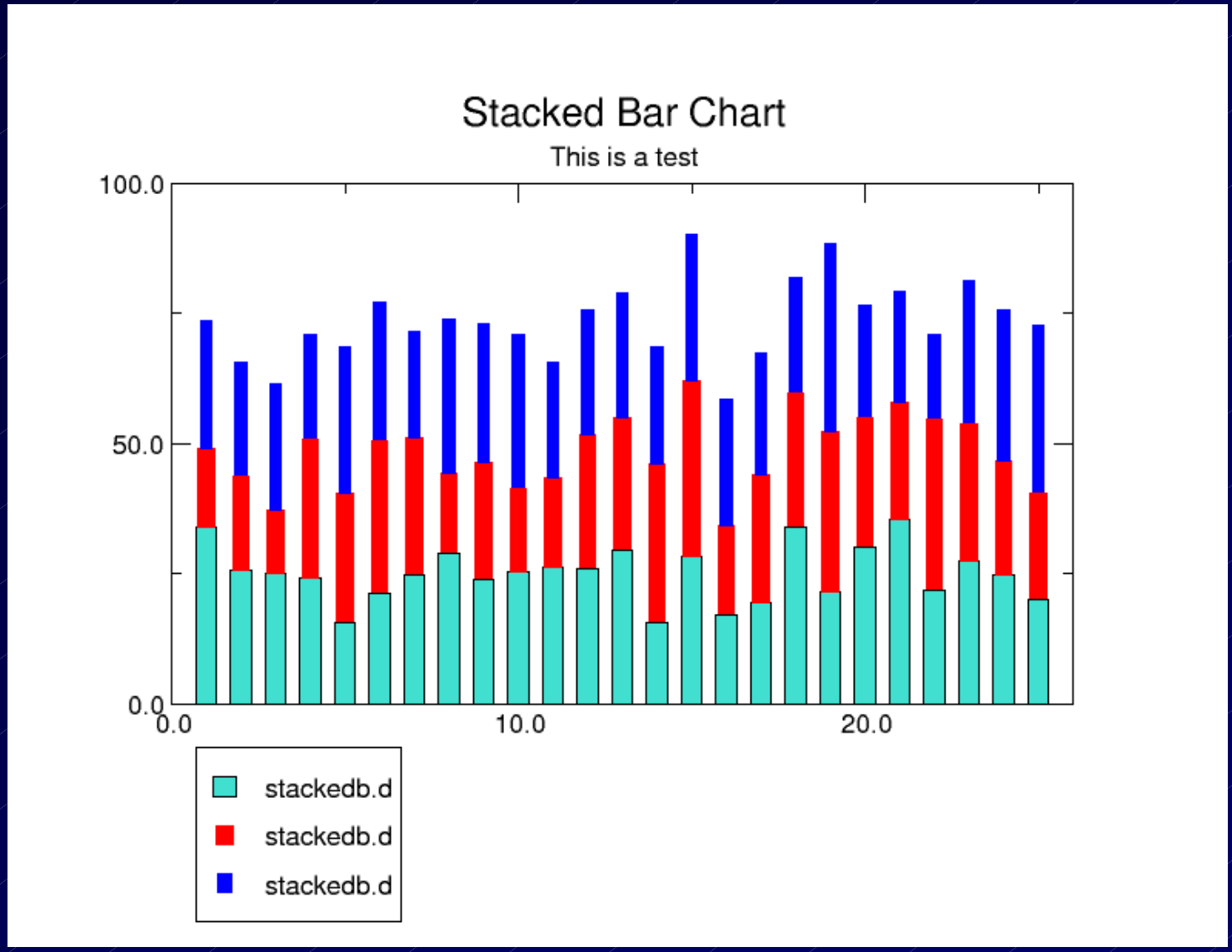
Xmgr -Grace Evolution



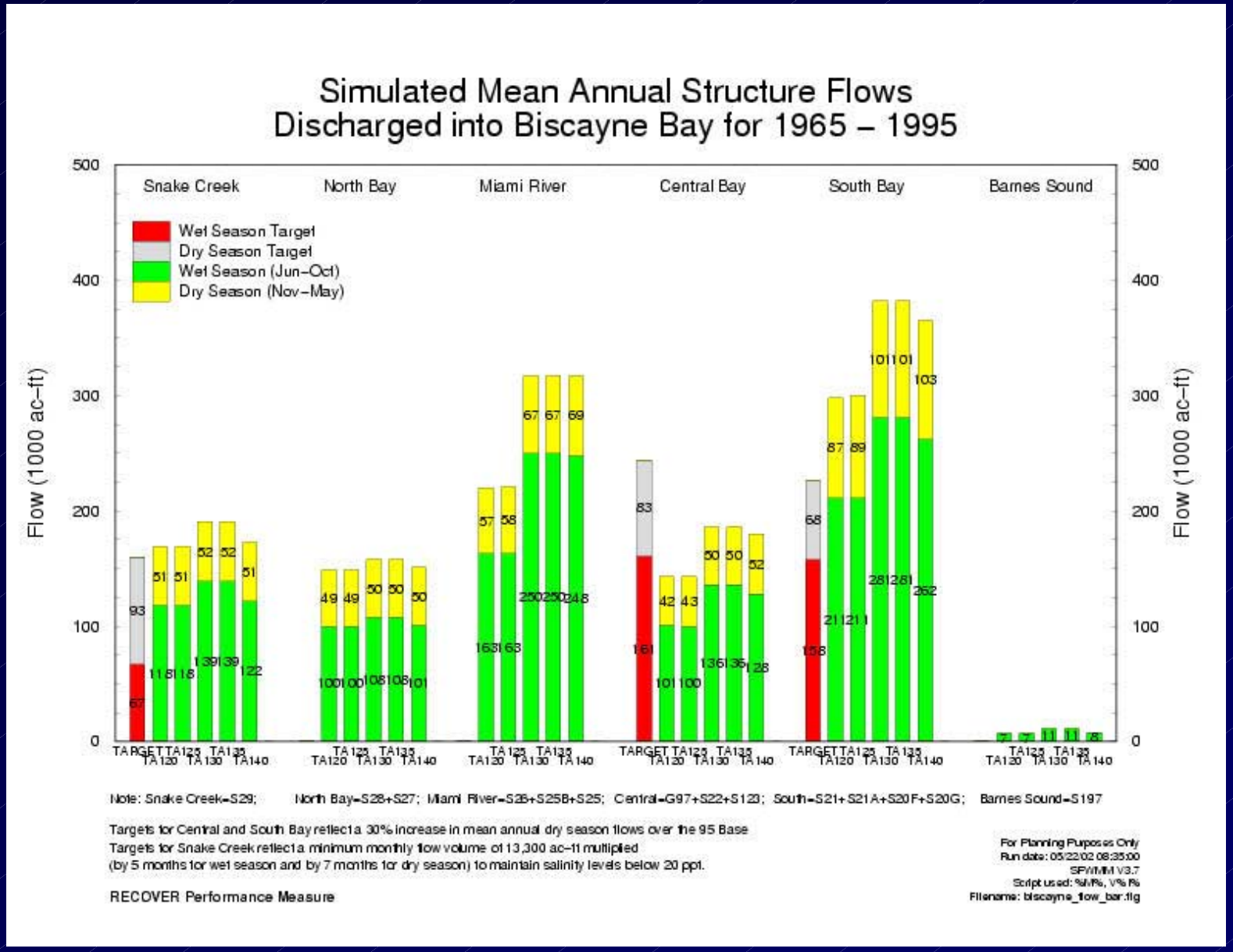
Various Graphic Styles



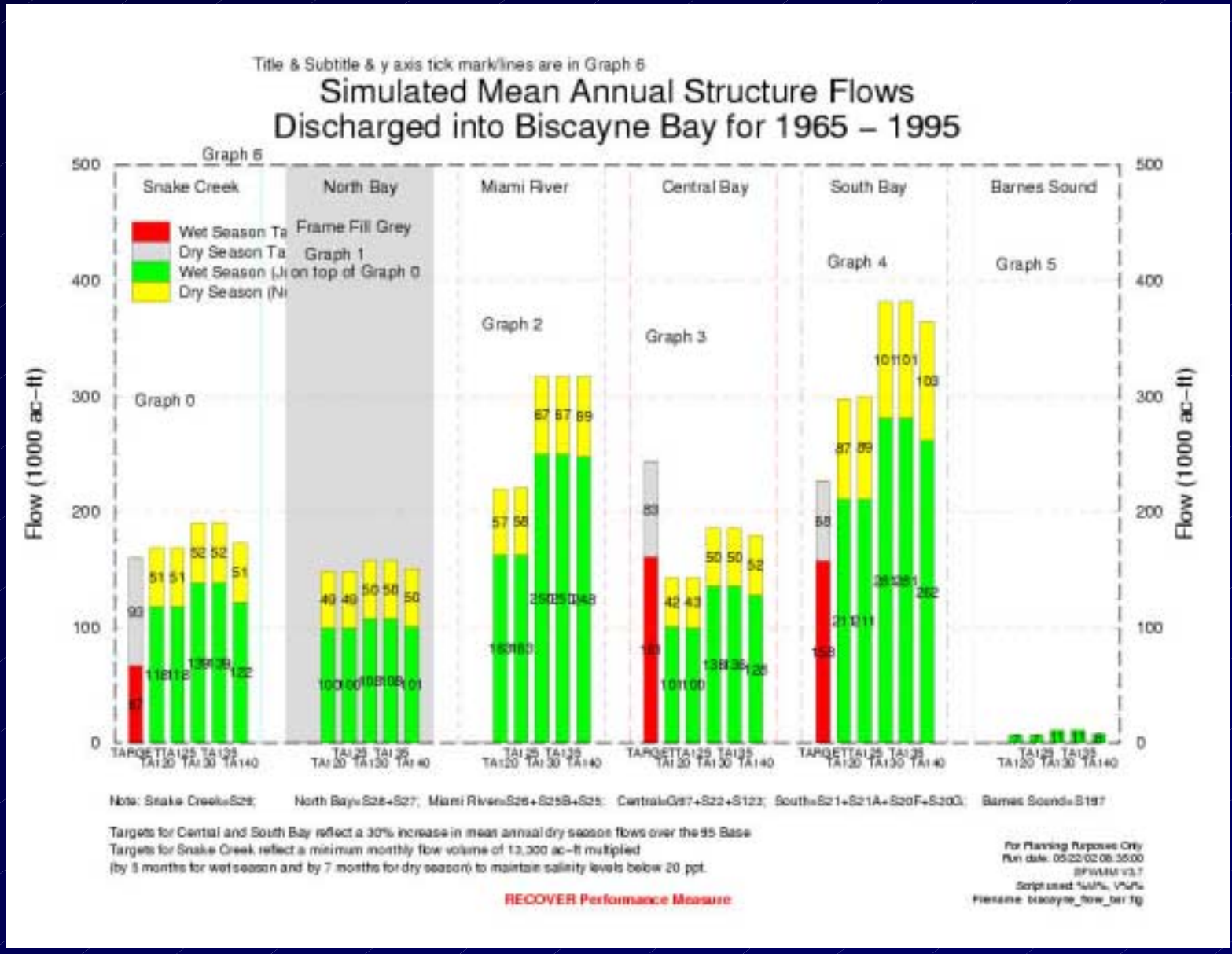
Stacked Bar Plot w/varying Bar Widths



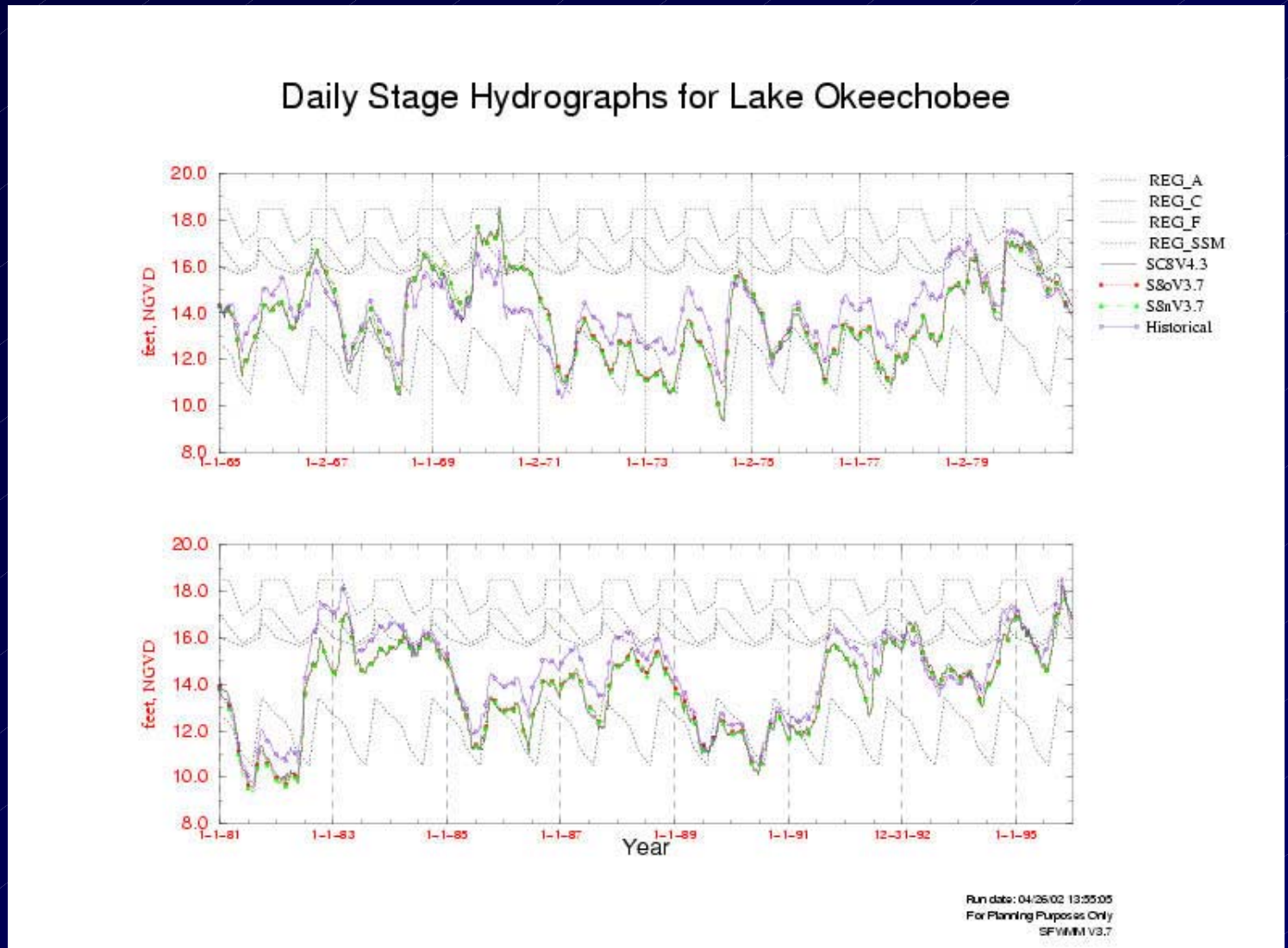
Xmgr Multiple Stacked Bar Plot



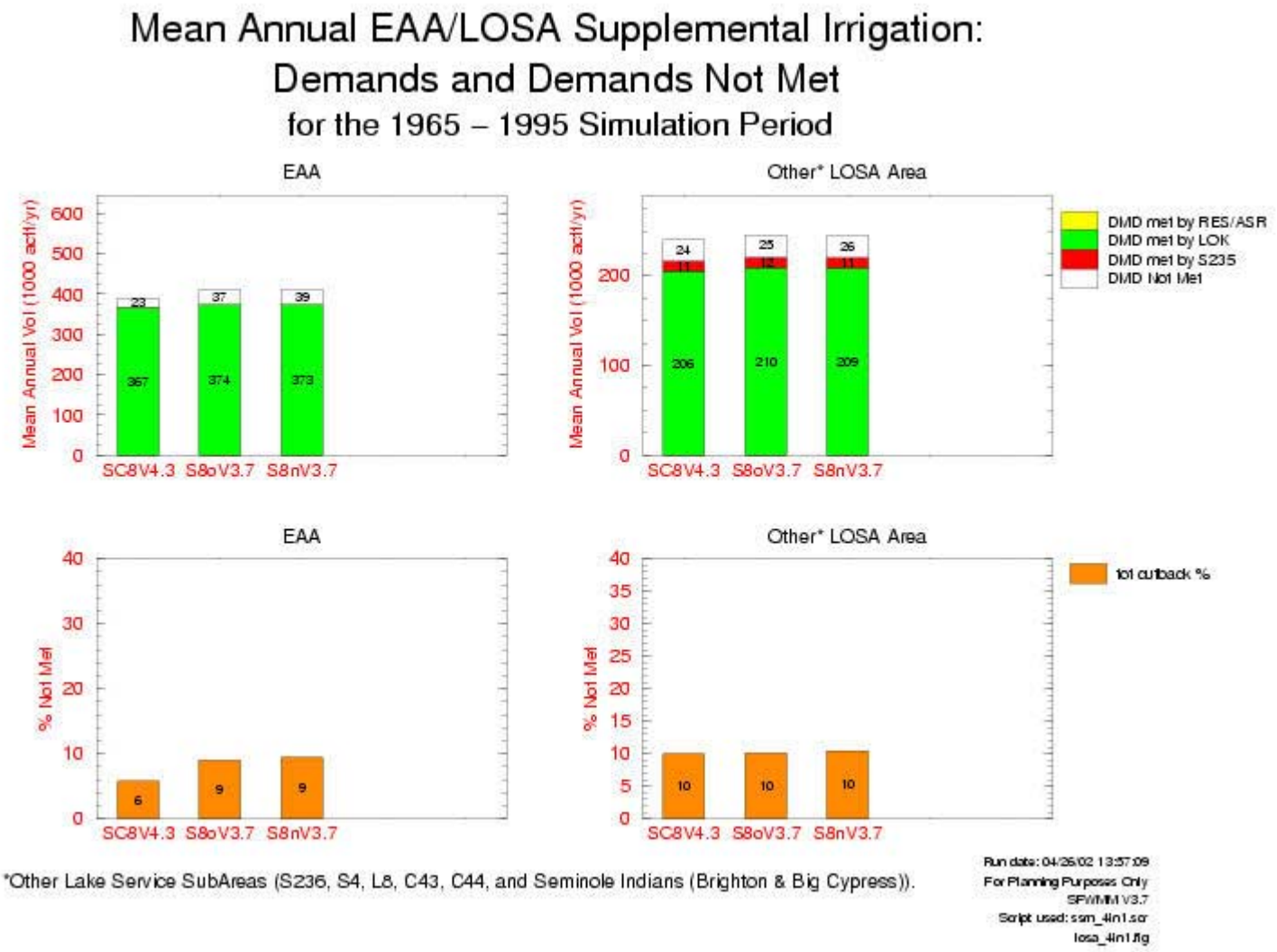
Xmgr Multiple Stacked Bar Plot Explained



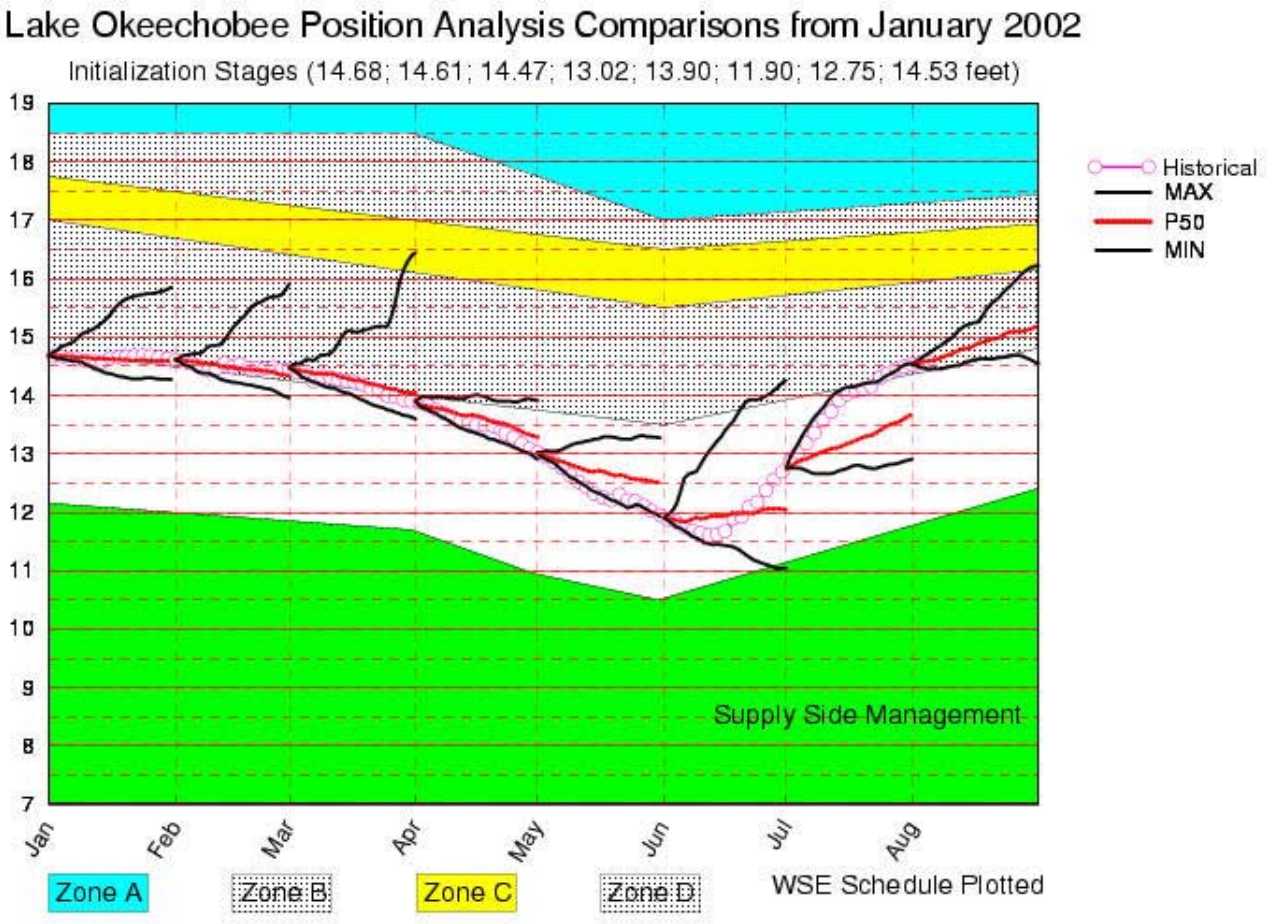
Xmgr Split Stage Hydrograph Plot



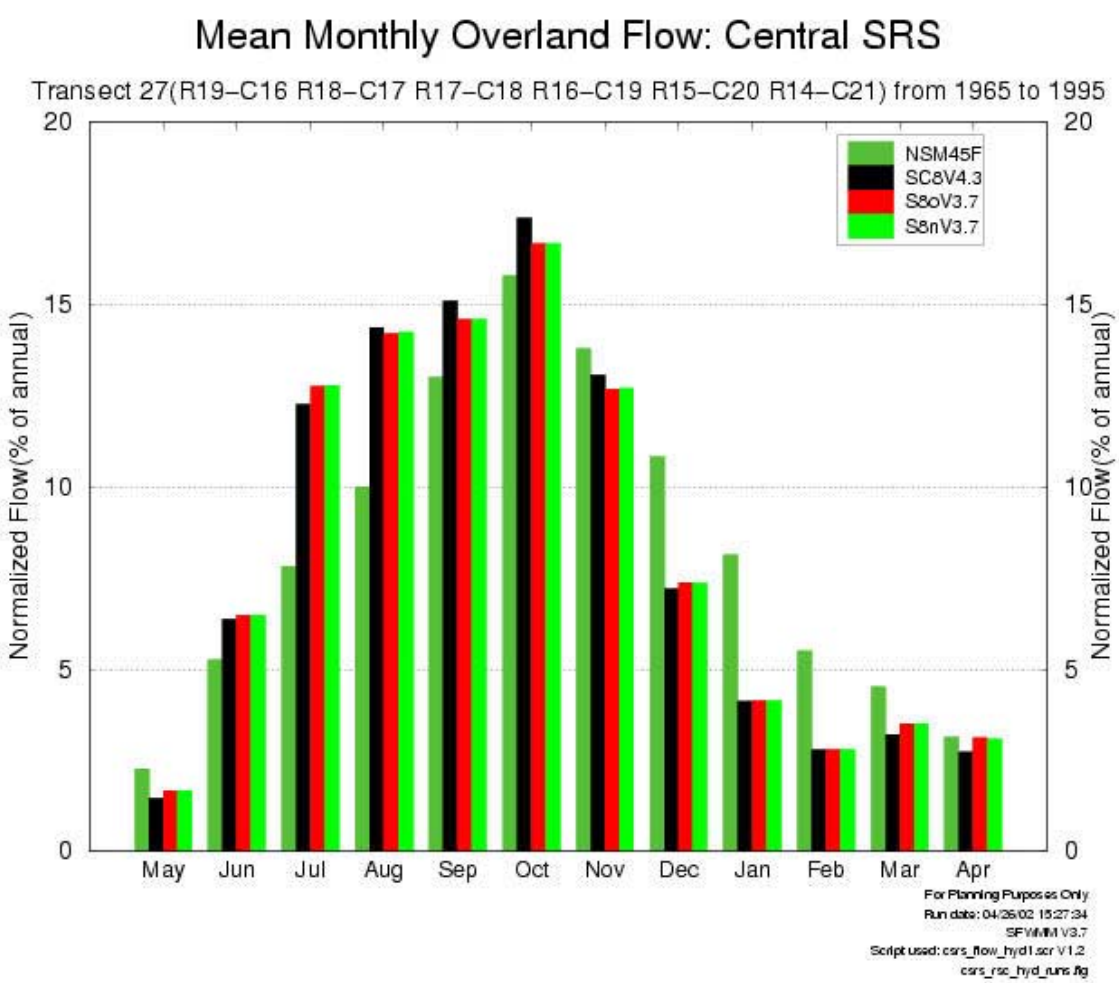
Xmgr Multiple Stacked Bar Plots



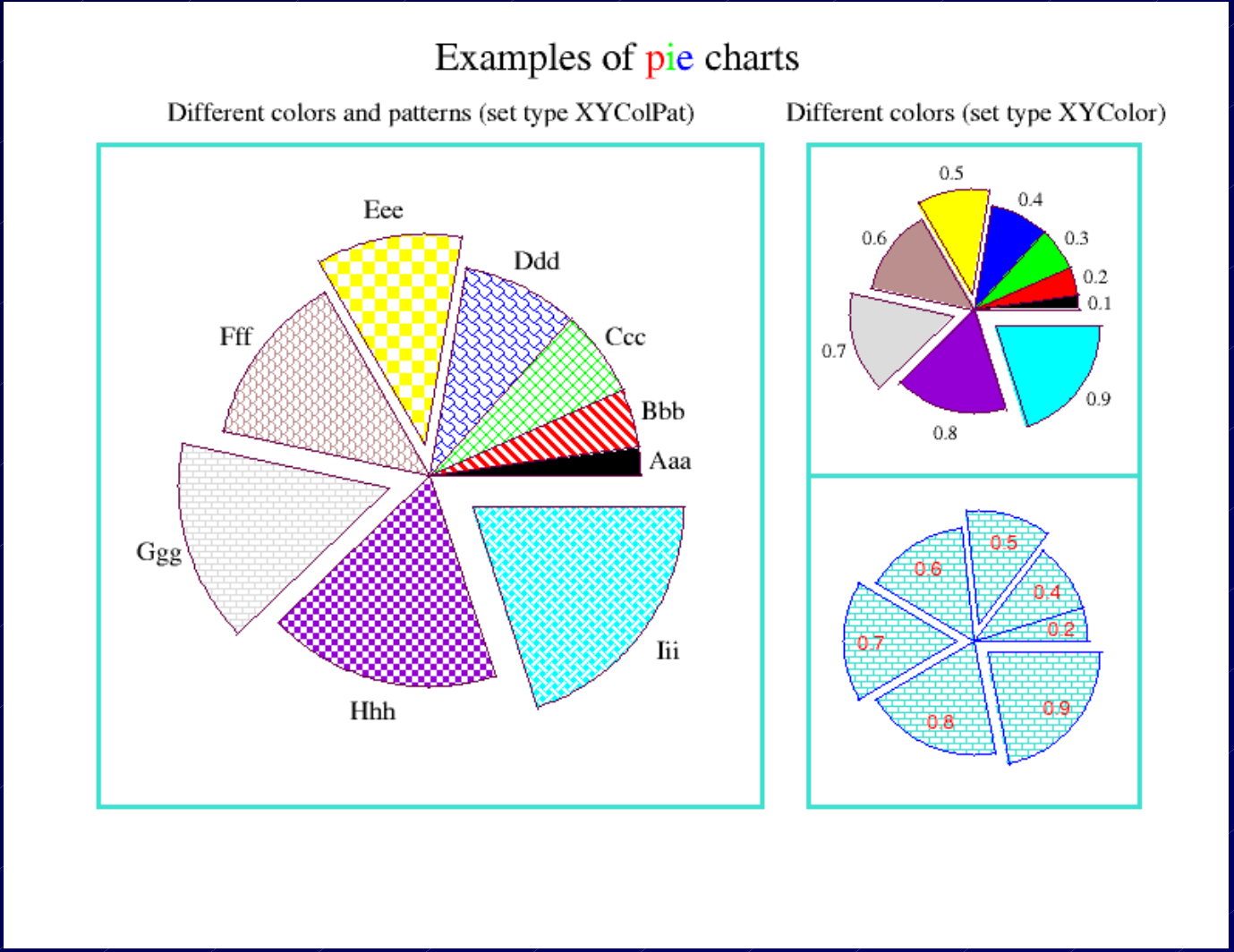
Xmgr Multiple Stacked Bar Plot



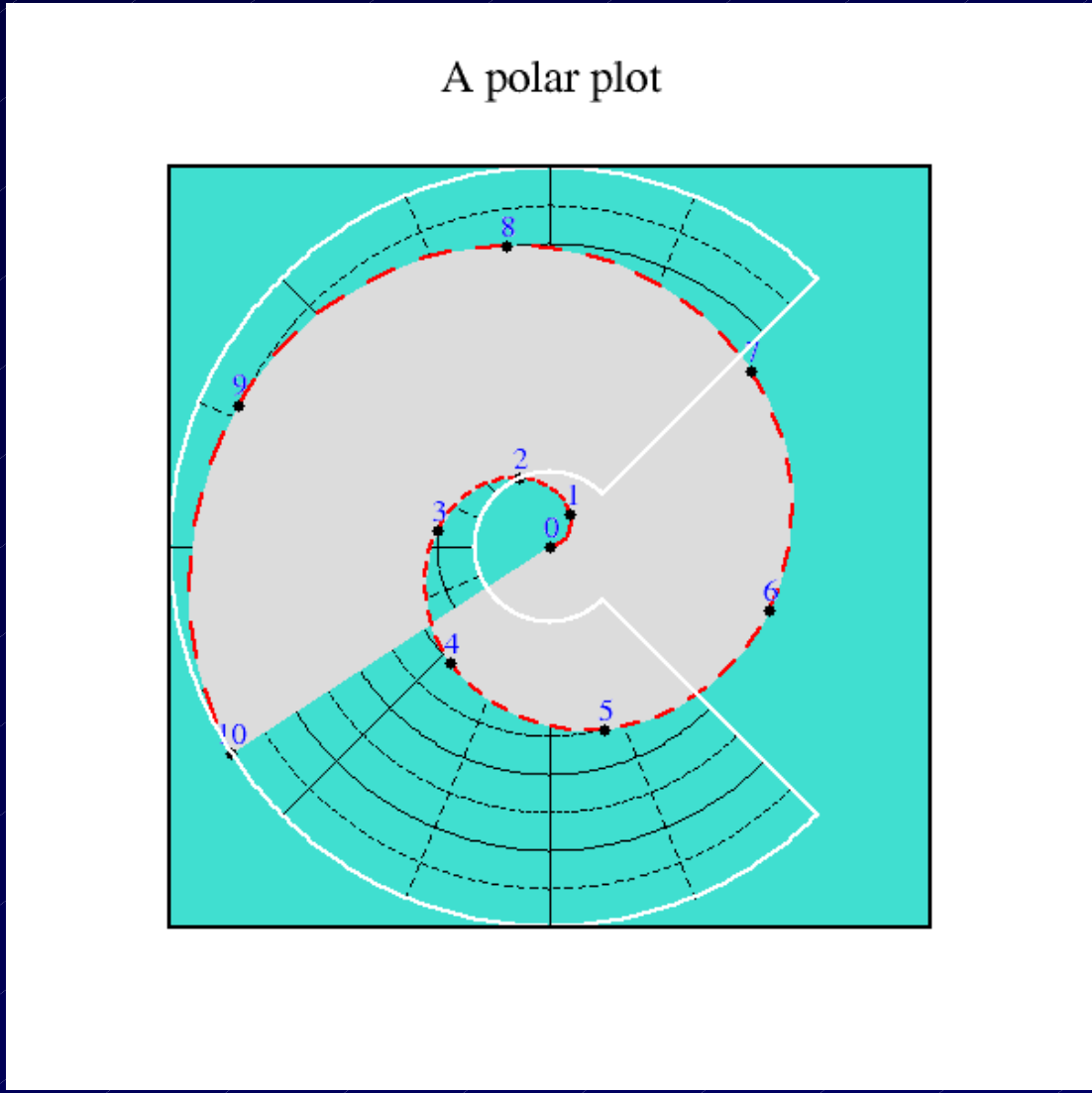
Xmgr Multiple Bar Plot



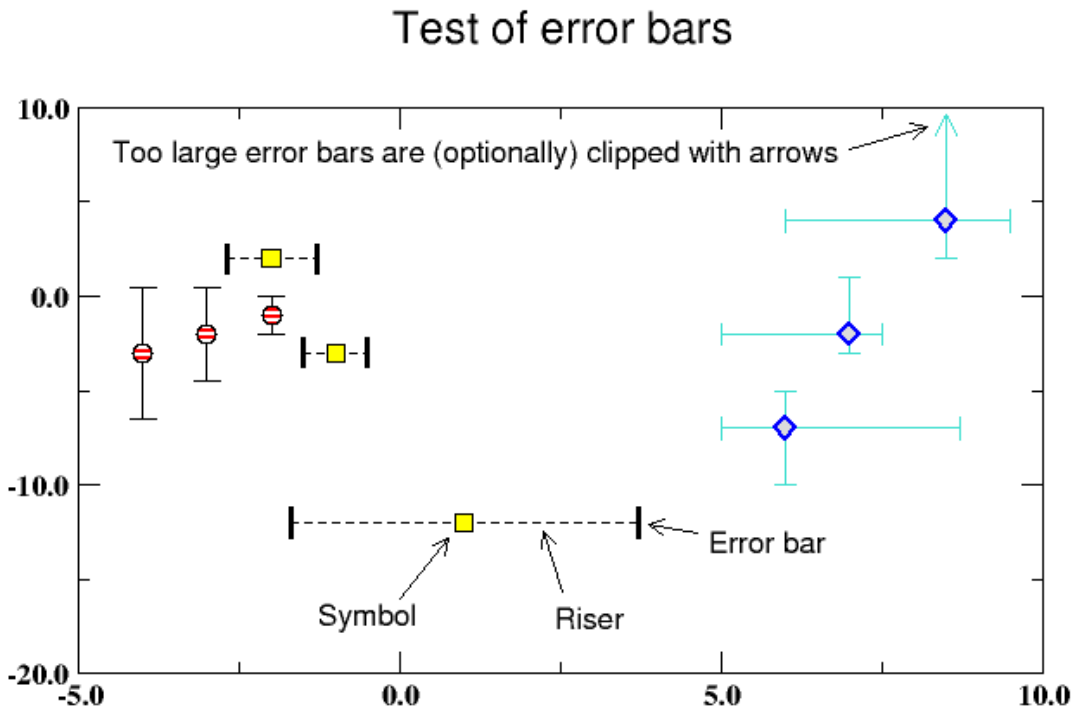
Grace Pie Charts



Grace Polar Chart (Xmgr also plots polar)

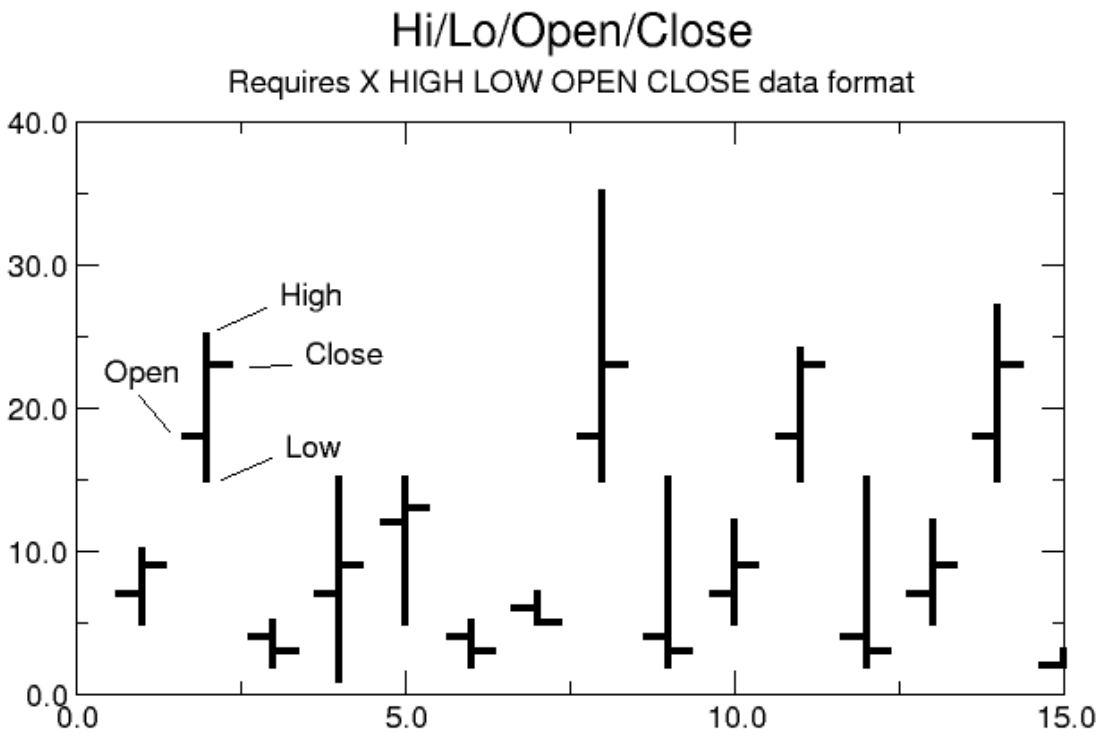


Graphing with Error Bars

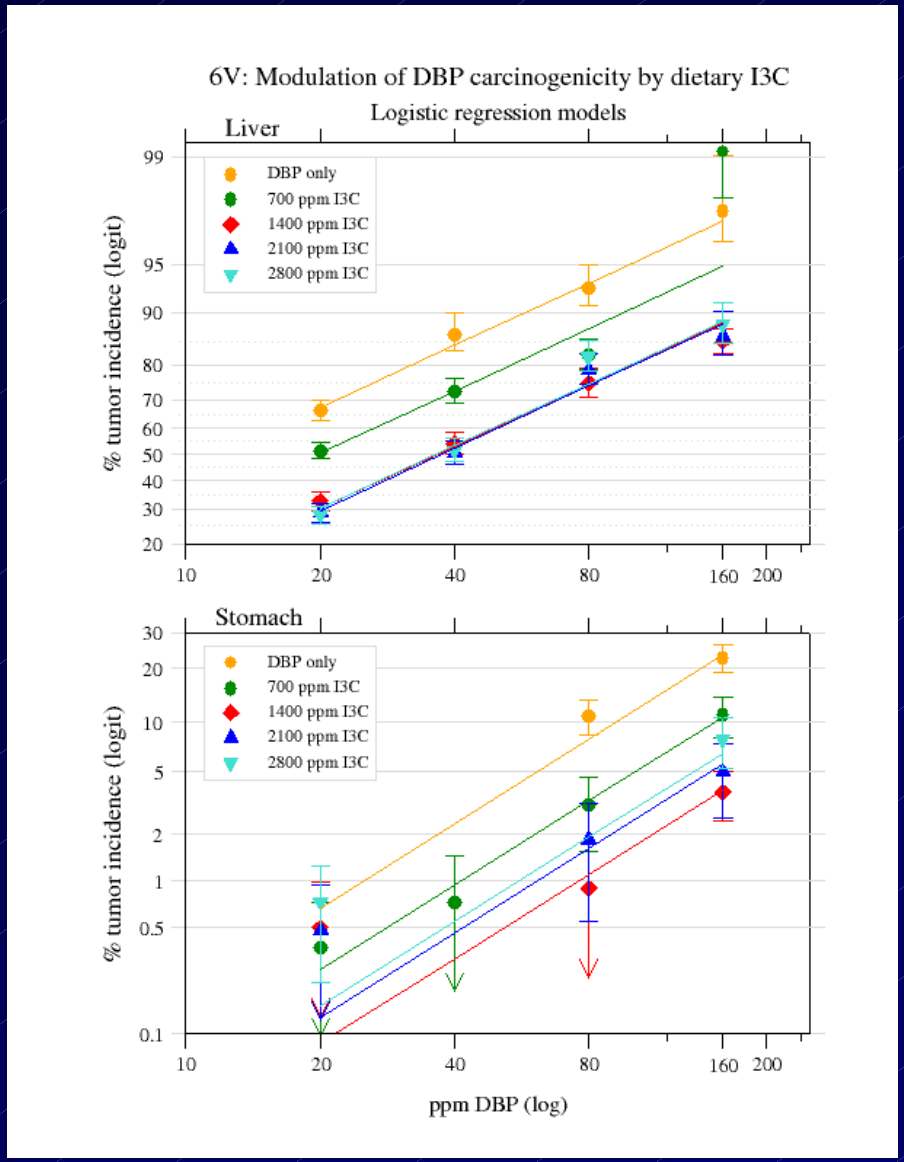


Error bars can be drawn along either X or Y or both, with differing values on either side of the datum. Setting the properties of error bars is done in Plot/Set appearance (error bars tab).

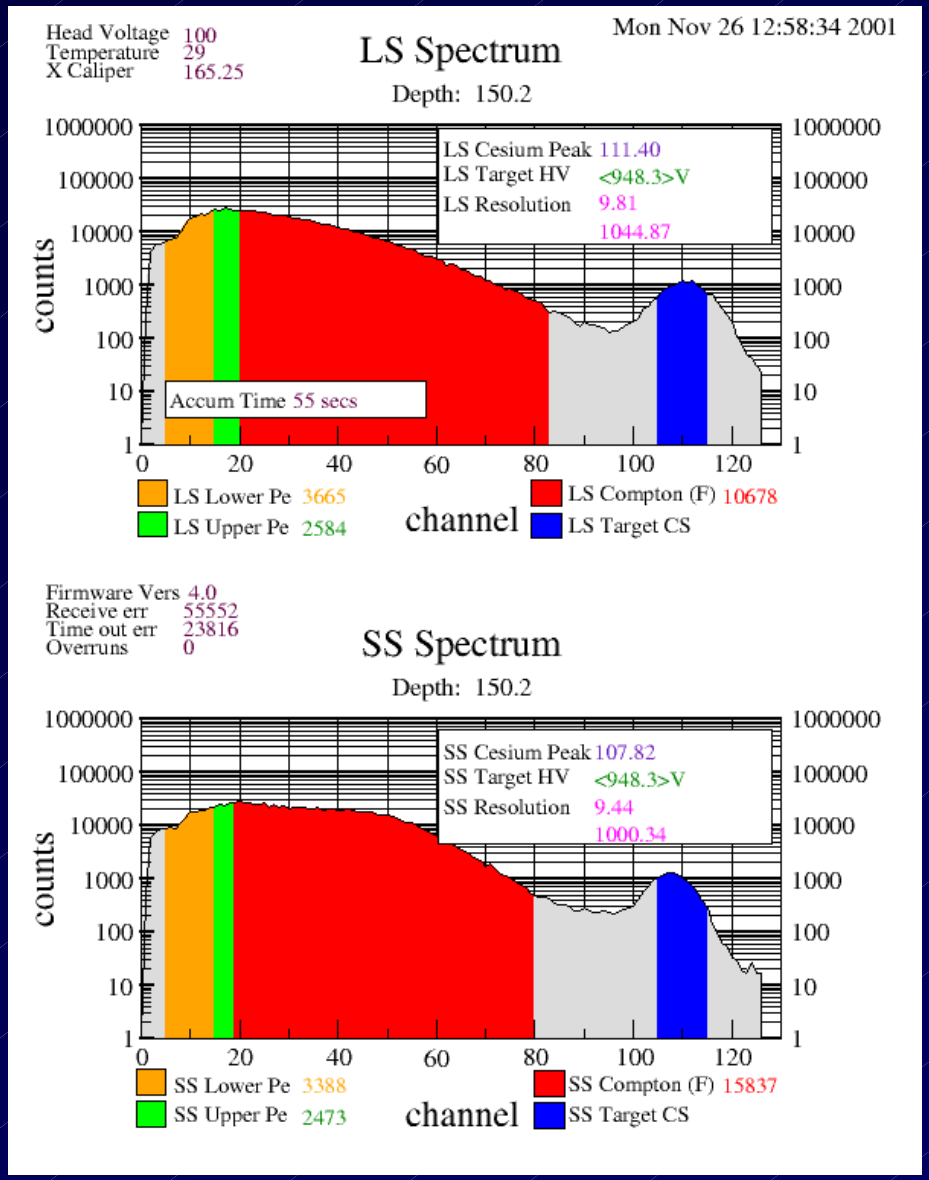
Xmgr-Grace Hi-Lo Graph



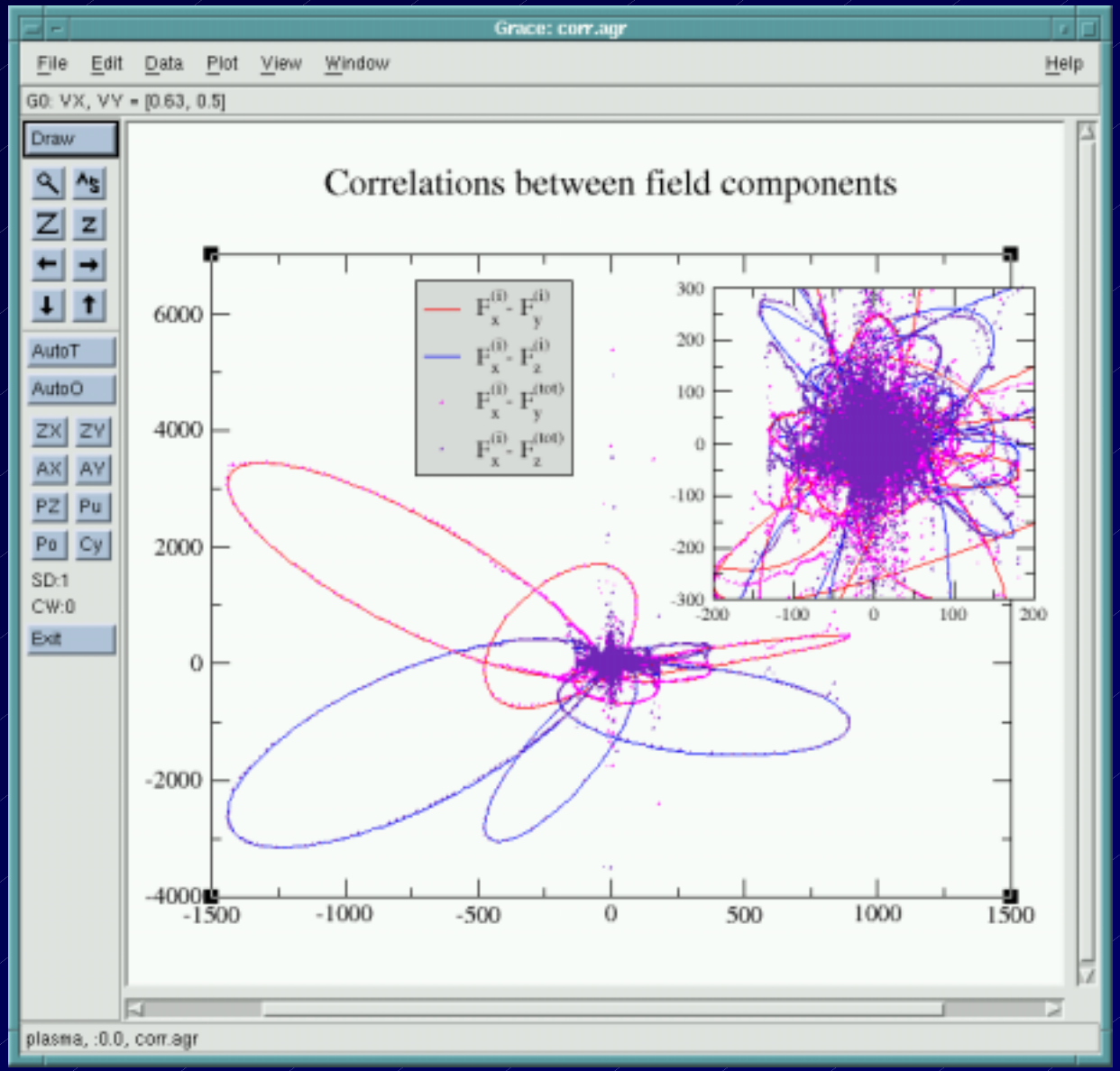
Grace


6V: Modulation of DBP carcinogenicity by dietary I3C
Logistic regression models
Liver
DBP only
700 ppm I3C
1400 ppm I3C
2100 ppm I3C
2800 ppm I3C
% tumor incidence (logit)
99
95
90
80
70
60
50
40
30
20
10
20
40
80
160
200
Stomach
DBP only
700 ppm I3C
1400 ppm I3C
2100 ppm I3C
2800 ppm I3C
% tumor incidence (logit)
30
20
10
5
2
1
0.5
0.1
10
20
40
80
160
200
ppm DBP (log)

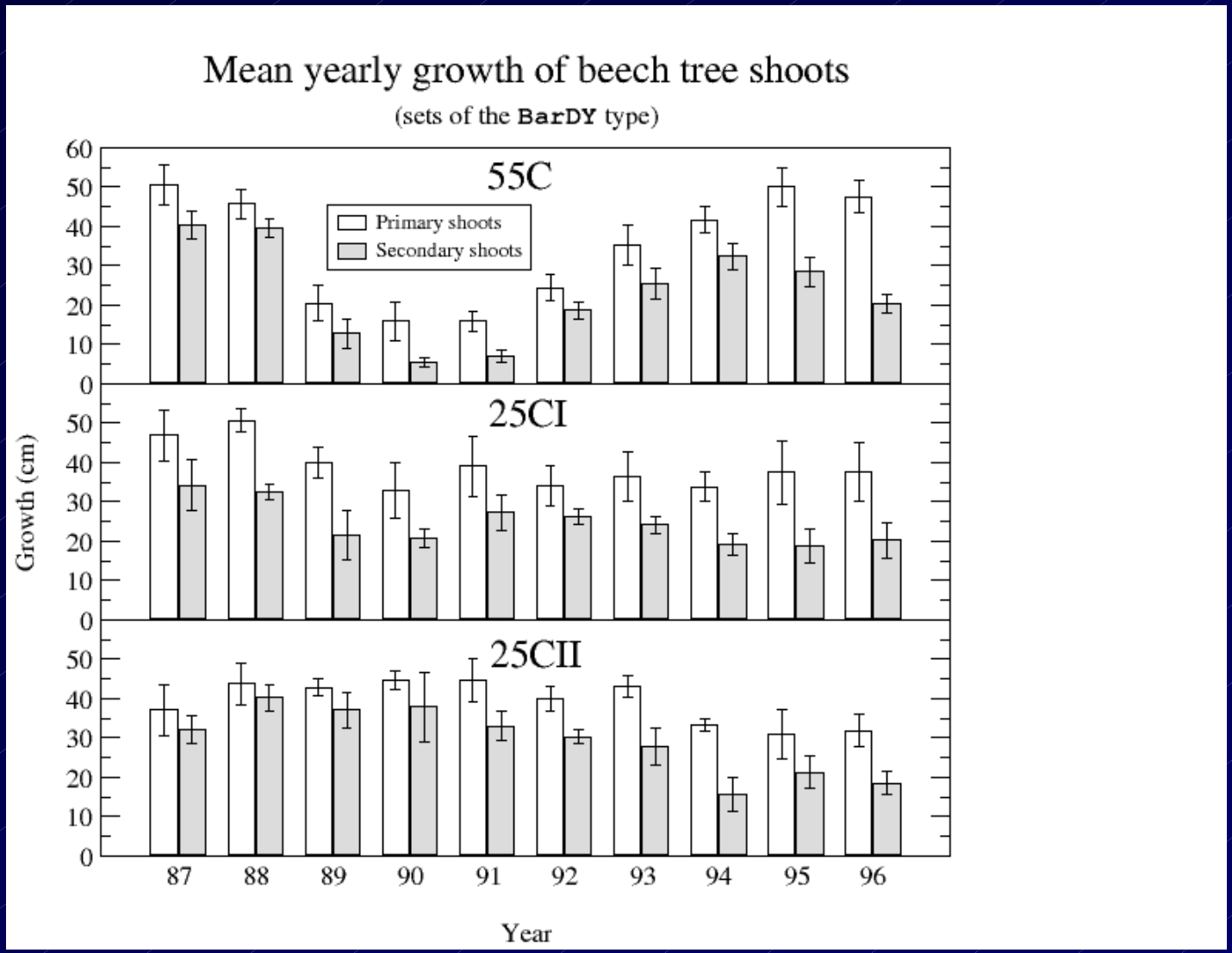
Grace


Head Voltage 100
Temperature 29
X Caliper 165.25
Mon Nov 26 12:58:34 2001
LS Spectrum
Depth: 150.2
LS Cesium Peak 111.40
LS Target HV <948.3>V
LS Resolution 9.81
1044.87
Accum Time 55 secs
counts
channel
LS Lower Pe 3665
LS Upper Pe 2584
LS Compton (F) 10678
LS Target CS
Firmware Vers 4.0
Receive err 55552
Time out err 23816
Overruns 0
SS Spectrum
Depth: 150.2
SS Cesium Peak 107.82
SS Target HV <948.3>V
SS Resolution 9.44
1000.34
counts
channel
SS Lower Pe 3388
SS Upper Pe 2473
SS Compton (F) 15837
SS Target CS

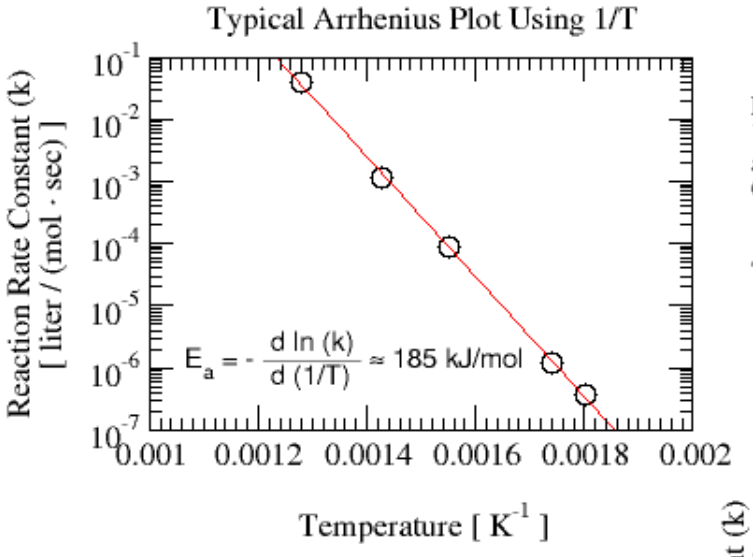
Grace Correlations Enhanced



Grace Bar DY Graph



Grace Enhancements to Log Plots



Data is from the sixth edition of *College Chemistry With Qualitative Analysis*, by Nebergall, Holtzclaw, and Robinson, published in 1980 by D. C. Heath & Company, Lexington, Massachusetts (pp. 383-384).

The activation energy is estimated to be 185 kJ/mol.

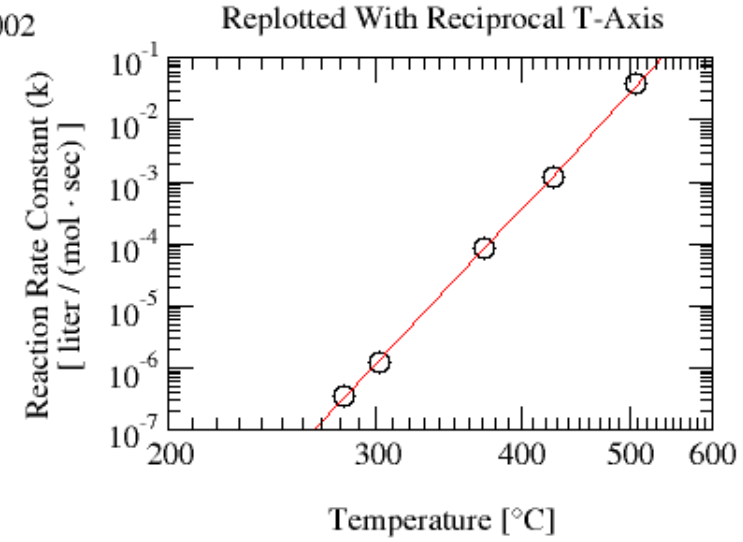
1) Plot the data using T (in Kelvin), instead of 1/T

2) Select "Invert axis"

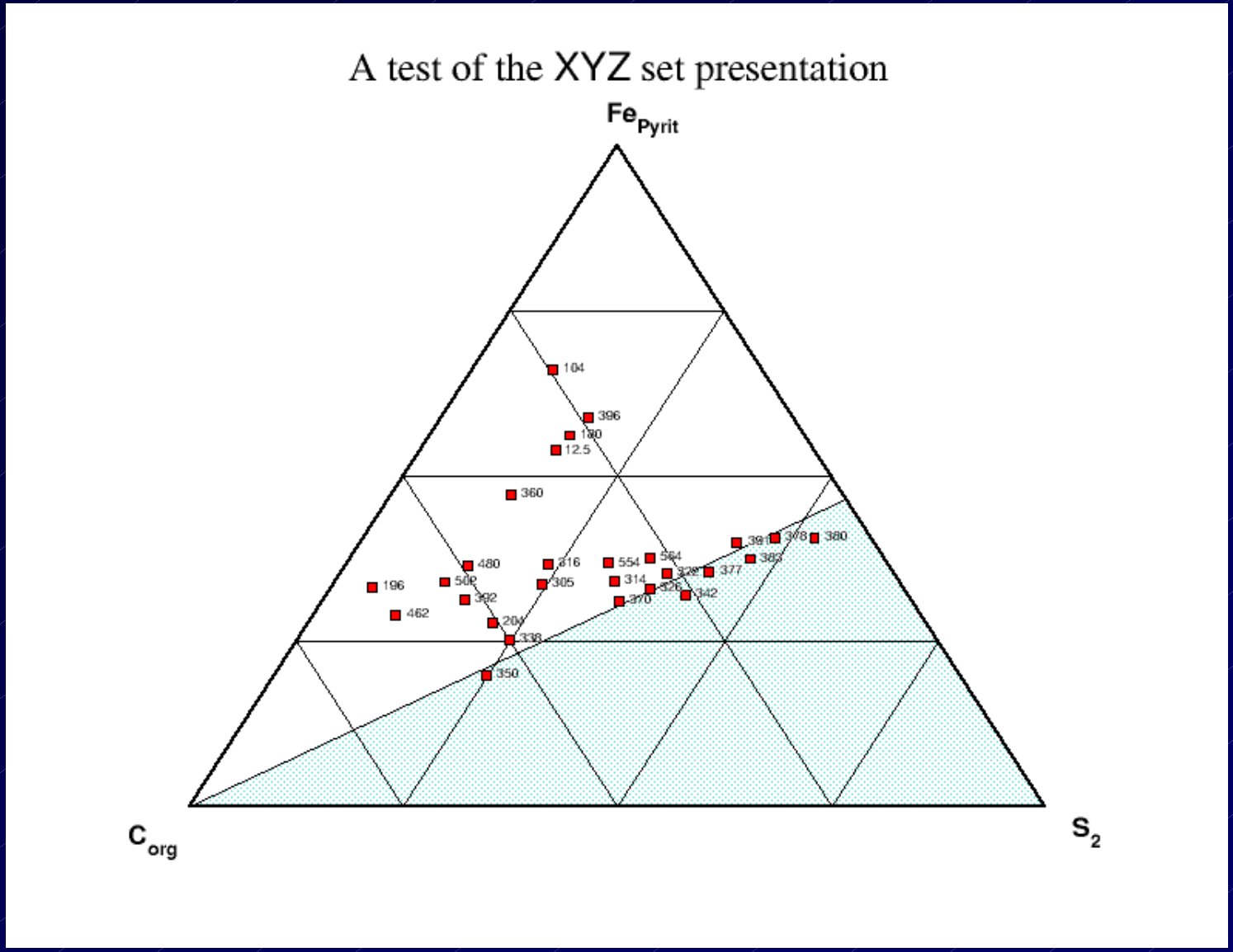
3) Assign special tick labels for °C

or

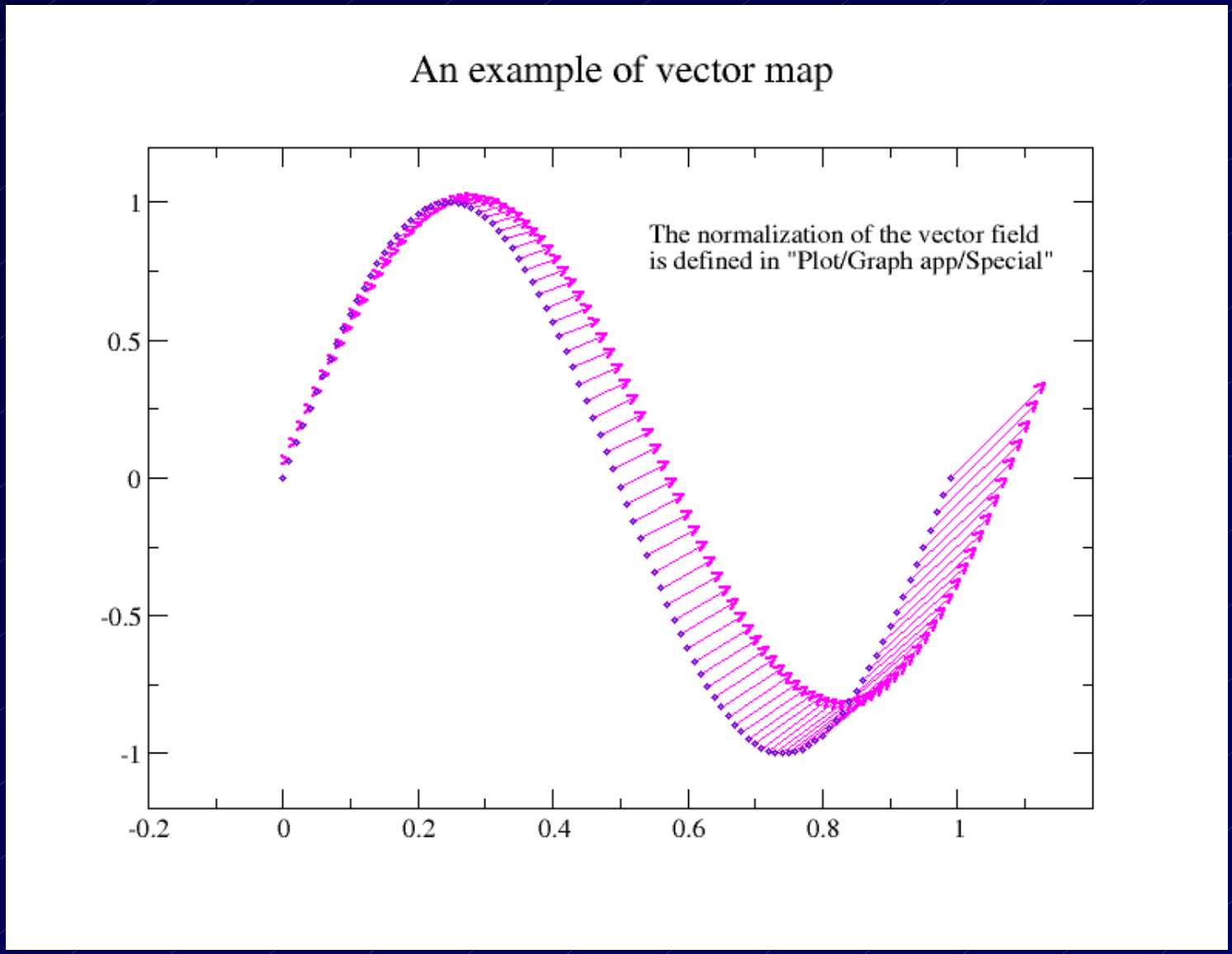
Apply axis transform "$t -273.15"



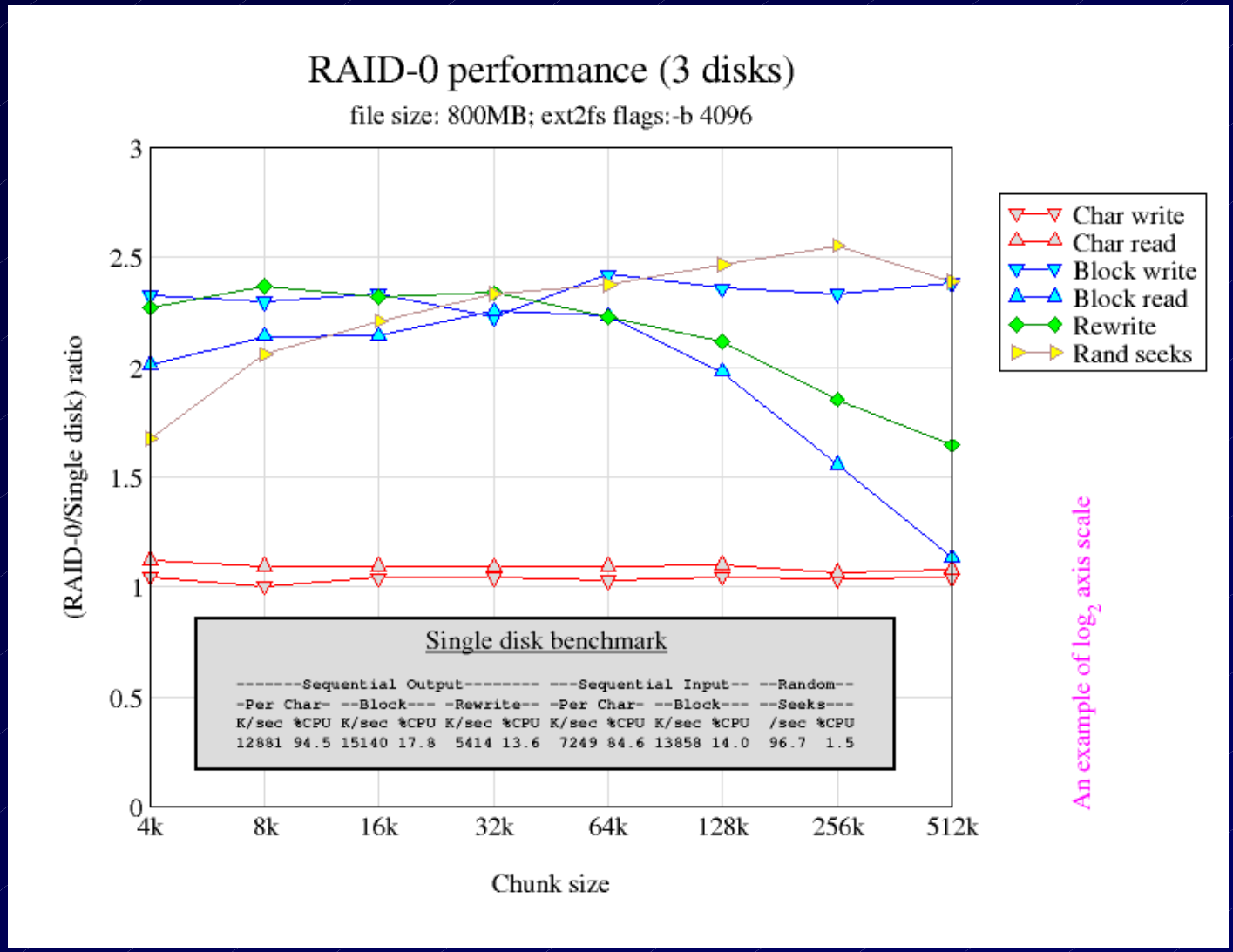
Xmgr-Grace XYZ Graph



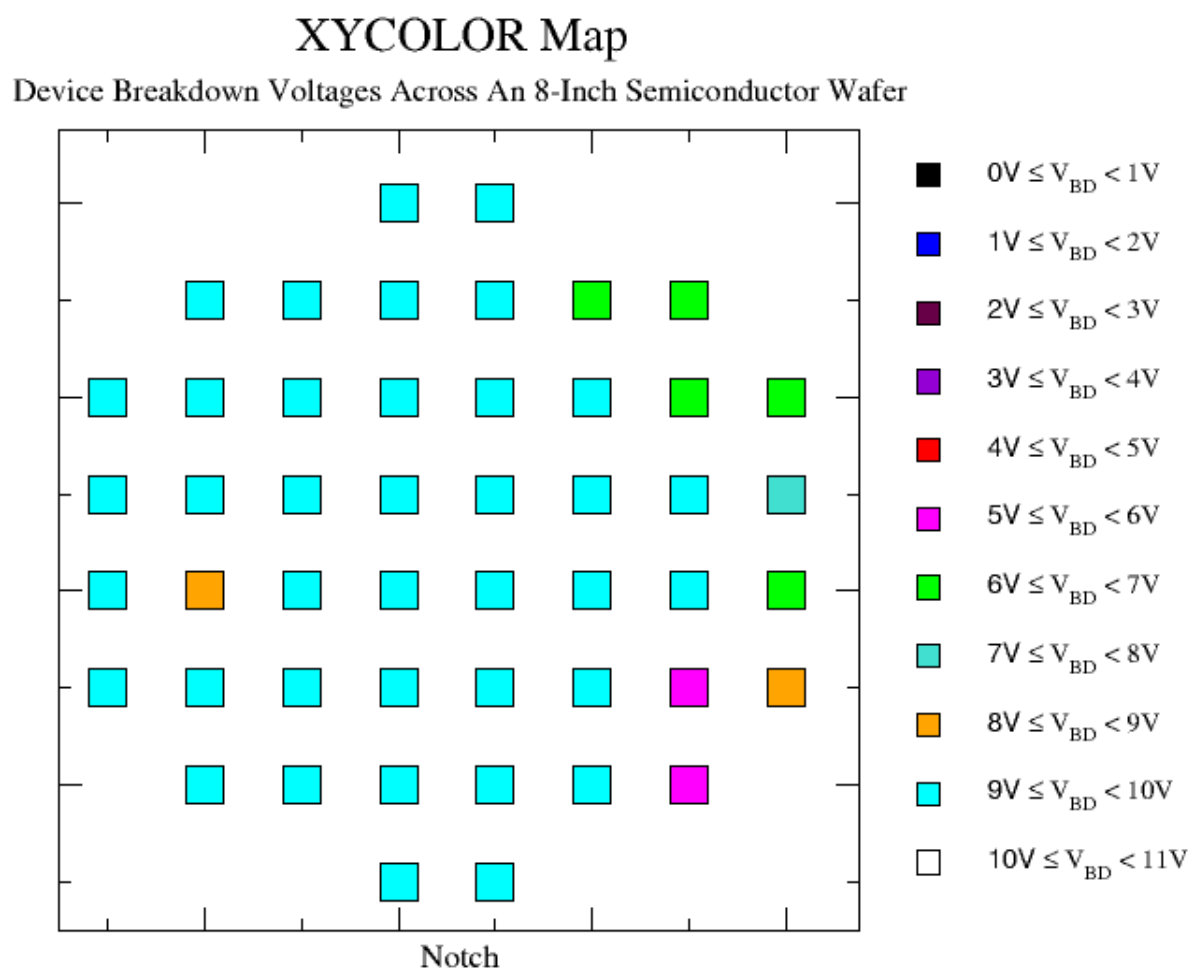
Grace Enhancement in Vector Plot



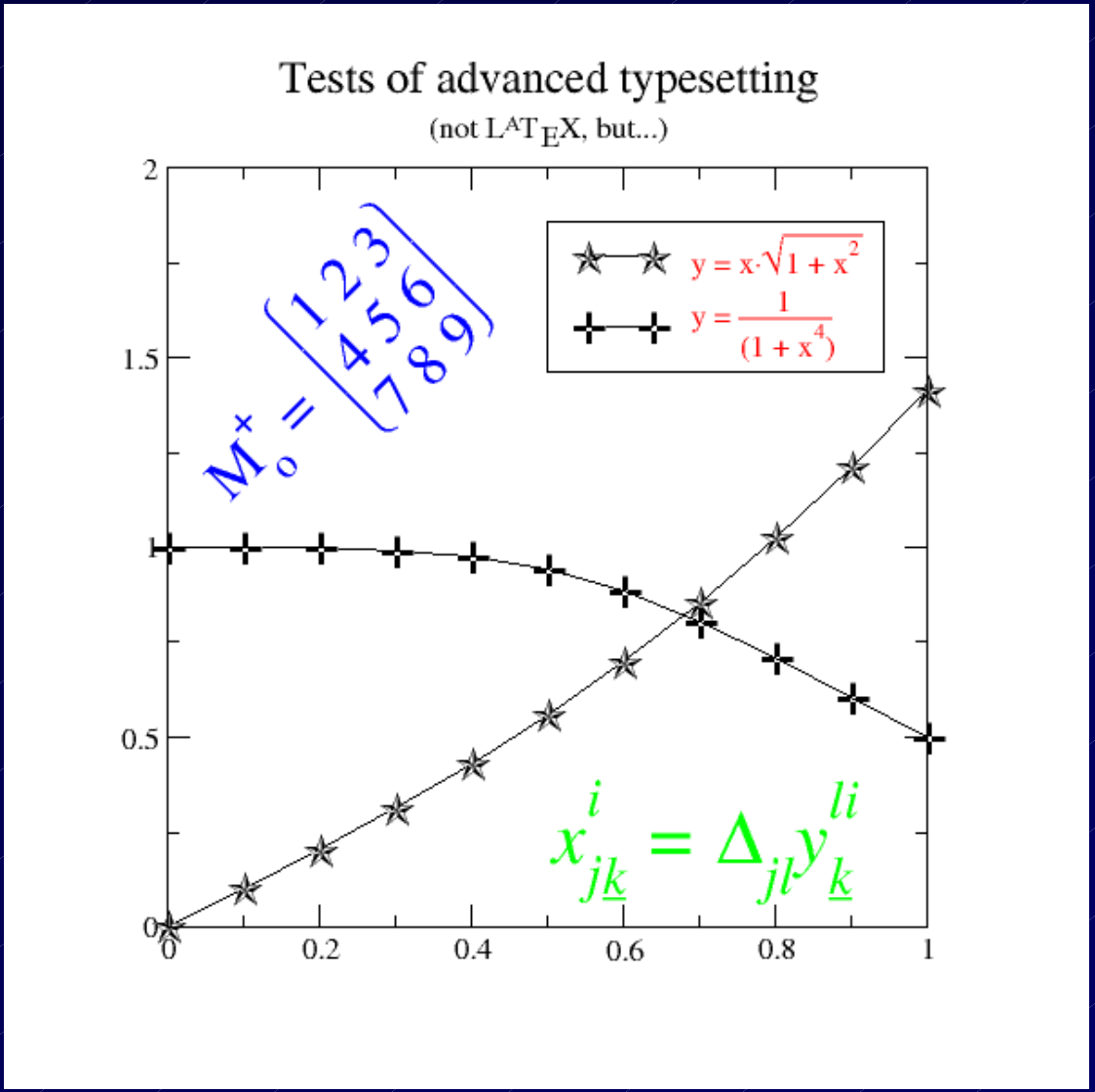
Grace


RAID-0 performance (3 disks)
file size: 800MB; ext2fs flags:-b 4096
(RAID-0/Single disk) ratio
3
2.5
2
1.5
1
0.5
0
4k
8k
16k
32k
64k
128k
256k
512k
Chunk size
Char write
Char read
Block write
Block read
Rewrite
Rand seeks
Single disk benchmark
-------Sequential Output-------- ---Sequential Input-- --Random--
-Per Char- --Block--- -Rewrite-- -Per Char- --Block--- --Seeks---
K/sec %CPU K/sec %CPU K/sec %CPU K/sec %CPU K/sec %CPU /sec %CPU
12881 94.5 15140 17.8 5414 13.6 7249 84.6 13858 14.0 96.7 1.5
An example of log2 axis scale

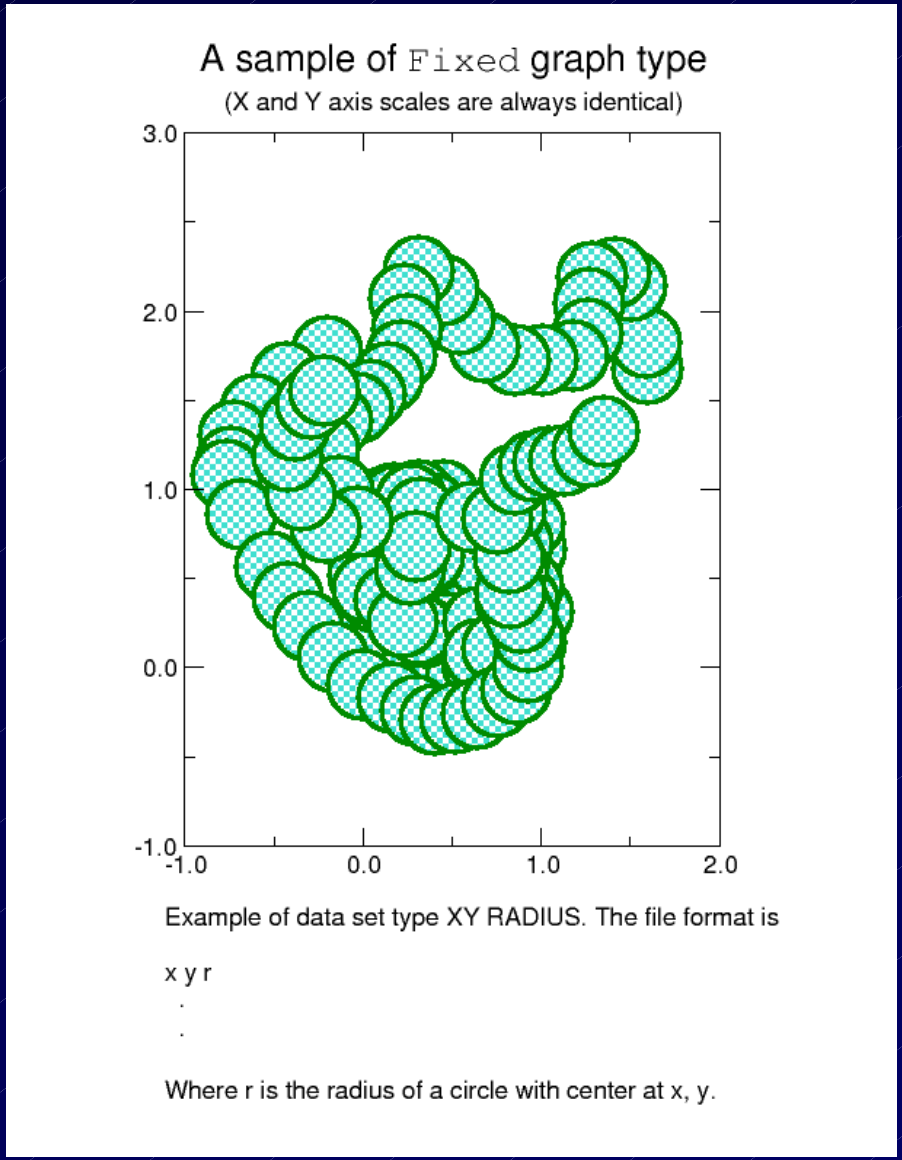
Grace Graphic



Grace Enhancements to Text



Xmgr-Grace Radius Graphic



Grace Graphic