Gempak Introduction

I. Important Preparation for Running Code

a. Before running a .csh script, the file MUST be executable
   - Use command chmod 754 your_file.csh (this syntax allows you to execute, read, and write your file, other cirrus users may execute but not write your file).
   - Run file using ./your_file.csh

b. When saving to a GIF file, always run gpcolor first to set the background to white.
   - Set COLORS to 101=255:255:255
   - This sets the background color to white, to avoid wasting toner if you print your map.
   - Set DEVICE to your output file (discussed later).

c. After running your code
   - ALWAYS type "gpend" in case a process has not stopped running. This prevents orphaned processes from being left running on cirrus.
   - If you need to terminate a .csh script, you may also need to enter the "cleanup" command to stop orphaned processes.
   - This step is important. Orphaned processes may result in cirrus crashing. THIS IS BAD!

d. When running a c-shell script or executing GEMPAK commands it is often helpful to have two windows open at once (one to execute commands, and the other to see what files are in your working directory).

II. SFMAP (plots surface stations observations)

a. Display and analysis areas
   - AREA is the data area, GAREA is the graphics area (what is shown in the plot).
   - These values may be specified as lat/lon values (lower left and upper right corners) or as a state or country name.
   - Example 1: 20;-130;55;-60
   - Example 2: MO-, PA, CO+, US (+/- signs zoom into specific areas)

b. Surface Parameters
   - Ex. SFPARM = TMPF;PMSL
   - WARNING: Position on list determines location in relation to station plot. See link for specific positions: http://www.unidata.ucar.edu/software/gempak/man/parm/sfparm.html

c. File and Date Information
   - SFFILE = input_file.gem
   - DATTIM = date and time (formats: YYMMDD/HHMM, DD/HHMM, HHMM)

d. Map Colors
   - COLORS allows user to specify colors of specific variables on a station plot in the SAME order as the surface parameters (Ex. 26;2;7)

- See Figure 1 for GEMPAK colors
- MAP specifies the color of natural and political boundaries (default setting is black, 32).

e. Display device
- May be set to x-windows (XW) or an output file (I suggest using a .gif file)
- Ex. DEVICE = gif | your_file.gif | 1280 ; 960 (the last section specified file resolution)
- Make sure device is also consistent when you run gpcolor, or else your map will not print.

III. Contour Maps (EXAMPLE 700 hPa Temperature Advection, GDCNTR)

a. Date and Time
- Similar to DATTIM for station data
- Ex. GDATTIM = YYMMDD/HHMM
- User may also want to specify the forecast time (YYMMDD/HHMM**f**hhhmm or f00)

b. Vertical Coordinate and Variables to Plot
- GLEVEL specifies pressure or height level to use (Ex. GLEVEL = 500, GLEVEL = 10)
- GVCORD specifies vertical coordinates (Ex. GVCORD = PRES)
- GFUNC specifies the function that will be plotted (Ex. GFUNC = hght, GFUNC = adv(TMPK,wnd))

c. File Information
- GDFILE = input_file.gem

d. Scale
- Allows user to rescale variables to physically meaningful values
- Ex. SCALE = 8 for vorticity advection

e. Contour Format and Interval
   a. LINE = color/type/width (see link below for more information)
   b. Line information: https://www.unidata.ucar.edu/software/gempak/man/prog/gdcntr.html
   c. CINT = interval/minimum/maximum

f. Fill Format and Interval (similar to Contours)
   a. Don't forget to specify CTYPE (f or c)
   b. FLINE = fill colors/fill types (Order may vary, Ex. FLINE = 30-10)
   c. Fill Line Information: https://www.unidata.ucar.edu/software/gempak/man/parm/fline.html
   d. FINT = fill interval/minimum/maximum

g. Other Important Settings
   a. GAREA (graphics area, same as for SFMAP)
   b. DEVICE (same as for SFMAP)
   c. MAP (same as for SFMAP)
   d. CLEAR (yes or no to clear graphics screen before plotting)

IV. Wind Vectors (GDWIND, SAME PARAMETERS AS GDCNTR)

a. Function to Plot
    a. GVECT = vector function, Ex. GVECT = wnd
    b. This may also be used to compute other vectors quantities (Ex. Q-vectors)
    c. Wind has two components as two separate variables (UREL, VREL)
b. Plotting Vectors
    a. WIND = wind symbol/size/width/type/arrow head size
    b. Ex. Bk32/0.5//0221/0.5 (barb, kt, black/0.5/not specified/barb location, ignore calm, start at station, not filled)
    c. See Link Below: https://www.unidata.ucar.edu/software/gempak/man/parm/wind.html

V. Another Grid Analysis Tool (GDINFO, lists grids in a file.)
a. Lists Grids in a File
b. Suggested Settings
    a. GDFILE = your_file.gem
    b. LSTALL = yes (lists all grids)
    c. OUTPUT = (blank output will print it to command window)
    d. GDATTIM = f00
    e. GLEVEL = all
    f. GVCORD = all
    g. GFUNC = all
c. Type “run” to run this or other GEMPAK scripts manually.

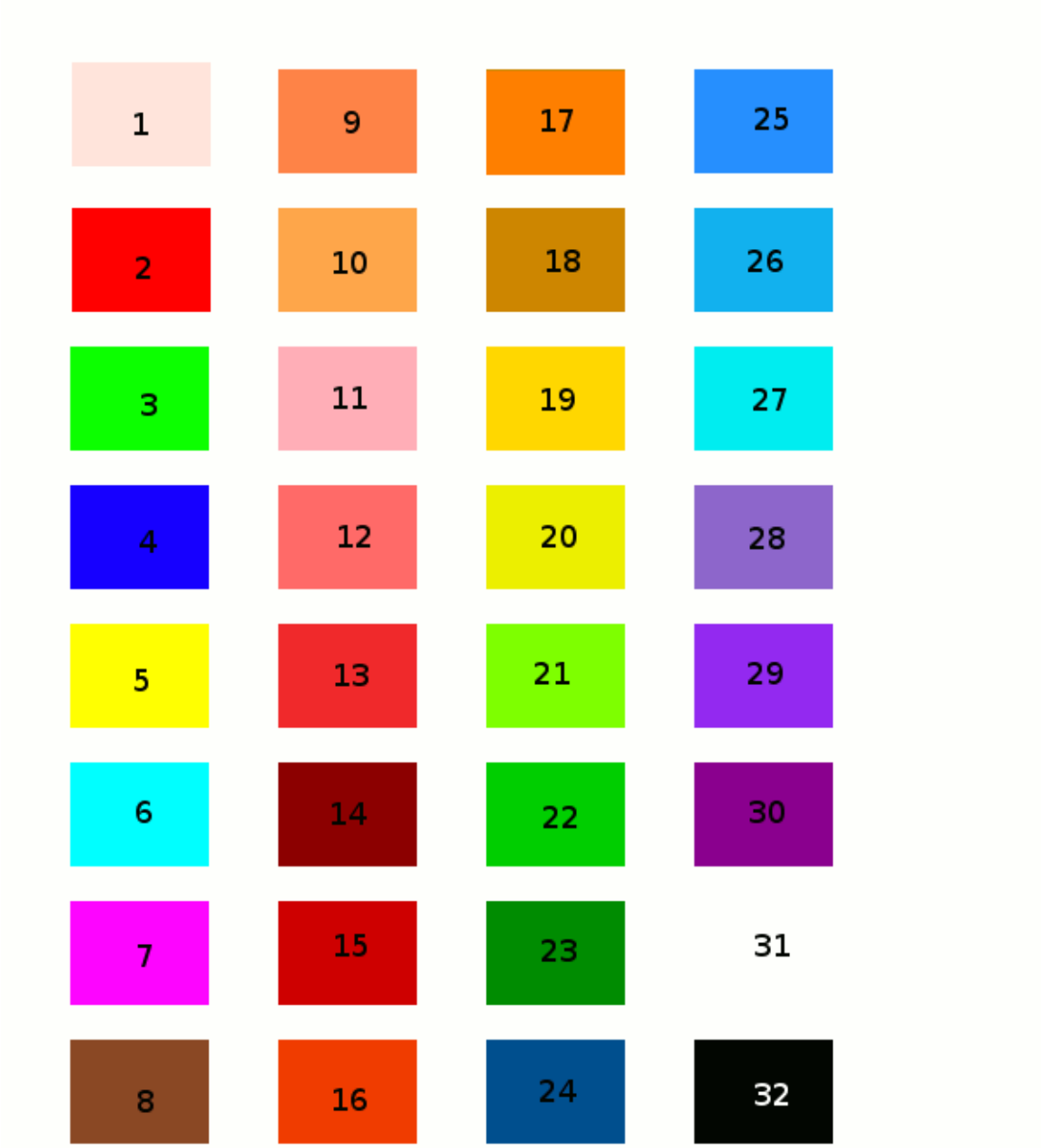

Figure 1: GEMPAK color key (image from SUNY Albany).