LAB ASSIGNMENT #5

(due Thursday September 29)
10 points

Learning Objectives:
Upon completion of this lab you will be able to:

- plot gridded model data in a variety of GEMPAK programs.
- articulate the relationship between the ageostrophic wind and regions of divergence.
- investigate the nature of vertical motions in the vicinity of fronts.

For the following problems use the NAM analysis at 1200 UTC 21 September 2016 (in the $MODELDATA directory). This time, use the *title* parameter to describe each plot (variables, times, etc...), and simply staple everything together with this sheet.

1. a) Hand in a plot containing **300-mb geopotential heights** (use a solid line), **divergence of the ageostrophic wind** (use phelp gfunc to find your variables) and **wind barbs of the ageostrophic wind in knots**. Contours of positive divergence should be solid lines, and contours of negative divergence (aka convergence) should be dashed lines. Omit the zero divergence line. (See the **GDCNTR/GDPLOT** section of the lab to review the procedure used to omit the zero line.) Also use the following settings:

```
PANEL    = 0
GDATTIM  = f36
SKIP     = /2
CONTUR   = 3/1
TEXT     = 0.75
GAREA    = ca-
PROJ     = utm
MAP      = 8
CTYPE    = c
LATLON   = 0
```

   b) Explain, with reference to the ageostrophic wind in this plot, why convergence and divergence are located where they are with respect to the trough over California/Nevada.

c) If you had only this plot to look at, where would you expect strong upward vertical motion? How about downward vertical motion? Explain your reasoning using concepts from lecture.

d) Now make a plot of **700-mb vertical motion**, with ascent contoured as solid lines, descent contoured dashed lines, and the zero line omitted. (Remember: $\omega = dp/dt$) To get started, use:

```
SCALE = 3
GFUNC = omeg
```

Describe how the model vertical motion corresponds to what you stated in part (c)?

2. a) Using the same file and the same time, create a plot of **850-mb potential temperature** (every 3 K) over the Western US (garea=or--).

   b) Plot a cross section of **potential temperature** (contoured every 3 K) and **vertical motion** (using the same conventions as in question 1d) that cuts through the cold front located in the Gulf of Alaska (use: cursor cxstns) and identify the location of your selected cross section on your horizontal map of potential temperature. You will see where the NAM domain ends, and that is okay in this case! Use the following parameters to get started:

```
PTYPE    = log
GVECT    =
YAXIS    = 1000/100/100
BORDER   = 1
TEXT     = 0.75
CONTUR   = 3/1
```

   c) Within your cross section, identify where the cold front is located. Do you see evidence of a thermally direct circulation within your cross section? Explain. Is anything missing?