IC4.2 Part 1: Job Sheet

Interpreting Standardized Anomalies

Objectives:

1) become familiar with forecast anomaly resources on the Internet
2) Interpret the meaning of standardized anomalies anomalies and their relationship to severe winter weather hazards.

Data: Internet

Instructions: Review the following websites to become familiar with using online anomaly resources to identify significant anomalies. Recall from IC4 Lesson 2 that significant standardized anomalies normally range from 2-3 standard deviations from normal. Values of 4 to 5 standard deviations from normal are considerably rarer. Values over 6 standard deviations are extremely rare, and they are normally associated with deep tropical storms. Although the current weather being analyzed may not have anomalous winter weather, it is still useful to learn how and where to access anomaly information on the web. Bookmark the sites you find useful.

CONUS Sites: If you are investigating CONUS weather, go to the following website to view current anomaly forecasts for ensemble data or some individual model runs (site may take up to a minute to load):

http://eyewall.met.psu.edu/ensembles/index.html

1. Select “MREF” as the “Model” and “NOAM/500H” for the field. Move the scrollbar on the right side of the browser down to include the bottom image and the player buttons (“<” and “>”) at the top. Then step through the loop. Look for significant 500mb height anomalies (bottom) and ensemble spread (top). Low confidence in the strength of the anomaly occurs where ensemble spread (top) is correlated with the anomaly. High confidence in the strength of the anomaly occurs where ensemble spread (top) is not correlated with the anomaly.
2. Select “SREF” as the “Model” and “US/MSLP” as the field, and step through the loop. Look for significant anomalies in the pressure field, and gauge the confidence in the anomaly by looking at the correlation between the anomaly and the spread as in #1.
3. Select “SREF” as the “Model” and “US/850T” as the field, and step through the loop. Look for significant 850mb temperature anomalies, and gauge the confidence in the anomaly by looking at the correlation between the anomaly and the spread as in #1.
4. Select “SREF” as the “Model” and “US/850WIND” as the field, and step through the loop. Look for significant 850mb u anomalies (top image) and v anomalies (bottom image).

OCONUS Sites: If you are investigating OCONUS weather, go to the following website to view current anomaly forecasts for *individual model runs*:

http://www.hpc.ncep.noaa.gov/training/SDs/

1. Select the “500 hPa Heights” link or the “Previous Cycle 500 hPa” link under the “GFS Forecast“ heading. Look for significant 500mb height anomalies in the GFS forecast.
2. Select the “850 hPa Temperatures” link or the “Previous Cycle 850 hPa” link under the “GFS Forecast“ heading. Look for significant 850mb temperature anomalies in the GFS forecast.

Past Events Exercise: Now that you are done accessing forecast data, it is time to look up anomaly information on a few major events that we will name below. For both CONUS & OCONUS weather, use the following websites to view archived anomaly information from the reanalysis data:

The NCEP reanalysis data site is useful to view the evolution of systems and standardized anomalies:
http://www.hpc.ncep.noaa.gov/ncepreanal/

1. You can view a four panel display of standard pressure levels including 200 mb, 500 mb, 850 mb, and 1000 mb.

2. Standardized anomalies are provided to you for 500 mb heights, 850 mb temperature, and precipitable water.

3. You may pick a loop for any time period from 1948 to the end of 2007 at 12 hour increments. However, you shouldn’t try to loop the entire time period.

4. Choose a beginning time in the box labeled ‘Current Date’, and an ending time in the box labeled ‘End Date’.

Now go to the Penn State standardized anomaly reanalysis site to view the interactive Global re-analysis data for a memorable event at:
http://hart.met.psu.edu/meteo497/mapper.html

1. Data are available in 6-hour increments for many different variables.
2. The “Map Time Set” menu provides a loop of variables before and after the date entered. Pick “1 Day Before/After”.
3. Pick the display “Region” (e.g. North America).

4. Select the variables for the 4 panel chart (e.g. “Heights” or “U-winds”).
5. You can select the plot size, but the default “Medium” should be fine.
6. You must use the Plot button to make the image. Be patient as the program uses raw data to create images. Feel free to peruse other variables/dates.

Review case 1:

1) Let’s review the evolution of the strong east coastal storm (aka storm of the century) from 1993 March 12- 14, 00 UTC. This coastal storm ranked #1 of all east coast snow storms in terms of the most number of people affected by the largest amount of snow. The severe winds added to the impact by creating blizzard conditions from Alabama to Maine. The west coast of Florida experienced one of the biggest storm surges in the state’s history.
2) From the Penn State reanalysis site, play a loop of data by entering in 12Z 13 March, 1993. Then select a ‘Map Time Set’ of 1 day before/after.
3) Click the “+” or “-“ 6hrs button to step back and forth from your selected date.
4) View the following variables:
   a) SLP/2m Temp/Prec Water/Precipitation
   b) Heights
   c) Thicknesses
   d) Temperatures
   e) Specific humidity
   f) U-winds, V-winds, Total wind magnitude
   g) 10m wind magnitude
5) Among the selection, what standardized anomalies stand out above the rest in this loop?

6) How do you think the anomalies contributed to producing the scale of the snow, wind and storm surge? Were some anomalies a direct cause? Did some require to combine with other signals to create this disaster?

Review Case 2

1) Let's review the evolution of one of the most severe ice storms in Oklahoma memory from 2007 December 9-11. This storm produced the worst power blackout seen in 20 years for Oklahoma because 2-3" of ice accumulated over the most densely populated areas from Oklahoma City to Tulsa. The worst of the icing ended by the morning of the 10th. A new wave of precipitation swept over the state late on the 10th but temperatures rose above freezing in most areas by then.
2) Using the Penn State reanalysis site, choose 00Z 10 December, 2007 as a starting time and set 'Map Time Set' to 1 day before/after.
3) Go through the same variables as with case 1.
4) Among the selection of variables, what standardized anomalies stand out above the rest in this loop?

5) How do you think the anomalies contributed to producing the scale of the ice storm? For example, were there any anomalies that had a direct cause and effect to producing the disaster? Were there anomalies that indirectly caused the disaster? Were some anomalies requiring the presence of the right setup in order to be allowed to contribute to making this ice storm disaster?