**Names: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Group Project#03**

**Computer Applications in Meteorology Due: Fri. Feb. 7, 2020**

**GARP**

1. Driver Initials:\_\_\_\_\_\_\_\_ Passenger Initials:\_\_\_\_\_\_\_\_
* Launch Xming
* Launch SSH Secure Shell (via PuTTY)
	+ logon to “blizzard.atms.unca.edu”
		- login:
		- password:
* /home/username > csh
* /home/username > garp
	+ (your screen should be nearly filled with the GARP window)
* point (but don’t click) the mouse to each of the 10 GARP icons and list below the pop-up descriptor title:
	+ icon#1;
	+ icon#2;
	+ icon#3;
	+ icon#4;
	+ icon#5;
	+ icon#6;
	+ icon#7;
	+ icon#8;
	+ icon#9;
	+ icon#10;
* click on “Options” above the icons
	+ click on “Lat/Lon Grid”
	+ click “On” button within “Map & Lat/Lon Preferences” window
	+ click “Apply” button at bottom of “Map & Lat/Lon Preferences” window
	+ click “Close” button at bottom of “Map & Lat/Lon Preferences” window
* click on the correct satellite GARP icon (of the ten listed above) to pull up the latest GOES-13, 4km, **IR** image loop starting from 1200 UTC (at the earliest) to the present time and take note of the map background before clicking on “Display & Close” button at the at bottom of “Image Products” window
	+ note below what changed about the projection of the background map

**Names: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Group Project#03**

**Computer Applications in Meteorology Due: Fri. Feb. 7, 2020**

**GARP (continued)**

* animate the satellite loop
	+ note below the approximate center point location (latitude/longitude) of an extensive cloud mass near Boston, MA for the final time of the loop [use the mouse to determine the latitude/longitude]
* experiment with the different looping options; “Speed”, “Fade”, “<<”, “>>”, “< >”, “<”, “>”, and “■”
	+ describe below the function of the “< >” button
* click the left mouse button somewhere on the satellite image map
	+ describe below what happens
* zoom on an area surrounding the cloud mass by clicking and dragging the left button of the mouse
	+ note below the latitude/longitude of the extreme Northeast corner of the zoom area
* position the “+” character using the mouse at the coldest cloud top (largest “Raw” value) near 42.4oN, 71.0oW for the image corresponding to the final time of the satellite loop
	+ determine the distance (in kilometers) from the coldest cloud top to Albany (ALB), New York. Note below the Raw value of the coldest cloud top in the satellite image
* save the satellite images to a file in directory “/home/atms261/GroupNN/” [NN=>assigned #]
	+ click “File” above GARP icons
	+ click “Save”
	+ click “All Frames” within the “Save Frame(s) to GIF File”
	+ enter “/home/atms261/GroupNN/satloop”
	+ write below the names of the files that you created in directory “/home/atms261/GroupNN/”
1. Driver Initials:\_\_\_\_\_\_\_\_ Passenger Initials:\_\_\_\_\_\_\_\_
* clear the satellite image loop from GARP and click on “CONUS” within the “Area” button located above the GARP icons to get the original continental U.S. map background
* click on the correct surface observation GARP icon to pull up the latest METAR surface observation loop (‘20200207/1500’) starting from 1500 UTC (at the earliest) to the present time
	+ note below the time (in UTC) of maximum # of snowfall obs located in Pennsylvania

**Names: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Group Project#03**

**Computer Applications in Meteorology Due: Fri. Feb. 7, 2020**

**GARP (continued)**

* zoom in on states in the Pennsylvania – Maine region using the mouse; start by dragging the mouse from just southwest of Pennsylvania (lat/lon=39.7oN/80.5oW) to just northeast of Maine (lat/lon=47.2oN/66.0oW).
	+ note below the states containing station observations (if any) reporting three dot (or greater) intensity precipitation
* click on the “Time” button above the GARP icons and choose “Time Matching” to click on the “Strict” and “All Times” buttons within the “Time Matching” window, then click on the “Close” button at the bottom of the “Time Matching” window
* go back to choose the GOES-13, 4km, **IR** image loop and the times should automatically be selected
	+ note below the UTC time(s), if any, when you have surface observation data but no satellite imagery
* use the mouse to determine the brightness temperature of the image (labeled “RAW” on the bottom panel) at one station location experiencing precipitation within fifteen minutes of one of the IR satellite images
	+ note below the station name, the brightness temperature value, and UTC time (if you don’t know the station name, you can plot the call letters by clicking on the surface observations GARP icon and clicking on “Station Layout” within the “Surface Observations” window, follow the directions and then type “close” and then “Display & Close” within the next “Surface Observations” window)
* click on the “METAR Obs” legend at the bottom of the picture with the left button of the mouse
	+ note below what happens after clicking on the image legend
* clear the images and plot the RAOB (balloon sounding) data from days ago using the two soundings (0000 UTC 6 Feb. and 0000 UTC 7 Feb. 2020) taken at Peachtree City, GA (FFC)
	+ note below the observed 925 mb air temperatures and dewpoint temperatures for FFC and if the environment became more stable or less stable from 6 Feb. to 7 Feb. looking at the Lifted Index (LIFT; negative value means favorable for convection and less stable)
* clear the GARP screen and click on the model vertical profile GARP icon choosing; “GFS thinned” (for the weather model), the 1200 UTC time from Friday morning (“200207/1200F000”), and typing “GSO” into the “Position” window, then click “Display & Close” within the bottom of the “Model Vertical Profile” window
	+ note below the GFS forecast time (“…Vhhh” indicates hhh hour forecast)

**Names: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Group Project#03**

**Computer Applications in Meteorology Due: Fri. Feb. 7, 2020**

**GARP (continued)**

* *without clearing the GFS GSO sounding*, shut off strict time matching and choose the actual (observed) 1200 UTC 7 Feb. 2020 RAOB for Greensboro/High Point, NC (GSO)
	+ note below the observed 925 mb air temperature, dewpoint temperature, and Lifted Index value for GSO
	+ if the GFS forecast time is “000”, this is an analysis. Note below if the GFS analysis or forecast agrees with the actual GSO sounding in terms of moisture and temperature
	+ save the GARP image as a \*.gif format image in the “…/GroupNN/” subdirectory used before for saving the satellite image naming it “GSOsnd.gif”
1. Driver Initials:\_\_\_\_\_\_\_\_ Passenger Initials:\_\_\_\_\_\_\_\_
* clear the GARP screen and choose the model plan projection GARP icon to select a horizontal plot of a weather model; choose “GFS thinned” and select the 12-hour forecast for the sea level pressure map (choose “200207/0000F012” in the “Available Times” window and choose “MSLPress\_mb” in the parameters window)
	+ note below the GFS 12-h forecast sea level pressure (SLP) at a cyclone center located near the northeastern U.S.
* without clearing the SLP plot, overlay the GFS-analysed SLP map valid at 1200 UTC 7 Feb. 2020 and zoom in on the position of the low center
	+ note below the differences in the intensity (SLP at center of the analysed/forecast cyclone center) and in the position (in kilometers) of the low center
* without clearing the SLP plot, overlay the “METAR” and “Ship/Buoy” surface observations valid at 1200 UTC 7 February 2020
	+ note below if the surface observations agree with the GFS analysed and forecast cyclone center intensity and position
* clear the GARP screen and plot a model vertical cross section using the proper GARP icon selecting; “GFS thinned”, typing “1000” into “Level 1” window and “500” into “Level 2” window, typing “dvn>gso” in the “Cross Section” window, and choosing the 1200 UTC 7 February 2020 GFS analysis of equivalent potential temperature (“ThetaE\_K”)
	+ describe below the location (XY) on the section of the most humid air (largest ThetaE values)

**Names: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Group Project#03**

**Computer Applications in Meteorology Due: Fri. Feb. 7, 2020**

**GARP (continued)**

* clear the GARP screen and verify the previous response by clicking “More” on the “Model Cross-Section” window and change your contour interval from 5 K to 1 K, “Close” and “Display & Close” to get a new cross section plot
	+ describe below if the most humid air is confirmed to be at the same (XY) location as described earlier
* clear the GARP screen and verify the previous response by clicking “More” on the “Model Cross-Section” window, change your contour interval from 1 K to 5 K, click “Color Fill” and “Close” and “Display & Close” to get a new cross section plot
	+ describe below the color corresponding to humid air and the color corresponding to dry air
	+ save the GARP image as a \*.gif format image in the “…/GroupNN” directory used before for saving the satellite image naming it “VXSthtae.gif”
* clear the GARP screen and plot a model time height series using the proper GARP icon selecting; “GFS thinned”, typing “1000” into “Level 1” window and “500” into “Level 2” window, typing “gso” in the “Position” window, and choosing the 1200 UTC 7 Feb. 2020 GFS analysis of equivalent potential temperature (“ThetaE\_K”) with a contour interval of 2 K
	+ describe below if the air is forecast by GFS to become more humid or less humid with time at the 925mb level [look **CAREFULLY** at the time axis]
* exit “GARP”
	+ log out from “blizzard” (type ‘exit’ {no quotes})
	+ close the SSH window
* hand in answers and signatures/initials written on this hand-out

# Deliverables for Group Project#03 to Prof. Miller, “/home/atms261/GroupNN/” subdirectory on “blizzard” must contain:

1. satellite \*gif images
2. GSOsnd.gif image
3. VXSthtae.gif image

# Next Class: **FORTRAN and scripting**