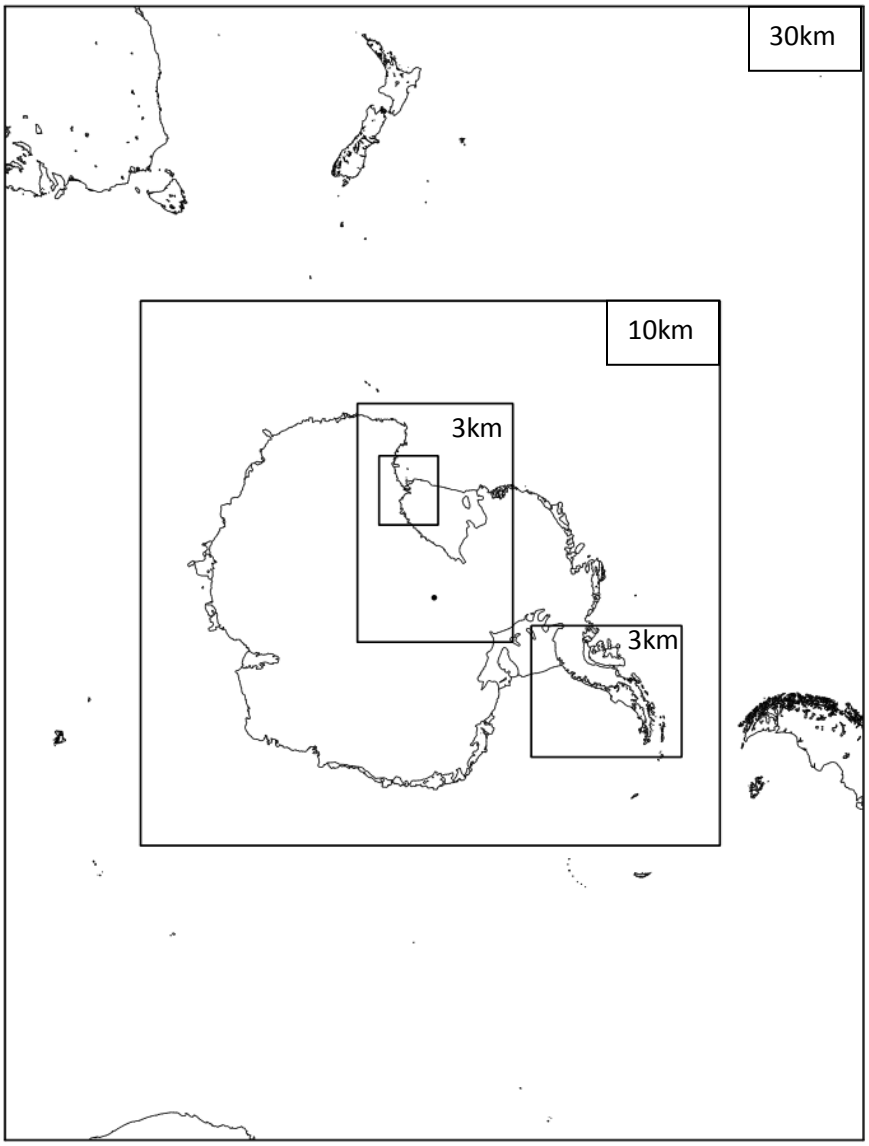
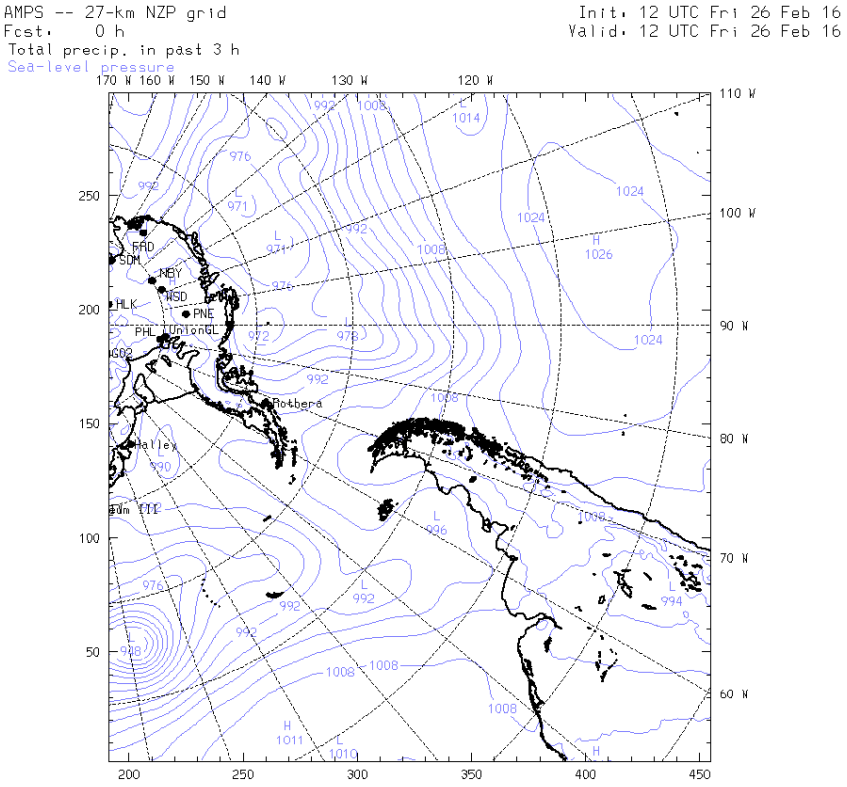
Antarctic Mesoscale Prediction System Forecasts

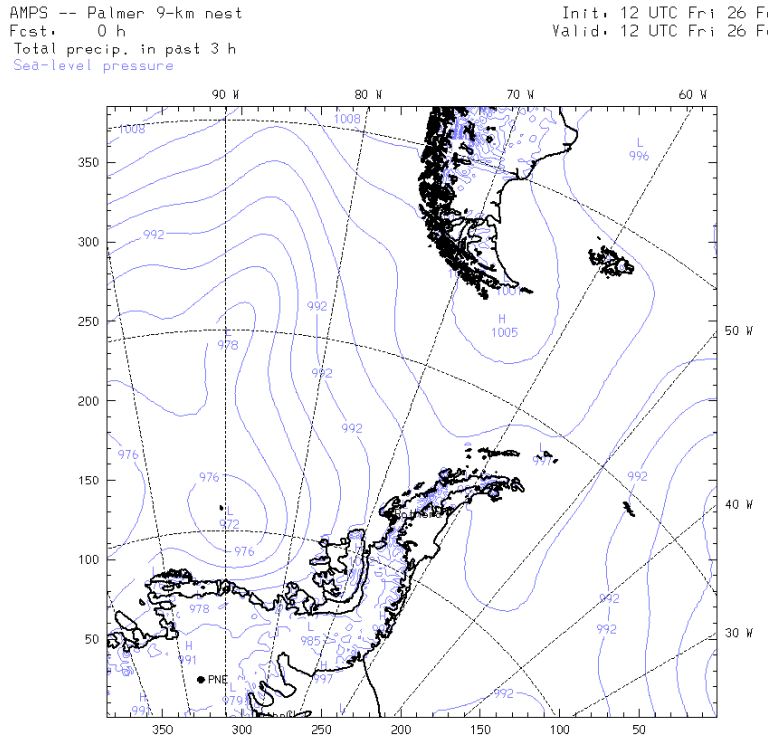
These forecasts are generated by the Byrd Polar Research Center at Ohio State University and the National Center for Atmospheric Research. They are generated twice daily. The calculations start at either 00:00 UTC or 12:00 UTC. They are made specifically to support the U.S. Antarctic Program and are freely available online at http://www2.mmm.ucar.edu/rt/amps/. A unique characteristic of these forecasts, is that they attempt to account for the physical effects of sea ice and ice covered land masses.

The area of the forecasts is determined by the "grid" used for the calculations. There are two separate sets of nested grids with separate calculations. One set is 30km, 10km, 3km and 1km, and the other is 27km and 9km. For the 30km grid, the areas are given in the following map. (The only area with a 1km grid is Ross Island.)



I haven't found a similar map for the 27km and 9km grids, but here are some charts from a forecast that show the areas involved. The top chart shows the 27km grid area and the bottom the 9km area.



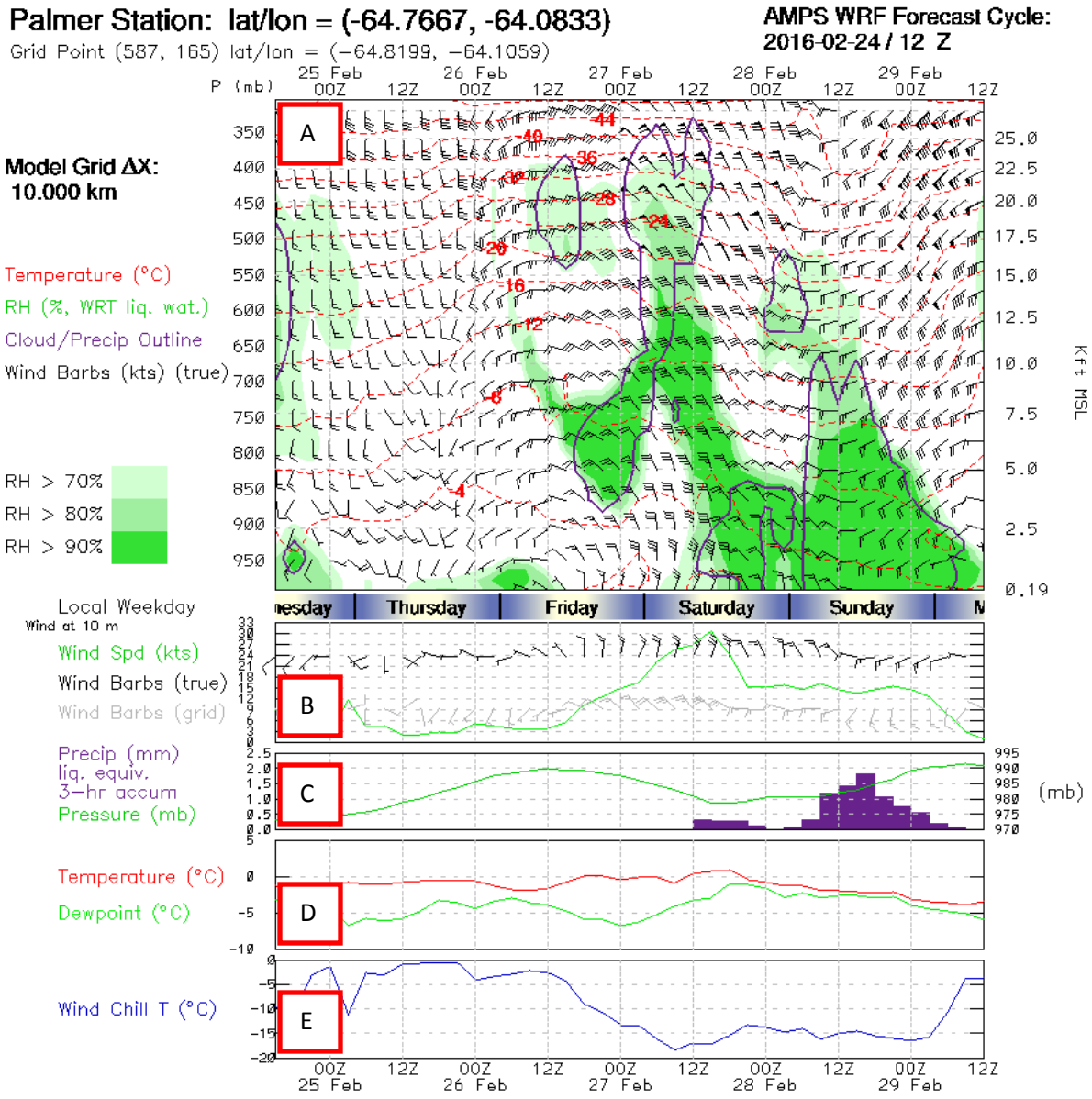


The calculations for the 30km and 27km grids use the same input data, but other than that they are independent. This means that there is no feedback from the 27km grid calculations to the 30km calculations. (Since the models have the same input parameters and are governed by the same physics, the forecasts shouldn't be completely different.) The nested grids within the 27 and 30 km areas *do* feedback into the parent (i.e. larger area) grids. This means that the calculations for the 3km Antarctic Peninsula grid will be consistent with the calculations for the 10km and 30km grids.

Every day, we automatically download the forecasts for Palmer Station derived from the 10km, 9km and 3km nested grids. They are made available on Palmer's intranet around6:30 pm local because it takes about 9 hours for the forecast's calculations to be completed. The forecasts are in the form of a meteogram which displays how various weather parameters change as a function of (UTC) time. The time range for each of the meteograms is different. As the spatial resolution of the grid increases the time range decreases. Here are the time ranges for the meteograms for the three grids:

- 10 km: 5 days
- 9 km: 3 days
- 3 km: 39 hours

An example of a meteogram from the 10km grid is provided below.



The upper panel, panel A, shows the state of the atmosphere above the ground. The left axis is altitude in kilofeet. The data displayed is temperature, relative humidity (RH), cloud/precipitation outline, and wind barbs (in knots). You can get an indication if a day is going to be sunny or if there might be precipitation. For instance, on Thursday there is no purple cloud outline up to 26000 feet, so this might be a sunny day. On Sunday, the cloud outline is at low altitudes and there is also high relative humidity, so there is a good chance of precipitation. Remember that all times are Zulu or UTC time.

The next panel down, panel B, shows the wind speed and direction. The wind direction relative to true north is given by the black wind barbs. The gray wind barbs give direction relative to the grid coordinate system, I think, so ignore those.

Panel C gives precipitation and pressure as a function of time. The purple bars show predicted accumulation in three hour increments. These bars coincide with the times in panel A when there is high RH near the ground and the and the cloud outline is at low altitudes, so expect rain or snow on Sunday.

Panels D and E show temperature/dewpoint and wind chill respectively.

The meteograms from the 3km and 9km grids give the same information.

The accuracy of these forecasts seems to be better than those from McMurdo, and they provide much more detail. As you go further out in time, the accuracy diminishes. I have seen wind events that were predicted a few days out disappear once we were within the 39 hour time window of the 3km forecast. Also, sometimes predicted events occur but sooner or later than predicted. As anecdotal evidence of the accuracy of the forecasts, I have given grantees advice on when to sample using them and I also try to predict when I will have favorable conditions for air sampling. Sometimes, I'm disappointed, but generally the AMPS forecasts are good.

How to read wind barbs