In this section we will use one of the diagnostic tools that come with HYSPLIT to examine the trajectory flow field, which could help us explain some of the differences we've seen in the trajectory calculations. So the best way to go about this, is let's go to the meteorology tab, and look at display data, contour map. This will permit us to contour any one of the meteorological variables that are available in the data files. Now we did the calculations, the base calculations, using the North American Regional Reanalysis. But for space reasons these data have been parsed to only cover the domain over the northeast United States. So we want to look at a data file that has more coverage, more spatial coverage, and that would be the Global Reanalysis. So let’s select that file, and that would be under the tutorial/captex directory, captex2_gblr.bin.

Let's look at the geopotential height field. Remember the trajectory animation we did was also looking at the height field because the trajectories above the boundary layer, or at least when there're a few frictional effects, will be parallel to the height field gradient. So let's be looking at heights, so that's this variable, and let's look at the heights at, closer to the top of the PBL, and that would be level four. The levels, I know they're not indicated by any useable units here, pressure or sigma, this is just the index level number, starting from the bottom going up. You can figure out which level it is by using the profile program, for instance. We want to select level 4 and you'll see it comes out to be the level that we're interested in.

The other thing is that this particular program goes through the entire file, in this case right now we just look at the first time, but the first time is not the time of that backward trajectory calculation. We want to review the calculations we did in the previous section, from the location just off the east coast of the United States, and that would've been approximately 48 hours after the start of this meteorology file. Remember all the meteorology files start about the time of the CAPTEX tracer release, which would have been on the 25th, and we only need to look at one time period. So leave this alone.

And we want to center the map, since this is a larger map, covering a much larger domain, we want the center of the map to be 40 degrees North and approximately 80° West, which is negative, and we want a map that covers a lot of area, so the radius of the map would be 25° latitude, and if I leave the contour information as -1, it optimizes the contours, so we don't need to determine the contour interval in this case.

So if I click on run contour, you see now the final map, and this map shows the height contours at 850 hecto Pascals. And if you remember the starting trajectory locations were here in this region, off the eastern half, the north-eastern part of the United States, in the ocean, and you can see right here there is this region of uncertainty, the flow field is not really well-defined. You can easily picture slight changes in the gridding, different data, where the grid points fall, or even which a vertical velocity is slightly different, height, a different wind direction, could get you in

a totally different flow regime here. If you imagine being at this point here, right, just a very slight, slight change in position could mean you can go one way or the other. Whereas if we were in this more well defined flow region, so if you were to go back and do the same height map, for the start time of the trajectories at Dayton, Ohio, you will see that the flow will also be very well defined. And the trajectories, no matter where you fall here will have almost the same pathway.

So you can use these diagnostic tools that come with the HYSPLIT package to understand some of the results you are seeing and we will go into some other methods in the subsequent sections.