In this section we will examine the effect of different meteorological data on the trajectory error. As you noted in the previous section, the computational error was not a significant source of trajectory error. However, the spatial and temporal resolution of the meteorological data can be important. So we will redo the 750 meter mid boundary layer trajectory, but instead of using the North American Regional Reanalysis, which is at 32 km every three hours, we will use the Global Reanalysis data, which is at two and a half degree resolution, about 250 km, and every six hours.

So go to the trajectory tab, and set up run, and retrieve the previously saved CONTROL file, that we, or that you should have saved, when we did that the boundary layer trajectory calculation. If I browse in my working directory you should find traj_fwrd_control.txt. Open up that file and you can see here, starting locations, we're doing the 750 meter boundary layer calculation, for the 25th, starting at 17 Z for 68 hours.

Now curiously notice the back button is highlighted. Now the sign on the calculation is positive, so this is really going to be a forward calculation, but because the last calculation that we did was a backward calculation, so that was the information that was loaded into the graphical user interface when it was opened. When we did the retrieve, and we did a forward calculation, the direction button was not changed. This is an internal feature of the graphical user interface and what really matters is that the sign is positive that would be a forward calculation. So if I

were to click on forward, see nothing changes and if I were to click on back, now the sign is negative. That's not what we want, we want the forward calculation. So the point I am making here is that there are some features in the graphical user interface that may not act always the way it should. This may be something that can be corrected in the future. This particular feature.

The other thing we want to do is change the name of the output file because we will be using different meteorological data. So instead of forward, let's use the abbreviation for the meteorological data file, GBLR, for global reanalysis. To select the Global Reanalysis, we first clear the current selection and then we add meteorology file, and it should open to the tutorial/captex directory. If not, you need to go to the directory where you installed the tutorial and select the GBLR data. And that's in fact all you need to do, click save, and now trajectory run model.

The calculation completes fairly quickly and we will do a trajectory display. Now we previously calculated the trajectory with the Regional Reanalysis data, so we can actually display both on top of each other, so plus tdump_fwrd. And I will just go ahead and execute display. Now you can see the two trajectories, one calculated with the Global Reanalysis, and the other with the NARR data. And although they're very similar the first half of the calculation, the last half, they diverge quite considerably. So you have to remember that the trajectory for each calculation, is in a in a sense exact, using the data that was provided, for there is very little

computational error, but the real problem, the underlying issue, is that the gridded meteorological data that we are using really just represents a snapshot, if you will, of the continuous meteorological data that are available, that we're trying to represent in the atmosphere.

So when you integrate the trajectory equation, we are assuming, or when the model is integrating the trajectory equation, it assumes that the meteorological data are a function continuous in space and time. In fact they are not, they're represented by these gridded data that have different spatial or temporal resolution, and therefore they may or may not accurately represent that flow field of the atmosphere. Picture a situation where the winds are uniform and they don't change in time, so in that case, it doesn't really matter what resolution meteorological data you have because all grid points will represent the same value, but if you have a wind field that is varying very quickly in space or in time, then the resolution needs to be sufficiently dense to capture those changes properly.

So in the example that we're looking at here, it just may be that one or two grid points are really not representative of where the trajectory calculation or where the trajectory happens to be that particular point, the calculation starts to diverge. So perhaps instead of calling this trajectory error, we should just call this trajectory uncertainty. And there are going to be, we will demonstrate later, ways of more quantitatively representing this.

This concludes our discussion on the meteorology

component of the trajectory error.