In this next section, we will look at how you can use observations such as satellite data to adjust the particle positions. We're going to continue on with the same volcanic ash calculation that we have just completed in the last section. That is the particle file where the positions were valid at 1200 UTC on 15 April. Now there are many sources of satellite data. There is a relatively low resolution, simple data set that is available through the graphical user interface, and that is the NASA TOMS satellite archives, which are available online. And so we're going to go and obtain that from the NASA website. Now, if you do not have access to the Internet doing this example, then the NASA TOMS file is available in the tutorial/volcano directory.

So what we're going to do is go to the advanced satellite data, and we're going to FTP the TOMS data for the 2010 April, on day 15. These are daily files that contain all the passes for that day. So this is a polar orbiting satellite, so it does make a pass around noon each day. So the pass time would approximately be the valid time that we have the particle positions for. And we're going to download this to the working directory and we downloaded the file, and we renamed it to ga100415.txt. These are text files. I would point you to the TOMS website for more information on the file format and other details.

Now we have this file, we can view it. There is a viewer available that permits us to not only view the TOMS data, but also it will superimpose the particle positions, as well as the concentration predictions. However at this point, I don't want to see the concentration predictions, it will just make the graphic a little bit too confusing, so I'm going to rename that cdump file, here, to something else, say 100415. So when the graphical user interface, this particular script tries to plot that file, it will not find the file. And if we execute the display, we get a basic map background. And I'm going to zoom in over the area of interest, which is going to be Iceland to Europe. So I can simply place my mouse and, let's say upper left and then press and hold the left button, and then bring it down to the lower right, and let go and that becomes our plotting domain, and then I right click the mouse, and now I can left click to go to the next frame, and of course the only frame.

So this is really reproduction of the graphic of the particle positions as well as the, the squares are the TOMS data, and you can see the high values have some resemblance to where the particle positions are. But there are some other values here further north, but we're not looking at this from the standpoint of verification as much as how to adjust particle positions. The concept is that if you are running the model and you have observational data, it might be useful to readjust the particle positions, especially if you are doing a forecast. So if we have current satellite data, which gives us a position, a current position, then before we do a forecast, we should try to eliminate as much of the error as possible. And that is the basis for this approach and I'm just really going to demonstrate it.

So let's go ahead and close this, that was left click and quit and let's go to the concentration, utilities, particle adjustment menu. Now this menu permits you to do two kinds of adjustments, either a window adjustment, or a rotation adjustment. The window adjustment is a translation. So you define a window here with the upper lower and a window by its corners. And then you define a shift latitude and shift longitude. So the code will shift the particles within that window that many degrees latitude and longitude. Or we could select the rotation option, where from particular latitude and longitude, from that particular point, for all the particles that are let's say, within 1000 km of the point, we would rotate them by a certain number of degrees, positive being clockwise, so let's say we rotate them 10° clockwise. So that would be ideal for a point source where we can see obviously from the date that the numbers are not correct, that the positions are not correct. And the PARDUMP file will be read and the PARINIT file will be written with the adjusted particle positions. So let’s go ahead and do this rotation.

And the program automatically opens up the particle plot positions and you can see the effects of this 1° rotation, 10° rotation. Now this is obviously a discontinuity and that's why there is a blend option. And if you select the blend option and then process points, it smooths the transition a little bit in this region. Now did we actually improve anything, we can go back and we can open up the satellite data viewer, and compare the adjusted file, the PARINIT file with the positions, select the window again, and then right click, and left click, and it's actually little bit worse.   So, but the point of this was not to improve it or, I just wanted to demonstrate the approach.

And that concludes with adjusting particle positions.