In this section, we will review how we might improve the dust emission factors to get a better prediction. In the previous example, the dust emission factors were climatological, that was based on a five-year period of observed, satellite observed, dust events. But year to year the situation may change, and for the Salt Lake City example, the climatology for those locations may not have been representative of the conditions in March of 2010. The climatology was computed for a period in the early two thousands, early to mid, two thousands.

So one approach that you can take is, and I'm not going to do that here, but you, if you have measurement data, you can use the measurement data to compute what kind of emission factors are required to achieve those results. This is actually, it's not cheating, right, because what you're really doing is a form of assimilation, that you are adjusting the model based on observations and especially, this is especially true if you're trying to do a dust forecast. So that if you use the existing conditions to modify the prediction factors, then tomorrow's forecast could be much better. And that's really what I'm getting at here, is that it's best to use information on current local conditions to improve calculations. We're going try a slightly different approach and that let's take a look at the emission files, the climatological files for that period and those were available, as you recall in the dust directory, under the conus ZIP files. And there're really just, essentially CONTROL, well not so much CONTROL files, but the latitude, longitude, and threshold, and the product of the soil density and the area.

So if I would extract those files for March and April, our dust event was at the end of March, and looked at all those values, and computed a cumulative probability distribution, let's say. And I might decide that let's take, just to see, let's take the highest value that we observed in the satellite climatology for that period. And it happens to be 2×10^6, in this case the units are grams per meter. The climatology's do adjust for different conditions, so that emission factors in the west would be higher in the spring, because it is windier. The emission factors to be lower in winter because the region might be snow covered. And vegetation might be a factor in the late spring, early summer. So these things are accounted for to some extent in the climatology files, but as you found out the actual conditions might be quite different.

So the point is let's just try using the maximum emission factor and see if what that does, this 2×10^6. And all we're going to do is really use the CONTROL file, this CONTROL_dust4 control file, and replace each of the emission factors with two times ten to the sixth. This is the same CONTROL file we just used in the previous example, the dust2 file, except we're just replacing it by this fixed value, which is the maximum value that we've seen over any grid cell in the month of March or April. So to set that up and since we're continuing on from the previous example, I really don't need to change anything, but you can load the, well you should load the CONTROL file here, so in setup run, retrieve instead of dust2, we're going to retrieve dust4, which is the CONTROL file that's

been prepared already with the highest observed emission factors. And we can do a save and I don't need to go into the name list, it was from the previous simulation, the setup_dust.txt which sets the ICHEM parameter to 3 and we can just run simulation now.

Finally the simulation has completed. And we can go directly to the display menu, and execute. And you can see that the predictions are in the orange region, which was the hundreds of micrograms, which is comparable to the measurements, that is the measurements are in the orange region. And we can do a statistical plot, or statistical analysis, by converting to, and it's pointing to the correct file, and now we can do statistics, and we can see for those seven points, we have a correlation of .76 and an average calculated to measured of .74. And almost all the bias has been eliminated and the correlation is quite good.

So you can see that the dust storm calculations are very sensitive to these emission parameters, and the emission parameters are going to vary from year-to-year and they're going to vary with each meteorological event. And if they have a rain storm in April, the other prediction the following day, of course, would not be valid, using those same emission factors. So the emission factors need to be calibrated to current events and that's the main take away from this discussion.

And that concludes the fire and dust sections and the next thing we will do is an exercise.