In this section we will continue the discussion of how to configure HYSPLIT for the wet deposition of gases. The wet deposition calculation for gases is treated the same way as the other processes. We define a deposition velocity for the gas, a wet deposition velocity that is, it is equal to Henry's constant, times the universal gas constant, times temperature, times a precipitation rate. Henry's constant is the, or is a measure of the solubility of that gas in water and there are tables available, either through the Internet, or in chemistry volumes, that tabulate the Henry's constant values. Once we've computed the velocity, we then divide that velocity by the depth of the rain layer to give us the time constant. The rain layer for gases is applied at all levels from the ground to the top of the cloud layer. And the top of the cloud layer is defined at a level when the relative humidity first reaches 80%, and the top of the cloud is when the relative humidity drops below 60%. Now this beta, that we compute, is the same beta that we use for dry deposition. It's just an additional term in this equation, where we compute than the total mass removal from a particle.

To configure HYSPLIT for this calculation, let's go to the menu, and we can retrieve the previously configured, the previous configuration that we saved: deposit_control; and we can also do that with a name list: deposit_setup. As you recall this base configuration did not have any deposition set, it only configured the two levels for output, the deposition level and the 0 to 100 m concentration level.

Now to configure the gaseous wet deposition, let's go to the deposition menu and we can start simply by seeing what the pre-populated values would be, so we can select the wet deposition button. And you can see here that dry deposition, well particle settling, particle values are zero, which means it's a gas. There will be no dry deposition, and we defined a Henry's constant for a gas. Now a value of three, this is typical of molecular Iodine. Different chemicals have different deposition, Henry's constants. For instance some information maybe available and there are two different Henry's constants in this table. One for instance, for SO2 is 1.2. The one that you want to use for wet deposition, gaseous wet deposition, is the actual Henry's constant. The effective Henry's constant is the one that you would use in the dry deposition line, where it asks you for the Henry's constant, that is the last value in the dry deposition line. That Henry's constant, the effective Henry's constant, is somewhat different because in the dry deposition computation, what we are interested in is how the surface interacts with the chemical or pollutant in terms of solubility, for instance, solubility within a leaf, or some other surface, ground surface, and those would not be the same as the actual Henry's constant determined in a laboratory setting.

In any event now we're going to continue on with, save this, and save, save, and run model. And if we look at the display, let's give this a unique name so we can look at it later on, plot_wetg for gas, and we're looking at both levels, and we want to see the total, and everything else should be the same. Scroll through to the end and you

can see here that there are two deposition regions, two wet deposition regions. And the maximum here is only 2 pg/m^2 and as you might guess this number is very small and we can confirm that by looking at the MESSAGE file. And rather than opening the MESSAGe file through the graphical user interface, I will go directly to the working directory, and before I open it, I will also rename it so we can look at it later on if need to be. We'll just also call it WETG and looking at this file, going down to the end, you can see after 25 hours, we practically have all the mass that was released still in the atmosphere, 200980 grams, compared with the original dry MESSAGE file, no deposition MESSAGE file. I'm sorry not dry, the nodep file, the no deposition file, and here we have 200981. So literally the only difference appears to be a gram or two. The wet deposition is not very effective. And you can probably confirm that calculation by just integrating the deposition plot. That is we have approximately a picogram here in the blue region, so multiply a picogram per square meter by the area underneath these blue regions and you should get a number around the order of a gram or two.

And this concludes the discussion of wet deposition of gasses.