Subject: Re: gaussian air dispersion model
Posted by Mark Hadfield on Thu, 24 Nov 2005 23:34:03 GMT
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Kenneth P. Bowman wrote:
> In article <1132850938.403782.225280@o13g2000cwo.googlegroups.com>,
> guillaume.drolet.1@ulaval.ca wrote:
>
>
>> Since I do almost all my work with IDL, I am looking for IDL ways of
>> estimating along-wind distances of the footprints using a gaussian
>> dispersion model (functions, procedures, etc.). I don't have a strong
>> background in physics so I need some solutions I will understand. My
>> background is mostly in forest sciences and remote sensing and I do a
>> lot of programming.
>
>
> This sounds like a pretty big problem.

Maybe. In a previous life I worked in pollution dispersion etc and am familiar with Gaussian dispersion models. In their simplest form they are semi-analytical expressions for concentration as a function of spatial coordinates (x, y, z). They model a plume as having a Gaussian profile in cross-wind (conventionally y, or is it x? I forget) and vertical (z) directions. They normally achieve their simplicity by neglecting plume growth in the alongwind direction (x) and also shear. I say *semi* analytical because the basic Gaussian plume expression is analytical and not very complicated, but it involves parameters sigma-y and sigma-z that are functions of downwind distance, and those functions might be implemented as piecewise polynomial expressions of look-up tables or (in my day) graphs on paper.

Tell us more, Guillaume, about which bits you need help with. Your basic Gaussian plume model can be implented as a function of x, y and z and containing just one line of code. This will contain references to your sigma-y and sigma-z, which will be implemented as functions of x, using whatever method you consider best. Calculating the ground-level concentration is then straightforward and then you might want to contour it to establish the horizontal extent of the footprint? That last bit requires a bit of IDL-specific knowledge, but it can be done.

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