## Subject: Re: Convolve a spectrum (from MODTRAN) with a spectral response function
Posted by Paul Van Delst[1] on Mon, 04 Jan 2010 22:39:58 GMT

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Your SRF (spectral response function) seems to only increase (looks like only half an SRF?), and your computed radiances do not span the bit of SRF that you do have.

Also, in that part of the IR spectrum you have some water vapour line absorption contamination so I would be suspect of a convolution at such a coarse resolution - I would think you would have a bias that varies with the column water amount in your MODTRAN calc. Easy enough to determine - just plot the convolved result as a function of TPW for a couple hundred(or thousand) profiles.

I would start by doing the radiative transfer calc at a finer resolution and linearly interpolating the results to the same frequency spacing as the SRF. Then it's just a case of

  Convolved_Radiance = TOTAL(Interpolated_Radiance*SRF,/DOUBLE)

You could do a "proper" convolution using INT_TABULATED or CONVOL, but given the paucity of your dataset, a simple summation is the better option IMO.

At least in the case of INT_TABULATED, I know from experience it does not (cannot) perform well for too few SRF data points as it uses spline interpolation.

I reckon the FFT approach is overkill here - and you would have to interpolated the SRF to do it... again, not a good idea due to the lack of data.

cheers,

paulv


Mat wrote:
> On Dec 30, 4:41 pm, Mat <m...@waikato.ac.nz> wrote:
>
> Sorry I will try again!
>
> Hi all
>
> I would like to convolve a spectrum (output from MODTRAN) with a
> spectral response curve (Landsat7 B62) and then integrate the
> convoluted result. As you can see from the example below the spectral
> resolution does not match.
>
> Eg. Spectrum:
>
> Wavenumber          Radiance

> 800.0  7.52E-004
> 801.0  7.66E-004
> 802.0  7.58E-004
> 803.0  7.25E-004
> 804.0  7.23E-004
> 805.0  7.62E-004
>
> Eg. Response
>
> Wavenuber        Relative Spectral response
> 800.00000        0.2
> 800.64051        0.29
> 801.28205        0.27
> 801.92462        0.28
> 802.56822        0.36
> 803.21285        0.36
> 803.85852        0.39
> 804.50523        0.41
> 805.15298        0.42
> 805.80177        0.43
> 806.45161        0.45
>
> Any help would be much appreciated.